Cilt/Volume 33 **Ek Sayı**/Supplement 1 **Yıl**/Year 2025

E-ISSN 2687-2242

JARSS
Anestezi Dergisi

Journal of Anesthesiology and Reanimation Specialists' Society

Anesteziyoloji ve Reanimasyon Uzmanları Derneği Yayın Organı
Official Journal of Anesthesiology and Reanimation Specialists' Society

www.anestezidergisi.com • www.jarss.org

Cilt/Volume 33 **Ek Sayı**/Supplement I **Yıl**/Year 2025 E-ISSN 2687-2242

JARSS Anestezi Dergisi

Journal of Anesthesiology and Reanimation Specialists' Society
Anesteziyoloji ve Reanimasyon Uzmanları Derneği Yayın Organı
Official Journal of Anesthesiology and Reanimation Specialists' Society

Yönetim Yeri/*Administrative Office*
Anestezi ve Reanimasyon Uzmanları Derneği
Sağlık 1 Sokak No: 33/4, Sıhhiye, Ankara
Tel: 0532 253 07 64
E-posta: anestezidergisi@yahoo.com

Yayın Türü/*Publication Type*
Yaygın Süreli Yayın/*International Periodical*

Yayınevi/*Publishing House*
BULUŞ Tasarım ve Matbaacılık Hiz.
Bahriye Üçok Caddesi No: 9/1 Beşevler 06500 Ankara Türkiye
Tel: +90 (312) 223 55 44; +90 (312) 222 44 06
Faks: +90 (312) 222 44 07 E-posta: bulus@bulustasarim.com.tr

Yayın tarihi/*Publishing Date*
04.08.2025

Anesteziyoloji ve Reanimasyon Uzmanları Derneği Dergisi, Anesteziyoloji ve Reanimasyon Uzmanları Derneği'nin (ARUD) resmi bilimsel yayın organıdır.
Dergi üç ayda bir yılda 4 sayı (Ocak, Nisan, Temmuz, Ekim) olarak yayımlanan açık erişim, ücretsiz ve hakemli bir dergidir.
TÜBİTAK ULAKBİM TR Dizin, EMBASE, EBSCO ve Scopus tarafından indekslenmektedir.
Yayın politikaları ve yazım rehberine www.anestezidergisi.com adreslerinden ulaşılabilir

Journal of Anesthesiology and Reanimation Specialists' Society (JARSS), is an official scientific journal of Anesthesiology and Reanimation Specialists' Society (ARSS).
It is published quarterly as 4 issues every year (January, April, July, October).
JARSS is an open Access, free and peer-reviewed journal and indexed in EMBASE, Scopus, EBSCO and ULAKBİM TR Dizin.
You can reach publication policies and writing guide from www.jarss.org

JARSS
Anestezi Dergisi
Journal of Anesthesiology and Reanimation Specialists' Society
Anesteziyoloji ve Reanimasyon Uzmanları Derneği Yayın Organı
Official Journal of Anesthesiology and Reanimation Specialists' Society

Danışma Kurulu / *Advisory Board*

Danışma Kurulu / *Advisory Board*

Esra Özayar	*SBÜ Keçiören EAH, Anesteziyoloji ve Reanimasyon Kliniği, Ankara*
Fatiş Altındaş	*İstanbul Üniversitesi Cerrahpaşa Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, İstanbul*
Feyhan Ökten	*Ankara Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, Ankara*
Funda Gök	*Necmettin Erbakan Üniversitesi Meram Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, Konya*
Gevher Rabia Genç Perdecioğlu	*Etlik Şehir Hastanesi, Algoloji Kliniği, Ankara*
Gokhan Yildiz	*Etlik Şehir Hastanesi, Algoloji Kliniği, Ankara*
Gözen Öksüz	*Kahramanmaraş Sütçü İmam Üniversitesi Tıp Fakültesi Anesteziyoloji ve Reanimasyon AD, Kahramanmaraş*
Gülay Ok	*Celal Bayar Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, Manisa*
Güvenç Doğan	*Hitit Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, Çorum*
Hadi Ufuk Yörükoğlu	*Kocaeli Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, Kocaeli*
Hakkı Ünlügenç	*Çukurova Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, Adana*
Handan Birbiçer	*Mersin Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, Mersin*
Hatice Türe	*Yeditepe Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, İstanbul*
Hija Yazıcıoğlu	*SBÜ Şehir Hastanesi SUAM, Anesteziyoloji ve Reanimasyon Kliniği, Ankara*
Hilal Ayoğlu	*Zonguldak Bülent Ecevit Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, Zonguldak*
Hülya Bilgin	*Uludağ Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, Bursa*
Hüseyin İlksen Toprak	*İnönü Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, Malatya*
Işıl Özkoçak Turan	*SBÜ Gülhane Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, Ankara*
İlkay Baran Akkuş	*SBÜ Dışkapı Yıldırım Beyazıt EAH, Anesteziyoloji ve Reanimasyon Kliniği, Ankara*
İrfan Güngör	*Gazi Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, Ankara*
Jasmina Smajic	*University Clinical Center Tuzla, Clinic for Anesthesiology and Resuscitation, Tuzla, Bosnia and Herzegovina*
Jülide Ergil Hallıoğlu	*SBÜ Dışkapı Yıldırım Beyazıt EAH, Anesteziyoloji ve Reanimasyon Kliniği, Ankara*
Kamil Toker	*İstinye Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, İstanbul*
Karamehmet Yıldız	*Erciyes Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, Kayseri*
Keziban Sanem Çakar Turhan	*Ankara Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, Ankara*
Lale Karabıyık	*Gazi Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, Yoğun Bakım Bilim Dalı, Ankara*
Leyla İyilikçi Karaoğlan	*Dokuz Eylül Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, İzmir*
Maja Sostaric	*Clinical Department of Anesthesiology and Intensive Care, Zaloska 7, Ljubljana, 1000 Slovenia*
Mehmet Murat Sayın	*SBÜ Dışkapı Yıldırım Beyazıt EAH, Anesteziyoloji ve Reanimasyon Kliniği, Ankara*
Menekşe Özçelik	*Ankara Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, Ankara*
Murat İzgi	*Hacettepe Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, Ankara*
Mustafa Aksoy	*Ankara Yıldırım Beyazıt Üniversitesi, Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, Ankara*
Mustafa Kemal Bayar	*Ankara Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, Ankara*
Nazım Doğan	*Atatürk Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, Erzurum*
Nedim Çekmen	*Başkent Üniversitesi Tıp Fakültesi Hastanesi, Yoğun Bakım AD*
Nesrin Bozdogan Ozyilkan	*Başkent Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, Adana*
Nezih Sertöz	*Ege Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, İzmir*
Nuray Camgöz Eryılmaz	*Gazi Üniversitesi Tıp Fakültesi Hastanesi, Anesteziyoloji ve Reanimasyon AD, Ankara*
Nurten Bakan	*SBÜ Sancaktepe Şehit Prof. Dr. İlhan Varank Hastanesi, Anesteziyoloji ve Reanimasyon Kliniği, İstanbul*
Nurten İnan	*Gazi Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, Ankara*
Okan Ermiş	*Gazi Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, Ankara*
Onat Bermede	*Ankara Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, Ankara*
Onur Özlü	*TOBB ETÜ Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, Ankara*
Oya Yalçın Çok	*Başkent Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, Adana*
Ömer Kurtipek	*Gazi Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, Ankara*
Özgür Canbay	*Hacettepe Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, Ankara*
Özlem Kocatürk	*Aydın Adnan Menderes Üniversitesi, Diş Hekimliği Fakültesi, Aydın*
Özlem Korkmaz Dilmen	*İstanbul Üniversitesi Cerrahpaşa Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, İstanbul*
Özlem Sağır	*Balıkesir Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, Balıkesir*
Özlem Selvi Can	*Ankara Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, Ankara*

Danışma Kurulu / *Advisory Board*

Pakize Kırdemir	*Süleyman Demirel Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, Isparta*
Paraskevi Matsota	*University Hospital "Attileoç", 9nd Department of Anesthesiology, Athens, Greece*
Perihan Ekmekçi	*Ufuk Üniversitesi Tıp Fakültesi, Dr. Rıdvan Ege Hastanesi Anesteziyoloji ve Reanimasyon AD, Ankara*
Pınar Kendigelen	*İstanbul Üniversitesi Cerrahpaşa Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, İstanbul*
Pınar Zeyneloğlu	*Başkent Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, Yoğun Bakım Bilim Dalı, Ankara*
Reyhan Polat	*SBÜ Dışkapı Yıldırım Beyazıt EAH, Anesteziyoloji ve Reanimasyon Kliniği, Ankara*
Rudin Domi	*University of Medicine, Faculty of Medicine, Tirana, Albania, Anesthesiologist-Intensivist Department of Anesthesiology and Intensive Care, American Hospital 3, Tirana, Albania*
Savaş Altınsoy	*SBÜ Dışkapı Yıldırım Beyazıt EAH, Anesteziyoloji ve Reanimasyon Kliniği, Ankara*
Seda Banu Akıncı	*Hacettepe Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, Ankara*
Sema Şanal Baş	*Eskişehir Osmangazi Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, Eskişehir*
Seval İzdeş	*Ankara Yıldırım Beyazıt Üniversitesi, Şehir Hastanesi Yoğun Bakım Kliniği, Ankara*
Sevtap Hekimoğlu Şahin	*Trakya Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, Edirne*
Seyhan Yağar	*SBÜ Ankara Şehir Hastanesi SUAM, Anesteziyoloji ve Reanimasyon Kliniği, Ankara*
Shubha Srinivasareddy	*Penn State Health, Anesthesiology And Peri-operative Medicine, Malvern, United States of America*
Sibel Barış	*Ondokuz Mayıs Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, Samsun*
Sree Kumar E J	*Sriher, Anesthesiology*
Suna Akın Takmaz	*T.C. Sağlık Bakanlığı Ankara EAH, Anesteziyoloji ve Reanimasyon Kliniği, Ankara*
Süheyla Karadağ Erkoç	*Ankara Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, Ankara*
Süheyla Ünver	*SBÜ Dr. Abdurrahman Yurtaslan Onkoloji EAH, Anesteziyoloji ve Reanimasyon Kliniği, Ankara*
Süleyman Ganidağlı	*Gaziantep Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, Gaziantep*
Şule Akın	*Girne Amerikan Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, Girne, KKTC*
Taylan Akkaya	*SBÜ Dışkapı Yıldırım Beyazıt Eğitim Araştırma Hastanesi, Algoloji Kliniği, Ankara*
Tuğhan Utku	*Yeditepe Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, İstanbul*
Tülay Şahin	*Kocaeli Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, Kocaeli*
Ülkü Aygen Türkmen	*İstanbul İl Sağlık Müdürlüğü Gaziosmanpaşa EAH, Anesteziyoloji ve Reanimasyon Kliniği, İstanbul*
Ülkü Sabuncu	*Ankara Bilkent Şehir Hastanesi, Algoloji Kliniği, Ankara*
Ümmügülsüm Gaygısız	*Gazi Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, Ankara*
Vojislava Neskovic	*Military Medical Academy, Anesthesiology and Intensive Care, Belgrade, Serbia*
Volkan Baytaş	*Ankara Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, Ankara*
Volkan Şıvgın	*Gazi Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, Ankara*
Vuslat Muslu Erdem	*Albert Einstein College of Medicine, Montefiore Medical Center, Internal Medicine, New Rochelle, NY, USA*
Yasemin Güneş Kocaoğlu	*Çukurova Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, Adana*
Yavuz Gürkan	*Koç Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, İstanbul*
Yunus Gürkan Türker	*Uludağ Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, Bursa*
Yusuf Ünal	*Gazi Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, Ankara*
Yüksel Erkin	*Dokuz Eylül Üniversitesi Tıp Fakültesi, Algoloji Blim Dalı, İzmir*
Zeki Tuncel Tekgül	*SBÜ Izmir Bozyaka SUAM, Anesteziyoloji ve Reanimasyon Kliniği, İzmir*
Zeliha Aslı Demir	*SBÜ Ankara Şehir Hastanesi SUAM, Anesteziyoloji ve Reanimasyon Kliniği, Ankara*
Zeliha Aycan Özdemirkan	*Gazi Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD, Ankara*
Züleyha Kazak Bengisun	*Ufuk Üniversitesi Tıp Fakültesi, Rıdvan Ege Hastanesi, Anesteziyoloji ve Reanimasyon AD, Ankara*

Cilt/Volume 33 **Ek Sayı**/Supplement I **Yıl**/Year 2025 E-ISSN 2687-2242

JARSS
Anestezi Dergisi
Journal of Anesthesiology and Reanimation Specialists' Society
Anesteziyoloji ve Reanimasyon Uzmanları Derneği Yayın Organı
Official Journal of Anesthesiology and Reanimation Specialists' Society

İçindekiler / *Contents*

Oral Presentations / Sözlü Sunumlar

Anesthesiology and Reanimation Specialists Society

Annual Congress

BALKAN STATES ANESTHESIA DAYS - IX

Disaster Preparedness in Anesthesia and Intensive Care

24-27 April 2025

Skopje, Macedonia

International Balkan University Conference Hall




www.arud2025.org

in collaboration with

UA(I)S

with the supports of

TİKA

INTERNATIONAL BALKAN UNIVERSITY

organization secretariat

DiAMED

hakan@diamed98.com
+90 533 247 6627

Committees / Komiteler

Congress President

Onur Özlü
Vesna Durnev

General Secretary

Dilek Ünal

Local Secretary

Biljana Kuzmanovska

Organizing Committee

Güldeniz Argun
Ezgi Erkılıç
Višnja Ivančan
Murat İzgi
Meral Kanbak
Umut Kara
Marijana Karisik
Andrian Kartalov
Saimir Kuci
Fatos Sada
Fatma Sarıcaoğlu
Dusica Simic
Jasmina Smajic
Maja Sostaric
Gülten Ütebey

Scientific Committee

Seda Banu Akıncı
Filadelfo Coniglione
Tatjana Goranovic
Biljana Kuzmanovska
Miodrag Milenovic
Rajmonda Nallbani
Feyhan Ökten
Dilek Özcengiz
Zerrin Özköse Şatırlar
Onur Özlü
Mirjana Shosholcheva
Slavenko Štraus
Dilek Ünal
Urška Žerjav

Invitation / Davet

Dear Colleagues,

We are happy to greet all of you once again on behalf of The Association of Anesthesiology and Reanimation Specialists (ARUD). We started our first Balkan States Anesthesia Days meetings in 2014 in Pristina Kosovo, with the participation of our colleagues from almost all Balkan states.

The "Balkan States Anesthesia Days - IX" will be organized by ARUD, with the collaboration of Macedonian Society of Anesthesiologists and Intensive Care Medicine (MSA). The congress will be at the meeting halls of International Balkan University on 24-27 April 2025. Our congress theme is "Disaster Preparedness in Anesthesia and Intensive Care". As the scientific committee, together with our colleagues from the Balkan Countries, we covered the topics of the scientific program from a broad perspective and will have the opportunity to discuss, chat, exchange information and share our experiences with all participants. We will be together with two important pre-congress workshops on April 24, 2025; "Low Flow Anesthesia" and "Regional Anesthesia". On April 25, 2025, we will start our congress with the attendance of our valuable speakers and participants.

We will be very happy and honored to see you at our congress where we will be able to exchange knowledge and scientific experience, and we will also find a platform to tighten our bonds and deepen our friendship and enhance communication.

We invite you to "Balkan States Anesthesia Days - IX" in Skopje which will be treasured with your participation and contributions, and thank you for your support.

Dear colleagues, we look forward to meeting you all in Skopje!

With my respects and greetings

Prof. Dr. Onur ÖZLÜ

Invited Speakers / Davetli Konuşmacılar

- Alfred İbrahimi
- Androniki Bibovska
- Bilge Çelebioğlu
- Biljana Kuzmanovska
- Biljana Shirgovska
- Bojan Kontestabile
- Cem Okan Erözü
- Darko Sazdov
- Dilek Özcengiz
- Dilek Ünal
- Dafina Karadjova
- Dusica Simic
- Ermina Mujičić
- Ervin Bejko
- Ezgi Erkılıç
- Fatma Sarıcaoğlu
- Fatos Sada
- Filadelfo Coniglione
- Ivana Petrov
- Jasmina Smajic
- Jasminka Nanceva
- Krenar Lilaj
- Lale Karabıyık
- Levent Öztürk
- Maja Sostaric
- Marija Jovanovski Srceva
- Miodrag Milenovic
- Mirjana Shosholcheva
- Murat İzgi
- Mustafa Necmi İlhan
- Onur Özlü
- Rajmonda Nallbani
- Renata Curic Radivojevic
- Saimir Kuci
- Seda Banu Akıncı
- Serkan Doğru
- Seval İzdeş
- Slavenka Štraus
- Sultan Pınar Çetintepe
- Tatjana Goranovic
- Umut Kara
- Urška Žerjav
- Vesna Durnev
- Visnja Ivancan

Scientific Programme / Bilimsel Program

25 April 2025, Friday				
9:00	**9:15**	**WELCOME**		
9:00	9:15	Welcome Speech		
9:15	**9:25**	**OPENING CEREMONY**		
9:15	9:25	Opening Speech	**Onur Özlü, Vesna Durnev**	
9:25	**9:45**	**OPENING CONFERENCE**		
9:25	9:45	Architecture in Lighting of Music: An Analysis of Musical Proportions by Mosque of Mimar Sinan	Cem Erözü	*Türkiye*
9:45	**10:00**	***Coffee Break***		
10:00	**10:25**	**CONFERENCE 1**	**Vesna Durnev**	**Işıl Özkoçak Turan**
10:00	10:25	Disaster Preparedness: Before, During, and After and the Management of Health Care Services	Mustafa Necmi İlhan	*Türkiye*
10:25	**11:40**	**PANEL I - Beyond the Initial Phase: Planning, Training and Education**	**Mirjana Shosholcheva**	**Ali Fuat Erdem**
10:25	10:45	Professional Development Module in Disaster Medicine: European Training Requirements	Mirjana Shosholcheva	*North Macedonia*
10:45	11:05	Basic Principles of Disaster Medicine	Biljana Kuzmanovska	*North Macedonia*
11:05	11:25	Stimulation Training and Nurse Readiness in Disaster Management	Darko Sazdov	*North Macedonia*
11:25	11:40	*Discussion*		
11:40	**12:55**	**PANEL II - Prehospital Care**	**Andrijan Kartalov**	**Ahmet Coşar**
11:40	12:00	Current Classifications and Triage Scoring Scales	Slavenka Štraus	*Bosnia and Herzegovina*
12:00	12:20	Basic and Advanced Life Support	Miodrag Milenovic	*Serbia*
12:20	12:40	Triage: Ethical Dilemmas in Disaster Settings	Dilek Özcengiz	*Türkiye*
12:40	12:55	*Discussion*		
12:55	**14:10**	***Break for Lunch***		
14:10	**15:25**	**PANEL III - Airway Management**	**Biljana Andonovska**	**Özgür Canbay**
14:10	14:30	Airway Management During Mass Casualty Event or Disaster	Tatjana Goranovic	*Crotia*
14:30	14:50	Airway Management Techniques: High Tech vs Old Fashion	Renata Curic Radivojevic	*Crotia*
14:50	15:10	The Challenges of Emergency Airway Management Including The Pediatric Airway	Dafina Karadjova	*North Macedonia*
15:10	15:25	*Discussion*		
15:25	**15:40**	***Coffee Break***		
15:40	**16:55**	**PANEL IV - Improving Disaster Planning**	**Vesna Durnev**	**Dilek Ünal**
15:40	16:00	Development of a Hospital Disaster Plan	Levent Öztürk	*Türkiye*
16:00	16:20	The Anaesthetist's Role in Global Infections	Biljana Andonovska	*North Macedonia*
16:20	16:40	Preparing for Disasters in the OR and the ICU	Fatos Sada	*Kosova*
16:40	16:55	*Discussion*		
16:55	**18:10**	**PANEL V - The Multi Trauma Patient - I**	**Dusica Simic**	**Zerrin Özköse Şatırlar**
16:55	17:15	Traumatic Brain Injury Management in Adults	Vesna Durnev	*North Macedonia*
17:15	17:35	Brain and Spinal Cord Injury in Children	Dusica Simic	*Serbia*
17:35	17:55	Managing Severe Burns: A Multidisciplinary Perspective with Focus on Intensive Care	Aleksandra Gavrilovska Brzanov	*North Macedonia*
17:55	18:10	*Discussion*		
15:40	**16:50**	**Oral Presentation I – AMPHITHEATER, HALL A303**	**Ayşegül Özgök**	**Nuray Altay**
15:40	16:35	Oral Presentations (between OP01 - OP11)		
16:35	16:50	*Discussion*		
15:40	**16:50**	**Oral Presentation II – AMPHITHEATER, HALL A304**	**Gözde İnan**	**Tuğba Aşkın**
15:40	16:35	Oral Presentations (between OP12 - OP22)		
16:35	16:50	*Discussion*		
16:50	**17:00**	***Break***		
17:00	**18:05**	**Oral Presentation III – AMPHITHEATER, HALL A303**	**Işıl Özkoçak Turan**	**Süheyla Ünver**
17:00	17:50	Oral Presentations (between OP23 - OP32)		
17:50	18:05	*Discussion*		
17:00	**18:05**	**Oral Presentation IV – AMPHITHEATER, HALL A304**	**Seval İzdeş**	**Türkay Çakan**
17:00	17:50	Oral Presentations (between OP33 - OP42)		
17:50	18:05	*Discussion*		

26 April 2025, Saturday				
9:00	**9:25**	**CONFERENCE 2**	**Biljana Kuzmanovska**	**Feyhan Ökten**
9:00	9:25	Regional Anesthesia	Fatma Sarıcaoğlu	*Türkiye*
9:25	**10:40**	**PANEL VI - Preventing Harm to Health Care Workers**	**Jasminka Nancheva**	**Mustafa Necmi İlhan**
9:25	9:45	Managing the Disaster Associated Burden of Critical Care Team	Seda Banu Akıncı	*Türkiye*
9:45	10:05	Health and Safety of Workers During Disasters	Sultan Pınar Çetintepe	*Türkiye*
10:05	10:25	Assessment and Management of Risks in the OR	Androniki Bibovska	*North Macedonia*
10:25	10:40	*Discussion*		
10:40	**10:55**	***Coffee Break***		
10:55	**12:10**	**PANEL VII - Mechanical Ventilation**	**Visnja Ivancan**	**Ülkü Aypar**
10:55	11:15	Role of NIMV in Disasters	Ervin Bejko	*Albania*
11:15	11:35	Sortage of Ventilators? The Story of Making a DIY Ventilator During COVID Pandemia	Bojan Kontestabile	*Slovenia*
11:35	11:55	Role of High Flow Nasal Oxygen in Disasters	Seval İzdeş	*Türkiye*
11:55	12:10	*Discussion*		
12:10	**13:25**	***Break for Lunch***		
13:25	**15:00**	**PANEL VIII - Balkan Anesthesia Platform**	**Meral Kanbak, Andrijan Kartalov, Jasmina Smajic**	
13:25	13:45	Anesthesia for Emergency and Trauma Surgery	Jasmina Smajic	*Bosnia and Herzegovina*
13:45	14:05	Trauma Induced ARDS	Filadelfo Coniglione	*Albania*
14:05	14:25	Anesthetic consideration for extremity injuries in disaster situations	Dilek Ünal	*Türkiye*
14:25	14:45	Injured Patient Transportation to the Hospital	Ivana Petrov	*Serbia*
14:45	15:00	*Discussion*		
15:00	**15:15**	***Coffee Break***		
15:15	**16:30**	**PANEL IX - Anesthesia Management During Disasters**	**Saimir Kuci**	**Süheyla Ünver**
15:15	15:35	Ketamine in Emergency and Disaster Medicine	Onur Özlü	*Türkiye*
15:35	15:55	Advantages of Peripheric Nerve Blocks in Anesthesia Management During Disasters in Children	Jasminka Nancheva	*North Macedonia*
15:55	16:15	Anesthesia for Patients With Acute Burn Injuries	Vanja Dzambazovska Trajkovska	*North Macedonia*
16:15	16:30	*Discussion*		
16:30	**17:45**	**PANEL X - The Multi Trauma Patient - II**	**Fatos Sada**	**Bilge Çelebioğlu**
16:30	16:50	Cardiac Injuries	Maja Sostaric	*Slovenia*
16:50	17:10	Aortic Dissection After Various Traumas	Saimir Kuci	*Albania*
17:10	17:30	Major Haemorrhage Management	Ermina Mujičić	*Bosnia and Herzegovina*
17:30	17:45	*Discussion*		
15:40	**16:50**	**Oral Presentation V – AMPHITHEATER, HALL A303**	**Murat İzgi**	**Ezgi Erkılıç**
15:40	16:35	Oral Presentations (between OP43 - OP53)		
16:35	16:50	*Discussion*		
15:40	**16:50**	**Oral Presentation VI – AMPHITHEATER, HALL A304**	**Aleksandra Gavrilovska Brzanov**	**Vanja Dzambazovska Trajkovska**
15:40	16:35	Oral Presentations (between OP54 - OP64)		
16:35	16:50	*Discussion*		
16:50	**17:00**	***Break***		
17:00	**18:10**	**Oral Presentation VII – AMPHITHEATER, HALL A303**	**Dilek Ünal**	**Güldeniz Argun**
17:00	17:55	Oral Presentations (between OP65 - OP75)		
17:55	18:10	*Discussion*		
17:00	**18:10**	**Oral Presentation VIII – AMPHITHEATER, HALL A304**	**Dafina Karadzova**	**Aleksandar Dimitrovski**
17:00	17:55	Oral Presentations (between OP76 - OP86)		
17:55	18:10	*Discussion*		
27 April 2025, Sunday				
9:00	**10:15**	**PANEL XI - The Intensivists During Disaster**	**Atanas Sivevski**	**Dilek Özcengiz**
9:00	9:20	AKI in Crush Syndrome	Alfred Ibrahimi	*Albania*
9:20	9:40	Inhalational exposures to toxic substances during disasters; Carbon monoxide poisining	Lale Karabıyık	*Türkiye*
9:40	10:00	Chemical, Biological and Radiation Exposure and Decontamination	Marija Jovanovski Srceva	*North Macedonia*
10:00	10:15	*Discussion*		
10:15	**10:30**	***Coffee Break***		
10:30	**11:45**	**PANEL XII - The Pregnant Patient During Disasters**	**Marija Jovanovski Srceva**	**Jülide Ergil**
10:30	10:50	Obstetric Case Experiences: Türkiye-Syria Earthquakes	Serkan Doğru	*Türkiye*
10:50	11:10	Guidelines for the Management of a Pregnant Trauma Patient	Rajmonda Nallbani	*Kosova*
11:10	11:30	The Special Transfusion Strategies During Disasters	Krenar Lilaj	*Albania*
11:30	11:45	*Discussion*		
11:45	**13:00**	**PANEL XIII - Special Circumstances**	**Maja Sostaric**	**Türkay Çakan**
11:45	12:05	High Altitude Physiology and Anesthesia	Višnja Ivančan	*Crotia*
12:05	12:25	Safe Anesthesia Management in Low-Resource Settings in the Underdeveloped Countries	Urška Žerjav	*Slovenia*
12:25	12:45	Critical Care in Austere Environment	Murat İzgi	*Türkiye*
12:45	13:00	*Discussion*		
13:00	**13:30**	**CLOSING CEREMONY**		
13:00	13:30	Closing Speeches	**ARUD and MSA Executive Committees**	

SUMMARIES


Anesthesiology and Reanimation Specialists Society
Annual Congress
BALKAN STATES
ANESTHESIA DAYS - IX
Disaster Preparedness in
Anesthesia and Intensive Care
24-27 April 2025
Skopje, Macedonia
International Balkan University Conference Hall
www.arud2025.org

Anesthesiology and Reanimation Specialists Society

Annual Congress

BALKAN STATES ANESTHESIA DAYS - IX

Disaster Preparedness in Anesthesia and Intensive Care

24-27 April 2025

Skopje, Macedonia

International Balkan University Conference Hall





www.arud2025.org

in collaboration with

PANELISTS

with the supports of

TİKA

INTERNATIONAL BALKAN UNIVERSITY

organization secretariat

DİAMED

hakan@diamed98.com

+90 533 247 6627

* Manuscripts of shared presentations are printed according to the panelists' alphabetical order.

* The authors are responsible for the content of the manuscripts included in this supplement, which have not undergone the journal's regular review processes.

17:35-17:55 (Panel V)
Full Manuscript

Managing Severe Burns: A Multidisciplinary Perspective with Focus on Intensive Care

Aleksandra Gavrilovska–Brzanov

Ss. Cyril and Methodius University, Faculty of Medicine, Clinic for Traumatology, Orthopedic Disease, Anesthesiology, Reanimation and Intensive Care Medicine and Emergency Department, Skopje, RN Macedonia

ABSTRACT

One of the most destructive types of trauma is severe burn injuries, which can result in major disruptions to a person's physiological, psychological, and physical systems. In order to effectively manage patients of this nature in the intensive care unit (ICU), a coordinated multidisciplinary approach is required. This approach should involve anesthesiologists, intensivists, surgeons, infectious disease specialists, nutritionists, and nurses who have received specialized training. The clinical goals are early airway control, fluid resuscitation, infection prevention, nutritional assistance, and sufficient pain management. Particularly in cases of carbon monoxide poisoning, inhalation injuries require prompt recognition and early intubation, as well as mechanical ventilation and oxygen therapy. In addition, intubation must be performed as soon as possible. If treatment is not administered, burn-induced systemic inflammation can lead to capillary leakage and fluid changes, both of which can accelerate the progression of burn shock. During the first twenty-four hours, it is absolutely necessary to perform fluid resuscitation that is directed by the appropriate formula and individualized according to the amount of urine output and hemodynamics. As a result of a persistent hypermetabolic state, the nutritional requirements increase, necessitating early enteral feeding as well as meals that are high in protein and calories in order to facilitate the healing process. In order to prevent the development of resistance, it is recommended that topical medicines be used instead of routine antibiotic prophylaxis, unless an infection has been confirmed. A multimodal approach is required for pain management in order to address both the background pain and the procedural pain. In addition, it is vital to pay attention to the operation of the cardiovascular system, the pulmonary system, the digestive system, and the nervous system in order to reduce the risk of complications such as multiple organ dysfunction. Early excision along with wound covering is beneficial in improving results. It is essential for the recovery of the burn patient to undergo continual assessment and therapies that are adapted to the ever-changing clinical conditions. Through a multidisciplinary and system-based approach, intensive care plays a vital role in enhancing survival, decreasing morbidity, and guaranteeing excellent long-term recovery in patients with severe burns.

Keywords: Burned patients, fluid resuscitation, inhalation injuries, nutrition, pain control

INTRODUCTION

Burn injuries are among the most complicated and sometimes fatal types of trauma, as they cause severe disturbances in the body's physiological, psychological, and physical systems. A coordinated multidisciplinary approach is required for their management in the intensive care unit (ICU). This approach should involve anesthesiologists, intensivists, surgeons, infectious disease specialists, nutritionists, and trained nurses. In the therapeutic setting, the most important things to focus on are early airway control, fluid resuscitation and stabilization, wound care, infection prevention, nutritional support, sufficient pain management, and long-term rehabilitation. When it comes to burn patients, each phase of care is essential in order to significantly improve outcomes and reduce morbidity and death (1,2).

Types of Burns and Their Classification

Each type of burn is categorized according to its depth and extent (3):

1. Burn Depth and Degrees (4):

Table 1. Depth of Burning and Degrees of Burning

Degree	Tissue Involved	Appearance	Pain	Healing
Superficial (1st)	Epidermis only	Red, dry, no blisters (e.g., sunburn)	Yes (painful)	3-6 days, no scarring
Partial-thickness (2nd)	Epidermis + partial dermis	Blisters, moist, red/pink, may blanch	Yes (very painful)	1-3 weeks, minimal scarring
Full-thickness (3rd)	Entire dermis destroyed	Dry, leathery, white/black, no blanching	No (nerve damage)	Requires grafting, scarring
Fourth-degree (4th)	Extends to muscle, tendon, or bone	Charred, eschar, deep tissue visible	No	Requires surgery, high morbidity

2. Using the following formulas, the extent is determined by the percentage of total body surface area (TBSA) that is affected: the rule of nines (nine), the Palmar method, and a chart created by Lund and Browder.

Table 2. Guiding Fluid Resuscitation and Treatment Planning, the Extent of the Burn is Evaluated

Method	Description
Rule of Nines	Quick method for adults; body divided into sections of 9% (e.g., leg = 18%)
Palmar Method	Patient's palm (including fingers) = ~1% TBSA; useful for small, irregular burns
Lund and Browder Chart	Most accurate; adjusts for age and body proportions, especially in children

The Pathophysiology of Burns and Illnesses

Those who sustain burn injuries experience necrosis of the tissues and the beginning of a complex inflammatory cascade that involves numerous systems (6):

Key mediators and phase events involved in the pathophysiology of burns are vasodilation, increased capillary permeability, decreased fluid loss, and swelling, which are the immediate responses. In addition to serotonin, histamine, bradykinin, and prostaglandins are released.

The phase of inflammation involves the recruitment of immune cells. Complement activation (C3a, C5a), in addition to TNF-α, IL-1, IL-6, and IL-8. Catecholamines (epinephrine and norepinephrine), cortisol, and glucagon, as well as catabolism and oxygen demand, are all components of the hypermetabolic phase.

Capillary leak, hypovolemia, lactic acidosis, and organ failure are all indications of a systemic involvement response similar to that of systemic inflammatory response syndrome (SIRS).

The cardiovascular system

A substantial pathophysiological reaction is triggered by severe burns, and this response spreads far beyond the boundaries of the local injury site. When severe tissue damage occurs, it immediately leads to the release of a multitude of inflammatory and vasoactive mediators. These mediators include histamine, prostaglandins, bradykinin, tumor necrosis factor-alpha (TNF-α), interleukins (IL-1, IL-6, IL-8), and complement proteins. The capillary permeability is significantly increased by these chemicals, which makes it possible for plasma proteins and fluids to escape from the intravascular region and enter the interstitium, where they are stored. This condition, which is referred to as capillary leak syndrome, is the cause of the fast development of edema, hypovolemia, and hemoconcentration.

There is a decrease in cardiac output as a result of a decrease in cardiac preload, which occurs when the intravascular volume falls. Direct myocardial depression, which is caused by circulating cytokines and myocardial depressant factors, is a factor that further reinforces this phenomenon. Despite an intact heart structure, its function becomes weakened, owing to inadequate tissue perfusion. This progression leads to burn shock, which is a distinct type of hypovolemic and distributive shock (6,7). If fluid resuscitation is not administered in a timely and vigorous manner, burn shock will develop.

Digestive and metabolic system

The gastrointestinal system goes through a large amount of dysfunction as a part of the systemic inflammatory response when serious burns are present. The splanchnic hypoperfusion is one of the consequences that occurs first and has the most significant impact. It is because the body places a higher priority on providing oxygen and blood to important organs like the brain and heart that the mesenteric circulation is affected. This redirection of blood flow leads to intestinal ischemia and mucosal damage.

The intestinal mucosal barrier, which ordinarily serves as a vital line of defense against infections, becomes anatomically and functionally compromised. A significant burn can cause mucosal atrophy and increased permeability to occur swiftly, frequently within a few hours of the incident. In addition to contributing to the development of sepsis and systemic inflammatory response syndrome (SIRS), this disturbance makes it easier for bacteria to translocate, which is the process by which bacteria and endotoxins move from the lumen of the stomach into the systemic circulation.

At the same time, the stress that is caused by burns, in conjunction with the elevated amounts of circulating catecholamines and inflammatory mediators, makes the gastrointestinal tract more susceptible to stress ulcers, particularly in the stomach and the proximal duodenum. These so-called Curling's ulcers can cause bleeding in the upper gastrointestinal tract, which may present itself as hematemesis or melena. Additionally, they have the potential to further exacerbate hypovolemia and anemia in a burn patient who is already in a weakened state.

Additionally, intestinal ileus is frequently the result of the neurohormonal reaction that one experiences in response to trauma and inflammation. Ileus, which is characterized by delayed gastric emptying and intestinal paralysis, makes enteral nutrition more difficult and raises the risk of aspiration and malnutrition. The presence of ileus for an extended period of time can result in stomach distention, nausea, and pain, all of which can potentially impede recovery and contribute to further metabolic load.

All things considered, the gastrointestinal system in burn patients plays a significant part in the course of systemic issues as well as the recovery of the patient. It is essential to provide early enteral nutrition, stress ulcer prophylaxis, and careful hemodynamic support in order to maintain the integrity of the gut and reduce the risk of gastrointestinal and infectious complications (6-8).

Pulmonary system

In individuals who have suffered burns, pulmonary involvement can greatly raise the risk of morbidity and mortality, particularly when it is combined with inhalation damage. It is possible for these injuries to occur with or without obvious facial burns, and they are often the result of exposure to superheated air, toxic gases, or combustion byproducts such as carbon monoxide (CO) and cyanide.

Inhalation of hot gases can induce thermal injury to the upper airways—primarily affecting the oropharynx, larynx, and upper trachea. It is necessary to perform early intubation in order to secure the airway since the airway edema, increased mucosal secretions, and inflammatory cell infiltration that emerge from this condition can have the effect of obstructing the airway. In the event that edema continues to worsen, stridor and respiratory failure may develop.

In addition to the upper airway, the chemical irritation caused by smoke and toxic gases can cause bronchospasm, mucociliary dysfunction, and inflammatory exudate. These symptoms contribute to the obstruction of the lower airway and a mismatch between ventilation and perfusion. It is possible for the respiratory tract to display sloughing of the bronchial epithelium, which can lead to the obstruction of the airways and the collapse of the alveoli (atelectasis).

Inhaling smoke can lead to carbon monoxide (CO) poisoning, which is more common in fires that take place in enclosed spaces. This is one of the most dangerous elements of smoke inhalation. CO binds to hemoglobin with a significantly higher affinity than oxygen, generating carboxyhemoglobin (COHb). As a result, the oxygen-carrying capacity of blood is diminished, and the oxygen-hemoglobin dissociation curve is shifted to the left. This results in a decrease in the amount of oxygen that is delivered to tissues, which will ultimately lead to cellular hypoxia. It is possible for tissue hypoxia to be severe even while the oxygen saturation on the pulse oximeter is normal.

Acute lung injury and the development of acute respiratory distress syndrome (ARDS) can be the result of direct harm to the alveoli and pulmonary capillaries in more severe cases, particularly when the exposure is protracted or when the burns are big. Non-cardiogenic pulmonary edema, extensive alveolar injury, and refractory hypoxemia are the hallmarks of acute respiratory distress syndrome (ARDS) in burn patients. This condition necessitates the use of mechanical ventilation and advanced supportive care.

The systemic inflammatory response also plays a role in the capillary leak that occurs within the lungs, which further exacerbates the pulmonary edema and the gas exchange process. Secondary infections, such as pneumonia, which can rapidly decrease respiratory function and produce sepsis, are especially dangerous for these individuals because they are particularly susceptible to them.

In light of these dangers, identification and treatment of inhalation injuries at an early stage are absolutely necessary. High-flow oxygen, bronchodilators, pulmonary hygiene, early airway protection, and hyperbaric oxygen therapy may be among the supportive methods that may be utilized in the event of substantial CO poisoning (6,7,9).

The metabolic process

The hypermetabolic and catabolic responses that are triggered by severe burns are among the most profound ones that are recognized in the medical field. Within hours of the injury, this metabolic storm begins to manifest itself, and it can last anywhere from weeks to months, making recovery and rehabilitation substantially more difficult.

The hypermetabolic state is largely characterized by a significant increase in catecholamines, including adrenaline and norepinephrine, as well as cortisol, glucagon, and inflammatory cytokines, including tumor necrosis factor-alpha (TNF-α), interleukins (IL-1, IL-6), and prostaglandins. These mediators jointly upregulate metabolic activity in practically every organ system.

A significant rise in resting energy expenditure (REE), which can often be twice as high as the average rate, is one of the defining characteristics of this condition. Significant pressure is placed on the circulatory and respiratory systems as a result of this elevated energy demand, which is accompanied by an increase in the consumption of oxygen, the creation of carbon dioxide, and the temperature of the core of the body.

Stress hormones and cytokines are responsible for the development of insulin resistance, which leads to the early onset of hyperglycemia. In spite of elevated insulin levels, glucose uptake by peripheral tissues is impaired, which results in persistent hyperglycemia. This hyperglycemia further contributes to immune dysfunction and impairment of wound healing. When it comes to burn management, strict glucose control becomes an essential component in order to lessen the likelihood of infections and sepsis.

The catabolic phase is also characterized by increased proteolysis, which is especially prevalent in skeletal muscle. As a result of the body breaking down protein in order to satisfy its energy requirements and as a means of supporting gluconeogenesis, lean body mass is rapidly decreased. Mobilization is hindered, hospitalization is prolonged, and wound healing is slowed down as a result of this muscular loss.

Concurrently, there is an increase in lipolysis, which is accompanied by an increased mobilization of free fatty acids and glycerol. It is important to note that the utilization of these substrates in the metabolic process is inefficient, and the accumulation of lipids in the liver might result in hepatic steatosis and dysfunction.

It is possible for metabolic acidosis to be the result of a combination of anaerobic metabolism, poor perfusion, and continuous inflammation. This can further exacerbate organ failure and tiredness. Since this is the case, nutritional support is an extremely important component of the treatment of burn patients. Early start of enteral feeding, often within the first 24 hours post-injury, is crucial to reduce the hypermetabolic response, retain gut integrity, and promote recovery. Diets that are high in protein and calories and that are supplemented with micronutrients are exceptionally important for promoting anabolism and immunological function.

The persistent stress response, if it is not controlled, can impede healing, delay wound closure, hamper rehabilitation, and increase the risk of infections and mortality (6,7,10). This is the case even when vigorous supportive care is provided.

Protocol for Resuscitation and Acute Management in the Intensive Care Unit (11)

Airway

Early airway control is of the utmost importance. The use of early intubation is indicated for patients who have face burns, hoarseness, or sputum that contains carbonaceous substances. Direct laryngoscopy and fiberoptic intubation are two of the techniques that can be used. In the event of carbon monoxide poisoning, it is necessary to administer oxygen at a concentration of one hundred percent, which drastically lowers COHb levels within thirty minutes.

Breathing

Patients who have suffered inhalation injuries, upper airway blockage, or hypoxemia are candidates for mechanical ventilation. To allow for the development of the respiratory system, chest escharotomies can be necessary. The presence of CO toxicity should be suspected in fires that occur in confined spaces and victims who are unconscious.

Circulation

The establishment of appropriate venous access and the beginning of fluid resuscitation are of the utmost importance. After an injury, burn shock can develop within a few hours due to the release of plasma. Monitoring includes blood pressure, heart rate, urine output, sensorium, and perfusion of the extremities. One of the most important indicators of adequate perfusion is a urine output that is greater than one milliliter per kilogram per hour.

Abilities and Potential Risks

The evaluation of the patient's discomfort, neurological condition, and the entire body is necessary. Doppler ultrasound should be used to assess the risk of compartment syndrome in patients who have sustained circumferential burns.

The administration of fluids (12)

The administration of the appropriate fluid treatment is the foundation of burn care. A number of equations serve as a guide for initial resuscitation:

The Parkland Formula is as follows: 4 milliliters per kilogram multiplied by the percentage of TBSA that is burned (50 percent in the first eight hours and the remaining 16 hours).

According to the modified Brooke formula, the amount of TBSA burned is equal to 2 milliliters per kilogram.

Consensus Formula (ABA): 2–4 mL/kg/%TBSA, with the dosage being adjusted based on the patient's feedback.

For the first twenty-four hours, crystalloids, also known as Ringer's lactate, are recommended. At a later time, colloids might be introduced. Abdominal compartment syndrome, pulmonary edema, and electrolyte abnormalities are all potential outcomes of experiencing an excessive amount of crystalloids. Therefore, the importance of fluid resuscitation that is both dynamic and customized is highlighted.

Colloids, such as albumin, may be given during the initial 12–24 hours, when the capillary integrity begins to improve. This is done in order to lower the amount of crystalloid that is required and to maintain oncotic pressure. In patients who have substantial TBSA burns, inadequate urine output despite appropriate crystalloid administration, or symptoms of third spacing (such as pulmonary edema or abdominal distension), the standard treatment is to consider administering an albumin infusion at a concentration of 5% or 25% after the first 12–24 hours.

Some of the reasons for using albumin are as follows:

It is necessary to restore the plasma oncotic pressure in order to draw fluid back into the intravascular space.

Interstitial edema, particularly in the lungs and belly, can be reduced by this treatment.

In order to reduce the likelihood of complications such as abdominal compartment syndrome, pulmonary edema, and electrolyte imbalances (hyponatremia and hyperchloremia), it is important to minimize the total volume of crystalloids.

Nevertheless, the administration of albumin ought to be tailored, with the administration being directed by hemodynamic parameters, serum albumin levels, urine output (target: 0.5–1 mL/kg/h), and trends in lactate or base deficit. In the event that capillary leakage continues, excessive use, particularly at an early stage, has the potential to exacerbate edema.

In conclusion, it is crucial to avoid the dangers of both under-resuscitation (hypoperfusion, organ failure) and over-resuscitation (fluid overload syndromes) by utilizing dynamic, titrated fluid resuscitation rather than rigidly adhering to existing formulas. In the case of patients who are exhibiting signs of volume overload or who have suffered major burns, the utilization of albumin plays a supportive but significant function in the process of refining fluid equilibrium.

Nutrition

As a result of the severe hypermetabolic and catabolic response that occurs after thermal injury, early and intensive nutritional therapy is an essential component in the management of burn patients. It is strongly suggested that early enteral nutrition (EN)

be started during the first twenty-four hours after an injury has occurred. This is because it lowers the infection rates, maintains the integrity of the gut mucosa, reduces the amount of bacterial translocation, and improves the modulation of the systemic inflammatory response. There is a correlation between delayed feeding and an increased risk of sepsis as well as malfunction in multiple organs.

Burn patients can have energy requirements that are 1.5 to 2 times higher than their basal metabolic rate (BMR) due to prolonged hypermetabolism. This is especially true for individuals who have burns that cover more than 20% of their total body surface area (TBSA). When indirect calorimetry is available, it is possible to make an accurate estimation of energy expenditure. However, predictive equations, such as the Curreri formula or the modified Harris-Benedict equation, may be utilized as alternatives.

A high-protein, high-calorie diet is needed to assist wound healing, maintain lean body mass, and increase immunological function. Protein requirements typically vary from 1.5 to 2.0 grams per kilogram per day, or even more in cases with significant burns. Certain protocols propose consuming up to 2.5 grams per kilogram per day in order to compensate for nitrogen losses. The insufficient consumption of protein has been linked to a decrease in the rate of wound healing, the loss of muscle mass, and an increase in mortality.

Additionally, the administration of micronutrients is essential. A considerable amount of antioxidant reserves and trace elements are depleted when burns occur. The following should be included in diets: Vitamin A: promotes epithelial healing and immunological protection;

The manufacture of collagen and the activity of neutrophils are both promoted by vitamin C. Zinc is essential for the production of proteins, the healing of wounds, and the immune response.

In addition, selenium, copper, and vitamin E are examples of micronutrients that have the potential to be useful. These micronutrients have the ability to reduce oxidative stress and enhance outcomes for burn patients.

One more essential component of nutritional therapy is the strict management of glucose levels. Insulin resistance and increased hepatic glucose production are two of the most common causes of hyperglycemia. Hyperglycemia is a factor that contributes to impaired wound healing, higher infection risk, and worse overall results. For the purpose of preserving glycemic objectives and avoiding problems, it is vital to perform glucose monitoring on a regular basis and to administer insulin therapy when required.

When it comes to increasing recovery and survival rates in patients who have suffered significant burns, individualized nutritional therapy plays a crucial role. This therapy should be started early, should contain sufficient amounts of energy and protein, should be enhanced with critical micronutrients, and should be supported with glycemic management.

Prophylaxis against microorganisms

It is not suggested to do routine systemic antibiotic prophylaxis due to the dangers associated with resistance. For the purpose of preventing colonization, topical antimicrobials such as silver sulfadiazine and mafenide are utilized. The use of systemic antibiotics is restricted to infections that have been confirmed. Reduce the risk of sepsis by performing early excision and covering wounds (14).

Pain management

Multiple Approaches to the Management of Pain in Burn Patients

Burn pain is one of the most intense and complicated types of pain since it consists of three different types of pain: breakthrough pain, procedural pain, and background pain. For burn patients to experience effective pain management, a multimodal approach is required. This approach should integrate systemic, regional, topical, and local therapies that are tailored to the specific requirements of the individual. In order to maximize pain relief, decrease the amount of opioids that are used, and make the recovery process easier, this strategy intends to treat the many pain mechanisms that are involved, including neuropathic, inflammatory, and nociceptive pain.

Systemic Analgesia

Systemic analgesia, predominantly through opioids, remain the cornerstone of pain care in burn patients. Opioids are very effective for both background pain and breakthrough pain, making them the most important component of pain management. The potency and efficacy of certain medications, such as morphine, fentanyl, and hydromorphone, to give long-term pain relief are the primary reasons for their widespread use. However, the potential of opioid-related adverse effects, which include

respiratory depression, constipation, and drowsiness, necessitates cautious titration and monitoring, particularly in patients who are in a critical condition. Non-opioid analgesics, such as paracetamol (acetaminophen) and nonsteroidal anti-inflammatory drugs (NSAIDs), such as ibuprofen, can be used in conjunction with opioids to alleviate pain. Paracetamol is effective because it inhibits the production of prostaglandins in the central nervous system, which helps to reduce inflammation and pain. Due to its ability to lower opioid requirements, prevent opioid tolerance, and give extra pain relief, ketamine has showed promise in the management of burn pain. This is especially true during acute pain episodes or in opioid-sparing protocols. Ketamine is an NMDA receptor antagonist.

Regional Analgesia

For patients with substantial burns or those requiring frequent dressing changes and difficult procedures, regional anesthesia can offer significant pain relief. Epidural analgesia, on the other hand, is typically avoided in burn patients, particularly those who have coagulopathy, which is a common complication in burn injuries due to the loss of skin and plasma proteins, or those who are at risk for hemorrhagic complications. Epidural procedures, although their efficacy in managing severe pain, necessitate careful evaluation of the patient's coagulation status due to the possibility of epidural hematoma, which could further worsen the patient's health.

Continuous peripheral nerve blocks or plexus blocks are two treatments that can be considered as alternatives to epidural analgesia in situations where the latter is not recommended. Techniques such as brachial plexus blocks for upper limb burns or sciatic nerve blocks for lower limb burns give good pain management without the hazards associated with epidural implantation. The location of the burn and the patient's health can be taken into consideration when designing these regional blocks, which provide excellent analgesia while reducing the amount of opioids that are administered centrally.

Topical and Local Analgesia

Topical and local anesthetics have the potential to be very successful in treating superficial burns or those that are small and localized in nature. Burn gels, lidocaine cream, and silver sulfadiazine are examples of topical agents that can be applied directly to the burn region to offer analgesia. These topical medicines also have the additional benefit of encouraging wound healing. As a means of providing temporary respite and alleviating the discomfort associated with wound exposure, numbing creams or cooling agents can be utilized for more extensive superficial burns.

For the purpose of administering local anesthesia during dressing changes, debridement, or other minor treatments, local anesthetics such as lidocaine or bupivacaine can be infused directly into the wound margins or under the skin. These agents, when used in conjunction with vasoconstrictors such as epinephrine, have the potential to enhance the local anesthetic effect and reduce systemic absorption. As a result, they can provide pain relief that is felt for a longer period of time with fewer adverse effects.

Additional Strategies and Adjuncts to Consider

The use of non-pharmacological therapies is another component of a multimodal pain strategy. These include the following:

Cognitive Behavioral Therapy (CBT) or relaxation techniques to assist in the management of the psychological aspect of burn pain, particularly in settings where the patient is experiencing chronic pain or post-traumatic stress disorder (PTSD).

Distraction therapy or virtual reality (VR) as part of the rehabilitation process, particularly in young burn victims, might minimize the sense of pain during painful operations.

Additionally, when applied with caution, cold therapy has the potential to alleviate pain and inflammation during the acute phase of burn injury, particularly in cases of mild burns.

CONCLUSION

Within the intensive care unit, the management of patients who have suffered severe burns requires constant monitoring, dynamic resuscitation, and coordination among multiple disciplines. It is possible to enhance survival and long-term results by addressing the pathophysiologic response of each organ system, as well as by providing prompt management of the airway, optimizing fluids, providing nutritional support, preventing infections, and controlling pain.

REFERENCES

1. Brusselaers N, Monstrey S, Vogelaers D, Hoste E, Blot S. Severe burn injury in Europe: a systematic review of the incidence, etiology, morbidity, and mortality. Crit Care. 2010;14(5):R188.
2. Snell JA, Loh NH, Mahambrey T, Shokrollahi K. Clinical review: the critical care management of the burn patient. Crit Care. 2013 Oct 7;17(5):241. doi: 10.1186/cc12706. PMID: 24093225; PMCID: PMC4057496.
3. Abazari M, Ghaffari A, Rashidzadeh H, Badeleh SM, Maleki Y. A Systematic Review on Classification, Identification, and Healing Process of Burn Wound Healing. Int J Low Extrem Wounds. 2022 Mar;21(1):18-30. doi: 10.1177/1534734620924857. Epub 2020 Jun 11. PMID: 32524874.
4. Milner SM. Classification of Burn Depth. Eplasty. 2024 Feb 28;24:QA5. PMID: 38501145; PMCID: PMC10948199.
5. Shah NR, Palackic A, Brondeel KC, Walters ET, Wolf SE. The Burn Wound. Surg Clin North Am. 2023 Jun;103(3):453-462. doi: 10.1016/j.suc.2023.01.007. Epub 2023 Mar 21. PMID: 37149381.
6. Dobson GP, Morris JL, Letson HL. Pathophysiology of Severe Burn Injuries: New Therapeutic Opportunities From a Systems Perspective. J Burn Care Res. 2024 Aug 6;45(4):1041-1050. doi: 10.1093/jbcr/irae049. PMID: 38517382; PMCID: PMC11303127.
7. Jeschke MG, van Baar ME, Choudhry MA, Chung KK, Gibran NS, Logsetty S. Burn injury. Nat Rev Dis Primers. 2020 Feb 13;6(1):11. doi: 10.1038/s41572-020-0145-5. PMID: 32054846; PMCID: PMC7224101.
8. Ng JW, Cairns SA, O'Boyle CP. Management of the lower gastrointestinal system in burn: A comprehensive review. Burns. 2016 Jun;42(4):728-37. doi: 10.1016/j.burns.2015.08.007. Epub 2016 Jan 13. PMID: 26774605.
9. Heimbach DM, Waeckerle JF. Inhalation injuries. Ann Emerg Med. 1988 Dec;17(12):1316-20. doi: 10.1016/s0196-0644(88)80357-3. PMID: 3057948.
10. Knuth CM, Auger C, Jeschke MG. Burn-induced hypermetabolism and skeletal muscle dysfunction. Am J Physiol Cell Physiol. 2021 Jul 1;321(1):C58-C71. doi: 10.1152/ajpcell.00106.2021. Epub 2021 Apr 28. PMID: 33909503; PMCID: PMC8321793.
11. Cancio LC, Salinas J, Kramer GC. Protocolized Resuscitation of Burn Patients. Crit Care Clin. 2016 Oct;32(4):599-610. doi: 10.1016/j.ccc.2016.06.008. Epub 2016 Aug 3. PMID: 27600131.
12. Guilabert P, Usúa G, Martín N, Abarca L, Barret JP, Colomina MJ. Fluid resuscitation management in patients with burns: update. Br J Anaesth. 2016 Sep;117(3):284-96. doi: 10.1093/bja/aew266. PMID: 27543523.
13. Singer P, Blaser AR, Berger MM, Alhazzani W, Calder PC, Casaer MP, Hiesmayr M, Mayer K, Montejo JC, Pichard C, Preiser JC, van Zanten ARH, Oczkowski S, Szczeklik W, Bischoff SC. ESPEN guideline on clinical nutrition in the intensive care unit. Clin Nutr. 2019 Feb;38(1):48-79. doi: 10.1016/j.clnu.2018.08.037. Epub 2018 Sep 29. PMID: 30348463
14. Pruskowski KA. Pharmacokinetics and Pharmacodynamics of Antimicrobial Agents in Burn Patients. Surg Infect (Larchmt). 2021 Feb;22(1):77-82. doi: 10.1089/sur.2020.375. Epub 2020 Nov 6. PMID: 33164665.
15. Griggs C, Goverman J, Bittner EA, Levi B. Sedation and Pain Management in Burn Patients. Clin Plast Surg. 2017 Jul;44(3):535-540. doi: 10.1016/j.cps.2017.02.026. Epub 2017 Apr 18. PMID: 28576242; PMCID: PMC5642992.

09:00-09:20 (Panel XI)

Abstract Only

AKI in Crush Syndrome

Alfred Ibrahimi

University Hospital Center Mother Teresa, Tirana, Albania

ABSTRACT

Natural disasters are sudden and unpredictable events that impact thousands globally each year. Among the various medical complications experienced by survivors, Crush Syndrome (CS) and acute kidney injury (AKI) are significant concerns. AKI may arise due to rhabdomyolysis-induced renal damage, hypovolemia, or hemodynamic instability. The standard treatment involves aggressive fluid resuscitation with large volumes of crystalloid solutions administered promptly after rhabdomyolysis is detected, along with renal replacement therapy (intermittent or continuous) to facilitate the removal of myoglobin. Emerging evidence suggests that hemadsorption techniques may offer advantages over traditional dialysis approaches. Current research is increasingly focused on exploring the pathophysiological mechanisms of CS to develop novel therapeutic targets. Promising results have been reported in animal models, particularly regarding antioxidant and anti-inflammatory pharmacological agents. Despite the development of clinical guidelines for managing crush injuries, mortality rates among affected patients remain high.

Keywords: Hemadsorption, hemodialysis, crush syndrome, pharmacotherapy, oxidative stress

16:00-16:20 (Panel IV)

Abstract Only

The Anesthetist's Role in Global Infections

Andonovska B, Trajkovska V, Andonovski A

University Clinic for TOARILUC, Medical Faculty, Ss Cyril and Methodius University of Skopje, Skopje, North Macedonia

ABSTRACT

Anesthesiologists are not only responsible for administering anesthesia before surgery. The 2019 Coronavirus disease (COVID-19) as a public health crisis provides an opportunity to examine how anesthesiology contributes to the impact of this and other pandemics, and how pandemics affect our specialty. Since its inception, it has had an impact on public health. Many physicians and the general population are not fully aware of the knowledge and skills that the anesthesiologist has at his disposal. Historically, anesthesiology has made major contributions to the management of epidemics. The cholera, polio, and SARS-CoV-1 (SARS) pandemics are not entirely a thing of the past. Each of them permanently reshaped the roles and practice of anesthesiology. The contributions of anesthesiologists to these epidemics have a shared impact with the COVID-19 pandemic. Back in the days of cholera, an anesthesiologist made a significant mark in identifying the source of infection, and his method of work laid the foundation for modern contact tracing, which is crucial for the coronavirus disease. The former standard of negative pressure ventilation with an "iron lung" was largely incompatible with the irregular breathing associated with bulbar poliomyelitis. Anesthesiologists were credited with introducing the cuffed tracheal tube in 1932 and positive pressure ventilation. The polio epidemic also saw the development of intensive care units, and its development was led by anesthesiologists. Anesthesiologists addressed the lack of technological support through innovations relevant still today, such as the first blood gas analyzer, the ambu mask. With the emergence of new pathogens, anesthesiologists are becoming increasingly aware of infection control and surveillance. Even before COVID-19, the risks of anesthesiologists involved exposure to blood, secretions, and needle-stick injury. The HIV/AIDS epidemic provided an impetus for the specialty to develop safer practices. It was, however, not until the 2002 SARS crisis that anesthesiologists recognized their field-specific vulnerabilities. Drawing upon the lessons from SARS, anesthesiologists are advocates for planned intubations, negative-pressure operating theatres, and consistent use of personal protective equipment, particularly relevant to the COVID-19 pandemic. The COVID-19 has undoubtedly challenged the medical profession. Anesthesiologists are on the front lines, caring for the most vulnerable patients while maintaining a tradition of ingenuity and dedication to patients.

Keywords: Anesthesiologists, role, pandemic, history of medicine, COVID-19

10:05-10:25 (Panel VI)

Abstract Only

Assessment and Management of Risks in the Operation Room

Androniki Bibovska[1], Darko Sazdov[2]

[1]Acibadem Sistina Hospital, Department of Education and Training, Macedonia
[2]Acibadem Sistina Hospital, General Intensive Care Unit, Macedonia

ABSTRACT

Introduction: Operating rooms are specific workplaces that carry risks for both patients and the staff working in them. One of the basic rights of every patient and employee is the right to safety. For this purpose, every hospital should have prepared an appropriate Risk Assessment and Management Program to recognize risks, manage them and improve the work process in operating rooms.

Objective: The objective of such a program is not only to define existing risks, but also to predict and identify new ones that may threaten the health and condition of patients and hospital employees.

Material and methods: According to the methodology for risk mapping and the act for risk assessment of workplaces in the Acibadem Sistina Hospital, the following points are included:

- Risk identification
- Risk assessment
- Variability analysis
- Risk control

This program includes:

- Risk assessment team
- Risk identification
- Risk assessment and prioritization
- Alerts, information
- Risk management
- Analysis of adverse events
- Decision-making for preventive action
- Planning and budgeting of activities
- Taking actions and implementation
- Monitoring and auditing

Result: By developing and implementing a Risk Assessment Program, the safety of patients, visitors and hospital employees is improved and the number of reported errors in the operating room is reduced.

Conclusion: Modern healthcare requires that all risks faced by hospitals in terms of the occurrence of risks be identified, ranked and prioritized, that the responsibilities and authorities of team members be determined and that employees be encouraged to actively participate in the processes of identification and control of the impact of risks, as well as constant control and updating of risks.

Keywords: Operation room, safety, risk assessment

10:45-11:05 (Panel I)

Abstract Only

Disaster Medicine: How to be Better Prepared for Future Disasters

Biljana Kuzmanovska

University Ss. Cyril and Methodius, Medical Faculty, Skopje, Macedonia

ABSTRACT

According to the World Health Organization, the definition of disaster is: “An occurrence disrupting the normal conditions of existence and causing a level of suffering that exceeds the capacity of adjustment of the affected community.”

A disaster is also defined by the International Federation of Red Cross: “Disaster is a sudden calamitous event that seriously disrupts the functioning of the community or society and causes human, material, and economic or environmental losses that exceed the community’s or society’s ability to cope using its own resources.”

Disasters can be natural (biological, geophysical, hydrological, meterological, climatological), or human caused (war/ terrorism, traffic, industry).

Disaster medicine as a concept was first proposed by military surgeon Karl Houghton in 1955, during of convention of military surgeons.

In 1986, the first National Disaster Medical System was created in the USA to provide healthcare during disasters.

In 2007, in USA, started augmented plan for public health and disaster medical preparedness, that lead to forming an American board of Disaster Medicine and American Academy for Disaster Medicine.

Disasters are classified as minor or major disasters.

According to Lesley Sheehan & Kenneth Hewitt, a major disaster is an event that causes:

- At least 100 human deaths
- At least 100 injured
- Economic damage to society of at least one million dollars.

Medical response to disasters is a subject of the medical field disaster medicine, which incorporates principles of emergency medicine in settings of disaster. Principles of disaster medicine are: prevention, preparedness, and first response to a disaster; early recovery, rehabilitation of the healthcare system and society, and finally, development, e.g, preparation of the healthcare system for future disasters based on the experiences acquired from previous disasters. The specific knowledge for disaster medicine is subject to constant refinement, since we continually learn something new from every disaster that strikes humanity.

REFERENCES

1. Oxford American handbook of disaster medicine. Robert A Paltridge, Lawrence Prodano, David Marcossi. Oxford University Press, 2012
2. Tabish S.A, Nabil Syed. Disaster Preparedness: Current trends and future directions. IJSR 2013
3. Stephen Cantrill, Dan Hafling. Allocating scarce resources in disaster: Emergency department principles. Annals of emergency medicine, 2012
4. Ernst G Pheninger et al.Medical student disaster medicine education: the development of an educational resource. Int J Emerg Med 2010
5. Rifat Latifi. Telemedicine for disaster management: can it transform chaos into an organized, structured care from the distance? American Journal of Disaster Medicine.2014

10:55-11:15 (Panel VII)

Abstract Only

Role of NIMV in Disasters

Ervin Bejko, Esmerilda Bulku, Jonela Burimi, Stavri Llazo, Dejvi Haxhiaj, Alfred Ibrahimi, Saimir Kuci, Krenar Lilaj

University Hospital Center "Mother Theresa," Tirana, Albania

ABSTRACT

Non-invasive Ventilation (NIV) provides respiratory support without intubation, using masks or other interfaces. Compared to invasive ventilation, NIV lowers infection risk, reduces Intensive Care Unit (ICU) burden, and is quicker to deploy. Continuous Positive Airway Pressure (CPAP) and Bi-level Positive Airway Pressure (BIPAP) are primary NIV methods. Case studies from earthquakes, floods, and pandemics show successful NIV application in emergencies. Acute Respiratory Distress Syndrome (ARDS) and hypoxia are common in mass casualties. Factors for NIV success include patient selection, proper fitting of masks, and timely intervention. Non-invasive ventilation is successful when we meet a decrease in Partial Pressure of Carbon Dioxide ($PaCO_2$) greater than 8 mm Hg, improvement in pH greater than 0.06, correction of respiratory acidosis.

Non-invasive ventilation is effective for Chronic obstructive pulmonary disease (COPD), pulmonary edema, and hypoxic respiratory failure but not suitable for all patients.

Non-invasive ventilation is counter indicated in need for urgent intubation (cardiac or respiratory arrest, severe respiratory distress, unstable cardiac arrhythmia), epileptic status.

Hospitals must adapt existing protocols to integrate NIV into emergency preparedness plans. Challenges include equipment shortages, patient monitoring limitations, and power supply issues. Field hospitals and temporary ICUs have successfully used NIV in disaster settings. Technological advancements in portable NIV and battery-powered devices improve disaster response.

Conclusion: Non-invasive ventilation is preferred in disasters due to ease of use, reduced complications, and resource efficiency. Future directions include Artificial Intelligence-assisted ventilation, improved mask designs, and wider availability of portable NIV. Noninvasive ventilation is a crucial tool in mass disasters, improving survival rates and reducing ICU burdens.

16:20-16:40 (Panel IV)
Full Manuscript

Preparing for Disasters in the OR and the ICU

Fatos Sada, Leon Hajdari, Pleurat Krasniqi, Engji Sada, Leke Ponosheci

Faculty of Medicine, University of Pristhina, Pristhina, Kosovo

ABSTRACT

The effective management of surgical surge capacity during mass casualty incidents (MCIs) is critical to minimizing morbidity and mortality. This comprehensive overview outlines the essential components of planning, activation, and response strategies to optimize surgical services in emergency scenarios. Key elements include the development of a robust disaster plan encompassing surge capacity assessment, resource allocation, physical space management, and staff training. Early activation of the surge plan relies on incident detection and predefined activation criteria, prompting rapid mobilization of personnel, supplies, and facilities.

Organizational response involves establishing a command structure, triaging patients based on injury severity, and prioritizing surgical interventions accordingly. Physical space management is vital; hospitals may expand operating room capacity by repurposing existing spaces or establishing temporary surgical areas to accommodate increased patient volume. Adequate supplies of surgical instruments, consumables, blood products, and medications must be ensured, with logistics coordinated through supply chain management. Staffing considerations include cross-training personnel, extending shifts, and deploying additional staff to critical areas to meet demand.

Effective communication within the hospital and with external agencies is essential for situational awareness and resource coordination. The response process encompasses patient transfer from emergency departments or field triage points to surgical areas, performing necessary procedures, and providing postoperative care. Postoperative management includes transfer to intensive care units or wards, with attention to infection control and rehabilitation.

Preparedness also involves regularly conducting drills and training exercises to test and refine surge protocols, ensuring staff familiarity and operational readiness. Flexibility in physical space utilization, resource management, and personnel deployment underpins a hospital's capacity to adapt swiftly during MCIs. Overall, establishing a well-coordinated mass casualty plan enhances response efficiency, optimizes patient outcomes, and strengthens hospital resilience in face of large-scale emergencies.

Keywords: Mass casualty incidents, surgical surge capacity, disaster planning, hospital emergency management, trauma surgery

INTRODUCTION

The frequency and complexity of mass casualty events —particularly those requiring multiple surgeries to be performed simultaneously across various operating rooms— have been increasing in recent years. These incidents pose significant logistical and clinical challenges for hospitals, demanding comprehensive planning and coordination. Although the existing body of literature mainly focuses on mass casualty management within the emergency department, it is equally critical that hospital disaster response plans include detailed strategies for managing multiple concurrent surgical procedures. Developing an effective mass casualty plan involves collaboration among various stakeholders in the perioperative environment, ensuring that all aspects —from activation to patient transfer— are meticulously prepared.

Key elements that must be addressed in such plans include clear activation protocols, efficient communication strategies, physical space allocation, staffing arrangements, equipment and supply management —including blood products and medications— patient disposition and offloading procedures, considerations for vulnerable or special populations, and regular rehearsal exercises to test and refine response capabilities.

The American College of Surgeons (ACS) Committee on Trauma mandates that trauma centers actively participate in the development and maintenance of hospital disaster plans as part of their verification process (1). Most current disaster plans and available resources tend to concentrate on initial triage, emergency department treatment, and stabilization, with comparatively little guidance on what occurs beyond the emergency department —in particular, the orchestration of multiple surgeries in the operating room and subsequent patient management. Many events have underscored the urgent need for specialized planning to address these complex situations (2).

While a wealth of research exists on triage protocols and initial management of injured patients during mass casualty incidents, guidance on subsequent phases —specifically, the orchestration of surgical response, operating room logistics, and postoperative care— is comparatively limited. One notable effort was the Information, Dissemination, and Exchange (3). Additionally, the American Society for Anesthesiologists (ASA) developed an Operating Room Mass Casualty Management checklist in 2015,

providing step-by-step guidance for operating room (OR) staff when a mass casualty incident is declared— guidance that is adaptable to the unique needs of individual institutions (4).

The critical role of anesthesiologists in mass casualty responses has been emphasized repeatedly in the literature, recognizing their central position in airway management, anesthesia delivery, and critical care. In 2020, the Japanese Society of Anesthesiologists collaborated with the Academic Consortium on Emergency Medical Service and Disaster Medical Response during the Tokyo Olympic and Paralympic Games to create a comprehensive guide for hospitals. This guide focused specifically on the management of the operating room during mass casualty incidents, highlighting the importance of pre-planned strategies for surge capacity and resource allocation (5).

It is essential that comprehensive disaster planning explicitly includes provisions for a **mass casualty** —a coordinated response designed to manage the influx of patients requiring urgent or emergent surgery from the moment the decision to operate is made until patients are stabilized and discharged from the hospital. Such a plan must be tailored to the specific capabilities and resources of each institution but should also contain core components applicable universally. Integration of the mass casualty planning is vital to ensure seamless coordination, preventing bottlenecks and ensuring timely care (6).

The ability to deliver prompt, effective surgical care to the vulnerable groups should be embedded into the disaster response framework (7).

DESIGN of the PLAN

The foundation of an effective mass casualty plan lies in the collaborative development involving key stakeholders from both surgical and anesthesia departments, as well as representatives from the operating room team. These individuals should work in close cooperation with the hospital's incident command and emergency management teams to establish a unified, well-understood response strategy (8).

The core planning team should include at least a trauma surgeon—preferably with experience in disaster scenarios—a designated anesthesiologist, and an OR nurse manager. To broaden the planning scope and ensure comprehensive coverage, additional participants should include OR technicians, pharmacy personnel, sterile processing staff, hospital administrators, blood bank representatives, Postanesthetic Care Unit (PACU) staff, respiratory therapists, pathologists, interventional radiologists, hospital security personnel or law enforcement, and bed flow coordinators. Each member's familiarity with the hospital's broader disaster response plan is essential, as is their understanding of resource limitations and logistical constraints (9).

Involving intensivists and hospitalists is also recommended, as they will be integral in managing the ongoing care of patients during the surge. This multidisciplinary approach ensures that the plan is robust, adaptable, and capable of addressing the dynamic nature of mass casualty situations (10).

PLAN STRUCTURE

The effectiveness of a mass casualty plan depends on detailed consideration of several key components:

- **Triggering conditions:**

Establish clear, objective conditions for activating the surgical surge plan. These should consider the potential impact on existing hospital operations, including limitations on normal overflow procedures, such as hospital power failures, fire or bomb threats prompting evacuations, water or gas supply disruptions, chemical or biological hazards, IT system collapses, or active shooter scenarios—and outline contingency strategies for each (11).

- **Personnel:**

Efficient and rapid mobilization of personnel is critical. The plan should include predefined mechanisms for calling in staff, with clear communication channels distinct from routine staffing requests. This includes notifying nurses, scrub techs, cleaning crews, and PACU staff through emergency-specific alert systems. Flexibility in staffing—redeploying personnel from other units, adjusting shift patterns, and utilizing off-site personnel—is necessary depending on the time of day and resource availability (12). Surgeons, particularly trauma surgeons, should be designated as triage leads within the OR, responsible for prioritizing cases based on injury severity and resource availability. Backup plans must designate senior nurses or advanced practice providers to assume triage roles if surgeons are unavailable. Multispecialty involvement is crucial; subspecialists such as neurosurgeons,

vascular surgeons, cardiothoracic surgeons, orthopedic surgeons, urologists, ENT specialists, plastic surgeons, gynecologists, and pediatric surgeons should have clear protocols for rapid mobilization and backup activation as needed (13).

- **OR and PACU:**

Assess the number of ORs available at different times—day, night, weekends—and plan accordingly. During a mass casualty incident, elective surgeries are typically canceled or expedited to free up operating rooms. Damage control principles should be emphasized to stabilize patients efficiently. Hospitals should consider opening additional spaces, such as outpatient surgical suites or endoscopy units, to increase capacity. Postoperative patient movement must be streamlined, with rapid transfer to PACU or alternative monitored units. Plans should include expanding PACU capacity, establishing relief staffing, and scheduling rest periods for responding personnel. Clear prioritization protocols should be established for emergent versus urgent cases, and designated staging areas outside the emergency department should be prepared for surgical teams to strategize and debrief (14).

- **Materials and distribution:**

Review sterilization processes and capacity to support multiple surgeries simultaneously, including alternative sterilization methods if standard procedures are compromised. Stockpile sufficient supplies of disposables, including surgical drapes, gloves, gowns, and specialized equipment, with resupply plans in place. The Disaster Available Supplies in Hospitals (DASH) tool can assist in estimating necessary stock levels but should be supplemented with institution-specific assessments (15). Supplies for pediatric patients, burn victims, and other specialized cases should be included. Personal protective equipment (PPE) — gowns, masks, gloves, scrubs— must be available in large quantities to accommodate surge personnel. Damage control supplies such as vacuum-assisted closure devices, external fixation sets, splinting materials, and chest tubes should be ready for rapid deployment, with attention to hypothermia prevention measures (16).

- **Blood products and pharmacy:**

The hospital's blood bank must be prepared to support multiple simultaneous transfusions, with contingency plans for mass transfusions during a large-scale incident. These plans should specify maximum supported transfusions, flexibility options, and regional resource sharing (17). Pharmacy services need protocols for rapid restocking of anesthesia drugs, antibiotics, analgesics, and emergency medications. Additional pharmacy staffing and logistics may be required, especially during off-hours. Tetanus prophylaxis and other critical medications should be readily accessible (18).

- **Patient transfer:**

Coordinate with ICU, step-down units, and medical-surgical wards to facilitate rapid patient transfer from OR and PACU, freeing up critical care and recovery space. Patients who are stable but require ongoing care should be transferred to designated areas or other hospitals if local resources are overwhelmed. Establish transfer agreements with regional hospitals, and involve bed flow coordinators to manage patient throughput efficiently. In large-scale disasters, geographic considerations often result in the closest facilities being overwhelmed; pre-planned regional transfer strategies can prevent bottlenecks. Utilizing regional medical operation centers can expedite patient movement, ensuring timely offloading and resource reallocation (19).

- **Vulnerable groups:**

Identify patient groups with unique needs—such as immunocompromised individuals, pediatric patients, burn victims, and those with complex cardiac or transplant conditions—whose care may be resource-intensive and less flexible during crises. These patients often require ongoing treatment that cannot be delayed or transferred easily. Planning must account for their specific needs, including specialized equipment, medications, and staffing, to ensure they receive appropriate care despite surge conditions (20).

EDUCATION

Preparedness depends heavily on the training and competence of OR teams. All team members should participate in disaster management and emergency preparedness courses. Surgeons and anesthesiologists should be familiar with damage control principles applicable across specialties, recognizing that in mass casualty scenarios, all surgical providers may need to perform urgent damage control procedures (21).

Courses like the ACS Advanced Surgical Skills for Exposure in Trauma and Advanced Trauma Operative Management are valuable for maintaining these critical skills. Cross-training nurses, technicians, and other OR staff is essential to ensure operational

flexibility—enabling personnel to fill multiple roles as needed. Anesthesia providers should undergo periodic refresher training in trauma resuscitation and airway management. Additionally, non-physician team members such as nurse practitioners, physician assistants, and surgical techs should be trained as surgical first assistants, prepared to step into critical roles during surge events (22).

It is well recognized that cohesive, experienced teams perform more efficiently under stress. During triage, the concept of "expectant" patients—those with injuries incompatible with survival—may be applied; providing comfort care and ongoing observation to these patients allows resources to be directed toward those with a higher likelihood of survival (23). Clear communication and role clarity during drills and actual events are fundamental to an effective response.

COORDINATION and TESTING the PLAN

An effective mass casualty plan must be integrated with the hospital's overall disaster response framework. Regular drills, simulations, and tabletop exercises should be scheduled at various times—day, night, weekends—to test different operational scenarios, including high patient volume, resource constraints, and logistical challenges such as instrument turnover and room turnover times. These exercises should involve all relevant departments and personnel, with outcomes reviewed and plans refined accordingly (24).

Internal OR simulations—cycling through different teams and scenarios—can help identify bottlenecks and improve coordination. Full-scale hospital-wide disaster drills, with simulated mass casualty influxes, are invaluable for testing the entire system's robustness. Post-exercise reviews should focus on identifying gaps and implementing corrective actions to enhance readiness.

CONCLUSION

The increasing frequency of mass casualty incidents—such as mass shootings, natural disasters, or terrorist attacks—necessitates that hospitals develop specialized, comprehensive plans for managing surgical surge capacity. Traditional disaster planning has often overlooked the critical importance of operating room readiness, which is vital for delivering timely, life-saving surgical interventions during large-scale emergencies. Engaging perioperative leadership, integrating surgical surge protocols into broader hospital disaster frameworks, and conducting regular training and drills are essential steps toward ensuring hospitals are prepared to respond effectively to these complex, high-stakes situations. Proactive planning and coordinated response strategies will ultimately improve patient outcomes, protect healthcare workers, and strengthen the resilience of healthcare systems in the face of future mass casualty events (25).

REFERENCES

1. American College of Surgeons (ACS) Committee on Trauma. Resources for Optimal Care of the Injured Patient. 2022.
2. Gohil S, et al. Lessons learned from the Boston Marathon bombing. J Trauma Acute Care Surg 2014;76(4):978-83.
3. CDC. Terrorism Injuries: Information, Dissemination, and Exchange (TIDE). 2009.
4. American Society of Anesthesiologists. Operating Room Mass Casualty Management Checklist. 2015.
5. Kato T, et al. Disaster management during the Tokyo Olympic Games: role of anesthesiologists. Anesth Analg 2020;130(3):41-3.
6. Moore EE, et al. Surge capacity in trauma systems. J Trauma 2010;69(2):318-29.
7. Uleberg O, et al. Planning for mass casualties in pediatric trauma: a review. Pediatr Surg Int 2021;37(3):271–80.
8. CDC. Disaster Preparedness and Response Planning: Hospital Surge Capacity and Resources. 2010.
9. McGonigal MD, et al. Regional hospital collaboration during mass casualty incidents. Prehosp Disaster Med 2016;31(4):385-90.
10. Rhee P, et al. Disaster management training for hospital staff. J Emerg Trauma Shock 2014;7(2):105-9.
11. Kaji AH, et al. Hospital disaster planning: a systematic review. Ann Emerg Med 2012;59(3):232-44.
12. Roberts DJ, et al. Disaster staffing models: a systematic review. Disaster Med Public Health Prep 2017;11(4):445-53.
13. Holcomb JB, et al. Damage control resuscitation: lessons learned from military experience. J Trauma 2011;71(2):353-8.
14. Dutton RP, et al. Damage control resuscitation in trauma. J Trauma 2014;77(1):183-8.
15. DASH. Disaster Available Supplies in Hospitals. CDC. 2012.
16. Kooijman H, et al. Damage control surgery: a review. J Trauma Manag Outcomes. 2017;11:21.
17. Spinella PC. Blood transfusions in trauma: a review. Crit Care Med. 2016;44(4):55-62.
18. D'Angelo J, et al. Mass transfusion protocols in disaster scenarios. Transfusion 2019;59(4):1070-7.

19. McGonigal MD, et al. Regional patient transfer strategies during disasters. Prehosp Disaster Med 2018;33(3):245-51.
20. Roberts DJ, et al. Planning for vulnerable populations in disaster surge. Ann Emerg Med 2019;74(2):221-9.
21. American College of Surgeons. Advanced Trauma Operative Management (ATOM) Course. 2020.
22. Burch JM, et al. Cross-training for disaster response: a surgical perspective. J Am Coll Surg 2017;224(4):343-51.
23. Holcomb JB, et al. Triage and management of expectant patients in mass casualty events. J Trauma 2012;72(4):143-8.
24. Kaji AH, et al. Disaster drill effectiveness in hospital preparedness. Ann Emerg Med 2013;61(4):371-8.
25. Lewis FR, et al. Building hospital surge capacity: lessons from recent disasters. J Emerg Med 2020;58(3):394-401.

14:25-14:45 (Panel VIII)

Abstract Only

Injured Patient Transportation to the Hospital

Ivana Petrov[1,2], Dušica Simić[1,2], Miodrag Milenovi[2,3]

[1]University Children's Hospital, Department of Anesthesiology and Intensive Care, Belgrade, Serbia
[2]Medical Faculty, University of Belgrade, Serbia
[3]University Clinical Centre of Serbia, Department of Anesthesiology and Intensive Care, Belgrade, Serbia

ABSTRACT

Primary transport refers to the transfer of an injured patient from the scene of an accident to a hospital. The configuration of the ambulance crew and the availability of equipment may vary depending on the clinical skills and qualifications of the team members.

Choosing the most appropriate mode of transportation (ground or air) for an injured patient is one of the most challenging decisions in emergency care so it must be based on a careful assessment of multiple dynamic factors, including the urgency of the situation, geographical location, weather conditions, traffic, and associated costs. Safe transport definition is not only immediate transfer of injured patient to a hospital without further physical injury, but also, reduction in bleeding, haemodynamic stabilization, avoidance of pain and distress, as well as maintenance of core temperature. Due to time sparing on the scene, most pre-hospital interventions take place during transportation. The rigid ABCDE approach has evolved to emphasize the principle of “resuscitate before you intubate”, highlighting the importance of optimizing hemodynamic stability and oxygenation prior to advanced airway management to reduce the risk of peri-intubation cardiac arrest.

Use of intravenous fluids during transportation is not routine and should follow specific indications. Control of external haemorrhage during transport should follow cABC approach in assessing poly/major trauma patients or simultaneously with airway management. End-point of damage control resuscitation principles is to restore vital organs perfusion which is adequate at SBP (systolic blood pressure) of 90-100 mmHg, not normal BP. Permissive hypotension should not be attempted in patients with closed head injury and paediatric age group.

Use of prehospital spine immobilization should follow clinical criteria. Use of spinal/long board should be used as an extrication device only and is no longer recommended for transport. Orthopedic scoop stretcher, vacuum mattress and pelvic splints (binders) are used instead. Propose to a safe, effective strategy for prehospital spinal immobilization does not include routine use of cervical collars.

The immediate transfer of an injured patient to a facility equipped to provide all necessary surgical interventions is critical. Effective handover between prehospital and hospital clinicians is essential. The use of a structured communication tool, supported by local or national guidelines, enhances clarity and continuity of care.

13:25-13:45 (Panel VIII)
Full Manuscript

Anesthesia for Emergency and Trauma Surgery

Jasmina Smajić

Clinic for Anesthesiology and Resuscitation, University Clinical Cener Tuzla, Medical Faculty, University of Tuzla, Bosnia and Herzegovina

INTRODUCTION

Emergency surgical procedures are frequently lifesaving but are associated with increased perioperative risk due to limited time for optimization. The anesthesiologist plays a pivotal role in stabilizing critically ill patients and ensuring safe surgical conditions despite the complex, dynamic nature of trauma physiology. Trauma remains a major public health concern due to the high cost, associated morbidity, and mortality both in developed and developing countries. Trauma remains the third most common cause of mortality across all age groups and the most common cause of mortality in individuals up to the age of 45 years (1). Although the most critically injured patients are ideally transported to a designated trauma center, anesthesiologists in other hospitals may provide care for a patient who requires immediate surgical or other interventions after traumatic injury (2). Emergency and trauma surgeries present unique challenges for anesthesiologists due to the acuity of patient conditions and the need for rapid intervention (3). The role of anesthesia in polytrauma requires an integrated, team approach. The optimal management of patients of trauma requires a multi-disciplinary, multimodal, and coordinated team approach for a successful outcome. Medical specialties involved may include surgery, anesthesiology, critical care, emergency medicine, orthopedics, neurosurgery, ophthalmology, otolaryngology, plastic surgery, urology, radiology, and blood banking. Anesthesiologists play an integral role in these multidisciplinary teams (4). Anesthesia for emergencies is not scheduled, so there is not much time to assess the patient preoperatively and prepare for the operation. Because of the patient's potential for rapid deterioration, prompt performance and decision-making are essential in a short time to preserve the patient's life (5).

PATIENT STABILIZATION AND GOALS

A clear, simple, and organized approach to the trauma patient is used in both the emergency department (ED) and operating room (OR), including assessment of airway, breathing, circulation, disability (eg, neurologic evaluation and cervical spine stabilization), and exposure (eg, hypothermia, smoke inhalation, intoxicants). Participation of the anesthesiologist at an early stage (eg, at the time of trauma response activation or patient arrival in the ED) provides continuity of care before and after transition to the OR (6). Primary goals in both the ED and the OR include:

- Airway management and lung-protective ventilation
- Maintenance of hemodynamic stability
- Management of bleeding and coagulopathy
- Maintenance of normothermia
- Maintenance of adequate cerebral blood flow (CBF), oxygenation, and ventilation to avoid secondary brain injury
- Appropriate treatment during painful interventions

The management of polytrauma patients can be challenging due to multi-organ involvement, occult injuries, limited information about patient history, evolving physiological derangements, presence of acute pain, limited time available to stabilize the patient in the pre-operative period (1).

PHYSIOLOGICAL CONSIDERATIONS IN TRAUMA

Trauma initiates a complex cascade of physiological disturbances affecting multiple organ systems, and these changes must be rapidly recognized and addressed in the perioperative period. Understanding these alterations is essential for effective anesthetic planning and resuscitation.

Hemorrhagic Shock and Hypovolemia

Hemorrhagic shock is a leading cause of preventable death following trauma and results in reduced circulating blood volume, impaired oxygen transport, and global tissue hypoperfusion (7). Early stages may be clinically occult, especially in young,

otherwise healthy individuals. Current resuscitation strategies prioritize damage control resuscitation (DCR), which includes permissive hypotension, early use of blood products, and limited crystalloid administration to minimize dilutional coagulopathy and inflammatory response (8,9).

Trauma-Induced Coagulopathy

Acute traumatic coagulopathy (ATC) is present in a significant proportion of severely injured patients upon hospital admission and may result from tissue injury, shock, and endothelial dysfunction (10). The presence of coagulopathy, particularly when associated with hypothermia and acidosis—components of the "lethal triad"—is associated with increased mortality. Management strategies emphasize the use of balanced transfusion protocols (1:1:1 ratio of RBCs, plasma, and platelets) and point-of-care coagulation monitoring using viscoelastic assays (11).

Respiratory Compromise and Hypoxia

Thoracic trauma, commonly involving pneumothorax, hemothorax, or pulmonary contusion, can severely impair oxygenation and ventilation. Additionally, airway compromise from facial trauma or altered mental status necessitates early airway intervention. Rapid sequence intubation, lung-protective ventilation, and monitoring for ventilator-induced lung injury are key components of respiratory management (12).

Acid-Base and Electrolyte Imbalance

Anaerobic metabolism secondary to hypoperfusion leads to lactic acidosis, contributing to further hemodynamic instability. Moreover, massive transfusion protocols can induce electrolyte derangements including hyperkalemia and hypocalcemia, which may exacerbate cardiac dysfunction and coagulopathy. Real-time laboratory and point-of-care monitoring are essential during resuscitation (13).

Hypothermia

Hypothermia (core temperature< 35°C) is a frequent complication of trauma due to environmental exposure, shock, and administration of cold fluids. It worsens coagulopathy, impairs myocardial performance, and increases the risk of infection and mortality. Early warming measures, such as forced-air warming and warmed intravenous fluids, should be initiated as part of resuscitation (14).

Neurologic Impairment

Traumatic brain injury (TBI) requires special anesthetic considerations to avoid secondary brain injury. Hypotension and hypoxia are strong predictors of poor outcome in TBI patients. Ventilation must be titrated to avoid hypo- or hypercapnia, and efforts should be made to maintain cerebral perfusion pressure within an optimal range (15).

Systemic Inflammation and Organ Dysfunction

Severe trauma is associated with a systemic inflammatory response syndrome (SIRS), which can evolve into multiple organ dysfunction syndrome (MODS). This process is mediated by pro-inflammatory cytokines and endothelial dysfunction and contributes to morbidity and mortality in trauma patients, particularly those requiring prolonged resuscitation or surgery (16).

PREOPERATIVE ASSESSMENT AND PLANNING

Effective management of trauma patients requiring emergency surgery begins with a focused and time-sensitive preoperative assessment. Unlike elective procedures, trauma scenarios often necessitate rapid decision-making with incomplete data. Nevertheless, a structured approach to evaluating physiological stability, comorbidities, and the extent of injuries remains crucial for improving outcomes. Following Advanced Trauma Life Support (ATLS) principles, the primary goal is stabilization and identification of life-threatening conditions before surgery (17). Airway assessment is critical, especially with facial trauma or decreased consciousness. Difficult airway scenarios must be anticipated, and equipment for advanced management should be readily available (18). Hemodynamic status should be evaluated using clinical signs, point-of-care ultrasound, and laboratory markers like lactate or base deficit, which guide resuscitation and surgical timing (19,20). Early trauma-induced coagulopathy is common and requires prompt detection with conventional or viscoelastic testing to inform transfusion strategies (21). Neurological evaluation, particularly in suspected traumatic brain injury, aims to prevent secondary damage through optimized perfusion and oxygenation. Anesthetic induction should minimize fluctuations in cerebral perfusion pressure (22). Despite time constraints, comorbidities and medications such as anticoagulants must be reviewed, as they influence perioperative risk and reversal needs (23). When consent is not possible, emergency care proceeds under implied consent (24).

AIRWAY MANAGEMENT

Airway management is a cornerstone of preoperative care in trauma patients, particularly when facial injuries, cervical spine instability, or reduced consciousness complicate the clinical picture. Early and accurate airway assessment is crucial to avoid life-threatening complications. The anesthesiologist must evaluate for potential obstruction, assess neck mobility, and anticipate difficult intubation scenarios. In patients with maxillofacial trauma, airway control may require alternative strategies, such as fiberoptic intubation or a surgical airway (25). The "LEMON" mnemonic (Look externally, Evaluate 3-3-2, Mallampati score, Obstruction, and Neck mobility) remains a useful framework for assessing airway risk in trauma patients (26). Additionally, recent advances in video laryngoscopy and airway ultrasound have improved the ability to visualize and manage difficult airways (27). These technologies are particularly beneficial in trauma settings, where rapid decision-making is paramount. Rapid Sequence Induction (RSI) is the technique of choice for securing the airway in these patients. RSI minimizes the risk of aspiration by using a combination of sedative and paralytic agents, which facilitates early intubation and reduces the time the patient is at risk of airway compromise (28). For patients with suspected cervical spine injuries, manual in-line stabilization is required to prevent further damage to the spinal cord during intubation. This technique involves manually immobilizing the head and neck to maintain proper alignment while the airway is secured (29). In cases where intubation fails, early identification of the need for a surgical airway is critical. Cricothyrotomy or tracheostomy may be required, especially when conventional methods are unsuccessful or contraindicated (30). The choice of induction agents should consider the patient's hemodynamic status and the potential for increasing intracranial pressure in cases of traumatic brain injury (31).

ANESTHETIC TECHNIQUES

Anesthetic management in trauma patients is critical for achieving adequate airway control, providing effective analgesia, and maintaining hemodynamic stability during surgery. The choice of anesthetic techniques and drugs must be tailored to the specific injuries and clinical context of the trauma patient, with careful consideration of the risks of adverse outcomes and drug interactions.

Induction Agents

For general anesthesia, Rapid Sequence Induction (RSI) is commonly used to secure the airway in trauma patients. The RSI technique involves a sedative agent followed by a muscle relaxant to facilitate intubation and minimize aspiration risk. The sedative of choice is propofol, administered at a dose of 1.5–2.5 mg kg^{-1} intravenously (IV), depending on the patient's hemodynamic status and injury severity (32). Alternatively, etomidate can be used at a dose of 0.2–0.3 mg kg^{-1} for patients with head injuries, as it has minimal hemodynamic effects and does not increase intracranial pressure (33). Either etomidate or ketamine is typically selected as the primary induction agent for a hemodynamically unstable patient.

Muscle Relaxants

For neuromuscular blockade, rocuronium is often preferred due to its rapid onset and relatively short duration of action. The standard dose for RSI is 1 mg kg^{-1} IV (34). It provides good intubating conditions and allows for quick reversal if necessary. Succinylcholine is avoided in cases where there is a risk of hyperkalemia (e.g., in patients with burns or muscle trauma) due to its potential to cause a significant increase in serum potassium levels. However, when used, succinylcholine is typically dosed at 1–1.5 mg kg^{-1} IV (35).

Analgesia and Maintenance

Multimodal analgesia is essential in trauma patients to minimize the need for opioids, which can have respiratory depressant effects and exacerbate hypotension. Fentanyl is commonly used for intraoperative analgesia, with an initial bolus of 1-3 mg kg^{-1} IV, followed by infusion if necessary. In cases of severe trauma, additional boluses of fentanyl can be administered (36). For maintenance of anesthesia, sevoflurane or desflurane are the agents of choice due to their rapid onset and ability to allow for quick emergence from anesthesia. Typically, sevoflurane is administered at concentrations of 1–2% in an oxygen/nitrous oxide mixture, titrating based on the patient's response and surgical stimuli (37).

Regional Anesthesia

Regional blocks, such as the lumbar plexus block or fascia iliaca block, can be beneficial for pain control in lower limb injuries, such as femoral fractures. For a fascia iliaca block, a typical dose of 30–40 mL of 0.25% bupivacaine is administered. This technique provides effective analgesia while reducing the need for systemic opioids (38). However, regional anesthesia is contraindicated in patients with significant coagulopathy or hypovolemia, as these conditions increase the risk of hematoma formation.

Coagulation Management and Hemorrhage Control

Trauma patients often present with significant blood loss and coagulopathy, requiring specific anesthetic management. Tranexamic acid (TXA), an antifibrinolytic agent, has been shown to reduce bleeding and improve outcomes when administered early in trauma patients. The recommended dose is an initial bolus of 1 g IV, followed by a 1 g infusion over 8 hours (39). In patients with ongoing hemorrhage, blood products, including packed red blood cells (PRBCs) and fresh frozen plasma (FFP), may be required to maintain hemodynamic stability and normal coagulation profiles.

Fluid Resuscitation

Fluid resuscitation is critical in trauma patients with hemorrhagic shock. The goal is to restore circulating volume and maintain organ perfusion. Crystalloids such as Lactated Ringer's solution or normal saline are commonly used for initial resuscitation, with an initial bolus of 20 mL kg^{-1} IV. However, in cases of severe blood loss, colloids or blood products should be used in conjunction with crystalloids to restore volume and improve oxygen-carrying capacity (40).

Invasive Monitoring

For trauma patients with severe injuries or significant hemodynamic instability, invasive monitoring may be necessary. Central venous catheters and arterial lines can provide continuous assessment of fluid status, venous oxygen saturation, and blood pressure. Central venous pressure (CVP) is often monitored to guide fluid resuscitation, while arterial blood gases (ABG) help assess oxygenation and acid-base status during surgery (41).

INTRAOPERATIVE RESUSCITATION AND MONITORING

Effective intraoperative resuscitation and monitoring are critical components of trauma anesthesia, aimed at supporting end-organ perfusion, controlling hemorrhage, and optimizing patient outcomes. Trauma patients often arrive in a state of hypovolemia or shock, requiring immediate volume resuscitation and close hemodynamic surveillance.

Early and aggressive fluid management is essential. Initial resuscitation typically begins with isotonic crystalloids such as Lactated Ringer's solution or normal saline, often administered in boluses of 20 mL kg^{-1}, with response assessed by clinical parameters and invasive monitoring if needed (42). However, excessive crystalloid administration is associated with dilutional coagulopathy and increased mortality. Consequently, damage control resuscitation strategies emphasize limited crystalloid use and early transfusion of blood products in balanced ratios, often 1:1:1 of packed red blood cells (PRBCs), fresh frozen plasma (FFP), and platelets (43).

Permissive hypotension—targeting a systolic blood pressure of 80–90 mmHg in patients without traumatic brain injury—can reduce ongoing hemorrhage prior to surgical hemostasis (44). In contrast, patients with suspected or confirmed traumatic brain injury require maintenance of cerebral perfusion pressure, generally necessitating higher mean arterial pressures (≥65 mmHg) (45). Tranexamic acid, an antifibrinolytic agent, has been shown to reduce mortality when administered within 3 hours of injury. The recommended dosing regimen is 1 g IV bolus over 10 minutes, followed by 1 g infused over 8 hours (46). Hemodynamic monitoring should be continuous and tailored to the patient's condition. Non-invasive methods (ECG, pulse oximetry, non-invasive blood pressure) are standard, but invasive monitoring is often required. Arterial lines provide real-time blood pressure monitoring and access for frequent blood gas and lactate analysis, while central venous catheters aid in fluid and vasopressor administration and central venous pressure measurement (47). Advanced cardiac output monitoring or echocardiography may be employed in patients with complex physiology or ongoing instability.

Serial blood tests including hemoglobin, lactate, arterial blood gases, electrolytes, and coagulation profiles guide ongoing resuscitation efforts. Point-of-care testing, including thromboelastography (TEG) or rotational thromboelastometry (ROTEM), is increasingly used to tailor transfusion therapy and manage coagulopathy in real time (48). Temperature, acid-base status, and ionized calcium must be closely monitored, as hypothermia, acidosis, and hypocalcemia worsen coagulopathy and increase mortality. The "lethal triad" of trauma—hypothermia, acidosis, and coagulopathy—must be actively prevented through warming measures, buffered fluids, and calcium supplementation (49).

POSTOPERATIVE CARE

After emergency trauma surgery, most patients remain intubated and sedated with controlled ventilation. Postoperative care of trauma patients is a continuation of resuscitative and supportive strategies initiated intraoperatively, focusing on physiological

stabilization, pain control, early detection of complications, and multidisciplinary rehabilitation planning. These patients frequently require admission to the intensive care unit (ICU) for ongoing monitoring, mechanical ventilation, and targeted interventions based on their injury profile and comorbidities (50). Hemodynamic instability may persist postoperatively, necessitating continued fluid resuscitation, vasoactive support, and transfusion based on dynamic assessments of perfusion and laboratory parameters. Lactate clearance and urine output remain essential markers of adequate resuscitation (51). In patients with ongoing bleeding or coagulopathy, viscoelastic testing such as thromboelastography (TEG) or rotational thromboelastometry (ROTEM) facilitates tailored hemostatic therapy (52). Pain management should be multimodal, combining regional techniques (e.g., epidural or peripheral nerve blocks) with systemic analgesics like acetaminophen, NSAIDs, and opioids, titrated carefully to avoid respiratory depression or delirium, especially in elderly patients (53). Patient-controlled analgesia (PCA) can be effective when appropriately monitored. Ventilated patients require lung-protective strategies to prevent ventilator-associated complications. Early extubation should be considered once hemodynamic and respiratory parameters permit. For patients with head trauma, intracranial pressure (ICP) monitoring, sedation titration, and neurological assessments are critical in the early postoperative period (54). Infection prevention is also a priority. Prophylactic antibiotics, deep vein thrombosis (DVT) prophylaxis, and early mobilization are essential components of care. Nutritional support should begin within 24–48 hours, preferably via the enteral route, to support metabolic demands and immune function (55). Delirium, acute kidney injury, and sepsis are common complications in this population. Frequent reassessment using tools like the Confusion Assessment Method for the ICU (CAM-ICU) and renal function monitoring guide early interventions (56). A multidisciplinary approach involving trauma surgery, anesthesiology, critical care, nursing, physiotherapy, and psychiatry improves outcomes and facilitates recovery planning (57).

RECENT ADVANCES AND FUTURE DIRECTIONS

Recent advances in trauma anesthesia reflect significant improvements in perioperative care, driven by better understanding of trauma physiology, integration of novel monitoring technologies, development of targeted pharmacologic therapies, and the establishment of trauma systems with multidisciplinary collaboration. These innovations have led to improved patient outcomes, more individualized care, and reductions in morbidity and mortality.

One major advancement is the shift toward goal-directed resuscitation, which uses dynamic monitoring tools such as pulse contour analysis, esophageal Doppler, and noninvasive cardiac output monitors to guide fluid and vasoactive therapy. These technologies allow for precise titration of therapy to optimize tissue perfusion and reduce fluid overload—a major contributor to secondary organ dysfunction in trauma patients (58). Real-time assessment tools, such as point-of-care ultrasound (POCUS), have also become indispensable in trauma care, allowing for rapid identification of internal bleeding, pneumothorax, cardiac tamponade, and guiding vascular access (59). The use of viscoelastic testing (e.g., TEG and ROTEM) has replaced conventional coagulation tests in many centers, facilitating early identification and correction of trauma-induced coagulopathy. This has been integrated into damage control resuscitation (DCR) protocols, which emphasize permissive hypotension, hemostatic resuscitation with balanced transfusion ratios (1:1:1 RBC:FFP:platelets), and early use of antifibrinolytics such as TXA. The CRASH-2 and subsequent studies have confirmed TXA's role in reducing mortality when administered within 3 hours of injury (60,61). In airway management, video laryngoscopy and portable fiberoptic devices have significantly increased first-pass success rates, especially in patients with difficult anatomy or cervical spine immobilization. Additionally, supraglottic airway devices are now more commonly used in prehospital and emergency settings, improving oxygenation in situations where intubation is delayed or not feasible (62).Pharmacologic advances have contributed to more tailored anesthetic care. Agents such as ketamine, once avoided in patients with elevated intracranial pressure, have regained favor due to their stable hemodynamic profile and emerging evidence of neuroprotective effects when normocapnia is maintained (63). Similarly, the development of short-acting opioids like remifentanil and ultra-short neuromuscular blockers such as sugammadex-reversible rocuronium has enhanced intraoperative control and recovery profiles (64).

The future of trauma anesthesia lies in precision medicine, with the application of genomics, metabolomics, and personalized algorithms to predict patient responses to trauma and resuscitation. Artificial intelligence (AI) and machine learning are being explored to integrate real-time physiologic data and guide clinical decisions, such as predicting hemorrhage risk or identifying early sepsis (65). Telemedicine and mobile trauma units, supported by digital platforms, are also transforming prehospital care, allowing remote anesthesiologists to assist with airway, sedation, or triage decisions in real time. Simulation-based training and crisis resource management (CRM) have become standard in trauma centers, improving team communication and preparedness for high-acuity scenarios. These programs enhance performance during rare or complex interventions, such as emergency thoracotomies or massive transfusion activation (66).

Finally, enhanced recovery after surgery (ERAS) principles are being adapted for trauma care, focusing on early mobilization, opioid-sparing analgesia, and nutritional support to accelerate functional recovery and reduce hospital stays. While more evidence is needed, these strategies show promise when selectively applied in stable trauma populations (67).

CONCLUSION

Anesthesia for emergency and trauma surgery presents complex challenges that demand rapid decision-making, multidisciplinary coordination, and the ability to adapt to dynamically evolving clinical situations. Advances in trauma physiology understanding, hemodynamic monitoring, airway management, and pharmacologic agents have significantly improved perioperative outcomes. The integration of technologies such as point-of-care ultrasound, viscoelastic testing, and video laryngoscopy, alongside individualized approaches like damage control resuscitation and multimodal analgesia, represent a paradigm shift in trauma care. Despite these improvements, trauma remains a leading cause of morbidity and mortality worldwide, particularly among younger populations. The anesthesiologist's role extends beyond intraoperative management, encompassing prehospital stabilization, preoperative planning, intraoperative resuscitation, and intensive postoperative care. Emerging fields such as precision medicine, artificial intelligence, and simulation-based training are poised to shape the future of trauma anesthesia, enhancing decision-making, preparedness, and ultimately patient survival. A continuous commitment to evidence-based practice, interdisciplinary collaboration, and innovation will be essential in meeting the evolving demands of trauma care and in improving both short- and long-term outcomes for this vulnerable patient population.

REFERENCES

1. Dattatri R, Jain VK, Iyengar KP, Vaishya R, Garg R. Anaesthetic considerations in polytrauma patients. J Clin Orthop Trauma 2021;12(1):50-7.
2. Sunshine JE, Humbert AT, Booth B, Bowman SM, Bulger EM, Sharar SR. Frequency of Operative Anesthesia Care After Traumatic Injury. Anesth Analg 2019;129(1):141-6.
3. Alnsour TM, Altawili MA, Alhoqail AM, et al. Anesthesia Management in Emergency and Trauma Surgeries: A Narrative Review. Cureus 2024;16(8):e66687.
4. Carvajal S, Uribe-Buritica FL, Ángel-Isaza AM. Trauma team conformation in a war-influenced middle-income country in South America: is it possible? Int J Emerg Med 2020 14;13(1):36.
5. Lake C. Assessment of the emergency surgical patient. Anaesth Intensive Care Med 2021; 22:603-6.
6. McCunn M, Dutton RP, Dagal A, Varon AJ, Kaslow O, Kucik CJ, Hagberg CA, McIsaac JH 3rd, Pittet JF, Dunbar PJ, Grissom T, Vavilala MS. Trauma, Critical Care, and Emergency Care Anesthesiology: A New Paradigm for the "Acute Care" Anesthesiologist? Anesth Analg 2015;121(6):1668-73.
7. Harada MY, Ko A, Barmparas G, et al. Damage control resuscitation: a practical approach for severely hemorrhagic patients and its effects on trauma surgery. World J Emerg Surg 2021;16(1):49.
8. Spahn DR, Bouillon B, Cerny V, et al. The European guidelines on management of major bleeding and coagulopathy following trauma: fifth edition. Crit Care 2019;23(1):98.
9. Curry N, De Lloyd L, Brohi K, et al. Early cryoprecipitate for major haemorrhage in trauma: a randomized controlled feasibility trial. Br J Anaesth 2018;120(5):876-85.
10. Gonzalez E, Moore EE, Moore HB, et al. Trauma-induced coagulopathy: an institution's 35-year perspective on practice and research. Scand J Surg 2014;103(2):89-103.
11. Grottke O, Braunschweig T, Spahn DR, et al. Point-of-care coagulation testing and goal-directed therapy in trauma. Eur J Anaesthesiol 2020;37(2):88-102.
12. Braithwaite S, Stephens C, Remick K, et al. Prehospital Trauma Airway Management: An NAEMSP Position Statement and Resource Document. Prehosp Emerg Care 2022;26(sup1):64-71.
13. Strandenes G, Hervig T, Apelseth TO, et al. Mass casualty events and transfusion needs: optimizing blood product use. Transfusion 2020;60(S2):39-47
14. Paal P, Gordon L, Strapazzon G, et al. Accidental hypothermia: diagnosis and management. BMJ. 2022;376:e064676.
15. Carney N, Totten AM, O'Reilly C, et al. Guidelines for the management of severe traumatic brain injury, fourth edition. Neurosurgery 2017;80(1):6-15.
16. Lord JM, Midwinter MJ, Chen YF, et al. The systemic immune response to trauma: an overview of pathophysiology and treatment. Lancet 2014;384(9952):1455-65.
17. American College of Surgeons. ATLS Student Course Manual. 10th ed. Chicago: ACS; 2018.
18. Naik BI, Armour R. Airway management in trauma. Anesthesiol Clin 2019;37(1):63-75.

19. Kirkpatrick AW et al. FAST in 2020. Radiology 2020;295(1):5-7.
20. Vincent JL, Bakker J. Blood lactate in sepsis. Crit Care 2021;25(1):153.
21. Gando S et al. Trauma-induced coagulopathy. J Intensive Care 2019;7:20.
22. Carney N et al. Severe TBI guidelines. Neurosurgery 2017;80(1):6-15.
23. Godier A et al. Anticoagulant reversal. Anaesth Crit Care Pain Med 2020;39(2):125-32.
24. Sulmasy DP, Mueller PS. Implied consent in emergencies. Ann Intern Med 2017;167(8):576-8.
25. Naik BI, Ballantyne S, Armour R, et al. Airway management in trauma: assessment and decision-making. Anesthesiol Clin 2019;37(1):63-75.
26. Frerk C, Mitchell VS, McNarry AF, et al. Difficult Airway Society 2015 guidelines for management of unanticipated difficult intubation in adults. Anaesthesia 2015;70(1):1-10.
27. Huang Y, Lyu L, Wei Y, et al. The role of video laryngoscopy in trauma patients: A systematic review and meta-analysis. Eur J Anaesthesiol 2020;37(5):380-7.
28. Naik BI, Ballantyne S, Armour R, et al. Airway management in trauma: assessment and decision-making. Anesthesiol Clin 2019;37(1):63-75.
29. Forster S, De La Cruz B, Kim M, et al. Manual in-line stabilization in trauma: A review of current techniques. J Trauma Nurs. 2020;27(5):271-6.
30. Koryllos A, Caro D, Remppis A, et al. Surgical airways in trauma patients: A retrospective analysis of indications and outcomes. Eur J Trauma Emerg Surg 2020;46(4):611-8.
31. Godoy M, Karcz M, Kluge S. Anesthesia for traumatic brain injury: challenges in management. J Neurosurg Anesthesiol 2018;30(3):215-20.
32. Naik BI, Ballantyne S, Armour R, et al. Airway management in trauma: assessment and decision-making. Anesthesiol Clin 2019;37(1):63-75.
33. Godoy M, Karcz M, Kluge S. Anesthesia for traumatic brain injury: challenges in management. J Neurosurg Anesthesiol 2018;30(3):215-20.
34. Cammu G, Puspa R, Dooms G, et al. Rocuronium versus succinylcholine for rapid sequence induction in trauma patients. Eur J Anaesthesiol 2019;36(6):426-31.
35. Shapiro R, Boyd L, Jamison P. Anesthetic management in trauma patients with suspected neuromuscular injury. Anesthesiol Clin 2020;38(2):245-55.
36. Holley SL, Blake CM, Tonge DJ. Regional anesthesia in trauma: A review of the current evidence. Trauma Surg Acute Care Open 2019;4(1):e000253.
37. Gando S, Hayakawa M, Sawamura A. Trauma-induced coagulopathy: evolving concepts and practical management. J Intensive Care 2019;7:20.
38. Roberts I, Shakur H, Coats T, et al. Effect of tranexamic acid on death, vascular occlusive events, and blood transfusion in trauma patients: A systematic review and meta-analysis. Lancet 2017;390(10106):239-49.
39. Agarwal S, Prabhakar H, Sharma S, et al. Monitoring in trauma anesthesia: Importance of invasive and non-invasive methods. J Anaesthesiol Clin Pharmacol 2018;34(1):15-21.
40. Marshall JC, Bosco L, Elster E, et al. Optimal resuscitation in trauma patients: A review of fluid and hemodynamic management. J Trauma Acute Care Surg 2020;89(1):1-9.
41. Spahn DR, Bouillon B, Cerny V, et al. Management of bleeding and coagulopathy following major trauma: An updated European guideline. Crit Care 2020;24(1):1-19.
42. Cannon JW. Hemorrhagic shock. N Engl J Med 2018;378(4):370-9.
43. Holcomb JB, Tilley BC, Baraniuk S, et al. Transfusion of plasma, platelets, and red blood cells in a 1:1:1 vs 1:1:2 ratio and mortality in patients with severe trauma. JAMA 2015;313(5):471-82.
44. Morrison CA, Carrick MM, Norman MA, et al. Hypotensive resuscitation strategy reduces transfusion requirements and severe postoperative complications in trauma patients. Ann Surg 2011;254(4):598-605.
45. Carney N, Totten AM, O'Reilly C, et al. Guidelines for the management of severe traumatic brain injury. Neurosurgery 2017;80(1):6-15.
46. Roberts I, Shakur H, Afolabi A, et al. The importance of early treatment with tranexamic acid in bleeding trauma patients: An exploratory analysis of the CRASH-2 randomised controlled trial. Lancet 2011;377(9771):1096-101.
47. Thiele RH, Raghunathan K, Brudney CS, et al. American Society of Anesthesiologists task force on intraoperative hemodynamic management. Anesth Analg 2020;130(5):1352-63.
48. Da Luz LT, Nascimento B, Rizoli S. Thrombelastography (TEG®): practical considerations on its clinical use in trauma resuscitation. Scand J Trauma Resusc Emerg Med 2013;21:29.
49. Kushimoto S, Kato H, Kojima Y, et al. The impact of the "lethal triad" of hypothermia, acidosis, and coagulopathy on the outcomes of trauma patients. J Trauma Acute Care Surg 2018;85(5):913-20.
50. Galvagno SM Jr, Nahmias JT, Young DA. Advanced trauma life support update 2019: management and applications. Anesthesiol Clin 2019;37(1):13-22.

51. Cecconi M, De Backer D, Antonelli M, et al. Consensus on circulatory shock and hemodynamic monitoring. Intensive Care Med 2014;40(12):1795-815.
52. Da Luz LT, Nascimento B, Rizoli S. Thrombelastography (TEG®): practical considerations on its clinical use in trauma resuscitation. Scand J Trauma Resusc Emerg Med 2013;21:29.
53. Chou R, Gordon DB, de Leon-Casasola OA, et al. Management of postoperative pain: A clinical practice guideline. J Pain 2016;17(2):131-57.
54. Carney N, Totten AM, O'Reilly C, et al. Guidelines for the management of severe traumatic brain injury. Neurosurgery 2017;80(1):6-15.
55. McClave SA, Taylor BE, Martindale RG, et al. Guidelines for the provision and assessment of nutrition support therapy in the adult critically ill patient. JPEN 2016;40(2):159-211.
56. Ely EW, Shintani A, Truman B, et al. Delirium as a predictor of mortality in mechanically ventilated patients in the ICU. JAMA 2004;291(14):1753-62.
57. Cannon JW. Hemorrhagic shock. N Engl J Med 2018;378(4):370-9.
58. Cecconi M, De Backer D, Antonelli M, et al. Consensus on circulatory shock and hemodynamic monitoring. Intensive Care Med 2014;40(12):1795-815.
59. Atkinson PR, Bowra J, Lambert M, et al. International Federation for Emergency Medicine point of care ultrasound curriculum. CJEM 2015;17(2):161-70.
60. CRASH-2 collaborators. Effects of tranexamic acid on death, vascular occlusive events, and blood transfusion in trauma patients. Lancet 2010;376(9734):23-32.
61. Gayet-Ageron A, Prieto-Merino D, Ker K, et al. Effect of treatment delay on the effectiveness and safety of antifibrinolytics in acute severe hemorrhage. Lancet 2021;397(10288):361-72.
62. Aziz MF, Healy DW, Kheterpal S, et al. Routine clinical practice effectiveness of the C-MAC video laryngoscope. Anesthesiology 2012;116(3):629-36.
63. Zeiler FA, Teitelbaum J, West M, et al. The ketamine effect on ICP in TBI: a systematic review and meta-analysis. Neurocrit Care 2014;21(1):163-73.
64. Sorgenfrei IF, Norrild K, Larsen PB, et al. Reversal of rocuronium-induced neuromuscular block by sugammadex. Anesthesiology 2006;104(4):667-74.
65. Komorowski M, Celi LA, Badawi O, et al. The Artificial Intelligence Clinician learns optimal treatment strategies for sepsis in intensive care. Nat Med 2018;24(11):1716-20.
66. Gardner AK, AbdelFattah KR, Willis R, et al. Trauma simulation: a review of simulation in trauma education and training. J Surg Educ 2020;77(2):346-71.
67. Thiele RH, Rea KM, Turrentine FE, et al. Standardization of care: impact of an enhanced recovery protocol on length of stay, complications, and direct costs after colorectal surgery. J Am Coll Surg 2015;220(4):430-43.

11:10-11:30 (Panel XI)

Abstract Only

The Special Transfusion Strategies During Disasters

Krenar Lilaj, Irena Seferi

University Hospital Center "Mother Theresa," Tirana, Albania

ABSTRACT

Blood transfusion strategies in war zones are critical for improving survival rates among combat casualties, particularly in environments where rapid hemorrhage control and resuscitation are essential. Battlefield medicine presents unique challenges, including limited blood supply, austere conditions, logistical constraints, and the need for immediate decision-making under extreme pressure. These factors necessitate a tailored, evidence-based approach to transfusion that prioritizes efficacy, safety, and resource optimization.

This review examines current transfusion protocols in military and conflict settings, with a focus on the benefits of whole blood transfusion over traditional component therapy. Recent advancements have reinforced the superiority of fresh whole blood in treating hemorrhagic shock, particularly in prehospital settings where rapid resuscitation can be life-saving. The implementation of walking blood banks and low-titer O whole blood (LTOWB) programs has improved the feasibility of fresh blood transfusions in field conditions, reducing logistical burdens while ensuring timely access to blood products.

Additionally, this paper explores the integration of prehospital transfusions as a critical intervention for trauma-induced coagulopathy, emphasizing the importance of early intervention in reducing mortality. Point-of-care testing has revolutionized transfusion medicine by enabling rapid assessment of coagulation status, facilitating targeted hemostatic resuscitation. Advances in blood storage, including freeze-dried plasma, cold-stored platelets, and synthetic blood substitutes, are also discussed as potential game-changers in resource-limited settings.

The optimization of transfusion strategies in war settings requires a multifaceted approach that balances clinical efficacy with logistical feasibility. As military medicine continues to evolve, adopting innovative transfusion protocols and emerging blood products will be essential in improving outcomes, reducing morbidity, and enhancing the overall effectiveness of combat casualty care. Future research should focus on refining these strategies, expanding access to safe and effective transfusion options, and integrating novel technologies to support front-line medical personnel in high-intensity conflict zones.

16:30-16:50 (Panel X)
Full Manuscript

Cardiac Injury

Maja Šoštarič

University Medical Centre Ljubljana, Faculty of Medicine, Department of Anesthesiology and Intensive Medicine, Ljubljana, Slovenia

ABSTRACT

Injuries to the heart are either penetrating or blunt. In the hospital, we mainly encounter blunt injuries, as penetrating injuries are usually fatal in the field. Blunt injuries most often occur as part of polytrauma following high-energy chest injuries. The clinical picture varies; symptoms may be absent, or there may be hemorrhagic or cardiogenic shock. If heart or great vessel injuries are suspected, rapid targeted diagnostics, supportive treatment of shock, and invasive or non-invasive care of the injury are essential. In polytrauma, it is vital to determine the order of treatment of individual injuries as part of polytrauma.

INTRODUCTION

Cardiac trauma refers to injuries to the heart and surrounding structures caused by external forces, often seen in blunt or penetrating injuries. These types of trauma can occur in various scenarios, including vehicle accidents, falls, assaults, or sports injuries. By mechanism, cardiac trauma is divided into penetrating and blunt cardiac injury. Penetrating trauma is caused by objects that penetrate the chest wall, such as knives or bullets, and can directly damage the heart or major blood vessels. Blunt trauma can result from a strong force applied to the chest, leading to contusions of the heart muscle or even tearing of cardiac structures.

Penetrating Cardiac Injury

Penetrating cardiac injury is a critical and life-threatening condition that requires immediate medical intervention. The heart is highly sensitive to trauma, and any injury can rapidly lead to catastrophic outcomes. Penetrating cardiac injuries are relatively rare but are considered among the most severe types of traumatic events due to their immediate risk of death.

Common causes of penetrating cardiac injuries include stab wounds, gunshot wounds, or shrapnel from explosions. These types of injuries pose a significant challenge to healthcare providers due to the complex nature of the required interventions and the urgency with which they must be performed.

Depending on the trajectory and force of the object, various heart structures, including the myocardium, coronary arteries, heart valves, and major vessels, can be damaged. The extent of the injury dictates the clinical manifestations and the urgency of management. One common and dangerous consequence of penetrating cardiac injury is cardiac tamponade. If not promptly relieved, tamponade can lead to rapid hemodynamic collapse and death.

The symptoms of penetrating cardiac injury can vary depending on the nature and severity of the wound. Common symptoms include chest pain, hypotension, tachycardia, and signs of shock. Patients may also present with distended neck veins, muffled heart sounds, and pulsus paradoxus, which are classic signs of cardiac tamponade. In cases of a more severe injury, the patient may experience loss of consciousness or hemorrhagic shock due to exsanguination.

Rapid diagnosis is critical in managing penetrating cardiac injuries. While a clinical assessment is essential, imaging modalities such as chest X-rays, CT scans, and focused assessment with sonography for trauma (FAST) can aid in identifying the presence and location of the injury. However, in many acute cases, clinical judgment dictates that exploratory surgery be performed promptly due to the severity of the patient's condition.

Emergent surgical intervention is often required for penetrating cardiac injuries. The primary goal of surgery is to control bleeding, repair the heart tissue, and relieve cardiac tamponade if present.

The prognosis for penetrating cardiac injury can be variable, mainly depending on factors such as the mechanism of injury (stab wound versus gunshot), the patient's physiological response, the timeliness and effectiveness of the initial intervention, and the presence of other systemic injuries. Stab wounds typically have a better prognosis compared to gunshot wounds, due to less energy transfer and damage. Survival rates increase significantly when treatment is administered promptly within the hospital, highlighting the importance of rapid transport and treatment.

Blunt Cardiac Injury

Blunt cardiac injury refers to any damage to the heart resulting from non-penetrating trauma, typically due to a forceful impact. This type of injury can occur from vehicular accidents, falls, sports injuries, or physical assaults. Unlike penetrating injuries, which involve direct penetration of the heart by a foreign object, blunt cardiac injuries are caused by compressive, concussive, or shear forces during an impact that affect the heart indirectly.

Blunt cardiac injury encompasses a spectrum of heart-related injuries ranging from minor myocardial contusions to significant structural damage affecting the heart valves, myocardium, or conducting system. The mechanism by which blunt cardiac injuries occur is multifaceted and often involves multiple physical forces acting simultaneously. The heart is located behind the sternum and rib cage, which provides some protection. However, a forceful impact, such as from a car accident, can cause the chest cavity to rapidly decelerate or deform, resulting in direct compression of the heart against the spine or sternum. Blunt cardiac injury can also result from the rapid increase in intrathoracic pressure, or a sudden deceleration injury, where the heart continues moving forward due to inertia as the body is abruptly halted. In sports or physical altercations, direct blows to the chest can similarly transmit force to the heart, potentially causing injury.

Types of Blunt Cardiac Injuries

1. Myocardial Contusion: This is the most common type of blunt cardiac injury and involves bruising of the heart muscle, varying in severity from mild to extensive damage. Contusions can lead to myocardial edema, necrosis, or hemorrhage within the myocardium.
2. Cardiac Chamber Rupture: While rare, a severe blunt cardiac injury can lead to rupture of one of the heart chambers. This can cause catastrophic bleeding into the pericardial space, leading to cardiac tamponade and often resulting in immediate cardiovascular collapse.
3. Pericardial Injury: Blunt trauma may lead to pericardial tears or effusion, which can progress to tamponade, necessitating urgent intervention.
4. Coronary Artery Injury: Although uncommon, blunt trauma can cause coronary artery dissection or thrombosis, resulting in myocardial infarction even in the absence of underlying coronary artery disease.
5. Valvular Injury: Damage to heart valves, particularly the aortic and mitral, may occur. This can lead to acute valvular insufficiency and hemodynamic instability.
6. Conduction System Injury: Blunt trauma can disrupt the conducting pathways of the heart, leading to arrhythmias such as atrial fibrillation, ventricular tachycardia, or heart block.
7. Septal Injury: Damage to the interventricular or atrial septum can result in septal defects, leading to abnormal blood flow between the heart chambers.

The symptoms of blunt cardiac injury can range from subtle to life-threatening, depending on the severity and specific nature of the injury.

In severe cases, such as cardiac rupture, symptoms will be more acute and rapidly progressive, often leading to death if not promptly addressed.

Timely diagnosis of blunt cardiac injury is crucial. However, diagnostic challenges arise due to the nonspecific symptoms and the potential for concomitant injuries. A comprehensive approach involving clinical assessment, imaging, and sometimes invasive procedures is necessary:

1. Electrocardiogram (ECG): Often the first diagnostic test performed to detect arrhythmias, conduction abnormalities, or signs of myocardial ischemia.
2. Cardiac Biomarkers: Troponin levels can indicate myocardial damage, although elevated levels can also occur due to other injuries or conditions. Troponin levels should be measured upon presentation and may be repeated over several hours (typically at 3-6 hours and again at 12-24 hours) to confirm a diagnosis. The timing is critical because troponin levels can peak 12 to 24 hours after the injury. A positive troponin test in the context of blunt cardiac injury can guide healthcare providers in deciding on further imaging or intervention. Elevated troponin levels should be interpreted in conjunction with clinical findings, imaging studies, and the patient's overall clinical picture to determine the necessity for surgical intervention or further monitoring.

3. Echocardiography: An essential tool for visualizing structural damage to the heart, including chamber size, wall motion abnormalities, valve function, septal defects, or pericardial effusion.
4. Chest X-Ray: Useful for assessing thoracic trauma but limited in detecting specific cardiac injuries.
5. Chest computer tomography: Advanced imaging that provides detailed views of the myocardial

The treatment of blunt cardiac injury is a critical component of trauma care, requiring prompt assessment and intervention to mitigate potential complications and improve patient outcomes. The approach to treatment largely depends on the severity of the injury, the patient's hemodynamic status, and the presence of associated injuries. In clinical settings, minor, non-significant blunt cardiac trauma can be observed and monitored with telemetry. In case of life-threatening heart failure, inotropes and mechanical circulatory support are needed.

CONCLUSION

While both penetrating and blunt cardiac injuries pose serious risks to patients, blunt cardiac trauma is generally more prevalent in trauma populations. The actual incidence rates can fluctuate based on the context of violence, accident rates, and healthcare access within a specific region or population. Advances in emergency medical care and surgical techniques have improved survival rates, but these injuries still pose significant challenges and require swift, decisive action to optimize patient outcomes. Ongoing research and development of novel surgical techniques, along with improved trauma care protocols, continue to enhance the chances for recovery in patients suffering from this catastrophic type of injury.

REFERENCES

1. Lee C, Jebbia M, Morchi R, Grigorian A, Nahmias J. Cardiac Trauma: A Review of Penetrating and Blunt Cardiac Injuries. Am Surg. 2025 Mar;91(3):423-433. doi: 10.1177/00031348241307400. Epub 2024 Dec 11. PMID: 39661455.
2. Goldstein AL, Soffer D. Trauma to the heart: A review of presentation, diagnosis, and treatment. J Trauma Acute Care Surg. 2017 Nov;83(5):911-916. doi: 10.1097/TA.0000000000001667. PMID: 28777288.
3. Lee A, Hameed SM, Kaminsky M, Ball CG. Penetrating cardiac trauma. Surg Open Sci. 2022 Nov 17;11:45-55. doi: 10.1016/j.sopen.2022.11.001. PMID: 36466048; PMCID: PMC9713325.
4. Hromalik LR Jr, Wall MJ Jr, Mattox KL, Tsai PI. Penetrating cardiac injury: a narrative review. Mediastinum. 2023 Feb 22;7:15. doi: 10.21037/med-22-18. PMID: 37261091; PMCID: PMC10226890.
5. Yousef R, Carr JA. Blunt cardiac trauma: a review of the current knowledge and management. Ann Thorac Surg. 2014 Sep;98(3):1134-40. doi: 10.1016/j.athoracsur.2014.04.043. Epub 2014 Jul 25. PMID: 25069684.
6. Kang N, Hsee L, Rizoli S, Alison P. Penetrating cardiac injury: overcoming the limits set by Nature. Injury. 2009 Sep;40(9):919-27. doi: 10.1016/j.injury.2008.12.008. Epub 2009 May 13. PMID: 19442973.
7. Mina MJ, Jhunjhunwala R, Gelbard RB, Dougherty SD, Carr JS, Dente CJ, Nicholas JM, Wyrzykowski AD, Salomone JP, Vercruysse GA, Feliciano DV, Morse BC. Factors affecting mortality after penetrating cardiac injuries: 10-year experience at urban level I trauma center. Am J Surg. 2017 Jun;213(6):1109-1115. doi: 10.1016/j.amjsurg.2016.07.014. Epub 2016 Oct 15. PMID: 27871682.
8. Clancy K, Velopulos C, Bilaniuk JW, Collier B, Crowley W, Kurek S, Lui F, Nayduch D, Sangosanya A, Tucker B, Haut ER; Eastern Association for the Surgery of Trauma. Screening for blunt cardiac injury: an Eastern Association for the Surgery of Trauma practice management guideline. J Trauma Acute Care Surg. 2012 Nov;73(5 Suppl 4):S301-6. doi: 10.1097/TA.0b013e318270193a. PMID: 23114485.

12:00-12:20 (Panel II)
Full Manuscript

Basic and Advanced Life Support: Evidence-Based Novelties - 2025 Update

Miodrag Milenović[1,2], Aleksandra Nikolić[2], Marija Rajković[1,2], Ivana Petrov[3], Dušica Simić[1,3]

[1]University of Belgrade, Faculty of Medicine, Belgrade, Serbia
[2]University Clinical Centre of Serbia, Department of Anesthesiology and Intensive Care, Belgrade, Serbia
[3]University Children's Hospital, Department of Anesthesiologly and Intensive Care, Belgrade, Serbia

INTRODUCTION

The 2025 updates to Basic and Advanced Life Support (BLS and ALS) guidelines represent a significant advancement in resuscitation science, reflecting the latest evidence and consensus from leading international organizations, including the International Liaison Committee on Resuscitation (ILCOR), the American Heart Association (AHA), and the European Resuscitation Council (ERC). These guidelines are the product of systematic reviews, scoping reviews, and expert consensus, and they emphasize high-quality resuscitation, early intervention, and individualized post-arrest care.

METHODOLOGY and SCOPE

The 2025 guidelines were developed through a rigorous, continuous evidence evaluation process. ILCOR's task forces conducted systematic reviews, scoping reviews and evidence updates to address 33 critical questions in BLS and ALS. Public comments were solicited and incorporated into the final recommendations, ensuring transparency and broad expert input. The guidelines address both in-hospital and out-of-hospital cardiac arrest scenarios, with an emphasis on adaptability for varied resource settings.

Basic Life Support (BLS) – 2025 Key Updates

- Early Recognition and Emergency Activation: Immediate activation of emergency medical services (EMS) is recommended for any unresponsive individual, without delaying for detailed breathing assessment. Dispatcher-assisted recognition of abnormal breathing is prioritized to minimize delays in CPR initiation, as rapid EMS notification is linked to improved survival.
- Chest Compression Quality: High-quality chest compressions remain fundamental. The guidelines reaffirm a compression rate of 100–120/min and a depth of 5–6 cm for adults, with a compression fraction above 60% associated with better outcomes. Interruptions should be minimized, and full chest recoil ensured.
- Compression-to-Ventilation Ratio: The recommended compression-to-ventilation ratio for single rescuers is 30:2, balancing oxygenation and perfusion. This is supported by recent systematic reviews and remains unchanged from prior guidelines.
- Dispatcher-Assisted CPR: Enhanced dispatcher-assisted protocols are emphasized, as evidence demonstrates increased bystander CPR rates and improved outcomes when dispatchers provide real-time guidance.
- AED Use and Early Defibrillation: Early use of automated external defibrillators (AEDs) is strongly recommended. The guidelines advocate for expanded AED access in public spaces and highlight the importance of early defibrillation in both adult and pediatric populations. Special considerations are provided for use in pregnancy and children.
- Cardiac Arrest in Pregnancy: A notable update is the recommendation to consider perimortem cesarean delivery at 5 minutes if return of spontaneous circulation (ROSC) is not achieved, based on evidence of improved maternal and fetal outcomes.
- Monitoring Rescuer Fatigue: Monitoring for rescuer fatigue is now a good practice statement, especially for those performing CPR while wearing personal protective equipment (PPE), as fatigue can compromise CPR quality.

Advanced Life Support (ALS) – 2025 Key Updates

- Early and High-Quality ALS: ALS interventions should be started as early as possible, integrating advanced airway management, manual defibrillation, and effective drug administration with ongoing high-quality BLS.
- Airway Management: A stepwise approach to airway management is recommended. Only rescuers with high intubation success rates should perform tracheal intubation; otherwise, supraglottic airway devices are preferred. Front-of-neck access (FONA) is newly included for "can't intubate, can't oxygenate" scenarios.

- Oxygenation and Ventilation: Effective oxygenation and ventilation must be maintained. Oxygen saturation targets are now 94–96% to avoid hyperoxemia, and capnography is essential for confirming airway placement and monitoring ventilation.
- Vasopressor and Antiarrhythmic Drugs: Epinephrine remains the first-line vasopressor for cardiac arrest (1 mg IV/IO every 3–5 min). Vasopressin or methylprednisolone may be considered as alternatives, but high-dose epinephrine is not recommended. Amiodarone or lidocaine may be used for refractory ventricular fibrillation/pulseless ventricular tachycardia, with no clear superiority between agents. Routine use of calcium, sodium bicarbonate, and magnesium is not recommended except for specific indications
- Defibrillation: Correct pad placement (apical-lateral) and minimizing pre-shock pauses are emphasized. Charging the defibrillator during compressions is recommended to reduce time to shock delivery.
- Extracorporeal Cardiopulmonary Resuscitation (ECPR): Extracorporeal cardiopulmonary resuscitation is now recognized as a reasonable option for selected patients with refractory cardiac arrest, provided that equipment and trained personnel are available. This is supported by recent trials demonstrating improved survival and neurological outcomes in appropriate settings.

Post-Cardiac Arrest Care

- Temperature Control: A deliberate strategy for temperature control (32°C to 37.5°C) is recommended for all adults who do not follow commands after ROSC. The term “targeted temperature management” has been replaced by “temperature control,” reflecting evidence that both hypothermia and normothermia are acceptable if fever is avoided.
- Coronary Angiography: Coronary angiography should be performed emergently for patients with suspected cardiac cause and ST-segment elevation, or considered in those without ST-elevation but at high risk of coronary artery disease.
- Neuroprognostication: A multimodal approach is recommended, utilizing clinical examination, EEG, imaging (MRI), somatosensory evoked potentials (SSEP), and blood biomarkers (e.g., neuron-specific enolase, GFAP, Tau, NfL) to guide prognosis and decisions regarding withdrawal of care.
- Seizure Management: Empirical trials of non-sedating antiseizure medications are suggested for adults with post-arrest EEG findings on the ictal-interictal continuum, as uncontrolled seizures are associated with poor neurological outcomes.
- Glucose Control and Antibiotics: Moderate glucose control is recommended, avoiding both hyper- and hypoglycemia. Routine prophylactic antibiotics post-ROSC are not recommended due to insufficient evidence.
- Monitoring and Technology Integration: Waveform capnography is essential for confirming airway placement and monitoring CPR quality. Point-of-care ultrasound (POCUS) is increasingly used to identify reversible causes and aid in neuroprognostication, but should not interrupt compressions. Mechanical chest compression devices may be considered where manual compressions are impractical. Brain monitoring (NIRS, EEG) is recommended for assessment during and after resuscitation.

Special Considerations

- Pediatric and Neonatal Life Support: Compression-to-ventilation ratios and defibrillation energy doses are age-appropriate, with early intervention crucial for survival.
- Trauma-Related Cardiac Arrest: Immediate identification and correction of reversible causes are prioritized.
- Resource-Limited Settings: ALS guidelines may need adaptation based on available resources; prevention, early first aid, and BLS are emphasized where ALS is not feasible.

CONCLUSION

The 2025 BLS and ALS guidelines underscore the primacy of high-quality chest compressions, early defibrillation, and individualized post-arrest care. Major changes include updated drug recommendations, new approaches to airway management, expanded use of ECPR, and a broader, evidence-based approach to temperature and seizure management. These updates are designed to improve survival and neurological outcomes across diverse healthcare settings, reflecting the most current and robust scientific evidence available.

Summary Table: Key 2025 Updates in Basic and Advanced Life Support (BLS & ALS)

Topic	2025 Update Highlights	Scientific Basis / Evidence Source
Basic Life Support (BLS)		
Early EMS Activation	Immediate EMS call for any unresponsive person without first confirming abnormal breathing; dispatcher assists breathing assessment	ILCOR 2025 Adult BLS CoSTR; ERC 2025 BLS Guidelines
Chest Compression Quality	Compression rate 100-120/min, depth 5-6 cm; minimize interruptions; maintain compression fraction >60%	Systematic reviews reaffirm optimal compression parameters, emphasizing uninterrupted high-quality CPR
Dispatcher-Assisted CPR	Enhanced dispatcher protocols improve bystander CPR initiation and quality; dispatcher coaching critical	Multiple RCTs and observational studies show dispatcher assistance increases survival
Automated External Defibrillator (AED) Use	Early defibrillation remains critical; expanded AED access recommended; use in special populations with modifications	Evidence supports AED use in adults, children, and pregnant women; early defibrillation improves outcomes
Cardiac Arrest in Pregnancy	Perimortem cesarean delivery recommended at 5 minutes if ROSC not achieved (updated from 4 minutes)	Observational data indicate improved maternal and fetal outcomes with this timing
Head-Up CPR	Preliminary evidence suggests potential benefit but insufficient for routine use; further research needed	Limited studies bundled with other interventions; no definitive recommendation yet
Advanced Life Support (ALS)		
Antiarrhythmic Drugs	Amiodarone and lidocaine show no significant survival difference; choice based on availability and experience	ILCOR 2025 ALS Evidence Update; systematic reviews show equivalence
Steroids During and After CPR	Some evidence suggests hemodynamic and neurological benefits; data remain insufficient for strong recommendation	Ongoing studies; cautious consideration pending further trials
Post-Resuscitation Care	Strong recommendation for targeted temperature management (TTM); multimodal neuroprognostication combining clinical exam, EEG, MRI, SSEP, and blood biomarkers (NSE, GFAP, Tau, NfL)	ILCOR 2025 Evidence Updates detail improved prognostic accuracy with combined modalities
Percutaneous Coronary Intervention (PCI) After ROSC Without STEMI	Early PCI considered beneficial in selected patients without STEMI but suspected coronary disease	Emerging evidence supports early coronary angiography improving outcomes in this group
Glucose Control	Avoid both hyperglycemia and hypoglycemia post-resuscitation to optimize outcomes	Observational data link glucose extremes to worse prognosis; guidelines recommend moderate control
Prophylactic Antibiotics	Insufficient evidence to recommend routine use post-ROSC	Current evidence inconclusive; use individualized based on clinical scenario
Point-of-Care Ultrasound (POCUS)	Useful for identifying reversible causes (tamponade, pneumothorax) and aiding neuroprognostication; avoid prolonged CPR interruptions	ILCOR 2025 reviews emphasize POCUS benefits and caution against delays in compressions
Airway Management	Stepwise approach recommended; only providers with high intubation success should perform tracheal intubation	ERC 2025 ALS Guidelines stress skill-based airway management for best outcomes
Early Adrenaline Use	Emphasized for non-shockable rhythms to improve survival	Supported by recent trials and meta-analyses
Removal of Calcium and Sodium Bicarbonate	No routine use during CPR except for specific indications	Evidence shows no benefit in routine use; removed from standard protocols
Precordial Thump	Removed from guidelines due to lack of evidence for benefit	Consensus based on systematic reviews

REFERENCES

1. International Liaison Committee on Resuscitation. ILCOR website. https://www.ilcor.org/. Accessed May 17, 2025.
2. Olasveengen TM, Mancini ME, Perkins GD, et al. Adult Basic Life Support: International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science with Treatment Recommendations. Resuscitation. 2020;156:A35-A79.
3. Appendix B Advanced Life Support – 2025 Evidence Updates https://ilcor.org/uploads/ALS-2025-Appendix-B-Evidence-Updates.pdf Accessed April 17, 2025.
4. European Resuscitation Council Guidelines 2025: Adult Basic Life Support https://cprguidelines.eu/assets/other-documents/ERC-BLS-Guideline-2025-V3.0-public-comments.pdf Accessed May 10, 2025.
5. Explore 2020-2025 BLS Updates - What Has Changed? - ACLS https://aclsnow.com/blog/bls-2020-to-2025-guideline-changes/ Accessed April 15, 2025.
6. ALS-2025-COSTR-Full-Chapter.pdf https://ilcor.org/uploads/ALS-2025-COSTR-Full-Chapter.pdf Accessed May 17, 2025.
7. European Resuscitation Council Guidelines 2025: Adult Advanced Life Support https://cprguidelines.eu/assets/other-documents/ALS_-ERC-G2025-for-public-comments.pdf Accessed May 12, 2025.
8. ERC Guidelines 2025 https://www.erc.edu/projects/erc-guidelines-2025-project Accessed May 17, 2025.
9. European Academy of Neurology (EAN) guideline on the management of amyotrophic lateral sclerosis in collaboration with European Reference Network for Neuromuscular Diseases (ERN EURO-NMD) Eur J Neurol. 2024;31:e16264. https://umu.diva-portal.org/smash/get/diva2:1851536/FULLTEXT02.pdf Accessed May 17, 2025.
10. Appendix B Basic Life Support – 2025 Evidence Updates https://ilcor.org/uploads/BLS-2025-Appendix-B-Evidence-Updates.pdf Accessed May 17, 2025.
11. ERC CPR Guidelines 2025 https://cprguidelines.eu/assets/posters/ERC-Guideline-2025-Scope-Document.pdf Accessed May 15, 2025.
12. Education for Resuscitation - ERC Guidelines https://cprguidelines.eu/assets/other-documents/ERC-Guidelines-2025-Education-for-Resuscitation-final-for-public-comments.pdf Accessed May 17, 2025.
12. 3025 Inova Advanced Cardiac Life Support (ACLS) - Renewal Update Live Course 01/21/2025. https://cme.inova.org/content/2025-inova-advanced-cardiac-life-support-acls-renewal-update-live-course-01212025 Accessed May 16, 2025.
13. Updates on ACT for ALS https://www.ninds.nih.gov/news-events/directors-messages/all-directors-messages/updates-act-als Accessed May 17, 2025.

12:25-12:45 (Panel XIII)

Abstract Only

Critical Care in Austere Environment

Murat Izgi

Hacettepe University School of Medicine, Department of Anesthesiology and Reanimation, Ankara, Türkiye

ABSTRACT

An austere environment is defined as a harsh, challenging, or resource-limited setting where conditions are severe, often lacking basic comforts or luxuries, infrastructure, or logistical support. These settings often present significant difficulties in delivering standard services, including healthcare, due to their resource constrained nature.

These environments can be natural or man-made and typically require resilience, adaptability, and specialized preparation to endure or operate within. Examples to these environments are as follows:

- Military/Conflict Zones – Battlefields with minimal support
- Disaster Areas – Post-earthquake, hurricane or famine regions
- Wilderness Survival – Deserts, deep oceans or uninhabited islands
- Extreme regions – Antarctica, underwater habitats, high-altitude mountain regions or space missions
- Developing nations or impoverished areas

Key characteristics of austere environments are:

- **Scarcity of resources:** Limited access to clean water, food, shelter, medical supplies, electricity and communication
- **Harsh physical conditions:** Extreme temperatures (hot or cold), high altitudes, difficult terrain (mountainous, desert, jungle) and exposure to the elements
- **Remoteness and isolation:** Geographically isolated areas with limited or no access to transportation, infrastructure or external support
- **Lack of infrastructure:** Roads, buildings, sanitation systems, and reliable power sources are often absent or limited.
- **Increased risk and danger:** These environments can pose various threats, including wildlife, natural disasters, conflict and disease.
- **Limited medical support:** Access to healthcare facilities, trained medical personnel, and evacuation capabilities is significantly reduced or even non-existent.

Austere critical care medicine is defined as the provision of critical care to patients in resource-limited settings, where access to electricity, water and standard medical infrastructure is :

- incapacitated
- overwhelmed by patient volume
- severely restricted, often operating with limited diagnostic and treatment capabilities
- affected by the environment
- the location is under continuous threat

In austere environments, critical care serves as a lifeline when standard medical infrastructure is absent or overwhelmed. Despite the challenges, the application of core principles- such as trauma stabilization, infection control and prolonged field care- can mean the difference between life and death. Life-saving interventions in austere critical care including the following:

- Airway management
- Hemorrhage control
- Analgesia and sedation

The goal is to provide the highest standard of care possible with available resources while prioritizing rapid triage and transport to higher-level care whenever feasible. In such settings, anesthesiologists play a vital role in emergency medicine, trauma management and critical care. Expertise in airway management, resuscitation, pain control and hemodynamic stabilization renders the anesthesiologist indispensable in resource limited and extreme conditions. In austere environments, anesthesiologists serve as frontline lifesavers, combining critical care proficiency, trauma expertise, and improvisational skills to deliver timely interventions when every second counts. Their role extends far beyond the traditional operating rooms, forming an essential component of survival medicine in some of the world's most hazardous settings.

REFERENCES

1. Lord S, Lee J (2024) Critical care in the austere environment. Crit Care Clin 40(3):451-62.
2. Bixio et al. Management of critically ill patients in austere environments: good clinical practice by the Italian Society of Anesthesia, Analgesia, Resuscitation and Intensive Care (SIAARTI)**.** J Anesth Analg Crit Care (2024) 4:74
3. Venticinque SG, Grathwohl KW: Critical care in the austere environment: providing exceptional care in unusual places. Crit Care Med 2008; 36(7 Suppl): 284-92.
4. Nowadly C, Portillo D, Davis M, et al. The use of portable oxygen concentrators in low-resource setting: a systematic review. Prehosp Disaster Med 2022;37(2): 247–54.

10:50-11:10 (Panel XII)

Abstract Only

Guidelines for the Management of a Pregnant Trauma Patient

Rajmonda Nallbani Komoni[1,2]

[1]University of Prishtina, Faculty of Medicine, Prishtina, Kosova
[2]University Clinical Centre of Kosova, Department of Anesthesiology and Intensive Care, Prishtina, Kosova

ABSTRACT

Objective: Trauma during pregnancy requires special clinical attention, as resuscitation efforts must consider both maternal and fetal factors. The most crucial aspect is maternal resuscitation because it constitutes the fundamental basis for fetal resuscitation. Maternal hemodinamic stability should be the primary focus in the management of trauma during pregnancy.

Method: Trauma is the primary non-obstetric cause of maternal mortality. Initial management for these patients is following the principles of advanced trauma life support. Primary survey, secondary survey and definitive care are integral parts of a successful management for both maternal and fetal outcome. Society of Obstetricians and Gynaecologists of Canada through clinical practice guideline has offered guidance for the most effective management of pregnant trauma patients.

Results: The initial assessment can be quite challenging considering the physiological alterations that occur during pregnancy in order to effectively manage airway, breathing, and circulation during resuscitation. Pregnant patients should receive meticulous airway management that considers pregnancy-related changes, undergo left uterine displacement, have two large intravenous lines inserted above the diaphragm and receive a balanced ratio of blood products. A secondary evaluation for obstetric complications, along with fetal assessment, should begin promptly, ensuring it does not disrupt maternal trauma management. For viable pregnancies, continuous fetal heart rate monitoring is typically done for at least 4 hours.

Conclusion: A resuscitative cesarean section should be considered for patients between 22 and 24 weeks gestation who experience cardiac arrest or severe hemodynamic instability. Imaging should not be avoided when necessary, even if there are concerns about fetal radiation exposure. Multidisciplinary approach is required. The fundamental principle that should guide therapeutic measures is that resuscitation of the mother will enable also successful resuscitation of the fetus.

Keywords: Trauma, pregnancy, menagement, guidelines

REFERENCES

1. Lopez CE, Salloum J, Varon AJ, Toledo P, Dudaryk R. The management of pregnant trauma patients: a narrative review. Anesthesia & Analgesia. 2023 May 1;136(5):830-40.
2. Jain V, Chari R, Maslovitz S, Farine D, Bujold E, Gagnon R, Basso M, Bos H, Brown R, Cooper S, Gouin K. Guidelines for the management of a pregnant trauma patient. Journal of Obstetrics and Gynaecology Canada. 2015 Jun 1;37(6):553-71.
3. Subcommittee, A. T. L. S. "Advanced trauma life support ATLS student manual." (2018):227-239

14:30-14:50 (Panel III)
Full Manuscript

Airway Management Techniques: High Tech vs. Traditional Methods

Renata Curić Radivojević[1,2], Dinko Tonković[1,2]

[1]University Hospital Centre Zagreb, Faculty of Medicine, Department for Anesthesiology, Reanimatology, Intensive Care Medicine and Pain Therapy, Kišpatićeva 12, Zagreb, Croatia
[2]University of Zagreb, Faculty of Medicine, Šalata 3, Zagreb, Croatia

ABSTRACT

Objective: Airway management is a fundamental element of safe anesthesia and emergency medical care. Over time, the methods and tools used to secure and maintain airway patency have significantly evolved. This review paper outlines the historical development of airway management techniques, the rise of modern technologies including artificial intelligence and robotics, and educational methods tailored to new generations of medical professionals. It also critically analyzes the balance between high-tech solutions and the necessity of traditional approaches.

Presentation: A change of clinical practice and behavior of students and residents across time was observed as a result of evolving technology and medical equipment. Major airway advances are presented such as videolaryngoscope, robotic intubation systems, intelligent intubation systems; possible artificial intelligence (AI) application in airway management from airway assessment to planning and teaching. After NAP 4 study results have been published, Difficult airway society updated all airway management guidelines, and an expanding number of airway management guidelines are published worldwide, bringing in focus patient safety during critical events, not only during intubation but for extubation also. There is a shift from ex cathedra and books learning to applications in anesthesiology, social media programs and e-learning, especially accelerated during and after lockdown because of Covid 19 pandemy.

Conclusion: Technology should enhance, not replace fundamental airway skills. While high-tech solutions improve patient safety, old-school methods remain indispensable when technology fails. Every provider should master the basics before relying on high-tech tools. What is the best approach? A blended (hybrid) one.

Keywords: Airway assessment, airway management, airway devices, artificial intelligence, education

INTRODUCTION

Airway management is a fundamental element of safe anesthesia and emergency medical care. Over time, the methods and tools used to secure and maintain airway patency have significantly evolved. This review paper outlines the historical development of airway management techniques, the rise of modern technologies including artificial intelligence and robotics, and educational methods tailored to new generations of medical professionals. It also critically analyzes the balance between high-tech solutions and the necessity of traditional approaches.

PRESENTATION

Airway management techniques involve all methods and devices that ensure the patency of the upper airway to allow safe breathing or mechanical ventilation. The development of this medical field is closely linked with advances in anesthesiology, surgery, and emergency medicine. From the first ether anesthesia demonstration (Morton, 1846) to apparatus for mechanical ventilation (Fell-O'Dwyer, 1878) detailed description of safe endotracheal intubation as still performed today was by Chevalier Jackson in 1910. Emergence of Anesthesia and Endotracheal Techniques has continued with introduction of cuffed endotracheal tube (Guedel and Waters, 1941); development of curved laryngoscope blade (Macintosh, 1943), and straight blade for pediatrics (Miller, 1949) which are still in use. Modern innovations continued with the first fiberoptic bronchoscopy by Dr. Shigeto Ikeda back in 1966, and clinical use of fiberoptic-guided intubation starting in 1972. Despite this, due to slow widespread use of this expensive equipment, first guidelines for awake tracheal intubation were published relatively late in 2019 by Difficult airway society (1). Big game changer on the scene of airway management was Dr. Archie Brain's development of the Laryngeal mask airway (LMA) in 1981. It entered clinical practice in the UK in 1988., and in 1992. in the USA. Since then many new first and second supraglottic airway devices were developed. The 3rd generation LMA with video technology was made in the 2021 (2). In 1993. McCoy blade was introduced with a hinged tip for epiglottis elevation. 21st Century started with the rise of video laryngoscopy (VL) following video chip technology invention, which improved glottis visibility and enhanced chances for successful first attempt intubation (3,4). Numerous single use or reusable VL devices are on the market today, with standard MAC curve blade or hyperangulated blades, classified as integrated channel laryngoscope (CTTrach, Pentax AWS, Airtraq); video stylets (rigid, e.g. Bonfils) or rigid blade laryngoscopes with standard blade or angled blade (5). During the last decade VL has

emerged as a promising method for airway management in patients with difficult airway with tendency to replace DL, which has been established as the gold standard for intubation for decades (6). Emerging robotic innovations and artificial intelligence (AI) in endotracheal intubation and airway management started in 21 century (7). The fields of artificial intelligence (AI) and machine learning are expanding rapidly and have started to play strong roles in difficult airway management. Several robotic models were tested for endotracheal intubation on manikins (8-12), and in 2012. the Keppler intubation system (KIS) was the first robotic system to perform tracheal Intubation in humans (10). Despite the progress made in robotic intubation, several challenges and limitations remain. None of these airway robots have been implemented in routine clinical practice, yet. The high cost, feasibility and effectiveness of robotic intubation in challenging scenarios, need for specialized training and expertise, refining technical capabilities, and establishing ethical frameworks can contribute to overcoming these challenges and maximize the potential benefits of robotic endotracheal intubation. The 4th National Audit Project (NAP4) (13) conducted by the Royal College of Anaesthetists and Difficult Airway Society (DAS) is recognized as the world's most extensive audit of airway complications. NAP4 described significant airway management-related complications such as death, brain damage, emergency surgical airway procedures, or unexpected admission to the intensive care unit in various settings over a year throughout the United Kingdom. The incidence of major airway complications during general anesthesia was 46.3 per million cases (95% confidence interval (CI) = 38.4-54.2), and more frequent and severe in emergency and intensive care departments. Analysis of the cases has identified repeated gaps in care that include: poor identification of at-risk patients, poor or incomplete planning, inadequate provision of skilled staff and equipment to manage these events successfully, delayed recognition of events, and failed rescue due to lack of or failure of interpretation of capnography. To mitigate the adverse outcomes associated with difficult airways, guidelines were developed for airway procedures. These guidelines are updated to incorporate advancements in medical knowledge and technology. Also, from 2015 all major airway societies have launched updated Major Airway Management Guidelines from JSA airway management guideline 2014: to improve the safety of induction of anesthesia (14); 2022 American Society of Anesthesiologists Practice Guidelines for Management of the Difficult Airway (15); Canadian Airway Focus Group updated consensus-based recommendations for management of the difficult airway (16); Updated PG56 Guideline on equipment to manage difficult airways 2025 from Australian and New Zealand College of Anaesthetists (17); And All India Difficult Airway Association 2016 guidelines for the management of unanticipated difficult tracheal intubation in adults (18).

Traditional airway assessment methods are subjective, with lack of sensitivity and poor reproducibility. ⅓ of complications reported to NAP 4 study are related to anesthesiologist error in assessing difficult intubation. As we do not have a precise tool for difficult airway prognostics, artificial intelligence (AI) may be at hand (19,20).

Several Tools used by AI and their application in airway management have been published and tried. AI and machine-learning represent new advances in airway management (21). If machine-learning can predict difficult airways in adults, AI may offer providers real-time clinical decision support during intubation. One of the examples of the AI-based Pre-Hospital Emergency Airway Assessment system (XAI-PEA) was developed by the X-Fea team to automatically identify facial and neck landmarks using image processing and machine learning techniques. This initiative captures pixel distances between key anatomical points and processes this data to generate real-time bedside testing results. These results can be used to assess the difficulty of maintaining a patient's airway (22). AI has a potential, but implementation remains challenging. Maybe the future will be to take a picture with a smartphone of patients' faces during preoperative anesthesia consultation and assess the risk of airway management difficulties. We cannot stop the future and progress. It will happen anyway.

Another possible application of AI is in teaching airway management in various forms: AI-Powered Virtual Simulations; Intelligent Manikins with AI Feedback; AI-Assisted Decision Support Systems; Personalized Learning Platforms (analyzing each student's performance data and tailor training to their specific weaknesses, providing adaptive quizzes, video tutorials, and case-based learning based on a student's progress); AI in Ultrasound-Guided Airway Management Training; AI for Remote Learning & Assessment (motion tracking and video analysis, providing automated scoring and feedback); AI-Generated Clinical Scenarios; AI for Enhancing Procedural Videos & Augmented Reality and for Team Training & Communication. Artificial intelligence (AI) can enhance the teaching of airway management, but it has to be evaluated and approved by medical experts in the field.

Education and Intergenerational Approaches

Learning styles across generations, technology they use, platforms or social media differ between generations. Generations born in 1946-1964 (Baby Boomers) prefer traditional lectures, books and structured, formal, in-person learning; generation X (1965-1980): combination of analog and digital methods; Millennials (Gen Y 1981-1996): Interactive, hands-on learning to interactive, tech-integrated environments; Generation Z (1997-2012) and Alpha (2013-present): Digital, fast-paced (bite-sized learning) and

visual learning methods using AI and virtual reality (VR) (23). Keeping a step with the technology and habits of new generations of students and residents is challenging and requires totally new infrastructure so as training the teachers.

Web-based media and digital study tools are finding larger audiences each year. Increasing amounts of medical information and its rapid digital dissemination have changed traditional teaching methods. This has also enabled more self-directed and online learning approaches. Web-based learning (WBL) is a form of asynchronous learning, which occurs outside the constraints of time and space. The learner has the flexibility of using resources across different digital platforms, at their own pace, whether at home or at the library. (24)

Airway Teaching Apps in Anesthesiology

Since the widespread use of smartphones, apps for teaching in anesthesiology became very popular. Some of the commonly used are: Anesthesiologist (https://play.google.com/store/apps/details?id=com.shahlab.anesthesiologist&pcampaignid=web_share); and airway teaching apps, such as: AIRWAY ex (https://play.google.com/store/apps/details?id=com.levelex.airwayex&pcampaignid=web_share); The Airway App : Laura Duggan / Pendar Labs. Available for iOS and Android, free download, 7.3 MB; STAT airway (https://play.google.com/store/apps/details?id=com.theairwaysite.DiffAirway&pcampaignid=web_share); iLarynx (25) and newly developed Anesthesia Assistant, powered by AI, trained by NYSORA. Some anesthesiology societies have a guide for apps that may be useful to medical professionals, for example Australian & New Zealand College of Anaesthetists (ANZCA) on their official website (https://libguides.anzca.edu.au/apps/atoz).

Social media platforms are also in use in medical education. For example: DAS took on #JanuAIRWAY in January 2022 with a month of daily airway educational 'tweetorials', each comprising a linked series ('thread') of themed educational material. A 'bitesize' learning approach was used with educational materials including a series of 'one-pagers (26).

Teaching clinical skills in airway management

Traditional teaching in the operating room not only uses valuable operating room time, but it can distract from patient care. Besides, exposure to cases can be limited. It is believed that simulator training before going to the operating room (OR) has a positive impact on students' acquisition of procedural and patient safety skills, although it is not confirmed so far in published studies (26). How Do We Learn Best? Is it from theory, practice or mistakes? It is believed that the best learning is from mistakes, but supervised mistakes in simulation labs are recommended.

Training endotracheal intubation with the videolaryngoscope results with improved intubation skills, and it may be attributable to the instructors' direct observation of the students' intubation attempts via the devices' video screens, with better and timely feedback (27). Simulation-based training has been utilized in airway management for over 50 years, enhancing trainees' skills and knowledge. Effective training requires experienced instructors, high-fidelity simulators, and well-designed curricula (28). But high-fidelity simulators are not available everywhere where education takes place. However, simulation labs are expansive and not widespread (29). This is a possible place for AI, as it switches from expensive simulation training to affordable VR training. However, structured guidance in medical training to enhance proficiency in emergency airway management is very important. (29) In a randomized controlled trial that involved practicing on low-fidelity mannequins to simulate difficult airway scenarios, students using the Vortex Approach improved decision-making and reduced anxiety during airway management tasks. The crucial aspect of the Vortex Approach is that it is flexible in choosing the airway protection device as it puts the use of a face mask, intubation, and laryngeal mask on an equal level (30).

Next question that is rising is should airway management education be mandatory? (31). And if so, when is the right time to start and how to do it? Several models are in practice as: traditional models of learning experientially in the operating room, regular, formal airway courses; e-learning; social media; didactic instruction at conferences, self-directed learning; simulation based medical education (SBME); practicing guidelines; mandatory education programs (e.g. Difficult Airway Algorithm and Rescue Cricothyrotomy (DAARC) program by United States Veterans Health Administration (VHA) (32). Wide range initiatives including standardization of airway equipment, airway examination and preanaesthesia assessment are available to improve performance and raise patient safety.

High tech learning has had advantages, during lockdown for Covid 19 pandemy, when the lectures and seminars at ours School of Medicine, University of Zagreb, Croatia were held online via Zoom or Teams platform. But during other kinds of disasters, when infrastructure is distorted; electricity is out, high tech devices not working or unavailable, and patients are emerging, back to basics and old school techniques are only available if we know how to use them.

CONCLUSION

Airway management has evolved from manual techniques to sophisticated AI systems. However, technology is not a substitute for knowledge and experience. Technology should enhance, not replace fundamental airway skills. While high-tech solutions can improve patient safety, old-school methods remain indispensable when technology fails. Combining the old and the new ensures the best outcomes for patients. Every provider should master the basics before relying on high-tech tools. There is emerging data for hybrid models combining traditional knowledge and modern technology to be the most effective in gaining and keeping airway management skills. According to the author's opinion the best approach is a blended (hybrid) one.

Authors' Contribution to the Article

Study concept-design: RCR
Data collection: RCR, DT
Data analysis and interpretation: RCR
Manuscript draft: RCR
Critical review of content: RCR; DT
Final approval and responsibility: RCR, DT

REFERENCES

1. Ahmad I, El-Boghdadly K, Bhagrath R, et al. Difficult Airway Society guidelines for awake tracheal intubation (ATI) in adults. Anaesthesia. 2020;75(4):509-28. doi:10.1111/anae.14904.
2. Van Zundert AAJ, Gatt SP, Van Zundert TCRV, et al. Features of new vision-incorporated third-generation video laryngeal mask airways. J Clin Monit Comput. 2022;36:921-8. doi:10.1007/s10877-021-00780-3.
3. Gupta N, Singh S, Shouche S, Mishra SK. Tracheal intubation using the Airtraq video laryngoscope vs. Macintosh laryngoscope in patients with anticipated difficult intubation. Med J Armed Forces India. 2022;78(Suppl 1):S31-4. doi:10.1016/j.mjafi.2020.02.005.
4. Ruetzler K, Bustamante S, Schmidt MT, et al. Video laryngoscopy vs direct laryngoscopy for endotracheal intubation in the operating room: a cluster randomized clinical trial. JAMA. 2024;331(15):1279-86. doi:10.1001/jama.2024.0762.
5. Healy DW, Maties O, Hovord D, Kheterpal S. A systematic review of the role of videolaryngoscopy in successful orotracheal intubation. BMC Anesthesiol. 2012;12:32. doi:10.1186/1471-2253-12-32.
6. Hansel J, Rogers AM, Lewis SR, Cook TM, Smith AF. Videolaryngoscopy versus direct laryngoscopy for adults undergoing tracheal intubation. Cochrane Database Syst Rev. 2022;4(4):CD011136. doi:10.1002/14651858.cd011136.pub3.
7. Khan MJ, Karmakar A. Emerging robotic innovations and artificial intelligence in endotracheal intubation and airway management: current state of the art. Cureus. 2023;15(7):e42625. doi:10.7759/cureus.42625.
8. Tighe PJ, Badiyan SJ, Luria I, Lampotang S, Parekattil S. Robot-assisted airway support: a simulated case. Anesth Analg. 2010;111(4):929-31. doi:10.1213/ANE.0b013e3181ef73ec.
9. Hemmerling TM, Wehbe M, Zaouter C, Taddei R, Morse J. The Kepler intubation system. Anesth Analg. 2012;114(3):590-4. doi:10.1213/ANE.0b013e3182410cbf.
10. Hemmerling TM, Taddei R, Wehbe M, Zaouter C, Cyr S, Morse J. First robotic tracheal intubations in humans using the Kepler intubation system. Br J Anaesth. 2012;108(6):1011-6. doi:10.1093/bja/aes034.
11. Wang X, Tao Y, Tao X, et al. An original design of remote robot-assisted intubation system. Sci Rep. 2018;8(1):13403. doi:10.1038/s41598-018-31607-y.
12. Biro P, Hofmann P, Gage D, et al. Automated tracheal intubation in an airway manikin using a robotic endoscope: a proof of concept study. Anaesthesia. 2020;75(7):881-6. doi:10.1111/anae.14945.
13. Cook TM, Woodall N, Harper J, Benger J. Major complications of airway management in the UK: results of the Fourth National Audit Project. Part 2: intensive care and emergency departments. Br J Anaesth. 2011;106(5):632-42. doi:10.1093/bja/aer059.
14. Japanese Society of Anesthesiologists. JSA airway management guideline 2014: to improve the safety of induction of anesthesia. J Anesth. 2014;28(4):482-93. doi:10.1007/s00540-014-1844-4.
15. Apfelbaum JL, Hagberg CA, Connis RT, et al. 2022 American Society of Anesthesiologists practice guidelines for management of the difficult airway. Anesthesiology. 2022;136(1):31-81. doi:10.1097/ALN.0000000000004002.
16. Law JA, Duggan LV, Asselin M, et al. Canadian Airway Focus Group updated consensus-based recommendations for management of the difficult airway: part 2. Can J Anaesth. 2021;68(9):1405-36. doi:10.1007/s12630-021-02008-z.
17. Endlich Y, Hore PJ, Baker PA, et al. Updated guideline on equipment to manage difficult airways: Australian and New Zealand College of Anaesthetists. Anaesth Intensive Care. 2022;50(6):430-46. doi:10.1177/0310057X221082664.

18. Myatra SN, Shah A, Kundra P, et al. All India Difficult Airway Association 2016 guidelines for unanticipated difficult tracheal intubation in adults. Indian J Anaesth. 2016;60(12):885-98. doi:10.4103/0019-5049.195481.
19. De Rosa S, Bignami E, Bellini V, Battaglini D. The future of artificial intelligence using images and clinical assessment for difficult airway management. Anesth Analg. 2025;140(2):317-25. doi:10.1213/ANE.0000000000006969.
20. Wilk M, Pikiewicz W, Florczak K, Jakóbczak D. Use of artificial intelligence in difficult airway assessment: the current state of knowledge. J Clin Med. 2025;14(5):1602. doi:10.3390/jcm14051602.
21. Bellini V, Rafano Carnà E, Russo M, et al. Artificial intelligence and anesthesia: a narrative review. Ann Transl Med. 2022;10(9):528. doi:10.21037/atm-21-7031.
22. VnExpress. AI-powered emergency airway assessment [Internet]. 2024 [cited 2025 May 4]. Available from: https://vnexpress.net/ai-powered-emergency-airway-assessment-4812081.html
23. Ahmed YA, Ahmad MN, Ahmad N, Zakaria NH. Social media for knowledge-sharing: a systematic literature review. Telemat Inform. 2019;37:72-112. doi:10.1016/j.tele.2018.01.015.
24. Briggs B, Kalra S, Masneri D, Husain I. Impact of a focused online teaching module on airway intervention: can an online teaching module enable knowledge acquisition and increased confidence in airway management? J Med Educ Curric Dev. 2023;10:23821205231192335. doi:10.1177/23821205231192335.
25. De Oliveira GS Jr, Glassenberg R, Chang R, et al. Virtual airway simulation to improve dexterity among novices performing fibreoptic intubation. Anaesthesia. 2013;68(10):1053-8. doi:10.1111/anae.12379.
26. Iliff HA, Lawson T, Ahmad I. #JanuAIRWAY: providing airway education through social media. Anaesth Rep. 2022;10(2):e12174. doi:10.1002/anr3.12174.
27. Muratore S, Kim M, Olasky J, et al. Basic airway skills acquisition using the ACS/ASE medical student simulation-based surgical skills curriculum: initial results. Am J Surg. 2017;213(2):233-7. doi:10.1016/j.amjsurg.2016.09.053.
28. Herbstreit F, Fassbender P, Haberl H, et al. Learning endotracheal intubation using a novel videolaryngoscope improves intubation skills of medical students. Anesth Analg. 2011;113(3):586-90. doi:10.1213/ANE.0b013e3182222a66.
29. Ott T, Schmidtmann I, Limbach T, et al. Simulationsbasiertes Training und Lehre im OP für Studierende: eine prospektive randomisierte, einfach verblindete Studie klinischer Fertigkeiten. Anaesthesist. 2016;65(11):822-31. doi:10.1007/s00101-016-0221-0.
30. Yang D, Wei YK, Xue FS, et al. Simulation-based airway management training: application and looking forward. J Anesth. 2016;30(2):284-9. doi:10.1007/s00540-015-2116-7.
31. Starosolski M, Kapłan C, Kalemba A, Majewska K. The impact of implementing the Vortex approach on airway management performance in stressed medical students: a randomized controlled simulation study. Med Sci Monit. 2023;29:e940372. doi:10.12659/MSM.940372.
32. Baker PA, Feinleib J, O'Sullivan EP. Is it time for airway management education to be mandatory? Br J Anaesth. 2016;117 Suppl 1:i13-6. doi:10.1093/bja/aew129.
33. US Veterans Administration Healthcare System. Out of Operating Room Airway Management (OORAM) credentialing program [Internet]. 2012 [cited 2025 May 4]. Available from: http://www.va.gov/vhapublications/ViewPublication.asp?pub_ID=2825

16:50-17:10 (Panel IX)

Abstract Only

Aortic Dissection After Various Traumas

Saimir Kuci[1], Alfred Ibrahimi[1], Marsela Goga[1], Ervin Bejko[1], Ermal Likaj[2], Maksim Llambro[3], Jacob Zeitani[2]

[1]German Hospital International, Anesthesia & ICU Service, Tirana, Albania
[2]German Hospital International, Cardiac Surgery Service, Tirana, Albania
[3]German Hospital International, Cardiology Service, Tirana, Albania

ABSTRACT

Objective: Traumatic aortic dissection (TAD) is a rare and often fatal condition typically associated with high-energy trauma. It presents unique challenges for anesthetic and perioperative teams, particularly when rapid decisions are required to stabilize critically ill patients. Aortic dissection is a catastrophic condition caused by a tear in the intimal layer of the aorta, allowing blood to dissect between the layers of the aortic wall. While commonly linked to chronic diseases such as hypertension, atherosclerosis, or genetic conditions like Marfan syndrome, traumatic aortic dissection (TAD) is an uncommon variant often resulting from blunt chest trauma. In TAD, forceful impacts on the thorax—such as deceleration injuries from motor vehicle accidents or direct trauma like punches or kicks—generate sufficient mechanical stress to rupture the aortic intima. These cases demand swift recognition and coordinated interventions, as the mortality rate increases rapidly without timely treatment. The Stanford classification, which separates dissections into type A (ascending aorta involvement) and type B (descending aorta involvement), remains a cornerstone for guiding treatment strategies. This presentation discusses two unique cases of TAD treated at our institution German Hospital International Tirana, focusing on anesthetic and perioperative considerations, which are crucial yet underexplored aspects of care. The nuances of managing these cases underscore the importance of integrating surgical, anesthetic, and critical care expertise in TAD.

Presentation: The first case refers to a 43-year-old man who developed a Stanford type A dissection after being punched in the chest and the second one a 19-year-old man who suffered a Stanford type B dissection following a high-speed car vehicle accident. This presentation focuses on the anesthetic and perioperative management strategies followed, while providing a comprehensive discussion on the nuances of care in traumatic aortic dissections. The aim is to contribute practical insights into a rare condition where timely and coordinated care can save lives.

Keywords: Traumatic aortic dissection (TAD), Energy trauma, Type A dissection, Type B dissection

REFERENCES

1. Mohr FW, et al. Aortic Dissection: Pathophysiology and Management. Circulation 2023;148(5):543-50.
2. Erbel R, et al. Diagnosis and Management of Aortic Dissection. Eur Heart J. 2022;43(7):379–404.
3. Criado FJ. Aortic Dissection: Current Perspectives. J Vasc Surg 2021;73(6):1899-1907.
4. Nienaber CA, et al. Modern Management of Aortic Dissection. Circulation 2020;142(4):360-74.
5. Tsai TT, et al. Acute Type B Aortic Dissection: Risk Stratification and Management. Ann Thorac Surg. 2021;94(6):1884–1892.

11:05-11:25 (Panel I)

Abstract Only

Simulation-Based Field Exercise for All-Hazard Disaster Preparedness Among Nurses: Focusing on Earthquake and Fire Response with Evacuation

Sazdov Darko[1], Dimitrov Ivica[1], Androniki Bibovska[1]

Acibadem Hospital, Department of Anesthesia and Intensive Care Medicine, Skopje, North Macedonia

ABSTRACT

Objective: In the wake of increasingly frequent and severe disasters, including natural events like earthquakes and secondary hazards such as fires, nurses are on the front lines of emergency response. Despite their critical role, many nurses lack hands-on training in managing complex, multi-hazard situations that require rapid triage, coordination, and evacuation under pressure. To assess the impact of a simulation-based field training exercise on nurses' preparedness for an all-hazard disaster scenario involving an earthquake followed by a fire, emphasizing evacuation protocols and interprofessional coordination.

Methods: A quasi-experimental pre-post intervention study was conducted with 60 registered nurses at a metropolitan hospital. Participants engaged in a full-scale simulation mimicking an earthquake-induced structural collapse, triggering a fire and necessitating patient evacuation. The exercise incorporated real-time triage, fire safety protocols, communication with emergency responders, and physical evacuation procedures. Preparedness was evaluated through pre- and post-intervention tests, skills checklists, and debriefing sessions. Statistical analysis included paired t-tests, and qualitative data were analyzed thematically.

Results: The simulation significantly improved nurses' knowledge of disaster protocols ($p<0.001$), practical response skills ($p<0.05$), and confidence in managing high-stress evacuation scenarios. Qualitative findings highlighted enhanced teamwork, clearer role understanding, and better integration with other emergency personnel. Participants emphasized the value of realistic practice in improving decision-making under pressure.

Conclusion: Simulation-based field exercises are highly effective in preparing nurses for complex, all-hazard disaster scenarios involving earthquakes and fires. By focusing on evacuation procedures and interdisciplinary coordination, such training boosts both competence and confidence. Regular implementation of realistic simulations can substantially strengthen hospital preparedness and frontline response capacity.

Role of High Flow Nasal Oxygen in Disasters

Seval Izdes

Yıldırım Beyazıt University, School of Medicine, Department of Anesthesiology and Intensive Care Medicine and Ankara Bilkent City Hospital, Intensive Care Clinic

OBJECTIVE

High-flow nasal oxygen (HFNO), also referred to as high-flow nasal cannula (HFNC) therapy, was initially used to treat newborns, but it has been employed as an alternative to standard oxygen delivery systems for adults for over 20 years (1). Following the outbreak of the SARS-CoV-2 pandemic, it has become widely used outside of intensive care units (ICUs) (2).

High-flow nasal oxygen (HFNO) is an advanced method of oxygen delivery. It delivers heated (37°C) and humidified oxygen at a very high flow rate of 60 liters per minute through a nasal cannula that fits snugly into the nostrils. This high flow rate enables oxygen concentrations ranging from 21% (room air) to 100% FiO_2 to be delivered, independently of the patient's breathing pattern. When closed-mouth breathing is performed alongside HFNO, 1 cm H_2O positive end-expiratory pressure (PEEP) is generated for every 10 L min^{-1} of flow. This increases lung volume at the end of expiration. Heated and humidified gas can improve secretion clearance, reduce airway inflammation and decrease energy consumption. In cases of acute respiratory failure (ARF), HFNO provides high gas flow rates suitable for patients' high inspiratory flow requirements. This prevents the dilution of oxygen with room air. It also improves oxygenation by increasing lung compliance and functional residual capacity. The high flow rate washes out the patient's pharyngeal dead space, thereby increasing CO_2 elimination and reducing respiratory effort. These physiological effects improve patient comfort in case of respiratory failure. In addition, HFNO is better tolerated than non-invasive mechanical ventilation (NIMV), since the tight mask can be uncomfortable. HFNO is also preferred to standard nasal cannulas because it provides humidified, warmed gas, thereby preventing mucosal dryness (3).

High-flow nasal oxygen therapy is used to treat adult patients with ARF regardless of the underlying condition. It can improve outcomes by preventing the need for intubation and invasive mechanical ventilation in certain cases. HFNO has also been reported to have beneficial physiological effects in patients with chronic respiratory failure. HFNO can be used alone or in combination with NIMV in such cases. However, delaying the transition to intubation and invasive mechanical ventilation may lead to adverse outcomes. Therefore, patients receiving HFNO therapy should be closely monitored. The ROX (respiratory rate and oxygenation) index is an important indicator used to determine the effectiveness of HFNO therapy and the timing of intubation in cases of ARF. It is calculated by dividing the SpO_2/FiO_2 ratio by the respiratory rate. Patients should be intubated without delay if the ROX index is less than 2.85 at the 2^{nd} hour, less than 3.47 at the 6^{th} hour, or less than 3.85 at the 12^{th} hour (4).

High-flow nasal oxygen therapy is crucial in disaster scenarios involving multiple casualties with respiratory failure. Disasters such as pandemics, chemical spills, epidemics, explosions or earthquakes can lead to acute hypoxic respiratory failure due to trauma, airway injuries or infections. HFNO can serve as a bridge between oxygen therapy and mechanical ventilation. In situations where mechanical ventilators are limited and resources are scarce, HFNO helps to prevent the need for intubation and invasive ventilation. HFNO devices that are both portable and transportable can be used in field hospitals, ambulances, and emergency shelters during disasters.

I would like to discuss examples of HFNO treatment used in disaster situations mentioned in the literature and HFNO devices that can be used in such situations. I will also outline the pros and cons of using HFNO treatment in disaster situations.

DISCUSSION

The effectiveness of HFNO in providing oxygenation before switching to invasive mechanical ventilation has been investigated in several studies and case reports in various disaster situations that cause ARF. The use of HFNO in various disaster situations will be discussed under the following headings.

Pandemics

Due to the ongoing pandemic, HFNO has become more popular and widespread. During the pandemic, HFNO therapy was widely used to treat AR patients. Approximately half of these patients did not require mechanical ventilation, which had a positive impact on outcomes (5). HFNO has proven to be a versatile treatment that can be used in both ICUs and hospital wards. Many clinicians have learned to administer this treatment (6).

During the pandemic, the cut-off values of the ROX index, which determine the effectiveness of high-flow nasal oxygen (HFNO) and the time of intubation, have been more clearly defined (4). Additionally, guidelines for the use of HFNO have been developed. Protocols such as the use of HFNO in the awake prone position to enhance its effectiveness have also been established (7). Together, these developments have created a knowledge base for the use of HFNO in future disaster management.

Natural Disasters

Natural disasters such as earthquakes, hurricanes and dust storms primarily cause traumatic injuries, but respiratory failure can also occur in survivors. Patients may aspirate dust, suffer pulmonary contusions, or develop acute respiratory distress syndrome (ARDS). While most patients require invasive ventilation due to trauma or shock, those with isolated respiratory failure can be supported with HFNO. HFNO can

also be used as a bridging therapy if the patient is conscious, breathing spontaneously, and hypoxic. Most of the evidence on the use of HFNO obtained from natural disasters is limited to small studies and case reports. A study conducted after the 2023 earthquake in Turkey, found that around 24% of patients admitted to ICU received HFNO at some point during their treatment (8).

Industrial Accidents

Victims of industrial accidents, such as explosions at chemical plants, gas leaks or smoke inhalation, may be exposed to toxic gases, such as chlorine, ammonia, carbon monoxide (CO) and cyanide, or smoke. This can lead to respiratory burns, chemical pneumonia or ARDS. In these scenarios, HFNO can play a supportive role by providing high concentrations of oxygen and helping to clear inhaled toxins from the airways. In a case presentation involving exposure to chlorine gas, pulmonary oedema developed that could not be attributed to heart failure or fluid overload. The patient was diagnosed with chemical pneumonia and ARDS because of inhaling chlorine gas. While receiving antibiotic, anti-inflammatory, blood purification and nebulization therapy, the patient was also administered HFNO therapy in an awake prone and lateral position. The patient was discharged from the ICU six days later with no adverse effects (9).

Carbon monoxide poisoning is traditionally treated with a non-rebreathing mask or hyperbaric oxygen. For acute CO poisoning, oxygen therapy with 100% FiO_2 is recommended. However, a non-rebreathing mask cannot deliver this level of oxygen. Studies have shown that HFNO significantly reduces the half-life of carboxyhemoglobin in cases of CO poisoning compared to low-flow oxygen delivery systems (10,11).

Battlefield and Military Medical Settings

High-flow nasal oxygen therapy is becoming increasingly accepted in military medical protocols for transport and field emergency care. An injured soldier can receive HFNO treatment during evacuation without the need for immediate intubation. ARF can result from blast injuries, smoke inhalation or severe infections. In a wounded soldier who is breathing but hypoxic, HFNO treatment saves resources and time in combat situations (5).

High-flow Nasal Oxygen Devices and Equipment for use in Disasters

The use of HFNO in disaster situations depends on logistical capabilities. High-flow nasal oxygen therapy is commonly used to transport pediatric patients, but prior to the SARS-CoV-2 pandemic, it was not widely used for adult patients. During this period, however, Kedzierewicz and his colleagues (12) successfully used HFNO in an ambulance to transport an adult patient with acute respiratory failure (ARF) caused by the virus. In this instance, they employed a non-portable HFNO device that was powered by the ambulance's power supply and lacked an internal battery. The device was connected to a 15 L, 200-bar oxygen cylinder as an oxygen source, which was sufficient for the duration of the journey (18 minutes) A flow rate of 50–60 l/min at a high fraction of inspired oxygen (FiO_2) can rapidly deplete standard oxygen cylinders. A portable oxygen cylinder (4.5 L, 200 bar) at 60 L/min and 100% FiO_2 can be emptied in less than 16 minutes (12).

Having an HFNO device with an internal battery would enhance safety as it could be used during transport and outside the hospital. Many modern transport ventilators include a HFNO mode and can switch between ventilation modes (invasive, continuous positive airway pressure (CPAP) and HFNO) on the same device. This makes them more suitable for use in a disaster situation. Additionally, oxygen sources compatible with HFNO should also be available in disaster areas. HFNO devices that are powered by portable batteries and oxygen sources, or that are integrated into transport ventilators, can be used in ambulances, helicopters or field hospitals.

Advantages of HFNO Treatment in Disasters

High-flow nasal oxygen therapy is easy to set up, operate and monitor, so it can be quickly initiated and maintained, and personnel can easily be trained to use it. High-flow nasal oxygen provides oxygenation for most patients with acute respiratory failure (ARF) during disasters, reducing the workload on the respiratory system and the need for intubation. This reduces the burden on the intensive care unit. As HFNO is non-invasive compared to intubation, it prevents airway trauma and ventilator-associated pneumonia. High-flow nasal oxygen therapy is also better tolerated than non-invasive mechanical ventilation (NIMV) and produces fewer aerosol particles than NIMV when appropriate precautions are taken in the presence of aerosol-transmitted infectious diseases (6).

Disadvantages of High-flow Nasal Oxygen Treatment in Disasters

High-flow nasal oxygen devices consume large amounts of oxygen, so ambulances and field settings require a significant quantity of high-volume oxygen cylinders (15 L at 200 bar), liquid oxygen tanks or industrial oxygen and oxygen generators. A power source is also required, such as electricity, generators, or lithium batteries in areas without grid power. Other necessary equipment includes sterile distilled water, clean cannulas, and humidification circuits.

High-flow nasal oxygen therapy should only be used with extreme caution in cases of partial nasal obstruction, airway trauma, contraindications to high oxygen, diseases transmitted by droplets and aerosols, and in children under 16 years of age (due to the high risk of pneumothorax). High-flow nasal oxygen therapy should never be used on patients with significant untreated pneumothorax, complete nasal obstruction, active epistaxis or skull base fractures, when alcohol-based skin preparation solutions are used (due to the risk of fire) (13).

In disaster situations, patients for HFNO should be carefully selected. Those with isolated hypoxemia, but with a preserved respiratory drive and intact airway, are suitable candidates. Personnel should be trained in setting up HFNO, monitoring patients on HFNO and recognizing HFNO malfunctions. Staff should also be knowledgeable about taking appropriate precautions, such as wearing a surgical mask over the cannula and using personal protective equipment, in situations where there is a potential for aerosol generation. Studies have shown that placing a mask over the cannula does not produce significantly more aerosols than other oxygen interfaces (12).

CONCLUSION

High-flow nasal oxygen therapy is a lifesaving, non-invasive respiratory support option in emergency situations, particularly when a rapid and scalable supply of oxygen is required. Therefore, it should be included in emergency preparedness plans, as it fills an important gap between basic oxygen therapy and mechanical ventilation. In emergency situations involving many ARF patients, it saves resources and time. When used alongside appropriate support (oxygen, electrical power, equipment and trained personnel) and protocols (ROX index, HFNO user guide and prone position), it is a valuable tool in disaster situations. Otherwise, its use may be risky.

REFERENCES

1. Nolasco S, Manti S, Leonardi S, Vancheri C, Spicuzza L. High-Flow Nasal Cannula Oxygen Therapy: Physiological Mechanisms and Clinical Applications in Children. Front Med (Lausanne) 2022;9:920549.
2. Tariq A, Ghamloush M, Schumaker G, et al. The role of high flow nasal oxygen therapy in acute hypoxemic respiratory failure due to COVID-19 pneumonia. Respir Med Res 2025;87:101156.
3. Lodeserto F J, Lettich T M, Rezaie S R. High-flow Nasal Cannula: Mechanisms of Action and Adult and Pediatric Indications. Cureus 2018; 10(11): e3639.
4. Ricard JD, Roca O, Lemiale V, et al. Use of nasal high flow oxygen during acute respiratory failure. Intensive Care Med. 2020; 46(12): 2238-47.
5. Dollin CYP, Elliott CBP, Markert R, Koroscil MMT. Outcomes of Heated High Flow Nasal Cannula in Patients with Severe or Life-Threatening COVID-19 at a Military Treatment Facility-A Retrospective Cohort Study. Mil Med 2023;188(3-4): e829-e832.
6. Kühn L, Esmail A, Oelofse S, Dheda K. A breath of relief: High-flow nasal oxygen in a resource-limited setting. Afr J Thorac Crit Care Med 2022;28(1):10.7196/AJTCCM.
7. McNicholas BA, Ibarra-Estrada M, Perez Y, et al. Awake prone positioning in acute hypoxaemic respiratory failure. Eur Respir Rev 2023; 32(168):220245.
8. Aydin K, Ozel Yesilyurt A, Cetinkaya F, Gok MG, Dogan O, Ozcengiz D. Earthquake victims in focus: a cross-sectional examination of trauma and management in intensive care unit. BMC Emerg Med 2024;24(1):30.
9. Wang F, Liu F, Lu H. Successful treatment of 1 patient with chlorine-induced ARDS using awake self-prone positioning and nasal high-flow oxygen: A case report. Medicine (Baltimore) 2024;103(3):e36995.
10. Ozturan, IU, Yaka E, Suner S, et al. Determination of carboxyhemoglobin half-life in patients with carbon monoxide toxicity treated with high flow nasal cannula oxygen therapy. Clinical Toxicology 2019; 57(7): 617–23.
11. Tomruk O, Karaman K, Erdur B, et al. A New Promising Treatment Strategy for Carbon Monoxide Poisoning: High Flow Nasal Cannula Oxygen Therapy. Med Sci Monit 2019;25:605-9.
12. Kedzierewicz R, Derkenne C, Fraudin A, et al. Logistical Challenge with Prehospital Use of High-Flow Nasal Oxygen Therapy in COVID-19-Induced Respiratory Distress: A Case Report. J Emerg Med 2021;61(1):37-40.
13. Cooper J, Griffiths B, Ehrenwerth J. Safe Use of High-Flow Nasal Oxygen (HFNO) With Special Reference to Difficult Airway Management and Fire Risk. APSF Newsletter. Circulation 122,210 2018;33(2):51-3.

17:15-17:35 (Panel V)
Abstract Only

Neurotrauma in Pediatric Patient

Simić Dušica[1,2], Budić Ivana[3,4], Milenovic Miodrag[5,2], Petrov Ivana[1]

[1]Univerzitetska dečja klinika, Beograd
[2]Medicinski fakultet Univerziteta u Beogradu
[3]Klinika za dečju hirurgiju i ortopediju, Klinički centar, Niš
[4]Medicinski fakultet Univerziteta u Nišu
[5]Klinički centar Srbije, Urgentni centar, Beograd

ABSTRACT

Pediatric neurotrauma, primarily resulting from traumatic brain injuries (TBIs) and spinal cord injury (SCI) stands as a significant contributor to morbidity and mortality among children worldwide. The Global Burden of Disease 2016 study estimated approximately 27 million new TBI cases globally, underscoring its pervasive impact. The incidence is notably high among children under four years and adolescents over 15, with common causes including falls, motor vehicle accidents, sports-related incidents, and non-accidental trauma such as child abuse.

The developing pediatric brain possesses unique anatomical and physiological characteristics, such as increased plasticity and thinner cranial bones, which influence injury mechanisms and recovery trajectories. TBIs in children can range from mild concussions to severe injuries involving diffuse axonal damage and intracranial hemorrhages. The pathophysiology encompasses primary injuries from direct impact and secondary processes like cerebral edema, excitotoxicity, and neuroinflammation. Notably, post-traumatic neuroinflammation, characterized by the activation of microglia and astrocytes and the release of pro-inflammatory cytokines, plays a critical role in exacerbating neuronal damage and can lead to persistent cognitive and behavioral deficits.

Pediatric spinal cord in within first 8 years prone to spinal cord injury without radiological abnormalities (SCIWORA) which is first time described at 1982.

Clinical assessment of pediatric TBI involves age-appropriate Glasgow Coma Scale (GCS) scoring and neuroimaging modalities such as computed tomography (CT) and magnetic resonance imaging (MRI). Management strategies prioritize timely stabilization, neuroprotection, and individualized rehabilitation plans to optimize recovery. Advanced neurocritical care approaches, including targeted temperature management and decompressive craniectomy, have shown promise in improving outcomes for severe cases. Unfortunately, decompressive craniectomy could be life saving, but usually without good neurological outcome.

Long-term consequences of pediatric neurotrauma are profound, with up to 50% of affected children at risk for developing behavioral problems and psychiatric disorders, including personality changes, secondary attention-deficit/hyperactivity disorder, and internalizing disorders. These issues may emerge shortly after injury or several years later, often persisting and potentially worsening over time.

Despite advancements in trauma care, pediatric neurotrauma remains a significant public health challenge. Ongoing research is essential to refine diagnostic tools, develop neuroprotective therapies, and enhance rehabilitation strategies. Preventive measures, such as promoting helmet use, enforcing child safety seat regulations, and implementing educational programs, are critical in reducing the incidence and severity of pediatric neurotrauma.

11:40-12:00 (Panel II)

Abstract Only

Current Classifications and Triage Scoring Scales

Slavenka Straus

Clinical Center University of Sarajevo, Clinic for Anesthesia and Resuscitation, Sarajevo, Bosnia and Herzegovina

ABSTRACT

Objective: Triage originates from the French word "trier" which is used to describe the processes of sorting and organization. It is utilized in the healthcare community to categorize patients based on the severity of their injuries. The history of the triage originated in the military for field doctors as early as the 18th century. The system was first implemented in hospitals in 1964 when Weinerman published a systematic interpretation of civilian emergency departments using triage. Today, triage is still deeply integrated into healthcare and can be broken down into three phases: pre-hospital triage, triage at the scene of the event, and triage upon arrival to the emergency department (ED), and further can be divided into non-disaster triage, belongs to ED, and disaster triage.

By understanding these systems, healthcare professionals can assess patient severity, predict prognosis, guide urgent interventions, optimize resource allocation and improve patient outcome.

Method: The most commonly used scales are:

START (Simple Triage and Rapid Treatment) used in mass casualty or disaster triage.

Categories victims into four groups: Expectant (Black), Immediate (Red), Delayed (Yellow), and Minor (Green).

SALT (Sort-Assess-Life-saving intervention-Treatment/Transport) similar to START.

ESI (Emergency Severity Index) is 5 level triage system based on stability of vital functions, potential for life/organ threat and expected resource needs.

The Australasian Triage Scale (ATS) is derived from the National Triage Scale (NTS) in 2000. The 5-point scale link patient history, signs and diagnosis to clinical urgency.

The Canadian Triage System & Acuity Scale (CTAS) based on NTS, 5 – level triage system where the Level 1 is the most severe patients, immediate medical attention to Level 5 non-urgent.

Manchester Triage System (MTS) is one of the most common triage systems used in Europe.

Utilized 52 flowcharts based on patients presenting complains. Categorized into an urgency category due to maximal waiting time where Immediate is 0 minutes, Very urgent 10`, Urgent 60`, Standard up to 120` and Non-urgent 240`.

Triage Revised Trauma Score (T-RTS) designed in the '80s in the US to identify patients

who needed to be transferred to a major trauma center.

The Cape Triage Score (CTS) used in pre-clinic and ED.

The triage guidelines were originally developed in 1974 with periodic revision every 5 to 10 years. Trauma systems have prioritized the goal of minimizing under-triage and accepting a higher level of over-triage to avoid increased mortality.

Conslusion: Trauma triage and scoring is an ongoing development process, and new systems are being optimized on a daily basis. By implementing evidence-based triage protocols and investing in the development of innovative technologies, healthcare organizations can enhance their ability to provide timely, appropriate care to all patients.

Keywords: Clinical assessment, Trauma, In-hospital triage, Field triage, Trauma scoring

Airway Management During Mass Casualty Event or Disaster

Tatjana Goranović[1,2]

[1]Sveti Duh University Hospital, Department of Anesthesiology, Resuscitation and Intensive Care Medicine, Zagreb, Croatia
[2]Josip Juraj Strossmayer University of Osijek, Faculty of Medicine, Osijek, Croatia

ABSTRACT

Airway management in disaster settings is a big challenge for professionals and relevant organizational services. The unpredictability of the disaster settings with overlapping states of situational urgency, a large number of patients with respiratory insufficiency, a limited number of competent health personnel, upper and lower airway injuries, hemodynamic instability, the risk of difficult intubation, the risk of aspiration, limited equipment and potential exposure to infectious or harmful biochemical or radiation substances require special organization of all relevant health services, well-coordinated logistical support, adapted airway triage and the application of adapted airway management techniques.

Keywords: Airway management, disaster medicine, mass casualty events, airway triage

OBJECTIVE

Airway management in disaster settings is challenging for all professionals who may be involved in the care of potential victims. The unpredictability of disaster situations with overlapping emergency situations, large numbers of patients with respiratory failure, limited number of competent health care personnel, upper and lower airway injuries, hemodynamic instability, risk of difficult intubation, risk of aspiration, limited equipment and potential exposure to infectious or harmful biochemical or radiation agents require special organization of all relevant health services and well-coordinated logistical support (1).

Professionals who have competences for basic and advanced airway management, such as anesthesiologists, intensivists, emergency medicine specialists and others, must have an idea in advance of their possible extraordinary role in disaster situations, and relevant services are obliged to provide a plan of their activities, equipment and targeted education (2). Anesthesiologists who are most skilled in airway management primarily work in the hospital setting, managing individual cases in the operating room and intensive care unit. Emergency medicine specialists who are familiar with the field conditions of outpatient medicine, on the other hand, may lack a sufficient number of intubations in the field to maintain advanced airway management skills (3).

DISCUSSION

The concept of a difficult airway in disaster settings

Although current airway management guidelines advocate universal acceptance of the concept of a difficult airway among anesthesiologists and those who regularly manage the airway, they themselves limit their application in the outpatient setting and are not intended for those who do not regularly manage the airway (4). Namely, natural disaster and war situations do not fit the characteristic concept of a difficult airway in many ways. Airway management can be a complex process, but the assessment of the airway itself using the existing numerous predictors of difficult airway can further complicate the situation, without increasing the accurate assessment of problems that may occur during intubation (5). It is realistically questionable whether in the conditions of the initial assessment of airway management there will be enough experienced practitioners who can provide quality airway management. It is also difficult to predict whether in emergency situations there is enough time to assess the airway and prepare an airway management plan according to the recommended procedures for preoperative airway assessment (4) or airway assessment in intensive care units (6). Some authors believe that, therefore, it is necessary to redefine the concept of difficult airway to be more comprehensive, simpler and more targeted in these situations that are not covered by the existing recommendations (7,8). For simplicity, Huitink and Bouwman recommend assessing the airway into basic and advanced airways8. For basic airways, basic airway management techniques are applied, and for advanced airways, the complexity is further assessed according to the acronym HELP-ET (H-human factors; E-experience; L-location; P-patient factors; E-equipment; T-time pressure) and the necessary assistance is requested accordingly (8). In 2017, the HEAVEN criteria (H-hypoxemia; E-extreme of age; A-anatomic challenge; V-vomiting/blood/fluid; E-exsanguination; N-neck mobility limitation) were described in the literature and subsequently validated for the assessment of airway management in emergency medicine (9). According to the results of the American Air Transport Service on 5137 patients intubated using the rapid sequence intubation technique, the HEAVEN criteria show a good prediction of poorer airway visualization (Cormack Lehane III/IV) and unsuccessful intubation on the first attempt for both direct laryngoscopy and videolaryngoscopy (10). In a recent review, Burgess et al. recommend airway assessment in disaster settings according to the acronym POST (P- patient; O-operator; S-setting; T-technology) while trying to take into account the interaction of relevant specificities (7).

Airway management techniques in disaster settings

Airway management techniques in disaster settings are adapted to emergency conditions, large numbers of victims, expected clinical scenarios and limited number of personnel and equipment (1,2). The safest way to manage the airway is intubation because it initially ensures airway

patency while protecting against aspiration of gastric contents, secretions, and blood. Ensuring airway patency ensures adequate oxygenation, but also the possibility of positive pressure ventilation without air leakage and possible dispersion of infectious and other toxic particles. In the case of a critical patient the recommendation is to use the rapid sequence intubation technique (1,6). If a cervical spine injury is suspected, cervical spine stabilization during intubation is necessary (1).

Published experiences from wartime conditions show that the percentage of unsuccessful intubation in prehospital settings is comparable to civilian emergency medical services (11). On the other hand, positive experiences with supraglottic devices in wartime conditions (12), despite the possible risk of aspiration, support the idea that supraglottic devices can be used as a transitional device during transport to the hospital where final airway management, i.e. intubation, is performed.

In the event of intubation and ventilation of a hypoxic patient being impossible, cricothyroidotomy should be performed on site. According to published data from recent wartime events, cricothyroidotomy has been used less frequently, more successfully, and with fewer complications (13) than before.

The risk of contamination of healthcare workers exists during intubation because all airway management procedures are classified as procedures that generate aerosols, so the use of personal protective equipment is necessary. Although the initial recommendation was at the consensus level, with the simple argument that the use of videolaryngoscopy allows for greater distance between the patient's mouth and the operator, during the COVID-19 pandemic videolaryngoscopy has practically established itself as the technique of choice for laryngoscopy in critically ill patients with active SARS-2 infection (14).

Recently, the literature has also mentioned a new SALAD technique (acronym for Suction Assisted Laryngoscopy and Airway Decontamination) adapted to the emergency management of airways contaminated with secretions and blood in the airway (15). Although there is no scientific evidence for the success of its use, its use may be beneficial in expected clinical scenarios in disaster situations.

CONCLUSION

Airway management in disaster situations requires extraordinary organizational and logistical support. Professionals who have the competences for basic and advanced airway management must have an idea in advance of their possible extraordinary role in disaster situations, and relevant services are obliged to provide a plan of their activities, equipment and targeted education. Disaster emergencies require both adapted airway triage and adapted airway management techniques.

REFERENCES

1. Talmor D. Airway management during a mass casualty event. Respir Care 2008;53(2):226-31.
2. Kuza CM, McIsaac JH 3rd. Emergency Preparedness and Mass Casualty Considerations for Anesthesiologists. Adv Anesth 2018;36(1):39-66.
3. Saviluoto A, Jäntti H, Kirves H, Setälä P, Nurmi JO. Association between case volume and mortality in pre-hospital anaesthesia management: a retrospective observational cohort. Br J Anaesth 2022;128(2):e135-e142.
4. Apfelbaum JL, Hagberg CA, Connis RT, et al. 2022 American Society of Anesthesiologists Practice Guidelines for Management of the Difficult Airway. Anesthesiology 2022;136(1):31-81.
5. Roth D, Pace NL, Lee A, et al.Airway physical examination tests for detection of difficult airway management in apparently normal adult patients. Cochrane Database Syst Rev 2018;5(5):CD008874.
6. Higgs A, McGrath BA, Goddard C, et al; Difficult Airway Society; Intensive Care Society; Faculty of Intensive Care Medicine; Royal College of Anaesthetists. Guidelines for the management of tracheal intubation in critically ill adults. Br J Anaesth 2018;120(2):323-52.
7. Burgess MB, Schauer SG, Hood RL, De Lorenzo RA. The Difficult Airway Redefined. Prehosp Disaster Med 2022;37(6):723-6.
8. Huitink JM, Bouwman RA. The myth of the difficult airway: airway management revisited. Anaesthesia 2015;70(3):244-9.
9. Kuzmack E, Inglis T, Olvera D, Wolfe A, Seng K, Davis D. A novel airway prediction tool for emergency airway management: validation of the HEAVEN criteria in a large air medical cohort. J Emerg Med 2017;54(4):395–401.
10. Nausheen F, Niknafs NP, MacLean DJ, et al. The HEAVEN criteria predict laryngoscopic view and intubation success for both direct and video laryngoscopy: a cohort analysis. Scand J Trauma Resusc Emerg Med 2019;27(1):50.
11. Adams BD, Cuniowski PA, Muck A, De Lorenzo RA. Registry of emergency airways arriving at combat hospitals. J Trauma 2008;64(6):1548-54.
12. Shavit I, Aviram E, Hoffmann Y, Biton O, Glassberg E. Laryngeal mask airway as a rescue device for failed endotracheal intubation during scene-to-hospital air transport of combat casualties. Eur J Emerg Med 2018;25(5):368-71.
13. Barnard EBG, Ervin AT, Mabry RL, Bebarta VS. Prehospital and en route cricothyrotomy performed in the combat setting: a prospective, multicenter, observational study. J Spec Oper Med 2014;14(4):35-39.
14. El-Boghdadly K, Wong DJN, Johnstone C, Ahmad I; intubateCOVID collaborators. Tracheal intubation of patients with COVID-19: global risks. Anaesthesia 2021;76 Suppl 3(Suppl 3):4-5.
15. Root CW, Mitchell OJL, Brown R, et al. Suction Assisted Laryngoscopy and Airway Decontamination (SALAD): A technique for improved emergency airway management. Resusc Plus 2020;1-2:100005.

12:05-12:25 (Panel XIII)

Abstract Only

Safe Anesthesia Management in Low-Resource Settings in the Underdeveloped Countries

Urška Žerjav

University Medical Centre Ljubljana, Department of Anesthesia

ABSTRACT

Objective: The quality of anesthesia services is directly tied to perioperative mortality and morbidity and most of the anesthesia-related deaths are preventable. In developed countries anesthesia is delivered safely whereas in underdeveloped countries its safety is plagued by multitude of problems. Almost 90% of population in developing countries have difficulties accessing surgical care because of lack of quality anesthesia resulting in delayed or even no surgical treatment of many common and treatable ailments. Organizing anesthesia service in developing countries poses a particular challenge due to limited funding, poor infrastructure, shortage of trained personnel and lack of essential medicines, equipment and other medical supplies. So, improving patient safety during anesthesia and surgery has become a major global public health issue, due to the increased surgical burden.

Evidence strongly suggests that adequate patient monitoring, using a combination of clinical skills and appropriate monitoring devices greatly increases perioperative patient outcome and safety. Therefore, the deficit of equipment and facilities is one of the hurdles to overcome in task of implementing safe anesthesia protocols. The other is the issue of personnel. Anesthesia providers in developing countries are usually unqualified and without access to higher training and resources. Various approaches have been suggested to help bridge this gap. They include strengthening the local health system via partnership programs, developing local capacities by training more clinicians, motivating the existing providers to stay in the local system and continuing to have international organizations provide anesthesia and surgical care in areas with minimal infrastructure. Given the inherent lag associated with health system strengthening and local capacity development, the need for international organizations to address the immediate gap is great.

Methods: The author applied scoping literature review method to search, screen and extract data.

Results: Data show that anesthesia services in developing countries are severely limited, leading to high perioperative morbidity and mortality rates.

Conclusion: Improving anesthesia safety in underdeveloped countries requires a multifaceted approach: training, reliable equipment, medication access, infrastructure, and strong systems support. Global collaboration and local empowerment are key to making safe anesthesia a reality for all.

Keywords: Anesthesia, anesthesia safety, developing countries.

15:55-16:15 (Panel IX)

Abstract Only

Anesthesia for Acute Burn Injuries

Vanja Trajkovska

University Clinic of Trauma, Orthopedic, Anesthesiology, Intensive Care Medicine, Emergency Surgical Centre Skopje, Clinical Campus-Mother Teresa
Faculty of Medicine- Ss. Cyril and Methodius University in Skopje, Republic of North Macedonia

ABSTRACT

Anesthetic management of the patient with major burn injuries presents numerous challenges. During the acute resuscitation phase, massive crystalloid infusions may be required. Anatomical distortions make airway management and vascular access difficult. With time, pathophysiological changes in cardiovascular function range from initial hypovolemia and impaired perfusion to a hyperdynamic circulation and hypermetabolic state. Pharmacological support of the circulation may be needed. These and other changes profoundly alter response to anesthetic drugs. Effective anesthetic management will depend on knowledge of the continuum of pathophysiological changes, technical skills, proper planning, and availability of proper resources. A team approach is necessary, keeping in mind that perioperative management not only depends on the surgical plan, but also should be compatible with ICU management and goals. This requires close communication with other members of the burn care team, which is one of the most important principles of effective anesthetic management of these challenging patients.

Keywords: Burn injury, anesthesia, analgesia.

11:45-12:05 (Panel XIII)
Full Manuscript

Physiological and Anesthesiologic Problems at High Altitudes

Višnja Ivančan

Anesthesiology Clinic in University of Medicine, Zagreb, Croatia

OBJECTIVE

A need for anesthesiologic procedures and maintenance of anesthesia at high altitudes is a great challenge even nowadays for each anesthesiologist. This area still has not been adequately researched. There have been only a couple of studies that have been published, out of which the most important research has been conducted in the town of La Oroya in Peru at 3,700 meters of altitude.

According to the available data, there are more than 10 million people living at altitudes higher than 3,000 meters. At least one thousand of those people require anesthesiologic procedures due to different reasons.

People have always tried to conquer the highest peaks of the world, and during that process, they have come across numerous issues, such as cold temperatures and lack of oxygen. With the increase of altitude, barometric pressure decreases along with partial oxygen pressure. This causes a state of hypoxia (decreased level of oxygen) in the human body, and it significantly affects different processes in the organism, both in humans and animals. The group of people that is mostly affected by hypoxia includes hikers, mountaineers, and alpinists who climb to high altitudes in a short period of time, so their bodies cannot adapt to lower oxygen levels, and conditions such as chronic altitude sickness, lung, and brain edema occur in their bodies (1). This issue has been researched since the end of the 19th century when the influence of hypoxia was studied on people who lived at sea level compared to people who lived at high altitudes (2). Although conditions are harsh, there are people who have spent their entire lives at high altitudes in the Andes and the Himalayas. They inhabit areas above 4,000 meters of altitude. Some of the famous settlements are Cerro de Pasco (4,330 m), La Plaz (3,800 m) and La Rinconada (5,100 m), the highest settlement in the world. Native inhabitants of those settlements have different adaptations to life in such extreme conditions compared to people who live at sea level. Those adaptations are both physiological and morphological (1,3). Nowadays, many researchers deal with the discovery of ideal animal models and the connection of certain adaptations with genetic predispositions. Also, P. maniculatus is more and more used as a 'lab rat,' i.e., an experimental animal species due to its specific ecology/ ecosystem (4,5).

Breathing and Types of Pressure at High Altitudes

At sea level, the amount of oxygen in the atmosphere is 21% and the partial oxygen level is around 21 kPa (150 mm Hg), breathing process is done normally. Breathing is a process of exchange of gases between the atmosphere and blood, i.e., bringing oxygen to different types of tissue and removing carbon dioxide from tissue and the organism (Figure 1). That process starts in the lungs, which expand by inhaling. A contraction of the diaphragm, stomach muscles, and rib muscles makes this possible. Pleural pressure, which is usually negative (and which makes it possible for the lungs to be stretched during the resting phase) becomes more negative during inhalation Alveolar pressure is equal to atmospheric pressure during rest. During inhalation, it becomes slightly negative. The drop in those two types of pressure makes air flow into the lungs is being made possible, i.e., to the alveoli in which exchange occurs. In the alveoli, oxygen from the inhaled air enters the bloodstream through the respiratory membrane and binds with hemoglobin in erythrocytes. In the meantime, carbon dioxide exits the bloodstream by diffusion through the membrane into the alveolar area. Oxygen bound to hemoglobin is transported to other types of tissue in the body by circulation. Exhaling is the opposite process where air comes out of the lungs. The diaphragm and stomach muscles relax, the ribs lower, and the lungs contract (1,6).

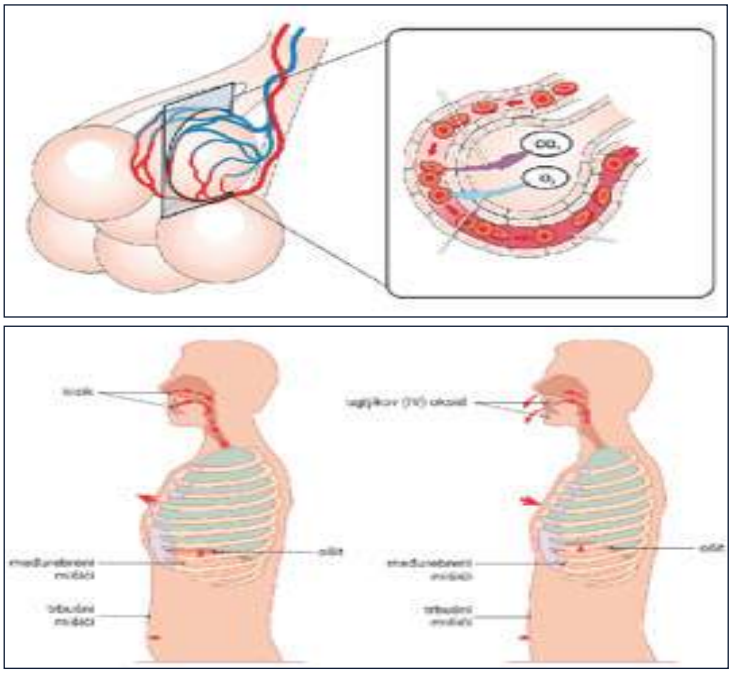


Figure 1. Process of breathing.

Along with carbon dioxide, there is water vapor in the alveoli whose pressure does not change considering altitude. Those two gases diminish the oxygen level in the alveoli, and it additionally decreases the total amount of oxygen a human body can absorb at high altitudes. Hemoglobin saturation, i.e., saturation of arterial blood by oxygen, is at least 90% and is constant at an altitude of 3,000 meters when it starts to suddenly drop (1).

Hypoxia is a state of low oxygen levels. The main cause of hypoxia in organisms at high altitudes is the drop in barometric pressure. Some signs of hypoxia start to show in not acclimatized persons at altitudes higher than 3,000 meters (Figure 2). Those symptoms include sleepiness, dullness/inertia, mental and muscle exhaustion/tiredness, sometimes headache, nausea, and euphoria. Those symptoms amplify with an increase in altitude, slowly progressing to hitches and convulsions, and at altitudes higher than 7,000 meters, they end up with coma followed by death. If it is strong enough, hypoxia can cause cell death in tissues. In milder cases of hypoxia, some of the above-mentioned symptoms appear together with decreased muscle work possibility of muscles. One of the most important effects of hypoxia is the decrease in mental capability, which is very important for pilots. Those symptoms are curable if a person descends to a lower altitude in time and/or starts oxygen treatment (1).

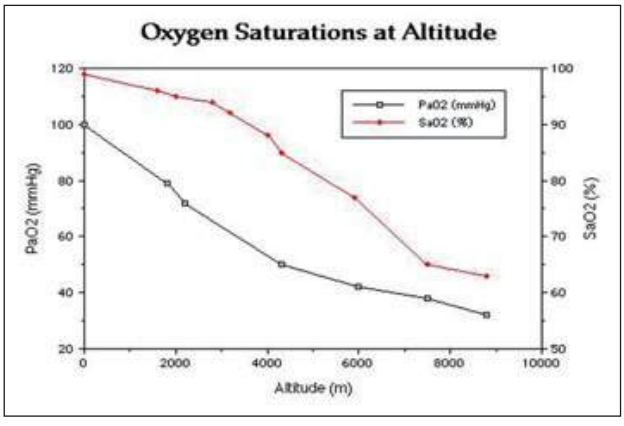


Figure 2. Oxygen saturations at altitude.

Answer of the Organism to Low Partial Oxygen Pressure

If a person stays at high altitude long enough (for days or weeks), his/her body adapts to low partial oxygen pressure over time. That process is called acclimatization. It is possible to conduct hard physical labor without the influence of hypoxia or to climb to even higher altitudes through acclimatization. A person can get acclimatized by a slow ascent that lasts for a couple of days instead of a couple of hours because people breathe deeper and can tolerate lower levels of oxygen in the atmosphere more easily. In normal conditions, a lack of oxygen (i.e. decreased partial oxygen pressure) activates chemoreceptors in the carotid and aortic bodies. Receptor stimulation incites breathing. Except of chemoreceptors, the nervous system participates in breathing regulation, i.e., the breathing center that is stimulated by differences in oxygen and carbon dioxide pressure in arterial blood. During the acclimatization process, the respiratory system loses its sensitivity to pressure changes in carbon dioxide and levels of hydrogen ions. With a sudden ascent to high altitude, arterial chemoreceptors activate, significantly increasing lung ventilation, which leads to giving high amount of carbon dioxide, accompanied by a decrease in the partial pressure of carbon dioxide and an increase of Ph of body fluids. That process inhibits the respiratory center and acts opposite to stimulation with low partial oxygen pressure. During a couple of days, that inhibition disappears, and ventilation increases about 5 times above normal levels. Kidneys also react to the decrease of partial pressure of carbon dioxide in the way that they decrease the secretion of hydrogen ions and increase the secretion of bicarbonate ions five times. This process decreases the influence of respiratory alkalosis, and plasma pH is brought to normal values, which removes part of the inhibition of the respiratory center (1,6,7). Except for the already mentioned lung ventilation, there are also other mechanisms that occur during acclimatization. Increase of number of erythrocytes and the amount of hemoglobin is one of those mechanisms. It is called secondary polycythemia or, in this case, physiological polycythemia. Along with that, blood volume increases, so that the total amount of hemoglobin gets even 50% higher. Also, the increase of concentration of 2,3-BPG can help with the release of oxygen in the tissue area (Figure 3) (1,6). Another mechanism that appears is a change in the peripheral circulation system and an increase in tissue blood flow. During ascent, blood minute volume increases but returns to normal levels over time. There is also a notice of an increased number of systemic capillaries outside of lung tissue (angiogenesis). There is a common occurrence of increased blood flow in the myocardium of the right ventricle due to hypoxia and increased load on the right ventricle caused by lung hypertension. The following mechanism is the increase in the diffusive capacity of the lung membrane. There is also a pressure increase in the lung artery. Due to this, blood is pressed into a larger number of alveolar capillaries, especially in the upper parts of the lungs, which have low blood flow under normal conditions. The last mechanism is the acclimatization of cells, i.e., the adaptation of cells to use oxygen more efficiently at high altitudes (1).

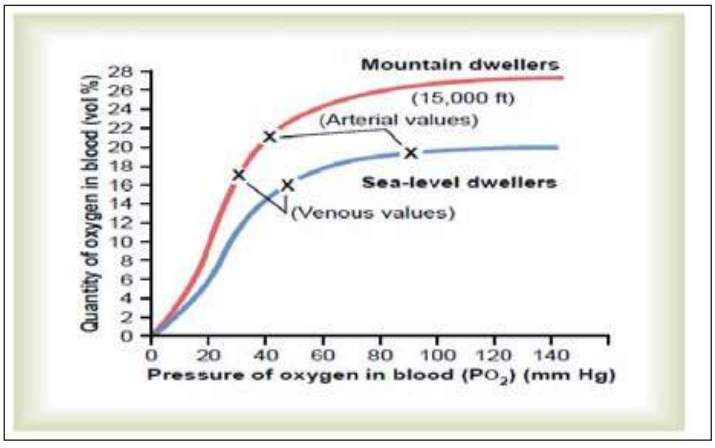


Figure 3. Oxygen-hemoglobin Dissociation Curves.

Diseases and Problems Caused by Hypoxia

One of the major problems caused by hypoxia at high altitudes is a significant decrease in the work capability of muscles. This does not affect skeletal muscles only, but also the heart. There is also the emergence of diseases with different symptoms, such as altitude sickness/disease, lung edema, brain edema, and chronic altitude disease. For both types of edema, the exact mechanism of disease development is not completely known, but these areas have been constantly researched (1). Hypoxia also causes issues during pregnancy due to low oxygen input and the inability to transport of sufficient amount of oxygen to the fetus because of pressure disruptions (8).

1. Acute lung edema

This disease is a form of not so rare acute altitude sickness. It can emerge a couple of days after ascent to elevation/altitude higher than 2,500 meters. It is caused by too large an increase in lung vascular resistance or hypoxic vasoconstriction, which leads to increased microvascular pressure. The resulting hydrostatic stress causes dynamic changes in the permeability of alveolar capillaries and mechanical injury, which brings the flow of large proteins and erythrocytes into the alveolar area. It is considered that other effects of hypoxia ultimately contribute development of acute lung edema. Although this disease can be life-threatening, it can be prevented by slow ascent, i.e., acclimatization, or by certain medications. Its treatment includes oxygen therapy (it is crucial to keep oxygen saturation above 90%), and in more severe cases, it is necessary to descend a patient to a lower altitude and prolong the hospitalization period (9).

2. Acute altitude sickness and brain edema

Acute altitude sickness is a neurological disorder whose symptoms assign to intracranial hypertension caused by brain edema due to mechanical disruption of the blood and brain barrier during hypoxia. Both brain edema and altitude sickness are caused by hypoxia. It is currently considered that acute altitude sickness belongs to a milder type of edema and that both syndromes are connected via mutual pathophysiology, i.e., vasogenic edema, brain swelling, and intracranial hypertension. The exact connection and differences between these two conditions are still being researched. Acute altitude sickness usually affects hikers, mountaineers, and alpinists within 6 to 12 hours after reaching an altitude above 2,500 meters. The main symptoms are headache, anorexia, nausea, vomiting, tiredness, vertigo, and insomnia. This disease is not very dangerous, but it can develop into brain edema in more severe cases or if a person continues to ascend above 4,000 meters of altitude. Brain edema is characterized by altered consciousness and ataxia, or both, in connection with acute altitude sickness and lung edema. If it is not treated, it can cause death. Treatment is similar to treating all types of diseases and conditions at high altitudes, and it includes oxygen therapy and descending the patient to a lower altitude. It has also been discovered that simulated descent with the aid of a hyperbaric chamber (bag) helps in the treatment (10,11).

3. Chronic altitude sickness

Chronic altitude sickness affects native inhabitants and people who have spent long periods of time at high altitudes. It mostly emerges in adulthood. Severe hypoxemia (extremely low oxygen levels in blood), excessive erythrocytosis from certain altitudes, and different symptoms, such as sleep disruptions, headache, vertigo, tinnitus, mental and physical exhaustion, and deterioration of cognitive abilities, are characteristic of this condition. Chronic altitude sickness can finally lead to outstanding altitude lung hypertension, and it can cause heart failure/arrest. It is believed that numerous symptoms are caused by cerebral hypoxia, which can be additionally worsened by frail/weak blood flow into the brain caused by increased blood viscosity. Its treatment includes descent to a lower altitude and medication therapy that is going to decrease the number of erythrocytes in the blood (12).

4. Pregnancy at high altitude

Moore says: 'Fundamental hypothesis that should be accentuated is that the decrease in weight at birth comes from an error of one or multiple components in the mother's system of oxygen transport in order to satisfy the increased oxygen need in pregnancy at high altitude." It has been discovered that altitude affects weight at birth, i.e., decreases it by around 100 grams for each 1,000 meters of altitude as a result of restriction during the third trimester of fetal growth (intrauterine growth restriction - IUGR). Intrauterine growth restriction increases the neonatal mortality rate or infant mortality rate regardless of altitude. It is considered that decreased uteroplacental blood flow is the main cause of intrauterine growth restriction. Chronic hypoxia also affects adaptations of a mother's circulation to pregnancy in such a way that it decreases blood volume and minute heart volume. Protection from intrauterine growth restriction has developed in native inhabitants throughout multiple generations due to higher blood flow in the uterine area, which makes giving birth at higher altitudes possible. Labors at altitudes over 4,000 meters have been recorded, although there is a higher weight deficit of newborns and infants in such cases (8).

Adaptations

Many people in the Andes and in the Himalayas live at high altitudes above 4,000 m. There is a group of native inhabitants living in the Peruvian Andes at an altitude of around 5,500 m who work in mines at an altitude of around 6,000 m. Natural acclimatization has enabled it, so they do not have decreased work capability, unlike other people (Figure 4). The natural acclimatization process starts during early childhood (1). Changes in the construction of arterioles have been recorded in those groups of people. Additionally, the development of primary lung hypertension is unknown in the Andes, as Williams claims. He has also

noticed that they have a specific type of body build and high levels of polycythemia. He has also noted that their chests are broad and look striking compared to their short, chunky body build (3). The factor that causes this is an augmented thorax, and they are of shorter height, which enables increased ventilation capacity compared to their body mass. Furthermore, they have larger hearts and increased minute volume compared to people who live at sea level. Their oxygen delivery by blood to tissues is also significantly facilitated (Figure 4) (1).

Figure 4. People who live at high altitudes.

They also have increased hemoglobin levels compared to inhabitants of sea level altitudes, with the way that the highest hemoglobin level recorded at the highest altitude. The possibility of natural selection in the areas of the Andes, Tibet, and Ethiopia has been researched. Those researchers have concluded that the discovery of the main gene suggests that the allele for higher blood oxygen saturation can be favored by natural selection (13). The following ten studies have confirmed that there are certain genes that show adaptations of native inhabitants to high altitudes (14).

Anesthesia at High Altitude

Anesthesia at high altitude is a challenging task for all anesthesiologists. The high-altitude intensivists are challenged by the human organism in a hypoxic environment, and the true research potential presented by high altitude, where the body is subjected to an essentially isolated hypoxic challenge, is just beginning to be realized. Anesthetic considerations for preoperative preparations at high altitudes must include the depressant effects of premedication drugs. The anesthesiologist working at increased altitudes must consider the physical and physiological effects of low barometric pressures, decreased oxygen tensions, and physiological changes of the acclimatized and unacclimatized residents. Also to be considered are the changes that occur with volatile agents, adjunct drugs, and anesthetic equipment. The anesthesiologist should avoid drugs that have a prolonged depressing effect on the respiratory center. A smooth, rapid induction with tracheal intubation is recommended. Agents such as halothane are used primarily because they allow increased oxygen concentrations.

Short-acting muscle relaxants are used to control alveolar ventilation, and thus they avoid hypoxia. Spinal anesthesia is thought to decrease alveolar ventilation, resulting in hypoxia. This decrease is thought to increase the incidence of postspinal headache, but this has not been proven.

CONCLUSION

High altitudes have always been attractive to people, especially to mountaineers and skiers. They are characterized by a hostile environment, extreme cold, low pressure, and hypoxia. Low pressure and hypoxia are characteristics that pose the biggest threat to human health. This article is an overview of the physiological processes caused in the body by hypoxia. It also explains the concept of acclimatization and describes some illnesses caused by high altitudes as well as their treatments.

This article also investigates the adaptations of high-altitude residents (animals and native inhabitants) to hypoxic conditions. A lot of work and research have been done in this area, but many mechanisms still remain unexplained and are in need of future research. To find appropriate animal models, future research of illness and adaptations in humans and animals should be conducted.

REFERENCES

1. Guyton AC, Hall JE. Textbook of medical physiology, 11th edition. Elsevier Inc., Philadelphia, 2006;427-8, 471-541.
2. Lenfant C. High Altitude Adaptation in Mammals. Amer Zool 1973;13:447-56.
3. Williams D. Adaptation and acclimatization in humans and animals at high altitude. Thorax 1994;49 Suppl(Suppl):S9-13.
4. Snyder LRG. Deer Mouse Hemoglobins: Is There Genetic Adaptation to High Altitude? BioScience 1981; 31(4):299-304.
5. Guo P, Luo H, Fan Y, Luo Y, Zhou Q. Establishment and evaluation of an experimental animal model of high altitude cerebral edema. Neurosci Lett 2013;547:82-6.
6. Raff H, Levitzky M. Medical Physiology A Systems Approach. The McGraw-Hill Companies Inc., 2011;305-30, 382-4, 735-8.
7. Rhoades RA, Tanner GA. Medical physiology 2nd edition. Lippincott Williams & Wilkins, 2003;343, 372-4.
8. Moore LG. Fetal growth restriction and maternal oxygen transport during high altitude pregnancy. High Alt Med Biol 2003;4(2):141-56.
9. Swenson ER, Bärtsch P. High-altitude pulmonary edema. Compr Physiol 2012;2(4):2753-73.
10. Bailey DM, Bärtsch P, Knauth M, Baumgartner RW. Emerging concepts in acute mountain sickness and high-altitude cerebral edema: from the molecular to the morphological. Cell Mol Life Sci 2009;66(22):3583-94.
11. Hackett PH, Roach RC. High altitude cerebral edema. High Alt Med Biol 2004;5(2):136-46.
12. León-Velarde F, Villafuerte FC, Richalet JP. Chronic mountain sickness and the heart. Prog Cardiovasc Dis 2010;52(6):540-9.
13. Beall CM. Andean, Tibetan, and Ethiopian patterns of adaptation to high-altitude hypoxia. Integr Comp Biol 2006;46(1):18-24.
14. Simonson TS, Yang Y, Huff CD, et al. Genetic evidence for high-altitude adaptation in Tibet. Science 2010;329(5987):72-5.

Anesthesiology and Reanimation Specialists Society

Annual Congress

BALKAN STATES ANESTHESIA DAYS - IX

Disaster Preparedness in Anesthesia and Intensive Care

24-27 April 2025

Skopje, Macedonia

International Balkan University Conference Hall




www.arud2025.org

in collaboration with

ORAL PRESENTATIONS

with the supports of

TİKA

INTERNATIONAL BALKAN UNIVERSITY

organization secretariat

DİAMED

hakan@diamed98.com

+90 533 247 6627

* The authors are responsible for the content of the manuscripts included in this supplement, which have not undergone the journal's regular review processes.

OP-1

Abstract Only

Protecting Emergency Responders: Managing Hazards and Ensuring Safety in Disaster Response

Sultan Pinar Cetintepe, Mustafa Necmi Ilhan

Gazi University, Faculty of Medicine, Department of Public Health, Division of Occupational Medicine, Ankara, TÜRKİYE

ABSTRACT

Objective: Occupational health and safety (OHS) during public health emergencies and natural disasters is critical for protecting emergency responders and healthcare workers. These scenarios expose workers to various hazards, including infectious diseases, extreme temperatures, ergonomic risks, and psychosocial stress, which can impair their performance and well-being.

Methods: This review document outlines the primary risks faced by emergency response teams and healthcare workers, such as biological and chemical exposures, falls, vehicular accidents, and mental health challenges. It provides detailed preventive strategies, including the use of personal protective equipment (PPE), appropriate training, adequate rest periods, and emergency procedures. A multidisciplinary and inclusive approach, considering environmental, cultural, and social factors, is emphasized to mitigate the impact of such hazards.

Conclusion: Ensuring the health and safety of emergency responders requires comprehensive policies that address both physical and psychosocial risks. Key recommendations include enhancing awareness through training, ensuring access to protective equipment, and implementing safety protocols tailored to the specific demands of disaster settings. The review emphasizes the necessity of proactive planning, inter-agency coordination, and continuous monitoring to create resilient and sustainable OHS practices during emergencies.

OP-2

Abstract Only

Sensitivity Comparison of Dynamic Parameters in the Evaluation of Fluid Responsiveness After Passive Leg Raise Test in Coronary Artery Bypass Surgery

Pinar Balcik, Umit Karadeniz, Nevriye Salman, Behic Girgin, Z. Asli Demir, Aysegul Ozgok

University of Health Sciences Ankara Bilkent City Hospital, Department of Anesthesiology and Reanimation, Ankara, Türkiye

ABSTRACT

Objective: The primary aim of the goal directed fluid therapy (GDFT), a personalized approach to fluid management, is to ensure euvolemia by avoiding hypo- and hypervolemia, while optimizing tissue oxygen delivery and cardiac output. This strategy minimizes the risk of fluid imbalance by preventing both hypo- or hypervolemic.

The aim of the this prospective observational study was to compare the sensitivity of dynamic parameters in assessing fluid responsiveness following the passive leg raising test (PLRT) in patients undergoing coronary artery bypass surgery.

Methods: Forty-eight adult patients with ASA physical status II-III undergoing coronary artery bypass surgery were included in the study. Following the induction of anesthesia, PLRT was performed; pulse rate, systolic arterial pressure (SAP), mean arterial pressure (MAP), diastolic arterial pressure (DAP), stroke volume variation (SVV), pulse pressure variation (PPV), pleth variability index (PVI) and cardiac index (CI) values were measured with invasive hemodynamic monitorization? before and after PLRT. ProAQT monitor was used to measure CI, SVV and PPV, while Massimo pulse oximetry probe was used to measure PVI. An increase of 15% or more in CI following PLRT was considered indicative of fluid responsiveness. Patients with a 15% or more increase in CI following PLRT constituted the fluid-responsive group, whereas patients with a CI increase of less than 15% constituted the fluid-unresponsive group. Statistical results were evaluated by ROC analysis.

Results: In the ROC analysis performed in our study, PPV had an AUC of 0.726, p=0.015, cut-off value was >21% and its correlation with CI was statistically significant (p=0.027). SVV had an AUC of 0.715, p=0.02, with a cut-off value >20%, and its correlation with CI was not significant (p=0.708). PVI had an AUC of 0.525, p=0.785 and found not to be statistically significant in the fluid responsiveness assessment.

Conclusion: In patients undergoing coronary artery bypass surgery, PPV was more sensitive than SVV in evaluating fluid responsiveness-reflected by changes in CI-during fluid management guided by PLRT as part of GDFT.

OP-05

Abstract Only

Our Approach to Port Catheter Migration in Oncology Patients: A Case Series

Merve Nur Ulug, Mehmet Emin Ince, Musa Mert Ozyavuz, Uygar Cagdas Yuksel

Gulhane Training and Research Hospital, Department of Aneesthesiology and Reanimation, Ankara, Türkiye

ABSTRACT

Objective: Totally implantable venous access device (TIVAD) placement is routinely performed by our department for oncology patients requiring drug therapy, transfusion and parenteral nutrition (1,2). Catheter line rupture is a rare but life-threatening complication of these devices (1,3). In this case series, we present the management of seven patients who experienced port catheter line embolization.

Case Presentation: The records of patients diagnosed with embolization of TIVAD catheter lines, that were followed up by Gulhane Training and Research Hospital Department of Anesthesiology during the period of 2012–2024, were reviewed. The demographic details, clinical findings and management of these patients were recorded (Table 1). By the time the patients were referred to our department for issues related to their TIVADs, all reported pain following saline flushing.

Each of the seven patients presented with varying symptoms-such as arrythmia, dyspnea and angina- depending on the anatomical location to which the catheters had embolized (Table I). Review of chest x-rays or computed tomography scans revealed migration of catheters into the cardiovascular system (Figure 1-3).

Fluoroscopic investigations were performed by the cardiology department and the intravascular foreign bodies were removed using snare techniques under sedation, while the remaining TIVAD components were subsequently removed by our surgical team (Figure 4).

Further management of vascular access varied among the patients. One patient declined additional vascular intervention and was discharged, while the remaining patients underwent placement of new vascular access devices (Table I). Written informed consent was obtained from all patients, including approval for the use of their medical images for publication.

Conclusion: TIVADs keep their functionality for a long-time, improving patient comfort, with very rare (2.76%) incidence of venous embolism (4). Risk factors for catheter embolization includes: area of placement - subclavian placement increases the risk of pinch-off syndrome (1) , and the material used for the catheter - polyurethane (PU) catheters may be less flexible and more prone to fracture compared to silicone - (5).

Keywords: Vascular access, catheter migration, implantable catheters

REFERENCES

1. Kaya E, Özkan G, İnce ME, et al. Pinch-Off Syndrome Presenting with Severe Arrhythmia. Journal of Cardio-Vascular-Thoracic Anaesthesia and Intensive Care Society Published online 2014.
2. Ince ME, Ozkan G, Ors N, Yildirim AK, Doganci S. Complications and pitfalls of central venous port catheters: experience with 782 patients with cancer. Ir J Med Sci 2020;189(4):1371-7.
3. Machat S, Eisenhuber E, Pfarl G, et al. Complications of central venous port systems: a pictorial review. Insights Imaging 2019;10(1):86.
4. Jiang M, Li CL, Pan CQ, Cui XW, Dietrich CF. Risk of venous thromboembolism associated with totally implantable venous access ports in cancer patients: A systematic review and meta-analysis. J Thromb Haemost 2020;18(9):2253-73.
5. Alzahrani K, Lejeune J, Lakhal W, et al. Polyurethane versus silicone port a cath: What's going on at removal? J Pediatr Surg 2018;53(7):1417-9.

Table I. Characteristics of the Patients And Port Cathethers

	Age (Years) / Gender	*Diagnosis*	*Additional Diseases*	*Total Time the TIVAD Was in The Patient*	*Total Time the TIVAD Was In Use*	*Embolized TIVAD Was Originally Placed: In Our Clinic/ Outer Clinic*	*Originally TIVAD's Location*	*Embolized Catheter Material*	*Location Of Migrated Catheter*	*Symptoms On Referral*	*Selective Angiography Method for Removal of Embolized Part*	*Further Vascular Access Management*
Case 1	24/Female	Ovarian Carcinoma	Reoccurring Deep Vein Thrombosis Managed With Inferior Vena Cava Filter	2 Years	Used For First 3 Days	Outer Clinic	Right Subclavian Vein	Polyurethane	Between Right Atria And Right Ventricle	Dyspnea, Arrhythmia, Pain on Injection	Trans Jugular Snaring	No Further Management
Case 2	25/Male	Osteosarcoma	-	8 Years	Used For First 2 Years	Outer Clinic	Right Internal Jugular Vein	Polyurethane	Between Two Pulmonary Arteries	Severe Dyspnea, Pleuritic-like Pain, Pain on Injection	Transfemoral Snaring	New TIVAD From Right Internal Jugular Vein
Case 3	27/Male	Testicular Mixed Germ Cell Tumor	-	1 Month	Used For the First Month	Outer Clinic	Left Subclavian Vein	Polyurethane	Between Superior Vena Cava and Right Ventricle	Arrhythmia, Pain on Injection	Transfemoral Snaring	New TIVAD From Right Internal Jugular Vein
Case 4	55/Male	Gastric Adenocarcinoma	-	1 Month	Used For the First Month	In Our Clinic	Right Internal Jugular Vein	Silicone	Between Superior Vena Cava and Right Ventricle	Arrhythmia, Angina like pain, Pain on Injection	Transfemoral Snaring	New TIVAD From Right Internal Jugular Vein
Case 5	34/Female	Breast Cancer	-	1 Month	Used For the First Month	In Our Clinic	Left Subclavian Vein (Leading to Pinch Off Syndrome)	Silicone	Inside Right Ventricle	Severe Arrhythmia, Pain on Injection	Transfemoral Snaring	New Implantable Left Subclavian Vein Catheter
Case 6	62/Male	Colon cancer	Diabetes, Coronary Artery Disease	16 months	Used For 16 months	In Our Clinic	Right Internal Jugular Vein	Silicone	Inside Left Pulmonary Artery	Pain on Injection	Transfemoral Snaring	New TIVAD From Right Internal Jugular Vein
Case 7	79/Female	Urethral Cancer	Breast Cancer, Coronary Artery Disease, Chronic obstructive pulmonary disease	6 Months	Used For 6 Months	In Our Clinic	Right Subclavian Vein	Silicone	Inside Right Ventricle	Severe Arrhythmia, Pain on Injection	Trans Subclavian Snaring	New Central Catheter from Right Subclavian Vein

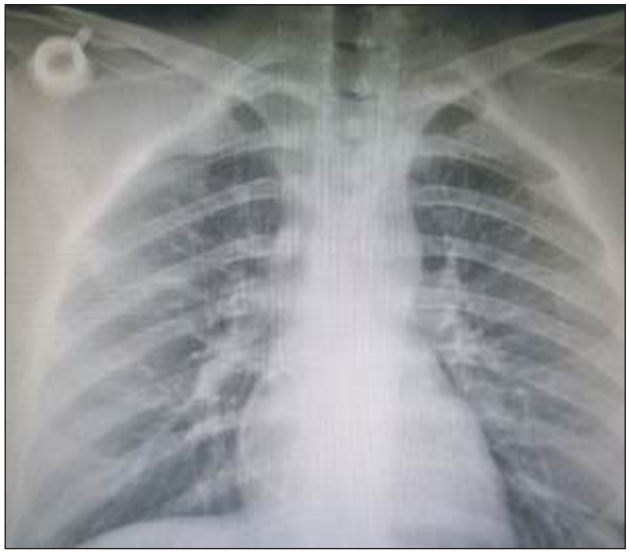


Figure 1. Embolized catheter part is observed inside the right atrium and ventricle.

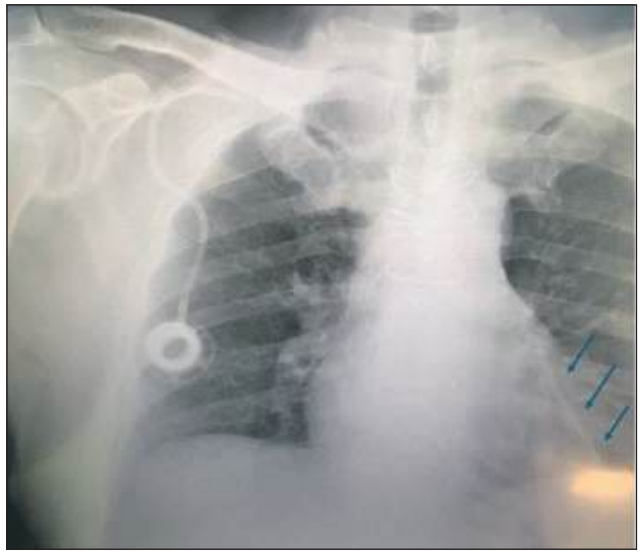


Figure 2. Embolized catheter part can be observed inside the left pulmonary artery (shown by blue arrows).

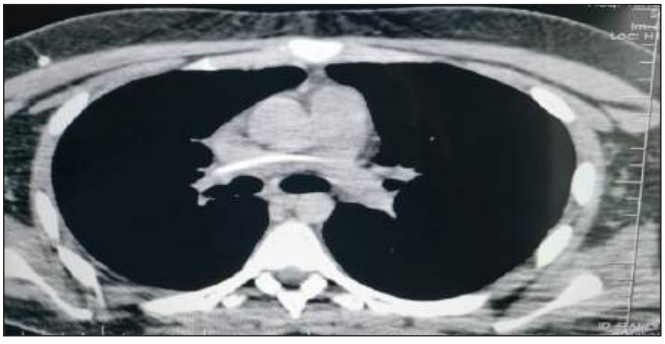


Figure 3. Embolized catheter part can be observed in between two pulmonary arteries (shown by blue arrow).

Figure 4. Teared TIVAD material reassembled after removal.

OP-06

Abstract Only

Management of a Patient Undergoing Unilateral Mastectomy with Factor VII Deficiency: A Case Report

Merve Nur Ulug, Ali Kemal Comez, Zeynep Bayazit, Gokhan Ozkan

Gulhane Training and Research Hospital, Department of Anesthesiology and Reanimation, Ankara, Türkiye

ABSTRACT

Objective: Factor VII (FVII) deficiency is a rare autosomal recessive coagulation disorder causing prolonged prothrombin time (PT) (1). Clinical presentation ranges from asymptomatic cases to life-threatening bleeding, such as gastrointestinal or central nervous system hemorrhage (1). Diagnosis is often made following a bleeding episode or family screening. Recombinant activated factor VII (rFVIIa) is commonly used to manage bleeding in these patients (1). In this case report, we present the perioperative management of a patient with FVII deficiency undergoing right-sided total mastectomy.

Case Presentation: A 56-year-old woman with rheumatoid arthritis, managed with oral hydroxychloroquine 200 mg daily, and a history of breast cancer was scheduled for a right-sided total mastectomy. During preoperative evaluation, an unexplained prolonged PT was observed. She was not receiving anticoagulant therapy and had no prior history of bleeding or prior surgical procedures. Repeat coagulation testing confirmed persistent prolonged PT, and normal mixing studies raised suspicion for a clotting factor deficiency (Figure 1). Hematology laboratory results revealed a factor VII activity level of 10% compared to the normal range, leading to a diagnosis of factor VII deficiency (Figure 1). Recombinant activated factor VII was recommended for perioperative management.

2 mg of rFVIIa was given intravenously before the operation after general anesthesia induction (Figure 2). Surgery proceeded without complications and the patient was closely monitored postoperatively for bleeding or hematoma formation. Postoperative INR was normalized, with no signs of bleeding or thromboembolism.

Written informed consent was obtained from the patient, including approval for the use of their medical images for publication.

Surgery in patients with FVII deficiency carries major bleeding risk without replacement therapy, thus preoperative anesthetic evaluation and multidisciplinary planning are important (1,2). Perioperative bleeding can occur even at FVII activity levels between 20–50% (1). In cases with FVII activity below 10–15% or in the presence of recurrent bleeding, rFVIIa is commonly administered, although the optimal treatment regimen remains unclear (3). Standard dosing is typically 15–30 μg kg^{-1} every four hours or 15–30 mg kg^{-1} day^{-1} (1). Additional doses should be tailored according to surgery duration, bleeding risk and the half life of rFVIIa.

Conclusion: Sharing clinical experience in rare conditions such as FVII deficiency contributes to the development of standardized protocols and improved patient management.

Keywords: FVII deficiency, coagulation management, recombinant activated FVII, surgical bleeding

Tüp Adı: Dış Lab. Koagulasyon - Onaylanmış					
Faktör 5	↑	131	%	70	120
Faktör 5	↑	131	%	70	120
Faktör 7	↓	8	%	60	150
Faktör 7	↓	8	%	60	150
Tüp Adı: Dış Lab.Koagülasyon2 - Onaylanmış					
Faktör 10		87	%	70	120
Faktör 10		87	%	70	120
Tüp Adı: Koagülasyon Gün Biyo. - Onaylanmış					
Protrombin Zamanı ...	↑	23,4	sn	9,7	14,3
Protrombin Zamanı ...	↑	23,4	sn	9,7	14,3
INR	↑	2,1	Yok	0,8	1,2
INR	↑	2,1	Yok	0,8	1,2
PTZ Karışım Testi		13.0			
PTZ Karışım Testi		13.0			

Figure 1. Patients' laboratory work showing prolonged International Normalized Ratio (INR), decreased FVII levels and normal mixing test results.

Figure 2. Recombinant activated factor VII vials.

REFERENCES

1. Demirci U. Management of Patients with Factor VII Deficiency in Surgery: Single Center Experience. Erciyes Medical Journal. Published online 2021.
2. Yoshida A, Kimoto Y, Ejiri K, Mitani Y, Kawamata T. Anesthetic management of a patient with factor VII deficiency undergoing laparoscopic colectomy: a case report. JA Clin Rep 2016;2(1):30.
3. Napolitano M, Siragusa S, Mariani G. Factor VII Deficiency: Clinical Phenotype, Genotype and Therapy. J Clin Med 2017;6(4).

OP-07

Abstract Only

Sympathetic Neurolysis for Post-Amputation Phantom Limb Pain in Earthquake Survivors with Lower-Limb Amputation

Ufuk Turan

Etlik City Hospital, Department of Algology, Ankara, Türkiye

ABSTRACT

Objective: Phantom pain, a painful sensation occurring in the area of a missing limb, is a significant complication following limb amputation and can severely affect quality of life (1). The pathophysiology of phantom pain is complex and involves peripheral, spinal, and central mechanisms, including maladaptive neuroplasticity and persistent nociceptive signaling (2). After the devastating Kahramanmaraş earthquake on February 6, 2023, many survivors experienced phantom pain due to limb loss. This report aims to assess the treatment efficacy of lumbar sympathetic neurolysis in earthquake victims with phantom pain.

Methods: A total of four patients with a history of phantom pain following limb amputation due to earthquake-related injuries were included in this report. Patients- particularly those who did not respond to medical therapy and basic interventional procedures- were assessed using the Numeric Rating Scale (NRS [Range:0-10]) and the Neuropathic Pain Scale (NPS: [Range:0-80]) for pain severity before treatment and at 4 weeks post-procedure. Fluoroscopy-guided sympathetic neurolysis was performed until sedation using lidocaine and alcohol/phenol at the levels of the second and fourth lumbar vertebrae (Figure 1). The procedure was overall well-tolerated, with no major complications reported.

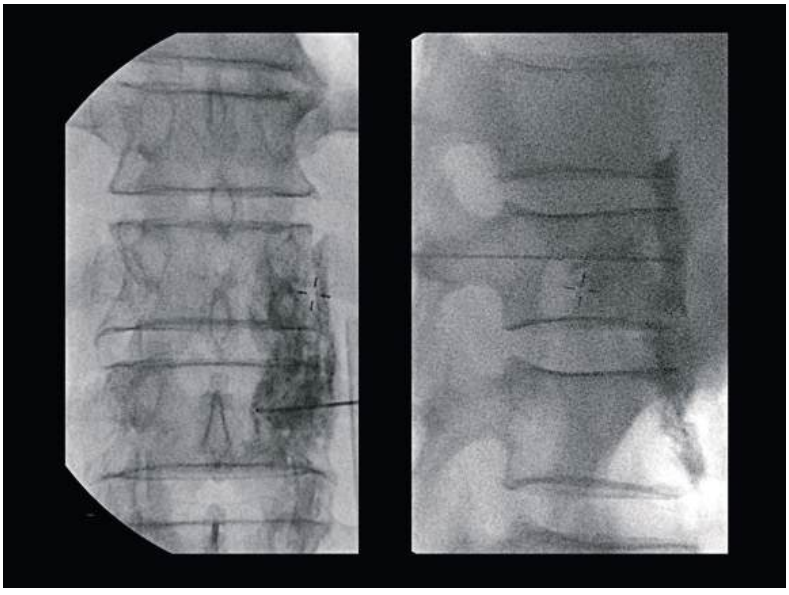


Figure 1. Right-sided sympathetic neurolysis at the L2 level with contrast spread pattern.

Results: The mean baseline NRS and NPS scores were 8 and 71.8 respectively before intervention. Pain relief was observed in 56–71% of patients at four weeks, with a mean NRS and NPS of 3.5 and 27 respectively (Table I). Additionally, patients reported reduced medication use and improved sleep quality, including fewer nighttime awakenings and a more restful sleep.

Table I. Patient Characteristics, Intervention Details and Pain Outcomes

	Age/Gender	Amputation Level and side	Intervention	Baseline NRS/ NPS	Control NRS/NPS	Medication
1	44/Male	Right above-knee	Lidocaine+Alcohol Neurolysis	8/72	3/28	GBP
2	57/Female	Bilateral lower extremity (Left sided phantom pain was present)	Lidocaine+Alcohol Neurolysis	7/65	2/20	GBP
3	32/Female	Left above-knee	Lidocaine+Alcohol Neurolysis	9/80	4/35	PGB+DLX
4	28/Male	Right above-knee	Lidocaine+Phenol Neurolysis	8/70	3/25	PGB

GBP: Gabapentin, **PGB:** Pregabalin, **DLX:** Duloxetin, NRS: Numeric Rating Scale, **NPS:** Neuropathic Pain Scale

Conclusion: These findings suggest that fluoroscopy-guided sympathetic neurolysis may be an effective approach for managing phantom pain in earthquake-related amputees, particularly in patients who did not benefit from medical treatments and basic interventional procedures. Sympathetic neurolysis provided significant pain relief and decreased analgesic consumption. Given the complex nature of phantom pain and the psychological burden on earthquake survivors, interventional pain management techniques should be integrated into a multidisciplinary rehabilitation (3,4). Additionally, optimizing patient selection criteria and identifying predictors of treatment response may enhance clinical outcomes (1). Further studies with larger cohorts and long-term follow-up are warranted to confirm these findings.

Keywords: Autonomic nerve block, disaster medicine, pain management, phantom limb

REFERENCES

1. Limakatso K, Ndhlovu F, Usenbo A, Rayamajhi S, Kloppers C, Parker R. The prevalence and risk factors for phantom limb pain: a cross-sectional survey. BMC Neurol [Internet]. 2024;24(1):57. Available from: https://bmcneurol.biomedcentral.com/articles/10.1186/s12883-024-03547-w
2. Markewych AN, Suvar T, Swanson MA, et al. Approaches to neuropathic amputation-related pain: narrative review of surgical, interventional, and medical treatments. Reg Anesth Pain Med [Internet]. 2024;49(12):889–99. Available from: https://rapm.bmj.com/lookup/doi/10.1136/rapm-2023-105089
3. Mendes E, Adiyeke O, Sarban O, et al. Enhancing Pain Management and Psychological Recovery in Earthquake Victims: The Role of Continuous Regional Analgesic Techniques Assessed by QoR-15. Diagnostics [Internet]. 2024;14(23):2678. Available from: https://www.mdpi.com/2075-4418/14/23/2678
4. Reinhardt J, Zhang X, Chen S, Li J, Zhou M, Khan F. Long-term effectiveness of rehabilitation services delivery for Wenchuan earthquake survivors with impairments over a 4-year period: a prospective cohort study. BMJ Open [Internet]. 2022;12(8):e057158. Available from: https://bmjopen.bmj.com/lookup/doi/10.1136/bmjopen-2021-057158

OP-08

Abstract Only

Ultrasound-Guided Management of Trochanteric Bursitis and Lateral Femoral Cutaneous Nerve Entrapment After Hip Arthroplasty

Ufuk Turan

Etlik City Hospital, Algology Clinic, Ankara, Türkiye

ABSTRACT

Objective: Total hip arthroplasty (THA) is performed for coxarthrosis. While it significantly improves pain and function, some patients develop complications such as trochanteric bursitis, which occurs in 17% of cases and often leads to persistent pain and reduced mobility (1). Additionally, irritation of the lateral femoral cutaneous nerve (LFCN) can contribute to the onset of neuropathic symptoms (2).

Case Presentation: A 74-year-old female ASA II patient had undergone THA due to coxarthrosis four months prior, without any acute perioperative complications (Figure 1). Th patient presented with lateral hip pain and tenderness. Ultrasonographic examination revealed capsular thickening of the hip joint with normal intra-articular fluid levels. A hypoechoic collection measuring up to 20 mm was noted in the trochanteric bursa (Figure 2).

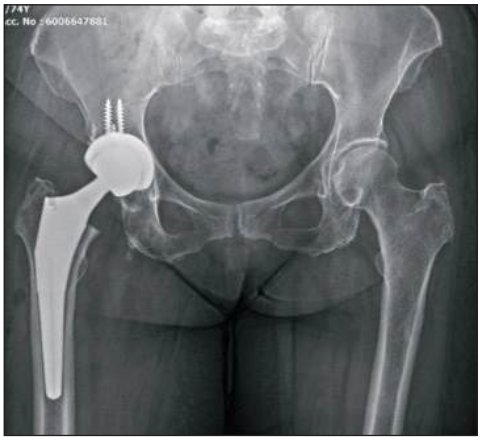


Figure 1. Anteroposterior pelvic radiography showing right total hip arthroplasty.

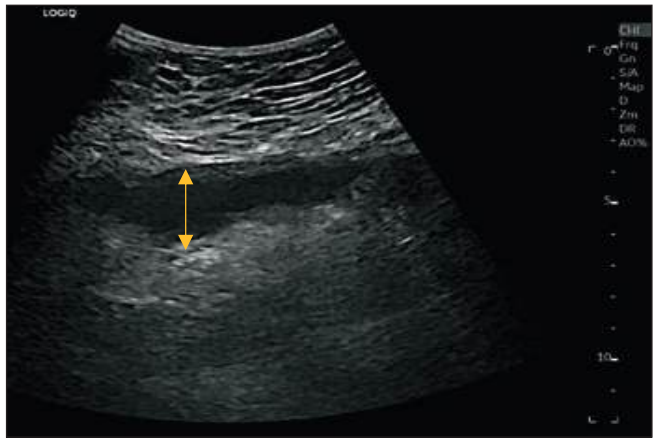


Figure 2. Sonographic view of trochanteric bursitis (double-headed arrow).

Moreover, the patient reported dysesthesia, pain and tingling confined to the distal lateral femoral region. Given the persistent symptoms, an ultrasound-guided trochanteric bursa and iliotibial band injection was performed with 8 mg dexametasone and 10 mg bupivacaine mixture. Numeric Rating Scale (NRS) score decreased from 7 to 2 on follow-up (NRS score range: 0-10). However, the preexisting dysesthesia and allodynia worsened along the femoral lateral region. Consequently, an ultrasound guided LFCN block was carried out using of bupivacaine and dexametasone mixture. The patient experienced significant relief in neuropathic symptoms following the block. Due to the positive response to the LFCN block, pulsed radiofrequency treatment (PRFT) was subsequently applied one week later (Figure 3 and 4).

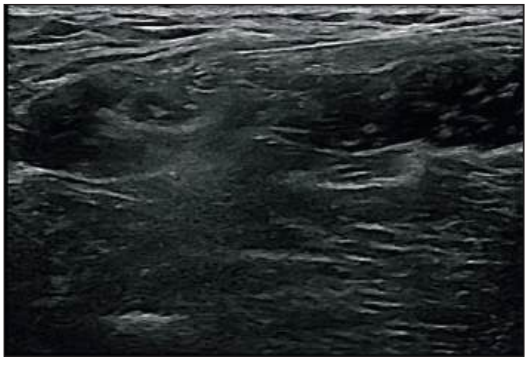


Figure 3. Sonographic view of lateral femoral cutenous nerve and radiofrequency needle.

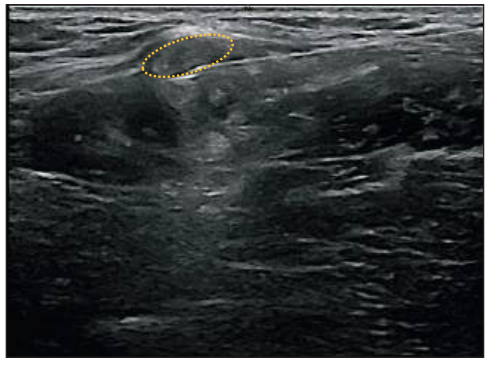


Figure 4. Sonographic view of injectate around the lateral femoral cutenous nerve.

Trochanteric bursitis following THA is a well-recognized cause of postoperative lateral hip pain. Additionally, LFCN entrapment or irritation -whether due to surgical factors or postural changes- can contribute to persistent discomfort (3). In such cases, nerve blocks and pulsed radiofrequency treatments may serve as effective therapeutic options (4).

To minimize the risk of trochanteric bursitis and LFCN-related neuropathic symptoms, careful surgical techniques, appropriate positioning, and rehabilitation strategies should be emphasized (5,6). In such cases, consultation with pain medicine can be valuable in optimizing treatment strategies. Ultrasound-guided interventions, including nerve blocks and PRFT, should be considered as part of a multimodal approach to address meralgia paresthetica (6).

Conclusion: This case demonstrates the value of multimodal pain management in addressing post-THA complications. Ultrasound-guided trochanteric bursa injections and LFCN blocks may offer substantial relief in patients presenting with both bursitis and neuropathic pain. Early identification and targeted interventions are crucial for enhancing patient outcomes.

Keywords: Hip arthroplasty, interventional ultrasonography, lateral femoral cutaneous nerve entrapment, neuropathic pain, trochanteric bursitis

REFERENCES

1. Axelrod DE, Ekhtiari S, Winemaker MJ, Beer J de, Wood TJ. Management of Greater Trochanteric Pain Syndrome After Total Hip Arthroplasty: Practice Patterns and Surgeon Attitudes. JAAOS: Global Research and Reviews [Internet]. 2023;7(12). Available from: https://journals.lww.com/10.5435/JAAOSGlobal-D-23-00085
2. Patton RS, Runner RP, Lyons RJ, Bradbury TL. Clinical Outcomes of Patients With Lateral Femoral Cutaneous Nerve Injury After Direct Anterior Total Hip Arthroplasty. J Arthroplasty [Internet]. 2018;33(9):2919-26.e1. Available from: https://linkinghub.elsevier.com/retrieve/pii/S0883540318303930
3. Hasija R, Kelly JJ, Shah N V, et al. Nerve injuries associated with total hip arthroplasty. J Clin Orthop Trauma [Internet]. 2018;9(1):81–6. Available from: https://linkinghub.elsevier.com/retrieve/pii/S0976566217304800
4. Scholz C, Hohenhaus M, Pedro MT, Uerschels AK, Dengler NF. Meralgia paresthetica: relevance, diagnosis, and treatment. Dtsch Arztebl Int [Internet]. 2023;120(39):655–61. Available from: https://www.aerzteblatt.de/10.3238/arztebl.m2023.0170
5. Goetting J, Jhaveri S, Koeper J, Sveum J, Hanna A. A Novel Hip Pad Design to Prevent Meralgia Paresthetica After Surgery in the Prone Position. Biomedical Materials & Devices [Internet]. 2024;2(2):883–90. Available from: https://link.springer.com/10.1007/s44174-023-00155-z
6. Ahmed MS, Varrassi G, Hadjiconstanti D, Zis P. The Diagnosis and Management of Meralgia Paresthetica: A Narrative Review. Pain Ther [Internet]. 2025;14(1):103–19. Available from: https://link.springer.com/10.1007/s40122-024-00693-4

OP-10

Abstract Only

Regional Anesthesia for Deep Brain Stimulator Electrode Insertion in Parkinson's Disease

Seyyid Furkan Kina

Etlik City Hospital, Clinic of Anesthesiology and Reanimation, Ankara, Türkiye

ABSTRACT

Objective: Traditionally, Deep Brain Stimulation (DBS) surgery for Parkinson's disease (PD) is conducted under local anesthesia, allowing the patient to remain awake (1). This approach enables intraoperative neurophysiological verification of the target area through microelectrode recording (MER) and facilitates clinical assessment of improvements in parkinsonian symptoms following test stimulation (2,3). In this case report, it is aimed to present the scalp block method applied to a patient who was planned to undergo DBS surgery.

Case Presentation: A 52-year-old male patient, classified as ASA III, provided informed consent for the procedure. His medical history included diabetes mellitus and Parkinson's disease. Standard ASA monitoring was applied and sedoanalgesia was administered using dexmedetomidine. A local anesthetic solution was prepared by mixing 36 mL of 0.5% bupivacaine with 4 mL of 0.01 mg cc^{-1} adrenaline. In the supine position, the patient underwent bilateral supratrochlear (2.5 mL), supraorbital (2.5 mL), auriculotemporal (2 mL), zygomaticotemporal (2 mL), greater occipital (5 mL), and lesser occipital (3 mL) nerve blocks. 15 minutes after the block application, the Mayfield pins head clamp was placed on the patient. The patient underwent a control CT scan after a successful DBS surgery (120 minutes). After the CT scan, battery was placed under the patient's right clavicle under general anesthesia, and the surgery was completed. At the end of the surgery, the patient was awakened and sent to the ward after appropriate recovery.

Conclusion: In DBS surgery, the neurological examination of patients is very important and positively affects the treatment (1). Scalp block application is a reliable anesthesia technique for selected intracranial procedures (4). The application of a skull pin head holder induces significant pain and leads to sudden increases in heart rate and arterial blood pressure (5). Utilizing a scalp block mitigates these effects while also eliminating the risks associated with general anesthesia (6).

REFERENCES

1. Lim ML, Zhan ABB, Liu SJ, et al. Awake versus Asleep Anesthesia in Deep Brain Stimulation Surgery for Parkinson's Disease: A Systematic Review and Meta-Analysis. Stereotact Funct Neurosurg 2024;102(3):141-55.
2. Saleh S, Swanson KI, Lake WB, Sillay KA. Awake Neurophysiologically Guided versus Asleep MRI-Guided STN DBS for Parkinson Disease: A Comparison of Outcomes Using Levodopa Equivalents. Stereotact Funct Neurosurg 2015;93(6):419-26.
3. Sutcliffe AJ, Mitchell RD, Gan YC, Mocroft AP, Nightingale P. General anaesthesia for deep brain stimulator electrode insertion in Parkinson's disease. Acta Neurochir (Wien) 2011;153(3):621-7.
4. Nasr, Yasser M, Salwa H Waly, and Ahmed A Morsy. "Scalp block for awake craniotomy: Lidocaine-bupivacaine versus lidocaine-bupivacaine with adjuvants." Egyptian Journal of Anaesthesia 36.1 (2020): 7-15.
5. Sahana BN, Radhapuram SD, Samantaray A, Hemanth N, Pasupuleti H, Mangu HR. Comparison of effects of dexmedetomidine added to ropivacaine versus ropivacaine alone infiltration scalp block for attenuation of the haemodynamic response to skull pin placement in neurosurgical procedures: A double-blind, randomised clinical trial. Indian J Anaesth 2021;65(11):782-8.
6. Zhuang Z, Chen Z, Chen H, Chen B, Zhou J, Liu A, Luo J. Using Local Anesthesia for Burr Hole Surgery of Chronic Subdural Hematoma Reduces Postoperative Complications, Length of Stay, and Hospitalization Cost: A Retrospective Cohort Study From a Single Center. Front Surg 2022 1;9:783885.

OP-12

Abstract Only

Sedation Management in a Child with Schimke Immuno-Osseous Dysplasia: A Case Report

Sabira Mamatova, Zehra Hatipoglu, Ersel Gulec, Mediha Turktan, Dilek Ozcengiz

Cukurova University Faculty of Medicine, Department of Anesthesiology and Reanimation, Adana, Türkiye

ABSTRACT

Objective: Schimke Immuno-Osseous Dysplasia (SIOD) represents an uncommon genetic disorder inherited in an autosomal recessive pattern, primarily manifesting as skeletal abnormalities, facial dysmorphism reminiscent of mucopolysaccharidosis, progressive nephropathy, and immune system deficiencies (1). There is a paucity of literature documenting anesthetic management in patient with SIOD (2). We present a case report of a child with SIOD who underwent procedural sedation for gastrointestinal endoscopy.

Methods: Following parental informed consent, a 10-year-old female patient was admitted to the operating room for upper gastrointestinal endoscopy to investigate suspected gastrointestinal hemorrhage. The patient was 16 kilograms with significant medical history including pancreatitis, chronic renal failure, hypertension and T-cell immunodeficiency. Laboratory values were within normal reference ranges except Blood urea nitrogen (25.9 mg dL^{-1}), creatinine (2.17 mg dL^{-1}), lipase (932 U L^{-1}), and potassium (3.1 mmol L^{-1}). During the airway assessment, a Mallampati class II, micrognathia and a short neck were noted (Figure 1). The patient was taken to the operating room and standard monitoring was applied. Heart rate was 68 beats/minute, noninvasive blood pressure was 99/60 mmHg, and peripheral oxygen saturation was 100%. Prior to the procedure, comprehensive preparation for difficult intubation were implemented, including flexible bronchoscopy, video laryngoscopy, and laryngeal mask airway, as the airway would be shared with the surgical team. Sedation was achieved with intravenous midazolam (0.06 mg kg^{-1}), atropine (0.01 mg kg^{-1}) and ketamine (1 mg kg^{-1}). The endoscopic procedure was completed in approximately 7 minutes. No complications occurred during the endoscopic procedure or sedation. The patient remained hemodynamically stable throughout and was transferred to outpatient care.

Figure 1. Physical image of the patient.

Conclusion: Patients with SIOD require meticulous anesthetic management due to the elevated risk of difficult airway during anesthesia and sedation. To our knowledge, there is only one previously published case report on this subject by Güçlü et al (2). Our case represents the second documented instance of anesthetic and sedation management in a patient with SIOD. In our case, comprehensive airway management preparations were implemented in anticipation of potential airway difficulties. However, the sedation procedure was completed without any airway complications or hemodynamic instability.

REFERENCES

1. Milovanova A, Ananin P, Vashurina T, et al. Genetic and Clinical Features of Schimke Immuno-Osseous Dysplasia: Single-Centre Retrospective Study of 21 Unrelated Paediatric Patients over a Period of 20 Years. International Journal of Molecular Sciences 202526(4): 1744.
2. Yıldırım Güçlü Çiğdem, Özlem Selvi Can, and Menekşe Özçelik. "Anesthetic management of Schimke syndrome." Journal of Anesthesia 28 (2014):797-797.

OP-13

Abstract Only

Comparative Effects of Ketamine and Magnesium Sulfate as Adjuvants to Bupivacaine in Erector Spinae Plane Block After Thoracic Surgery

Mediha Turktan, Fevzi Guler, Halil Ibrahim Demir, Ersel Gulec, Zehra Hatipoglu, Ismail Can Karacaoglu, Hakkı Unlugenc

Cukurova University Faculty of Medicine, Department of Anesthesiology and Reanimation, Adana, Türkiye

ABSTRACT

Objective: The erector spinae plane block (ESPB) has recently gained popularity in thoracic surgery due to its simplicity, effectiveness, and low complication rate. This study aimed to evaluate whether the addition of ketamine or magnesium sulfate to bupivacaine in ESPB following video-assisted thoracic surgery (VATS) enhances analgesia, lowers pain scores, and reduces morphine consumption compared to bupivacaine alone.

Methods: Sixty adult patients were randomized into three groups: Group B (bupivacaine alone), Group M (bupivacaine with 150 mg magnesium sulfate), and Group K (bupivacaine with 2 mg kg^{-1} ketamine). Postoperative morphine consumption, pain scores, rescue meperidine requirement, and side effects were evaluated.

Results: Postoperative morphine consumption was significantly lower in Group K than in Group B at 1 and 4 hours (p=0.004 and p=0.009, respectively). Although median pain score at rest remained below 4 in all groups throughout the study period, it was significantly higher in Group M than in Group B at 24, 36, and 48 hours (p=0.023, p=0.008, p=0.008, respectively). During effort, pain score was significantly lower in Group K than in Group B at 1 and 4 hours (p=0.012, p=0.018, respectively). The number of patients requiring supplementary meperidine was significantly higher in Group B than in Group M and Group K (p=0.009). The incidence of side effects was similar between the groups.

Conclusion: In patients undergoing VATS, the addition of ketamine (2 mg kg^{-1}) to bupivacaine in ESPB resulted in enhanced analgesia, lower pain scores, and reduced morphine consumption compared to using bupivacaine alone, particularly during the early postoperative period, without increasing side effects. However, we could not demonstrate any additive or synergistic effect of magnesium sulphate with bupivacaine. Further large clinical trials are needed to confirm this relation between ketamine and local anesthetics in ESPB and other thoracic plane blocks.

Keywords: Bupivacaine, erector spinae plane block, ketamine, magnesium sulfate, thoracic surgery

OP-14

Abstract Only

A Rare Complication: Irreversible Tetraplegia Following Laryngotracheal Reconstruction Surgery

Ebru Kucukcotur Kokurcan, Zehra Baykal, Muruvvet Taskir Turan

Ankara Etlik City Hospital, Department of Anesthesiology and Reanimation, Ankara, Türkiye

ABSTRACT

Objective: Cervical myelopathy and spinal cord injury may result from hyperflexion during surgical positioning. Cord ischemia is frequently attributed to interruption of arterial vascular supply to spinal cord following thoracic or abdominal vascular surgery, and rarely to head and neck surgery as in our case, due to tracheal reconstruction. There are few cases reported of acute ischemic spinal injury following tracheal reconstruction.

Case Presentation: We present a 25 year old patient with subglottic stenosis who underwent tracheal resection and end-to-end anastomosis. The patient had a history of prolonged intubation and tracheostomy due to traumatic subarachnoid hemorrhage. The patient's neck was positioned in hyperflexion after operation using chin stitches to minimize tension at the anastomosis. She was followed up in intensive care unit intubated and sedated. She was extubated on the third postoperative day. Following extubation, paresthesia and tetraplagia were noted. Magnetic resonance imaging (MRI) was performed showing lesions compromising spinal cord at the level between C2-C7. The cervical MRI revealed diffuse intramedullary cord swelling between C2-C7 with hyperintense signal changes in the anterior and posterior columns of the cord (Figure 1). Although a course of pulse steroid therapy was initiated, her deficit remained unchanged.

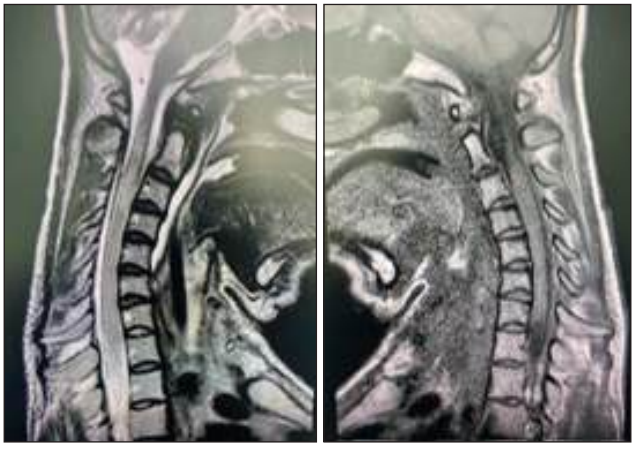


Figure 1. Cervical MRI showing spinal cord edema and signal changes.

Conclusion: The decreased blood flow in anterior spinal artery due to hyperflexion of the neck in combination with hypotension was the cause of this major complication. The different causal agents that could produce neurologic damage remained unclear, however mostly the combination of arterial hypotension secondary to the sitting position and disturbed autorregulation -caused by extreme neck flexion- may have resulted in ischemic spinal cord injury.

Reversal of neurological deficits is often ineffective; therefore, the primary preventive strategies for spinal cord ischemia should focus on correcting hyperflexion positioning and managing hypotension. Early initiation of physical therapy is crucial for optimizing neurological recovery.

OP-15

Abstract Only

Perioperative Concerns in Deep Brain Stimulation Surgery: Our Instutional Experience

Ebru Kucukcotur Kokurcan

Ankara Etlik City Hospital, Clinic of Anesthesiology and Reanimation, Ankara, Türkiye

ABSTRACT

Objective: Deep brain stimulation (DBS) surgery is an established therapetic option for alleviating movement disorders (MD). The advantages of DBS over ablative surgeries (e.g thalamotomy and pallidotomy) include its reversibility, adjustability and safety profile. Anesthetic approaches vary depending on the institutions performing these procedures and include monitored care with local anesthesia, conscious sedation with regional anesthesia and general anesthesia. We retrospectively reviewed patients who underwent this surgery at our instution to analyze the anesthetic management and perioperative complications.

Methods: The study included 10 consecutive patients. A standardized anesthesia protocol was used and clinical data were collected retrospectively. To present conscious sedation and regional anesthesia technique, consisting of scalp block, was used in our institution for patients undergoing DBS for the treatment of MD. Initial sedation was employed with dexmedetomidine 1 μg kg^{-1} loading dose in 10 minutes. Fentanyl 50 μg incremental boluses or dexmedetomidine 0.2-0.8 μg kg^{-1} h^{-1} infusion were used for rescue analgesia or sedation in an event of pain or anxiety. Hypertension (≥20% increase in mean arterial pressure (MAP) in comparison with baseline values) was treated with nicardipine or esmolol infusions. The locations of the electrodes were confirmed by imaging and the electrode-power supply connections were made under general anesthesia.

Results: Demographic data of the patients were similar (Table I-III). Conscious sedation and regional anesthesia were used in all cases. Dexmedetomidine loading dose was 1 μg kg^{-1}. (Table IV). While dexmedetomidine was used to facilitate regional anesthesia, scalp block was applied for regional anesthesia. The most common intraoperative complication was hypertension (Table V).

Table 1: Demographic profile and American Society of Anesthesiologists status

Parameters	Values
Age (years)	48.60±13.42
Weight (kg)	81.00±6.30
Gender	
Male	7 (70%)
Female	3 (30%)
ASA status (%)	
I	None
II	8 (80%)
III	2 (20%)

Table 2: Indications for the surgery

Indication	n (%)
Idiopathic Parkinson's disease	6 (60%)
Young onset Parkinson's disease	2 (20%)
Dystonia	2 (20%)

Table 3: Comorbidities

Comorbid diseases	n (%)
Hypertension	3 (30%)
Diabetes mellitus	2 (20%)
Coronary artery disease	1 (10%)
Asthma	1 (10%)
Hepatitis B	1 (10%)

Table 4: Mean total dosages of pharmacological agents

Sedatives	
Dexmedetomidine	71 μg ± 12,86
Local anesthetic	
Bupivacaine	33.8 mg ±1,135

Table 5: Intraoperative complications

	n (%)
Hypertension	6 (60%)
Regional	
Eyelid hematoma	1 (10%)
Lidocaine infiltration (insufficient analgesia)	1 (10%)
Respiratory	0 (0%)
Neurological	1 (10%)

Conclusion: Perioperative verbal communication with the patient during this procedure is essential. Therefore, awake surgery under scalp block is often the preferred method of anesthesia. An effective conscious sedation technique should induce a sedative state that maintains patient responsiveness and cooperation to verbal commands, without interfering with neurophysiological monitoring. Dexmedetomidine sedation along with scalp block provides good surgical conditions and pain relief during DBS for movement disorders.

REFERENCES

1. Ozlu O, Sanalbas S, Yazicioglu D, Utebey G, Baran I. Sedation and regional anesthesia for deep brain stimulation in Parkinson's disease. J Anesthesiol 2014; 6

OP-16

Abstract Only

Bronchospasm Triggered by Trigeminocardiac Reflex During Intraarterial Chemotherapy: Two Case Reports

Okan Ermis, Selin Erel, Rumeysa Saritas, Ercan Yildirim, Gozde Inan

Gazi University Faculty of Medicine, Department of Anesthesiology and Reanimation, Ankara, Türkiye

ABSTRACT

Objective: The trigeminocardiac reflex (TCR), mediated by trigeminal nerve afferents and vagal efferents, can induce bronchospasm, hypotension, and bradycardia (1). Intra-arterial chemotherapy is increasingly used for retinoblastoma, a common pediatric malignancy (2). Here, we present two cases of TCR-induced bronchospasm occurring during intra-arterial chemotherapy, underscoring the need for careful airway management in pediatric patients.

Case 1

A 19-month-old girl with unilateral retinoblastoma underwent general anesthesia for intra-arterial chemotherapy. After intravenous fentanyl (15 μg) and sevoflurane induction, a size 2 laryngeal mask airway (LMA) was placed. Approximately 30 minutes into the procedure, during microcatheter advancement into the ophthalmic artery, she developed acute respiratory compromise characterized by elevated airway pressures and inadequate tidal volumes. The LMA was removed and replaced with face mask ventilation, but persistent ventilatory insufficiency necessitated emergency orotracheal intubation with a 4.0 mm endotracheal tube and rocuronium (0.6 mg kg^{-1}). Concurrent theophylline administration improved oxygenation, and the remainder of the procedure proceeded uneventfully. She was extubated postoperatively and transferred to the ward.

Case 2

A 4-year 3-month-old boy with retinoblastoma received intravenous lidocaine (1 mg kg^{-1}), propofol (4 mg kg^{-1}), fentanyl (1 μg kg^{-1}), and rocuronium (0.6 mg kg^{-1}), followed by orotracheal intubation with a 5.0 mm endotracheal tube. During microcatheter manipulation near the ophthalmic artery, the patient exhibited acute bronchospasm, evidenced by markedly increased airway pressures and oxygen desaturation to 80%. Immediate interventions included manual ventilation with 100% oxygen and incremental propofol boluses. When saturation declined further to 69%, an additional propofol bolus was administered alongside theophylline, leading to gradual improvement. The remainder of the procedure was uneventful, and the patient was extubated and discharged to the ward.

Conclusion: Although TCR is documented in various surgical contexts, its association with bronchospasm during intra-arterial chemotherapy for retinoblastoma is rarely reported (1,3,4). The clear temporal link between ophthalmic artery manipulation and acute bronchoconstriction strongly suggests TCR activation. These cases underscore the necessity for immediate availability of advanced airway equipment and pharmacologic interventions in pediatric patients. Endotracheal intubation may provide more reliable airway security than supraglottic devices in such high-risk settings. Recognizing TCR-induced bronchospasm can guide anesthetic strategies and ultimately improve outcomes in pediatric oncologic procedures.

REFERENCES

1. Chowdhury T, Mendelowith D, Golanov E, et al. Trigemino-Cardiac Reflex Examination Group (TCREG. Trigeminocardiac reflex: the current clinical and physiological knowledge. Journal of neurosurgical anesthesiology 2015;27(2):136-47.
2. Zanaty M, Barros G, Chalouhi N, et al. Update on Intra-Arterial Chemotherapy for Retinoblastoma. The Scientific World Journal 2014;2014(1):869604.
3. Schaller B, Probst R, Strebel S, Gratzl O. Trigeminocardiac reflex during surgery in the cerebellopontine angle. Journal of neurosurgery 1999;90(2):215-20.
4. Sandu N, Chowdhury T, Meuwly C, Schaller B. Trigeminocardiac reflex in cerebrovascular surgery: a review and an attempt of a predictive analysis. Expert review of cardiovascular therapy. 2017;15(3):203-9.

OP-17

Abstract Only

Is There an Association Between Spinal Anesthesia-Related Cardiovascular Events and Tp-E/Qt Ratio?

Nilay Tas, Zubeyir Cebeci, Ilker Coskun, Osman Bektas, Ebru Canakci

Ordu University School of Medicine, Department of Anesthesiology and Reanimation, Ordu, Türkiye
Ordu University School of Medicine, Department of Cardiology, Ordu, Türkiye

ABSTRACT

Objective: High TP-e/QT ratio is known to be associated with cardiovascular events. In this study, we investigated whether there is an association between high preoperative TP-e/QT ratio and spinal anesthesia-related cardiovascular adverse events.

Methods: The study was prospectively performed on 249 adult patients who underwent spinal anesthesia after obtaining Ethics Committee approval (2022/256). Routine spinal anesthesia procedure and hemodynamic monitoring [mean arterial pressure (MAP) and heart rate (HR)] were performed. Millimetric measurements of preoperative TP-e distance and QT distance were made manually in lead V5 using a simple ECG ruler, QTc was calculated according to Bazzet formula.

Results: ROC analysis was used for the cut-off value of TP-e/QT ratio. The median values of TP-e/QT ratio did not differ according to gender ($p=0.336$). Statistically significant results were obtained between the increase in the TP-e/QT ratio and the decrease in MAP at minute 1, 5 and 10 ($p=0.007$, $p<0.001$ and $p=0.015$, respectively) shown in Table I. Statistically significant results were also obtained between the increase in TP-e/QT ratio and the decrease in HR at minute 1 and 5 ($p=0.011$ and $p<0.001$ respectively, given in Table II. A significant positive correlation was obtained between increased TP-e/QT ratio and ephedrine and atropine consumption ($p=0.018$ and $p<0.001$ respectively) as shown in Table III and Table IV.

Conclusion: This study demonstrated that a high preoperative TP-e/QT ratio is a risk factor for spinal anesthesia-related hypotension and bradycardia. Hypotension and bradycardia are the most common hemodynamic complications of spinal anesthesia on the cardiovascular system. In addition to predisposing factors such as volume depletion and advanced age, the presence of existing cardiac diseases is also important for spinal anesthesia-related cardiovascular side effects (1,2). A high TP-e/QT ratio on ECG has been shown to be an indicator of poor prognosis in cardiac diseases (3,4,5). Our study revealed that an increase in TP-e/QT ratio is an important factor for spinal anesthesia-related hypotension and bradycardia, independent of other predisposing factors. In conclusion, patients with a high TP-e/QT ratio, which can be identified through a simple preoperative ECG, should be closely monitored and promptly managed, particularly within the first 10 minutes following spinal anesthesia.

OP-18

Abstract Only

Results of the First 3 Years of Cardiac Surgery in a Startup Opened Cardiovascular Surgery Clinic

Kaptaniderya Tayfur, Melih Urkmez, Ferhat Borulu, Nilay Tas

Ordu University School of Medicine, Department of Cardiovascular Surgery, Ordu, Türkiye
Ordu University School of Medicine, Department of Anesthesiology and Reanimation, Ordu, Türkiye

ABSTRACT

Objective: Ordu Training and Research Hospital Cardiovascular Surgery Clinic was opened 3 years ago and during this period, important cardiac surgical interventions have been performed. Our aim is to evaluate the clinical outcomes of our open heart surgery procedures.

Methods: According to a retrospective review of patient files and our hospital data system, 940 open heart surgery operations were performed in the single operating room of our startup opened clinic between 12/12/2021 and 12/12/2024. Of the operations, 62.9% (n=592) were isolated coronary artery bypass grafting (CABG) and 9.7% (n=92) were isolated valve surgery. Isolated or complicated ascending and arcus aorta surgical procedures were performed in 8.5% (n=80) of patients. Adult congenital heart surgery was performed in 0.8% (n=8) of the patient group. Concominant surgical procedures accounted for 13% (n=123) of the patient group. Independently of these, 3.8% (n=36) of the patients underwent redo cardiac surgery.

Results: There were 650 (69.1%) male and 290 (30.9%) female patients. The mean age of our patients was 64.8 years. According to The European System for Cardiac Operative Risk Evaluation (EuroSCORE) II risk classification, 198 (30.1%) of the patients were in the low risk group, 296 (45.1%) in the intermediate risk group and 163 (24.8%) in the high risk group. A total of 33 patients developed exitus. 8 of these were intraoperative. A total of 12 patients needed extracorporeal membrane oxygenation (ECMO), while the rate of Intra-Aortic Balloon Pump (IABP) usage was 4.65%. The most common comorbidities with coronary artery disease in our patients were diabetes mellitus, peripheral arterial disease and COPD. All patients underwent general anesthesia. For postoperative analgesia; intravenous analgesia was used in the first year, while our analgesia method was changed to USG-guided ESP block (45 patients) and parasternal block (215 patients) in recent times.

Conclusion: European System for Cardiac Operative Risk Evaluation II risk scoring system predicts in-hospital mortality in cardiac surgery. Consistent with the literature, the overall mortality rate of our clinic was found to be 3.6%. These data should be considered as the result of strong collaboration, a team with significant surgical and anesthesia experience. Looking at the 3-year results, we are on our way to becoming a reference clinic in terms of clinical quality and patient safety.

OP-19

Abstract Only

Time Matters: A Retrospective Analysis of Perioperative Outcomes in Cranial Mass Surgeries Performed During and Outside Working Hours

Mehmet Sahap, Muhammed Talha Dasgin, Yusuf Furkan Gunes

Ankara Bilkent City Hospital, Ankara, Türkiye

ABSTRACT

Objective: Cranial masses are lesions arising from intracranial structures such as the brain parenchyma, meninges, or cranial bones, and may present as either benign or malignant tumors. These lesions can occur across all age groups due to diverse etiologies and typically manifest with a wide range of clinical symptoms. The primary treatment is usually gross total resection, with anesthetic management playing a critical role in ensuring patient safety and optimizing surgical outcomes. Depending on the patient's clinical status, these procedures may be performed during or outside regular working hours.

This study aims to evaluate the impact of surgical timing on anesthetic and perioperative outcomes in cranial mass surgeries by comparing procedures conducted during and outside regular working hours.

Methods: Following ethics committee approval, this retrospective, observational, and comparative study was conducted by reviewing the anesthesia records of patients who underwent cranial mass surgery under general anesthesia between January and June 2024 at our institution. Patients were categorized into two groups based on the timing of their surgery: during regular working hours and outside regular hours.

Parameters assessed included markers of systemic inflammation (Neutrophil-to-Lymphocyte Ratio [NLR], Platelet-to-Lymphocyte Ratio [PLR], and Systemic Immune-Inflammation Index [SII]), intraoperative inotrope and vasopressor requirements, estimated blood loss and transfusion needs, intraoperative complication rates, postoperative renal function, in-hospital mortality, and length of hospital stay.

Results: Of the 2.325 patient records reviewed, 289 with complete perioperative data were included in the final analysis. Mortality among patients operated on outside regular working hours was 2.3 times higher than those treated during regular hours. Inflammatory markers (NLR, PLR and SII) were significantly elevated in the after-hours group ($p< 0.001$). Interestingly, anesthesia duration was significantly longer in procedures performed during regular hours ($p< 0.001$).

Conclusion: Our findings suggest that cranial surgeries performed outside regular working hours are associated with heightened systemic inflammatory responses and increased mortality rates. These results highlight the importance of more comprehensive perioperative management and intensified postoperative monitoring in after-hours cases. When feasible, optimizing surgical scheduling may contribute to improved clinical outcomes in patients undergoing cranial mass resection.

OP-20

Abstract Only

Effect of Smoking Status on Disease Severity and Mortality in Patients with COVID-19 Pneumonia in Intensive Care

Nevzat Mehmet Mutlu[1], Mert Can Ugurcan[2], Muhammed Talha Dasgin[2], Behiye Deniz Kosovali[1], Canan Cam[1], Belgin Akan[1], Derya Gokcinar[1]

[1]Department of Critical Care, University of Health Sciences, Ankara Bilkent City Hospital, Ankara, Türkiye
[2]Department of Anesthesiology and Reanimation, University of Health Sciences, Ankara Bilkent City Hospital, Ankara, Türkiye

ABSTRACT

Objective: The Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2 virus) has caused clinical manifestations ranging from asymptomatic cases to lower respiratory tract infections requiring intensive care or resulting in death. This study evaluates the impact of active or passive smoking history on COVID-19 pneumonia severity and mortality.

Methods: Between April 2020 and April 2021, 321 patients admitted to intensive care for COVID-19 pneumonia were prospectively analyzed. Demographic characteristics, comorbidities, active/passive smoking history, pneumonia severity, oxygen therapy requirements (High flow nasal oxygen (HFNO), mask/nasal oxygen, mechanical ventilation), Intensive care unit (ICU)/hospital stay durations, and outcomes were recorded. Data were compared based on disease severity, smoking history, and outcomes. Disease severity and factors affecting disease outcome were evaluated by regression analysis.

Results: Comparison results according to mortality, disease severity and smoking history are given in Tables-I, II and III, respectively.

According to regression analysis results, smoking history in general (p=0.016) and especially being an active smoker (OR=2.143, p=0.010) were found to be significant for mortality. It is seen that the mortality risk in individuals who have actively smoked is significantly increased by approximately 2.1 times (OR=2.143). The mortality risk in individuals who need HFNO is also increased by 1.7 times (OR=1.677).

When the factors affecting the disease severity are examined, the risk of developing critical illness in individuals who have actively smoked is increased by 2.4 times (OR=2.408). The risk of critical illness increases 1.8-fold (OR=1.798) in individuals requiring HFNO, 1.8-fold as age increases (OR=1.796), and 1.3-fold as the number of comorbidities increases (OR=1.325).

Conclusion: In the mortal group, the average age, number of comorbidities, HFNO and MV requirement, critically severe and active smoking exposure patients were higher, while in the surviving group, nasal/mask oxygen requirement, number of patients without smoking exposure were significantly higher.

As a result, we can say that the risk of mortality and critical illness may increase in patients with COVID-19 pneumonia who are actively exposed to smoking and require HFNO in treatment.

Table 1. Comparison in Terms of Disease Outcome

		Alive (n=148)	Dead (n=173)	p
Gender	Male	87 (58.8)	111 (64.2)	0.323
	Female	61 (41.2)	62 (35.8)	
Mean age (years)		66.01±15.33	73.43±11.24	**0.000***
Number of comorbidities		2.16±1.71	2.64±1.67	**0.013***
COPD	Yes	21 (14.2)	29 (16.8)	0.632
	No	127 (85.8)	144 (83.2)	
HT	Yes	81 (54.7)	108 (62.4)	0.162
	No	67 (45.3)	65 (37.6)	
DM	Yes	60 (40.5)	65 (37.6)	0.587
	No	88 (59.5)	108 (62.4)	
CAD	Yes	35 (23.6)	52 (30.1)	0.198
	No	113 (76.4)	121 (69.9)	

Table 1. Cont.

		Alive (n=148)	Dead (n=173)	p
Blood group	A	73 (49.3)	84 (48.6)	0.826
	0	45 (30.4)	47 (27.2)	
	B	18 (12.2)	26 (15)	
	AB	12 (8.1)	16 (9.2)	
Rh	Positive	125 (84.5)	151 (87.3)	0.468
	Negative	23 (15.5)	22 (12.7)	
Need for HFNO	Yes	87 (58.8)	122 (70.5)	**0.028***
	No	61 (41.2)	51 (29.5)	
Need for Nasal/Mask O_2	Yes	146 (98.6)	75 (43.4)	**0.000***
	No	2 (1.4)	98 (56.6)	
Need for MV	Yes	19 (12.8)	173 (100)	**0.000***
	No	129 (87.2)	0 (0)	
Smoking history	Active smoker	26 (17.6)	54 (31.2)	**0.015***
	Passive smoker	22 (14.9)	30 (17.3)	
	Active and passive smoker	35 (23.6)	26 (15)	
	Non-smoker	65 (43.9)	63 (36.4)	
Severity of the disease	Mild	55 (37.2)	0 (0)	**0.000***
	Severe	73 (49.3)	0 (0)	
	Critically severe	20 (13.5)	173 (100)	
Length of ICU stay (day)		15.18±14.31	17.06±14.05	0.060
Length of ward stay (day)		7.99±6.3	4.46±6.74	**0.000***
Length of hospital stay (day)		21.61±14.59	18.02±15.25	**0.000***
HFNO duratin (day)		8.3±5.5	5.57±5.74	**0.000***
Nasal/Mask O_2 duration (day)		7.27±6.29	6.65±11.36	**0.001***
MV duration (day)		23.53±26.27	10.09±11.76	**0.000***
APY		16.68±28.29	16.53±25.24	0.578
PPY		10.01±17.1	7.9±15.86	0.190
A-PPY		26.69±35.03	24.43±30.12	0.908
ASEI		0.24±0.4	0.23±0.33	0.696
PSEI		0.16±0.29	0.11±0.23	0.149
A-PSEI		0.41±0.52	0.34±0.41	0.240

*p<0.05; significant difference, p>0.05; no significant difference

COPD: Chronic Obstructive Pulmonary Disease; **CAD:** Coronary artery disease; **DM:** Diabetes mellitus; **HT:** Hypertension; **HFNO:** High-flow nasal oxygen; **MV:** Mechanical ventilation; **ASEI:** Active smoking exposure index; **PSEI:** Passive smoking exposure index; **A-PSEI:** Active and passive smoking exposure index; **APY:** Active package x years; **PPY:** Passive package x years; **A-PPY:** Active package x year and passive package x year.

Table 2. Disease Severity Analyses

		Disease severity			p	p1-2	p1-3	p2-3
Mild (n=55)		**Severe (n=73)**	**Critically severe (n=193)**					
Gender	Male	30 (54.5)	44 (60.3)	124 (64.2)	0.410	0.516	0.191	0.410
	Female	25 (45.5)	29 (39.7)	69 (35.8)				
Mean age (years)		68.49±16.31	63.11±14.17	73.05±11.74	**0.000***	**0.048***	0.057	**0.000***
Number of comorbidities		1.89±1.65	2.33±1.81	2.6±1.66	**0.021***	0.162	**0.005***	0.245
COPD	Yes	4 (7.3)	15 (20.5)	31 (16.1)	0.117	**0.037***	0.099	0.117
	No	51 (92.7)	58 (79.5)	162 (83.9)				
HT	Yes	25 (45.5)	45 (61.6)	119 (61.7)	0.085	0.069	**0.032***	0.085
	No	30 (54.5)	28 (38.4)	74 (38.3)				
DM	Yes	19 (34.5)	34 (46.6)	72 (37.3)	0.293	0.171	0.708	0.293
	No	36 (65.5)	39 (53.4)	121 (62.7)				
CAD	Yes	11 (20)	22 (30.1)	54 (28)	0.403	0.194	0.235	0.403
	No	44 (80)	51 (69.9)	139 (72)				
Blood group	A	26 (47.3)	36 (49.3)	95 (49.2)	0.848	0.670	0.648	0.848
	0	19 (34.5)	21 (28.8)	52 (26.9)				
	B	7 (12.7)	8 (11)	29 (15)				
	AB	3 (5.5)	8 (11)	17 (8.8)				
Rh	Positive	47 (85.5)	61 (83.6)	168 (87)	0.760	0.770	0.759	0.760
	Negative	8 (14.5)	12 (16.4)	25 (13)				
Need for HFNO	Yes	0 (0)	73 (100)	136 (70.5)	**0.000***	**0.000***	**0.000***	**0.000***
	No	55 (100)	0 (0)	57 (29.5)				
Need for Nasal/Mask O_2	Yes	55 (100)	73 (100)	93 (48.2)	**0.000***	x	**0.000***	**0.000***
	No	0 (0)	0 (0)	100 (51.8)				
Need for MV	Yes	0 (0)	0 (0)	192 (99.5)	**0.000***	x	**0.000***	**0.000***
	No	55 (100)	73 (100)	1 (0.5)				
Outcome	Alive	55 (100)	73 (100)	20 (10.4)	**0.000***	x	**0.000***	**0.000***
	Dead	0 (0)	0 (0)	173 (89.6)				
	Yok	38 (69.1)	39 (53.4)	131 (67.9)				
Smoking history	Active smoker	10 (18.2)	10 (13.7)	60 (31.1)	**0.013***	0.354	0.095	**0.013***
	Passive smoker	6 (10.9)	13 (17.8)	33 (17.1)				
	Active and passive smoker	11 (20)	21 (28.8)	29 (15)				
	Non-smoker	28 (50.9)	29 (39.7)	71 (36.8)				
Length of ICU stay (day)		9±6.68	14.3±8.07	18.96±16.56	**0.000***	**0.000***	**0.000***	0.178
Length of ward stay (day)		8.27±7.81	7.87±5.45	5.09±6.54	**0.001***	0.872	**0.002***	**0.000***
Length of hospital stay (day)		15.16±8.33	21.74±10.01	20.18±17.66	**0.000***	**0.000***	0.155	**0.001***
HFNO duratin (day)		±	8.47±4.95	5.76±5.98	**0.000***	**x**	x	**0.000***
Nasal/Mask O2 duration (day)		8.87±6.71	5.73±5.04	7.03±10.81	**0.000***	**0.000***	**0.000***	0.570
MV duration (day)		±	±	11.42±14.34	x	x	0.749	x

Table 2. Cont.

Mild (n=55)	Disease severity: Severe (n=73)	Disease severity: Critically severe (n=193)	p	p1-2	p1-3	p2-3
APY	14.8±24.44	17.26±27.35	16.87±27.08	0.855	0.641	0.972	0.830
PPY	7.36±12.8	13.01±20.36	7.74±15.53	**0.049***	0.083	0.258	**0.020***
A-PPY	22.16±31.54	30.27±35.52	24.6±31.44	0.316	0.144	0.510	0.358
ASEI	0.21±0.34	0.26±0.42	0.23±0.36	0.759	0.601	0.986	0.956
PSEI	0.11±0.21	0.21±0.35	0.11±0.23	**0.014***	0.069	0.300	**0.013***
A-PSEI	0.33±0.46	0.47±0.56	0.35±0.42	0.202	0.115	0.794	0.075

*p<0.05; significant difference, p>0.05; no significant difference
COPD: Chronic Obstructive Pulmonary Disease; **CAD:** Coronary artery disease; **DM:** Diabetes mellitus; **HT:** Hypertension; **HFNO:** High-flow nasal oxygen; **MV:** Mechanical ventilation; **ASEI:** Active smoking exposure index; **PSEI:** Passive smoking exposure index; **A-PSEI:** Active and passive smoking exposure index; **APY:** Active package x years; **PPY:** Passive package x years; **A-PPY:** Active package x year and passive package x year.

Table 3. Analyses according to Smoking Status

Active smoker (n=80)		Smoking History: Passive smoker (n=52)	Smoking History: Active and passive smoker (n=61)	Smoking History: Non-smoker (n=128)		p	p1-2	p1-3	p1-4	p2-3	p2-4	p3-4
Gender	Male	73 (91.3)	7 (13.5)	50 (82)	68 (53.1)	**0.000***	**0.000***	0.102	**0.000***	**0.000***	**0.000***	**0.000***
	Female	7 (8.8)	45 (86.5)	11 (18)	60 (46.9)							
Mean age (years)		72.25±11.33	68.13±14.32	68.89±9.75	69.91±16.29	0.322	0.084	0.066	0.223	0.750	0.495	0.593
Number of comorbidities		2.53±1.87	2.31±1.41	2.87±1.54	2.18±1.75	0.063	0.449	0.234	0.180	**0.047***	0.640	**0.009***
COPD	Yes	18 (22.5)	5 (9.6)	15 (24.6)	12 (9.4)	**0.008***	0.057	0.771	**0.009***	**0.038***	0.960	**0.005***
	No	62 (77.5)	47 (90.4)	46 (75.4)	116 (90.6)							
HT	Yes	44 (55)	37 (71.2)	36 (59)	72 (56.3)	0.251	0.063	0.633	0.860	0.179	0.064	0.719
	No	36 (45)	15 (28.8)	25 (41)	56 (43.8)							
DM	Yes	27 (33.8)	25 (48.1)	29 (47.5)	44 (34.4)	0.124	0.100	0.097	0.926	0.955	0.087	0.082
	No	53 (66.3)	27 (51.9)	32 (52.5)	84 (65.6)							
CAD	Yes	29 (36.3)	9 (17.3)	24 (39.3)	25 (19.5)	**0.003***	**0.019***	0.707	**0.007***	**0.010***	0.730	**0.004***
	No	51 (63.8)	43 (82.7)	37 (60.7)	103 (80.5)							
Blood group	A	36 (45)	24 (46.2)	27 (44.3)	70 (54.7)	0.319	0.390	0.831	0.409	0.112	0.358	0.168
	0	26 (32.5)	11 (21.2)	23 (37.7)	32 (25)							
	B	10 (12.5)	11 (21.2)	5 (8.2)	18 (14.1)							
	AB	8 (10)	6 (11.5)	6 (9.8)	8 (6.3)							
Rh	Positive	70 (87.5)	43 (82.7)	55 (90.2)	108 (84.4)	0.619	0.442	0.621	0.533	0.243	0.781	0.280
	Negative	10 (12.5)	9 (17.3)	6 (9.8)	20 (15.6)							
Need for HFNO	Yes	51 (63.8)	39 (75)	43 (70.5)	76 (59.4)	0.177	0.175	0.400	0.529	0.592	**0.048***	0.139
	No	29 (36.3)	13 (25)	18 (29.5)	52 (40.6)							
Need for Nasal/ Mask O_2	Yes	54 (67.5)	32 (61.5)	45 (73.8)	90 (70.3)	0.536	0.482	0.420	0.669	0.164	0.254	0.623
	No	26 (32.5)	20 (38.5)	16 (26.2)	38 (29.7)							

Table 3. Cont.

Active smoker (n=80)		Smoking History				p	p1-2	p1-3	p1-4	p2-3	p2-4	p3-4
		Passive smoker (n=52)	Active and passive smoker (n=61)	Non-smoker (n=128)								
Need for MV	Yes	60 (75)	33 (63.5)	29 (47.5)	70 (54.7)	**0.004***	0.156	**0.001***	**0.003***	0.090	0.281	0.358
	No	20 (25)	19 (36.5)	32 (52.5)	58 (45.3)							
Outcome	Taburcu	26 (32.5)	22 (42.3)	35 (57.4)	65 (50.8)							
	Ex	54 (67.5)	30 (57.7)	26 (42.6)	63 (49.2)	**0.015***	0.252	**0.003***	**0.010***	0.110	0.302	0.396
	Yok	80 (100)	0 (0)	0 (0)	128 (100)							
Severity of the disease	Mild	10 (12.5)	6 (11.5)	11 (18)	28 (21.9)							
	Severe	10 (12.5)	13 (25)	21 (34.4)	29 (22.7)	**0.013***	0.179	**0.002***	**0.018***	0.233	0.274	0.229
	Critically severe	60 (75)	33 (63.5)	29 (47.5)	71 (55.5)							
Length of ICU stay (day)		19.09±20.29	14.31±10.68	16.54±11.44	14.99±11.6	0.458	0.304	0.750	0.363	0.200	0.742	0.208
Length of ward stay (day)		6.63±7.73	6.55±4.8	8±7.94	7.23±5.91	0.616	0.679	0.219	0.230	0.596	0.762	0.648
Length of hospital stay (day)		21.58±21.72	18.21±12.48	21.13±12.48	18.38±11.57	0.294	0.838	0.107	0.735	0.144	0.715	0.092
HFNO duratin (day)		7.62±6.97	5.4±3.8	7.5±6.26	6.23±5.38	0.413	0.196	0.939	0.306	0.170	0.682	0.280
Nasal/Mask O2 duration (day)		5.41±4.94	7.13±7.25	6.98±6.6	8.07±10.73	0.351	0.261	0.172	0.089	0.946	0.815	0.833
MV duration (day)		13.82±22.4	9.09±8.54	12.21±7.98	10.13±8.43	0.139	0.971	0.067	0.259	**0.045***	0.288	0.123

*p<0.05;significant difference, p>0.05;no significant difference

COPD: Chronic Obstructive Pulmonary Disease; **CAD:** Coronary artery disease; **DM:** Diabetes mellitus; **HT:** Hypertension; **HFNO:** High-flow nasal oxygen; **MV:** Mechanical ventilation.

OP-21

Abstract Only

Anesthetic and Analgesic Efficacy of Erector Spina Plane Block in Varicose Vein Surgery

Munevver Kayhan[1], Esra Kahya Tepe[2,4], Havva Suheyla Akin Uzan[3], Oznur Sen[2]

[1]İstanbul University, Cerrahpasa Faculty of Medicine, İstanbul, Türkiye
[2]İstanbul Haseki Training and Research Hospital, İstanbul, Türkiye
[3]Edirne Sultan Murat 1. State Hospital, Edirne, Türkiye
[4]Precenter. Research Assistant Doctor, İstanbul Haseki Training and Research Hospital, Department of Anesthesiology and Reanimation, İstanbul, Türkiye

ABSTRACT

Objective: Varicose vein surgery (VVS) often uses general or spinal anesthesia. Peripheral and fascial plane blocks, such as the Erector Spina Plane (ESP) block, offer an effective, low-complication alternative for both intraoperative and postoperative analgesia. This study reports our experience with ESP blocks in 4 male patients undergoing VVS. Among fascial plane blocks, ESP has shown spread from lower thoracic levels to the thoracolumbar region (1-5).

Methods: After obtaining informed consent, patients were monitored according to ASA standards. The L3-S1 block level was identified using ultrasound, and an 80 mm 22G needle was used to inject 50 ml of 0.375% bupivacaine and 1% lidocaine. Dermatomal coverage was assessed using the pin-prick test, and motor block was evaluated using the Bromage scale.

Results: Demographic data are shown in Table1. ESP blocks provided effective analgesia during surgery. There were no significant hemodynamic changes except for one patient, experienced bradycardia with a 40% decrease in heart rate, which remained stable without intervention. Pain levels were monitored using the Numerical Rating Scale (NRS) during the surgery and postoperative period. The NRS, dermatomal levels, and additional analgesic requirements are shown in Table2. Two patients had sensory block in the L2 dermatome but still experienced pain and required additional analgesics during surgery. All patients received 500 mg IV ibuprofen after surgery. No motor block was observed postoperatively, and no additional analgesics were needed in the first hours. Two patients required paracetamol and ibuprofen at hours 5 and 6, while the other two had no additional analgesics until hours 16 and 20. All patients were mobilized within 2 hours. No nausea or vomiting was observed, and patient satisfaction was high.

Conclusion: ESP block results vary across clinical, cadaveric, radiological studies. Some studies show inconsistent spread of local anesthetics in lumbosacral ESP blocks (6-8). Clinical evidence suggests ESP blocks are effective for lower extremity and hip surgeries(9-12). Our experience shows that ESP blocks are successful for VVS. ESP blocks are a safe and effective alternative to spinal anesthesia, especially for patients with comorbidities at VVS.

Table I. Demographic Characteristics

Descriptive	Patient Number	1	2	3	4
	Age/Gender	60 / M	62 / M	47 / M	52 / M
	Height (cm) / Weight (kg)	158 / 70	172 / 75	178 / 70	179 / 78
	ASA score	2	2	2	2
	Length of surgery (min)	45	55	60	55

Table II. The NRS, Dermotome Levels, And Need For Additional Analgesics

		1	2	3	4
Block Application	Patient Number, Application Volüme	20mL %0.375 bupivacaine + 5mL %1 lidocaine	20mL %0.375 bupivacaine + 5mL %1 lidocaine	20mL %0.375 bupivacaine + 5mL %1 lidocaine	20mL %0.375 bupivacaine + 5mL %1 lidocaine
	L3 (mL-content)	20mL %0.375 bupivacaine + 5mL %1 lidocaine	20mL %0.375 bupivacaine + 5mL %1 lidocaine	20mL %0.375 bupivacaine + 5mL %1 lidocaine	20mL %0.375 bupivacaine + 5mL %1 lidocaine
	S1 (ml-content)				
Motor Evaluation	Bromage Scale	4	4	4	4

Table I. Cont.

Descriptive	Patient Number	1	2	3	4
Sensorial Evaluation	Paraspinal area	+	+	+	+
	Posterior lumber area	+	+	+	+
	Sacral area	+	+	+	+
	Anteromedial upper leg	+	+	+	+
	Anterolateral upper leg	+	+	+	+
	Posteromedial upper leg	+	+	+	+
	Posterolateral upper leg	+	+	+	+
	Anteromedial lower leg	+	+	+	+
	Anterolateral lower leg	+	+	+	+
	Posteromedial lower leg	+	+	+	+
	Posterolateral lower leg	+	+	+	+
Dermotomal Coverage		L1-S2	L2-S1	L2-S2	L2-S2
Analgesia – sedative requirement	Intraoperatif additional drug/ opioid	50mg Fentanyl, 50 mg Propofol	None	100mg Fentanyl, 100mg propofol	None
	Postoperative additional drug/ opioid and time	500mg ibuprofen + 1000mg paracetamol + 500mg ibuprofen	500mg ibuprofen	500mg ibuprofen + 1000mg paracetamol + 500mg ibuprofen	500mg ibuprofen
NRS	Postoperative first NRS Postop max NRS and time MobiNRS and time	<2/10 4/10 - 5.hours 3/10 and postoperative 2. hours	<2/10 4/10 - 20.hours 3/10 and postoperative 2. hours	<3/10 5/10 - 6.hours 4/10 and postoperative 2. hours	<3/10 4/10 - 16.hours 5/10 and postoperative 2. hours

REFERENCES

1. Gloviczki P, Comerota AJ, Dalsing MC., et al (2011). The care of patients with varicose veins and associated chronic venous diseases: Clinical practice guidelines of the Society for Vascular Surgery and the American Venous Forum. Journal of Vascular Surgery 53(5), 2S-48S.
2. Bitargil M, Kiliç HE (2020). Comparing local tumescent anesthesia and spinal anesthesia methods during and after endovenous radiofrequency ablation of great saphenous vein. Journal of Vascular Surgery: Venous and Lymphatic Disorders, 8(3), 425-430.
3. Forero, M., Adhikary, S. D., Lopez, H., Tsui, C., & Chin, K. J. (2016). The erector spinae plane block: A novel analgesic technique in thoracic neuropathic pain. Regional Anesthesia & Pain Medicine, 41(5), 621–627.
4. Unal, M., Baydar, H., Guler, S., Sonmez, A., Gumus, M., & Tulgar, S. (2023). Sacral erector spinae plane block as the main anesthetic method for parasacral reconstructive surgeries: A single-center retrospective cohort feasibility study. Cureus, 15(4), e37347.
5. Chung, K., & Kim, E. D. (2018). Continuous erector spinae plane block at the lower lumbar level in a lower extremity complex regional pain syndrome patient. Journal of Clinical Anesthesia, 48, 30–31.
6. Alici HA, Ahiskalioglu A, Aydin ME, Ahiskalioglu EO, Celik M. (2019). High volume single injection lumbar erector spinae plane block provides effective analgesia for lower extremity herpes zoster. Journal of Clinical Anesthesia, 54, 136-7.
7. Breidenbach KA, Wahezi SE, Kim SY, et al (2023). Contrast spread after erector spinae plane block at the fourth lumbar vertebrae: A cadaveric study. Pain and Therapy, 12(1), 241-9.
8. Altinpulluk EY, Ozdilek A, Colakoglu N, et al (2019). Bilateral postoperative ultrasound-guided erector spinae plane block in open abdominal hysterectomy: A case series and cadaveric investigation. Romanian Journal of Anaesthesia and Intensive Care, 26(1), 83-8.
9. Kokar S, Ertaş A, Mercan Ö, Yıldırım FG, Taştan ÖA, Akgün K (2022). The lumbar erector spinae plane block: A cadaveric study. Turkish Journal of Medical Sciences, 52(1), 229-36.
10. Bansal T, Kumar P, Kadian Y, et al (2024). Comparison of ultrasound-guided sacral erector spinae plane block and caudal epidural block for analgesia in paediatric patients undergoing hypospadias repair: A double-blind, randomised controlled trial. Indian Journal of Anaesthesia, 68(8), 725-30.
11. Aksu C, Gürkan Y (2020). Sacral erector spinae plane block with longitudinal midline approach: Could it be the new era for pediatric postoperative analgesia? Journal of Clinical Anesthesia, 59, 38–39.
12. Gupta A , Kaur J, Kumar R (2022). Unilateral sacral erector spinae plane block for lower limb surgery in children. Anaesthesia Reports, 10(2), e12199.

OP-22

Abstract Only

A Risk that Should not be Forgotten in Intensive Care: Acute Neurotoxicity During Colistin Treatment

Sencer Ucar, Arif Timuroglu, Tugba Askin, Selda Muslu, Suheyla Unver

Ankara Dr. Abdurrahman Yurtaslan Oncology Training and Research Hospital, Ankara, Türkiye

ABSTRACT

Objective: Colistin neurotoxicity may manifest as dizziness, loss of balance, partial hearing loss, anesthesia, confusion, visual hallucinations, seizure, neuromuscular blockade or ataxia. In this case report, we will discuss colistin neurotoxicity with altered consciousness and seizure in a patient receiving 3.65 mg kg^{-1} day^{-1} Colistin.

Case Presentation: A 59-year-old male patient was lost to follow-up after 6 cycles of ABVD protocol for stage 3 Hodgkin's Lymphoma in 2014. In October 2024, he presented with B symptoms and was diagnosed with relapse of Classical Hodgkin's Lymphoma in supraclavicular excisional lymph node biopsy. Four more courses of chemotherapy were planned.

In January 2025, the patient was consulted to the intensive care unit due to sepsis, hypotension, and fever and was admitted with a preliminary diagnosis of septic shock.

On the 10^{th} day of colistin treatment, the patient was consulted to neurology with seizure-like activity followed by sudden confusion. Magnetic Rezonance Imaging (MRI) was ordered by neurology, and the patient underwent brain MRI in early February. Neurology recommended enoxaparin 2 x 0.4 IU, and radiology reported the absence of acute infarction in the brain MRI.

In February, the patient was electively intubated, and invasive mechanical ventilator treatment was initiated due to increased seizure frequency, hypoxemia, and decreased GCS values. Colistin treatment was discontinued on the same day.

Within 1 week, the patient was extubated after sedation was gradually reduced, and consciousness gradually recovered.

Afterwards, the patient remained seizure-free and conscious and was discharged 1 week after extubation without neurologic sequelae.

Conclusion: Although colistin neurotoxicity is a known but rare complication, it remains under-recognized, especially in critically ill patients with complex clinical pictures. In our case, neurotoxic symptoms developed despite standard dosing, highlighting that even recommended regimens may pose significant neurologic risks. The reversibility of symptoms after drug discontinuation emphasizes the importance of prompt recognition. This case contributes to the limited clinical literature by reinforcing the need for neurological monitoring during colistin therapy, even in the absence of overdose or renal impairment.

It is vital for clinicians to be alert to neurologic symptoms in patients started on Colistin, as discontinuation of the drug leads to dramatic improvement.

OP-23

Abstract Only

Recurrent Episodes of Anaphylactic Shock Following Glucocorticoid Administration: A Case Report

Akif Demirel[1], Cevdet Yardimci[1], Yesim Andiran Senayli[2], Mustafa Furkan Karatekin[1], Meral Kanbak[1]

[1]Yozgat Bozok University School of Medicine, Department of Anesthesiology and Reanimation, Yozgat, Türkiye
[2]Kırklareli University School of Medicine, Department of Anesthesiology and Reanimation, Kırklareli, Türkiye

ABSTRACT

Objective: Although corticosteroids are widely used in clinical practice, they may rarely lead to systemic allergic reactions. These reactions, particularly in adults, can have a sudden onset and may be life-threatening. In this case, we aimed to present a patient who developed recurrent anaphylactic reactions following methylprednisolone administration.

Case Presentation: A 34-year-old male presented to the emergency department with complaints of generalized pruritus and rash that began around noon. His medical history revealed that he was a railway worker and a known hepatitis B carrier, with no known drug/food allergies. His lunch included foods he had previously consumed without issues. In the emergency department, intravenous pheniramine hydrogen maleate, dexamethasone, and 80 mg methylprednisolone were administered. Shortly after treatment, the patient developed dyspnea and hypotension. Anaphylactic shock was diagnosed, and 1 mg intramuscular adrenaline along with 1000 cc isotonic fluid was initiated.

During follow-up, the patient experienced three episodes of recurrent rash at one-hour intervals, each treated with 80 mg methylprednisolone. After each administration, the patient developed worsening anaphylactic symptoms including dyspnea, hypotension, and increased rash, requiring repeated doses of 1 mg adrenaline. Due to persistent symptoms and incomplete resolution of the lesions, he was admitted to the intensive care unit.

On admission, vital signs were: temperature 36.9°C, respiratory rate 28/min, heart rate 118/min, SpO_2 88%, and blood pressure 84/56 mmHg. On examination, uvular edema was noted along with a diffuse maculopapular eruption involving the trunk and extremities. Oxygen therapy at 6 L/min via mask improved SpO_2 above 95%. Fluid therapy continued with 1000 cc bolus followed by maintenance infusion of isotonic sodium chloride at 150 cc/hour. Dermatology consultation diagnosed methylprednisolone-induced anaphylaxis and recommended pheniramine hydrogen maleate 4 times daily. Laboratory findings showed only mild leukocytosis.

Conclusion: In patients whose systemic symptoms do not improve or whose clinical condition worsens despite corticosteroid treatment for allergic purposes, it is crucial to consider that corticosteroids themselves may cause allergic reactions. This case emphasizes the importance of recognizing the rare but potentially severe allergic effects of corticosteroids.

OP-24

Abstract Only

Intensive Care Follow-up in a COPD Patient with Pneumonectomy: A Case Report

Akif Demirel[1], Cevdet Yardimci[1], Yesim Andiran Senayli[2], Ayse Betul Kilic[1], Meral Kanbak[1]

[1]Yozgat Bozok University School of Medicine, Department of Anesthesiology and Reanimation, Yozgat, Türkiye
[2]Kırklareli University School of Medicine, Department of Anesthesiology and Reanimation, Kırklareli, Türkiye

ABSTRACT

Objective: Chronic obstructive pulmonary disease (COPD) is a preventable and treatable respiratory disease and is the third leading cause of death worldwide. In this case, we present the intensive care unit (ICU) management of a COPD patient with a single lung requiring mechanical ventilation.

Case Presentation: A 52-year-old male (68 kg) was admitted to the ICU due to dyspnea, decreased consciousness, and pCO_2 of 120 mmHg, during pneumonia treatment on the Chest Diseases Service. He had a history of COPD, hypertension, and 20 pack-years of smoking. He had undergone left pneumonectomy 19 years ago due to tuberculosis and had been using home oxygen therapy. His home SpO_2 levels ranged between 82–88%.

At ICU admission: SpO_2: 86% (FiO_2: 100%), ABP: 98/55 mmHg, WBC: 30,000/mm^3, CRP: 148 mg/L. Chest X-ray showed right lung infiltration and post-pneumonectomy findings on the left (Figure 1). Antibiotics were initiated per infectious disease recommendation. Mechanical ventilation settings: tidal volume 5 mL/kg, PEEP 7 cmH_2O, and peak pressure 25 cmH_2O. On day 5, the patient was extubated due to stable vitals and improved blood gases. The next day, he was reintubated due to pH: 7.09, pCO_2: 129.6 mmHg, pO_2: 31.8 mmHg, and SO_2: 40%. On day 16, arterial blood gas improved (pH: 7.37, pCO_2: 58.7 mmHg, SO_2: 97.8%), and the patient was extubated again.

Figure 1. Chest X-ray at ICU admission.

Conclusion: In patients with lung resection, air trapping and ventilation dysfunction may complicate extubation. Individualized ventilation strategies and infection control are critical in pneumonectomy cases. This case highlights the importance of multidisciplinary ICU care in patients with a single lung and comorbidities.

OP-25

Abstract Only

Anesthetic Management of Giant Facial Hemangioma

Huseyin Ulas Pinar

Hacettepe University Faculty of Medicine, Department od Anesthesiology and Reanimation, Ankara, Türkiye

ABSTRACT

Objective: Management of the airway in patients with large facial hemangiomas presents unique challenges, particularly due to the difficulty in mask ventilation, endotracheal intubation, and the risk of severe bleeding. Vascular malformations can cause significant blood loss during excision or resection, and achieving hemostasis may prove difficult. This case report presents a challenging clinical scenario involving both a difficult airway and massive hemorrhage.

Case Presentation: A 28-year-old female without significant comorbidities was scheduled for surgery to remove a large facial hemangioma. Preoperative evaluation, including endoscopic assessment of the airway, suggested potential difficulty in intubation. Due to the high risk of major bleeding, preparations for blood products were made. After preoxygenation, the patient was sedated, and a surgical tracheostomy was performed under local anesthesia to facilitate general anesthesia. A partial excision and reduction of the hemangioma were planned. A prophylactic dose of tranexamic acid (1g) was administered intravenously prior to surgery. During the procedure, significant hemorrhage occurred, and it was discovered that the patient had previously undergone embolization with a sclerosing agent, a detail not included in the preoperative history. This complicating factor resulted in the need for aggressive blood product support, including 20 units of red blood cell suspension, 4 units of whole blood, 12 units of fresh frozen plasma, and 2 units of platelet suspension. The eight-hour surgery was completed using packing techniques for bleeding control. The patient was mechanically ventilated with sedation for 48 hours following surgery and was successfully extubated and transferred to the surgical ward after 4 days. She was discharged home on the 7th postoperative day.

Conclusion: Anesthetic management of such cases requires careful planning for difficult airway scenarios, particularly considering the location of lesions affecting ventilation and laryngoscopy. Additionally, managing blood loss during surgical interventions is critical. The use of vasodilatory anesthetic agents and positioning during surgery may exacerbate these challenges, potentially altering the size of lesions and increasing bleeding risk. Close monitoring, adequate preparation, and a multidisciplinary approach are essential in managing these high-risk procedures.

REFERENCES

1. Lalwani P, Khanna P, Nagarajappa A, Anaesthestic and airway management challenges in pediatric sclerothearpy for upper airway vascular malformation: A case report. Indian J Clin Anaesth 2025;12(1):150-153
2. Hoff SR, Rastatter JC, Richter GT. Head and neck vascular lesions. Otolaryngol Clin North Am. 2015;48(1):29–45.
3. Neeta S, Rao R, Upadya M, Keerthi P. Arteriovenous malformation of face: A challenge to anesthesiologists. Anesth Essays Res 2017;11:784-6.

OP-26

Abstract Only

A Rare Cause of Difficult Airway: Near-Complete Oropharyngeal Synechia Following Lingual Laser Tonsillectomy

Huseyin Ulas Pinar

Hacettepe University Faculty of Medicine, Department of Anesthesiology and Reanimation, Ankara, Türkiye

ABSTRACT

Objective: Tonsillectomy remains one of the most commonly performed surgical procedures. In recent years, the use of lasers has become increasingly popular due to their ability to reduce both operative time and postoperative bleeding. In this case report, we present a rare instance of delayed pharyngeal synechia and stenosis following a laser-assisted lingual tonsillectomy (1).

Case Presentation: A 32-year-old female patient presented to the Otorhinolaryngology clinic with complaints of dysphagia, dyspnea, and difficulty swallowing, two years after undergoing a laser-assisted lingual tonsillectomy at an external center. Endoscopic examination revealed pharyngeal stenosis and synechia. Surgical intervention was planned accordingly.

Considering the anticipated difficult intubation, a difficult airway cart was prepared in advance. Under sedation, a successful endotracheal intubation was achieved using fiberoptic nasal intubation. Following pharyngeal reconstruction surgery, the patient was successfully extubated and experienced an uneventful recovery, after which she was transferred to the hospital ward.

Conclusion: Previous studies have documented various complications associated with laser-assisted tonsillectomy. However, the complication described in this case appears to be exceedingly rare and has not been widely reported in the literature. Commonly used lasers in tonsillectomy include CO_2, KTP, and diode lasers, which serve both to dissect tissue and coagulate blood vessels. Techniques may involve full resection (laser tonsillectomy), volume reduction (laser-assisted serial tonsillectomy), or tissue vaporization (laser vaporization tonsillectomy).

Nasopharyngeal obstruction—defined as the fusion of the uvula and palatopharyngeal arch with the posterior pharyngeal wall—is a rare late complication of laser-assisted tonsillectomy. This condition likely results from inadvertent tissue injury and postoperative edema, often due to inadequate surgical technique or insufficient laser surgery training. Therefore, proper training is crucial before undertaking such procedures, as emphasized in prior studies and clinical guidelines (2). In our case, we also highlight an iatrogenic difficult airway scenario classified as Mallampati grade IV, underscoring the importance of anticipating airway management challenges in similar patients.

REFERENCES

1. Ahmed J, Arya A. Lasers in Tonsillectomy: Revisited With Systematic Review. Ear, Nose & Throat Journal. 2020;100(1_suppl):14S-18S.
2. Morwani, K.P., Patil, A, Ahluwalia G. (2016) Nasopharyngeal Obstruction: A Rare Post Laser Assisted Tonsillectomy Complication. International Journal of Otolaryngology and Head & Neck Surgery, 5, 84-89.

OP-27

Abstract Only

Can the Frailty Score Independently Predict Postoperative Morbidity in Patients with Colorectal Cancer?

Mustafa Kemal Sahin, Belkis Yilmaz

Dr. Abdurrahman Yurtaslan Oncology Training and Research Hospital, Clinic of Anesthesiology, Ankara, Türkiye

ABSTRACT

Objective: Frailty is a clinical syndrome marked by reduced physiological reserve and diminished resistance to stressors, often seen with advancing age (1). It has been increasingly recognized as a strong predictor of postoperative complications, frequently outperforming chronological age in risk assessment (2). However, its prognostic value in patients undergoing surgery for colorectal cancer has not been fully elucidated.

Methods: This prospective study included 89 patients undergoing elective colorectal cancer surgery. The Edmonton Frailty Risk Index was used preoperatively as it is a reliable and well-established tool for assessing frailty (3). Patients were categorized by frailty status and severity. Demographic, intraoperative, and postoperative data were collected and analyzed in relation to frailty levels.

Results: A total of 63 patients (70.8%) were identified as frail. A significant association was found between frailty and female sex (p=0.026), but no significant differences were observed in age, BMI, ASA score, surgical duration, or intraoperative blood loss between frail and non-frail groups (Table 1). Frail patients had a longer hospital stay compared to non-frail patients (9.9±5.5 vs. 7±2.7 days, p=0.006). However, no significant difference was found in PACU stay duration (31.7±22.4 vs. 26.6±18 hours, p=0.326) (Table 2). Subgroup analysis based on frailty severity showed a strong positive correlation between increasing frailty and PACU stay (p<0.001) (Table 3). Total hospitalization time was also associated with frailty severity (p=0.013). Postoperative complications occurred in 21 patients (23.6%), with the highest rates in the severely frail group (Table 4). The most common complications were pulmonary events, sepsis, and bleeding, while myocardial infarction, ileus, and neurological issues were less frequent.

Conclusion: Our findings underscore the relevance of frailty as an independent predictor of adverse postoperative outcomes in colorectal cancer patients. The severity of frailty appears to be directly related to complication rates and resource utilization (3,4). Preoperative frailty assessment provides valuable insight into postoperative risk in colorectal cancer surgery. Incorporating frailty evaluation into routine surgical planning may help improve patient outcomes and optimize perioperative care.

Table 1. Demographic Data

	No frailty (n=26)	Frail (n=63)	Total	p
Gender, n (%)				
Man	21 (38)	35 (62)	56 (100)	**0,026**
Woman	5 (15)	28 (84)	33 (100)	
Age	59±12	63±11		0.151
BMI	24.4±3.6	24.51±4.7		0.725
ASA				
1		1		0.788
2	13	32		
3	13	30		
Surgical duration, min	231±116	206±70		0.447
Amount of bleeding, ml	311±305	327±434		0.937
Vasopressor use				
None	20 (29)	49 (71)	69	0.941
Ephedrine	4 (30)	9 (70)	13	
Noradrenaline	2 (29)	5 (71)	7	

Table 2. The Relationship Between Frailty and the Length of Stay in the Postoperative Care Unit and Hospital

	No frailty (n=26)	Frail (n=63)	p
PACU (Post-Anesthesia Care Unit)	26.6±18	31.7±22.4	0.326
LOS (Length of Stay Hospital)	7±2.7	9.9±5.5	**0.006**

Table 3. Correlation Between Frailty Severity and Length of Stay in the Postoperative Care Unit and Hospital

	No frailty N=26	Sensitive N=28	Mildly Frail N=16	Moderate Frailty N=7	Severe Frailty n=12	p
PACU (Post-Anesthesia Care Unit)	26.6±18	22.4±7.5	37.6±24.4	34.8±29.8	43.3±30.9	**0.000**
LOS (Length of Stay Hospital)	7±2.6	7.39±2.5	9.8±3.4	14.4±7.7	13.3±8.2	**0.013**

Table 4. The Relationship Between Postoperative Complications and Frailty Severity

Postoperative Complications	No frailty N=26	Sensitive N=28	Mildly Frail N=16	Moderate Frailty N=7	Severe Frailty n=12	Total	p
No	22 (32)	25 (37)	11 (16)	6 (9)	4 (6)	68 (100)	**0.002**
Yes	4 (19)	3 (14)	5 (24)	1 (5)	8 (38)	21 (100)	

REFERENCES

1. Schmucker AM, Hupert N, Mandl LA. The Impact of Frailty on Short-Term Outcomes After Elective Hip and Knee Arthroplasty in Older Adults: A Systematic Review. Geriatr Orthop Surg Rehabil. 2019 May 6;10:2151459319835109. doi: 10.1177/2151459319835109. PMID: 31105984; PMCID: PMC6503596.
2. Czajka S, Taborek M, Krzych ŁJ. Is Frailty a Good Predictor of Postoperative Complications in Elective Abdominal Surgery?-A Single-Center, Prospective, Observational Study. J Pers Med. 2023 May 21;13(5):869. doi: 10.3390/jpm13050869. PMID: 37241039; PMCID: PMC10220709.
3. Owodunni OP, Mostales JC, Qin CX, Gabre-Kidan A, Magnuson T, Gearhart SL. Preoperative Frailty Assessment, Operative Severity Score, and Early Postoperative Loss of Independence in Surgical Patients Age 65 Years or Older. J Am Coll Surg. 2021 Apr;232(4):387-395. doi: 10.1016/j.jamcollsurg.2020.11.026. Epub 2020 Dec 29. Erratum in: J Am Coll Surg. 2021 Jul;233(1):165. doi: 10.1016/j.jamcollsurg.2021.04.015. PMID: 33385567; PMCID: PMC7771260
4. Frailty in Older Persons: Multisystem Risk Factors and the Frailty Risk Index (FRI) Ng, Tze Pin et al. Journal of the American Medical Directors Association, Volume 15, Issue 9, 635 - 642

OP-28

Abstract Only

Disaster Preparedness and Awareness Levels of Intensive Care and Operating Room Workers: A Survey Study

Esra Kongur, Gamze Kucukosman, Gulgun Elif Aksoy

Trabzon Kanuni Training and Research Hospital, Clinic of Anesthesiology and Reanimation, Trabzon, Türkiye

ABSTRACT

Objective: The preparedness of healthcare professionals for disaster situations is one of the most critical elements of effective intervention (1). Our study was planned to evaluate the knowledge levels of healthcare professionals working in intensive care and operating rooms on disaster preparedness, volunteering and equipment use.

Methods: A cross-sectional survey was conducted from March 15–30, 2025, at Trabzon Kanuni Training and Research Hospital with ethics approval and informed consent. Healthcare professionals (physicians, nurses, auxiliary staff) in intensive care and operating rooms were included. Those declining or submitting incomplete responses were excluded. The "Enhanced Disaster Preparedness Survey" which was prepared by compiling the demographic characteristics of healthcare workers and related studies was used to collect data. Data were collected by hand-distributing and filling out printed survey forms (35 questions). Disaster knowledge, preparedness, volunteering, and psychosocial awareness were compared between doctors and other healthcare workers (OHW). Descriptive stats (n, %) and chi-square tests ($p<0.05$) were used.

Results: The study was completed with 288 people. The majority of the participants were female (69%), aged between 18 and 39 (62%), 82% were OHW and 18% were physicians.

Demographics and disaster experiences are shown in Table 1. OHW showed better knowledge of roles ($p=0.003$) and equipment use ($p=0.043$) (Table 2). When the responses to questions about disaster volunteering and preparedness levels were compared, it was seen that the rate of knowing how to act in the event of a disaster was higher in the OHW ($p<0.001$), the professional responsibility of doctors ($p=0.002$) and the desire for humanitarian aid of OHW ($p=0.032$) were at the forefront (Table 3). Doctors more often knew disaster communication methods ($p=0.030$) and prioritized communication ($p=0.044$) (Table 4). 57% of all participants stated they would need psychological support post-disaster (Table 5).

Conclusion: OHW were more engaged in preparedness, volunteering and equipment use likely due to more frequent disaster training (2). Literature highlights that job role clarity influences volunteering (3). In our findings, doctors' participation was often due to professional responsibility, possibly impacted by unclear roles.

There is an urgent need for continuous, practical and job-specific disaster training programs on disaster preparedness, awareness and equipment use.

Keywords: Disaster preparedness, intensive care, operating room, volunteering, disaster management

Table 1. Demographic Information

		Doctors n=51 (%)	Other Health Personnel n=237 (%)
Gender	Female	17 (33.3)	181 (76.4)
	Male	34 (66.7)	56 (23.6)
Age	18-39 years	20 (39.2)	160 (67.5)
	40-59 years	30 (58.8)	76 (32.1)
	60 years +	1 (2.0)	1 (0.4)
Work Area	Intensive Care	17 (33.3)	137 (57.8)
	Operating Room	34 (66.7)	100 (42.2)
Professional Experience	0-5 years	4 (7.8)	58 (24.5)
	6-10 years	6 (11.8)	57 (24.1)
	11-15 years	11 (21.6)	54 (22.8)
	16 years+	30 (58.8)	68 (28.7)
Disaster Experience	Yes	17 (33.3)	61 (25.7)
	No	34 (66.7)	176 (74.3)

Table 2. Disaster Education and Knowledge Level

	Response Option	Doctors n=51 (%)	Other Health Personnel n=237 (%)	p
What is the definition of a disaster?	Unexpected and sudden events	48 (94.1)	221 (93.2)	0.573
	Only natural events	1 (2.0)	10 (4.2)	
	Only human-caused events	0 (0.0)	2 (0.8)	
	There is no definition of disaster	2 (3.9)	4 (1.7)	
How do you learn the in-hospital task distribution during a disaster?	From the disaster plan	38 (74.5)	158 (66.7)	0.066
	With instructions from senior management	6 (11.8)	63 (26.6)	
	I act on my own initiative	2 (3.9)	3 (1.3)	
	I don't know	5 (9.8)	13 (5.5)	
What is the primary duty of the unit during a disaster?	Ensuring the safety of existing patients	42 (82.4)	217 (91.6)	0.189
	Prioritizing the treatment of new patients	5 (9.8)	10 (4.2)	
	Checking medical supply stocks	1 (2.0)	1 (0.4)	
	Waiting for the decisions of senior management	3 (5.9)	9 (3.8)	
What should the patient evacuation process be like in a disaster?	Patients are prioritized according to their critical condition	37 (72.5)	125 (52.7)	0.226
	Mobile patients are evacuated first	11 (21.6)	100 (42.2)	
	All patients are tried to be evacuated at the same time	0 (0.0)	1 (0.4)	
	I don't know	3 (5.9)	11 (4.6)	
Do you know that there is a written "Disaster Management Plan" in the hospital?	Yes, I know	31 (60.8)	171 (72.2)	0.209
	No, I don't know	8 (15.7)	32 (13.5)	
	I'm not sure	12 (23.5)	34 (14.3)	
Your status of participation in disaster training programs	I participated, I found it useful	14 (27.5)	108 (45.6)	0.115
	I participated, I did not find it useful	6 (11.8)	21 (8.9)	
	I have never participated	28 (54.9)	94 (39.7)	
	I plan to participate	3 (5.9)	14 (5.9)	
Have you ever participated in a disaster drill?	Yes	12 (23.5)	68 (28.7)	0.131
	No	37 (72.5)	141 (59.5)	
	I don't remember	2 (3.9)	28 (11.8)	
What topics were covered during the drill? (among those who participated in the drill before)	Patient evacuation processes	11 (91.7)	52 (75.4)	0.210
For doctor n=12/ for Other Health Personnel n=68	Equipment and material management	11 (91.7)	43 (62.3)	0.047
	Communication and coordination	11 (91.7)	47 (68.1)	0.095
	Employee safety	10 (83.3)	45 (65.2)	0.215
Do intensive care and operating room staff know their roles and responsibilities in a disaster?	Yes, I know	9 (17.6)	54 (22.8)	**0.003**
	I know partially	16 (31.4)	119 (50.2)	
	No, I don't know	36 (51)	64 (27)	
Do you have the competence to use disaster response equipment?	Yes	8 (15.7)	38 (16)	**0.043**
	No	13 (25.5)	50 (21.1)	
	Partially	11 (21.6)	96 (40.5)	
	I don't know	19 (37.3)	53 (22.3)	

Table 3: Disaster Volunteerism and Preparedness Level

	Response Option	Doctors n=51 (%)	Other Health Personnel n=237 (%)	P
Do you know how to act in your unit during a disaster?	Yes, I know for sure	5 (9.8)	37 (15.6)	**<0.001**
	I know partially	25 (49)	162 (68.4)	
	No, I don't know	21 (41.2)	38 (16)	
How willing do you feel to take on a role in a disaster?	I am definitely unwilling	4 (7.8)	9 (3.8)	0.263
	I am unwilling	8 (15.7)	23 (9.7)	
	I am undecided	9 (17.6)	70 (29.5)	
	I am willing	23 (45.1)	99 (41.8)	
	I am definitely willing	7 (13.7)	36 (15.2)	
What is the most important reason for wanting to volunteer in disasters?	Professional responsibility	29 (56.9)	81 (34.2)	**0.002**
(Multiple options could be selected)	The desire to help people	24 (47.1)	150 (63.3)	**0.032**
	To improve my knowledge and skills	7 (13.7)	19 (8.0)	0.197
	A sense of obligation	9 (17.6)	14 (5.9)	**0.005**
	I do not want to volunteer	14 (27.5)	32 (13.5)	0.014
Which role would you prefer to take in a disaster? (multiple choice)	Medical intervention	38 (74.5)	136 (57.4)	0.023
	Triage	6 (11.8)	32 (13.5)	0.739
	Logistics (material, transportation, accommodation, safety)	1 (2.0)	37 (15.6)	**0.009**
	Coordination and management	11 (21.6)	38 (16.0)	0.340
	Communication	2 (3.9)	19 (8.0)	0.308
	Providing psychosocial support	2 (3.9)	22 (9.3)	0.209
What is the basic purpose of triage in a disaster?	Prioritizing patients according to their life-threatening conditio	45 (88.2)	216 (91.1)	0.731
	Prioritizing the first patient	3 (5.9)	8 (3.4)	
	Evacuating only intensive care patients	0.0	2 (0.8)	
	Treating as many patients as possible at the same time	3 (5.9)	11 (4.6)	
How competent do you feel in disaster response?	I don't feel competent at all	7 (13.7)	19 (8.0)	0.351
	I feel incompetent	11 (21.6)	62 (26.2)	
	I am undecided	21 (41.2)	86 (36.3)	
	I feel competent	11 (21.6)	69 (29.1)	
	I feel very competent	1 (2.0)	1 (0.4)	
Have you considered joining disaster response teams (AFAD, UMKE, Red Crescent, etc.)?	Yes, I became a member	7 (13.7)	17 (7.2)	0.013
	Yes, but I haven't joined yet	10 (19.6)	96 (40.5)	
	No, I haven't thought about it	34 (66.7)	124 (52.3)	
Are you open to providing voluntary support in the post-disaster recovery process?	Yes	27 (52.9)	129 (54.4)	0.097
	No	8 (15.7)	16 (6.8)	
	I am undecided	16 (31.4)	92 (38.8)	
Do you know how to communicate with your relatives in a disaster?	Yes, I know alternative ways	15 (29.4)	93 (39.2)	0.188
	No, I don't know	36 (70.6)	144 (60.8)	
Do you know the personal safety precautions to take during a disaster?	Yes	12 (23.5)	75 (31.6)	0.108
	Partially	30 (58.8)	142 (59.9)	
	No	9 (17.6)	20 (8.4)	

Table 4. Awareness

Table 3: Cont.

	Response Option	Doctors n=51 (%)	Other Health Personnel n=237 (%)	p
In disaster situations, which step do you think is the priority?	Communication and information sharing	26 (51.0)	85 (35.9)	**0.044**
(Multiple options could be selected)	Patient evacuation	13 (25.5)	75 (31.6)	0.387
	Material and equipment management	0.0	1 (0.4)	0.011
	Employee safety	28 (54.9)	115 (48.5)	0.652
Do you know the communication channels to be used in disaster s ituations within the hospital?	Yes	11 (21.6)	89 (37.6)	**0.030**
	No	40 (78.4)	148 (62.4)	
In which issues do you think you may experience difficulties in a disaster?	Patient evacuation management	28 (54.9)	133 (56.1)	0.874
(Multiple options)	Inter-team coordination	28 (54.9)	133 (56.1)	
	Lack of equipment and materials	26 (51.0)	118 (49.8)	0.877
	Insufficient knowledge or training	39 (76.5)	168 (70.9)	0.421
	Other (specified)	0.0	11 (4.6)	0.117

Table 5. Psychological and Social Factors

	Response Option	Doctors n=51 (%)	Other Health Personnel n=237 (%)	P
What is your biggest concern about participating in disaster response?	My own safety	16 (31.4)	59 (24.9)	0.339
(Multiple options could be selected)	My family's safety	25 (49.0)	114 (48.1)	0.905
	Lack of adequate medical support	19 (37.3)	70 (29.5)	0.279
	Post-disaster psychological effects	9 (17.6)	68 (28.7)	0.106
	Other (please specify)	3 (5.9)	4 (1.7)	0.078
Would you like to receive psychological support after a disaster?	Yes	29 (56.9)	135 (57)	0.574
	No	9 (17.6)	30 (12.7)	
	I am undecided	13 (25.5)	72 (30.4)	
What do you think is the biggest psychological burden during a disaster?	The stress experienced by patients and their relatives	14 (27.5)	64 (27.0)	0.948
(Multiple options)	Anxiety about not being able to provide adequate medical support	25 (49.0)	84 (35.4)	0.070
	Worrying about my own safety	13 (25.5)	57 (24.1)	0.828
	Burnout from working long hours	20 (39.2)	108 (45.6)	0.407
Who would be your biggest source of social support during a disaster?	My colleagues	26 (51.0)	99 (41.8)	0.229
(Multiple options)	My family and close circle	28 (54.9)	164 (69.2)	**0.049**
	Senior management and administrators	4 (7.8)	13 (5.5)	0.517
	I don't think I will receive any social support	6 (11.8)	16 (6.8)	0.221
What is the most significant impact of disasters on health services?	All (all specified effects)	44 (86.3)	205 (86.5)	0.931
	Exceeding hospital capacity	3 (5.9)	10 (4.2)	
	Insufficiency of electricity, water, and medical supplies	1 (2.0)	4 (1.7)	
	Staff burnout	3 (5.9)	18 (7.6)	

REFERENCES

1. Labrague, L. J., Yboa, B. C., McEnroe–Petitte, D. M., Lobrino, L. R., & Brennan, M. G. B. (2016). Disaster preparedness in Philippine nurses. Journal of nursing scholarship, 48(1), 98-105
2. Erkin Ö, Aslan G, Öztürk M, Çam B, Ödek Ş. Nurses' General Disaster Preparedness Status and Affecting Factors. Forbes J Med 2023;4(3):305-14
3. Taskiran, G. & Baykal, T. U. (2017). Nurses' preparedness for disasters in Turkey: Literature review. New Trends and Issues Proceedings on Humanities and Social Sciences. 4(2), pp 41-50

OP-29

Abstract Only

Anesthetic Management in a High-Risk Patient with Substance Abuse

Gulgun Elif Aksoy, Gamze Kucukossman, Esra Kongur

Trabzon Kanuni Training and Research Hospital, Clinic of Anesthesiology and Reanimation, Trabzon, Türkiye

ABSTRACT

Objective: It is not uncommon for patients with recent cocaine use to undergo procedures under anesthesia.While acute toxic effects are well known,chronic use may cause complex pathophysiological changes that lead to unexpected cardiovascular responses and interactions with anesthetic agents (1). This report presents a hypotension episode likely caused by catecholamine depletion in a chronic cocaine user.

Case Presentation: Informed consent was obtained from the patient for the presentation. A 41-year-old male with cocaine addiction was referred for emergency surgery due to acute perforated appendicitis. 10 days earlier he had been diagnosed with acute appendicitis and myocardial infarction at another center but was managed conservatively due to high anesthesia risk. The patient had a five-year history of dilated cardiomyopathy, congestive heart failure, and diabetes mellitus, along with chronic tobacco, alcohol and cocaine use.Physical exam and labs were unremarkable. Echocardiography showed an ejection fraction of 20%. He was classified ASA 4E and ICU follow-up was planned. The patient was conscious, cooperative and oriented preoperatively with a blood pressure (BP) of 90/60 mmHg, heart rate (HR) of 88 bpm and SpO_2 of 95%. Routine anesthesia monitoring including invasive arterial pressure and BIS monitoring, was performed.Anesthesia was induced with ketamine, midazolam, propofol, fentanyl and rocuronium. Following intubation, BP dropped to 78/40 mmHg. Despite 500 mL IV saline and ephedrine boluses, hypotension persisted.No rash, edema or ventilation issues were noted.HR remained 60–70 bpm.Antibiotics were administered. Norepinephrine infusion was started and continued intraoperatively. Anesthesia was maintained with sevoflurane (50% O_2/air), keeping BIS 40–60. No complications occurred apart from hypotension.

Conclusion: Cocaine use may lead to complications such as MI, myocarditis, cardiomyopathy, resistant hypertension and endocarditis (1). The management of acute cocaine toxicity is well defined. The management of hypotension is less specifically defined and should be approached with a more general strategy (2). In our case, the intraoperative hypotension was managed with intravenous fluids, ephedrine and subsequently with direct-acting vasopressors such as norepinephrine.

With the increasing prevalence of cocaine use, anesthesiologists must be able not only to manage acute cocaine toxicity but also to anticipate and address the cardiovascular effects associated with chronic use.

Keywords: Chronic cocaine addiction, anesthesia, heart failure

REFERENCES

1. Havakuk O, Rezkalla SH, Kloner RA. The Cardiovascular Effects of Cocaine. J Am Coll Cardiol. 2017 Jul 4;70(1):101-113. doi: 10.1016/j.jacc.2017.05.014. PMID: 28662796.
2. O'Donnell K, Boyle S, Abdulrahman S, O'Leary E. Unexpected intraoperative hypotension in a chronic cocaine user. Anaesth Rep. 2022 Jul 22;10(2):e12177. doi: 10.1002/anr3.12177. PMID: 35903242; PMCID: PMC9307088.

OP-30

Abstract Only

Hydrocelectomy Under Sedation in a Pediatric Patient with Primary Carnitine Deficiency: A Case Report

Vildan Ergen, Zeynep Yildirim

Ankara City Hospital, Anesthesiology and Reanimation Clinic, Ankara, Türkiye

ABSTRACT

Objective: Primary carnitine deficiency (PCD) is a rare autosomal recessive metabolic disorder caused by mutations in the SLC22A5 gene, leading to impaired intracellular transport of carnitine. Its deficiency results in impaired fatty acid oxidation, which may cause non-ketotic hypoglycemia, cardiomyopathy, muscle weakness, hepatic encephalopathy, and sudden death (1). During anesthesia, patients with PCD may encounter problems such as metabolic stress, fasting, hypothermia, hypoglycemia, and increased sensitivity to neuromuscular blockers. In particular, propofol is not recommended due to its potential to suppress fatty acid metabolism (2).

This case report presents the safe anesthetic management under sedation of a 2-year-old child with a diagnosis of PCD undergoing hydrocelectomy, in light of the literature.

Case Presentation: A 2-year-old male patient weighing 15 kg, previously diagnosed with homozygous primary carnitine deficiency due to an SLC22A5 gene mutation, was scheduled for elective left-sided hydrocelectomy. The patient was under regular oral L-carnitine treatment (200 mg/kg/day). The medical history revealed a penicillin allergy. Cardiac evaluation showed an ejection fraction (EF) of 78%. After premedication with midazolam(0.05mg/kg), sedation was achieved while maintaining spontaneous ventilation using intravenous ketamine (1mg/kg), fentanyl (1mcg/kg). Monitoring included ECG, SpO_2, non-invasive blood pressure, and capnography.

The procedure lasted 30 minutes and sedation was well tolerated. Additional doses of ketamine and fentanyl were administered when needed, and hemodynamic parameters remained stable throughout the operation. The intraoperative blood glucose level was 133 mg/dL. Spontaneous ventilation was maintained throughout the procedure. No hypoglycemia, desaturation, or muscle rigidity was observed. The procedure was completed without complications.

Conclusion: In patients with PCD, metabolic stability must be ensured before surgery, the fasting period should be minimized, carnitine supplementation should not be interrupted, and glucose-containing fluids should be used for metabolic support. In this case, sedation using a combination of ketamine, midazolam, and fentanyl was applied safely and without complications.

Consistent with the literature, propofol should be avoided, and inhalation agents or alternative sedatives should be preferred. Short surgical procedures under sedation can be safely performed in patients with metabolic disorders when appropriate perioperative preparation is made.

REFERENCES

1. Longo N, et al. Am J Med Genet C Semin Med Genet. 2006;142C(2):77–85.
2. Yu HK, et al. Medicine(Baltimore).2022(18);101(7):e28853.

OP-31

Abstract Only

Comparison of the Effects of M-TAPA or ESP Block on Postoperative Analgesia in Laparoscopic Surgery

Ozge Ozturk Dinc[1], Remziye Sivaci[1], Bilal Bezen[1], Merve Kaynak[2]

[1]Health Sciences University, School of Medicine, Department of Anesthesiology and Reanimation, Afyon, Türkiye
[2]Health Sciences University, School of Medicine, Department of Anesthesiology and Reanimation, Kütahya, Türkiye

ABSTRACT

Objective: Reducing postoperative pain in laparoscopic cholecystectomy operations is still an important issue. In this thesis study, it was aimed to compare the postoperative VAS scores, the duration of the first additional analgesic requirement, patient satisfaction, and the length of hospital stay of M-TAPA or ESP block types in laparoscopic cholecystectomy operations within the scope of multimodal analgesia.

Methods: Our study is a prospective clinical study and includes 40 patients aged between 18-70 years and with ASA scores between I-III who underwent elective laparoscopic cholecystectomy under general anesthesia at Afyonkarahisar Health Sciences University Hospital. The patients were divided into two groups according to the randomized sampling method as Group I (n=20) to which M-TAPA block was applied and Group II (n=20) to which ESP block was applied. All patients were examined approximately 30 min after the end of the operation. First, 1 mg/kg tramadol was administered intravenously for postoperative analgesia. Postoperative 24-hour dynamic and resting VAS scores, first additional analgesic hours, patient satisfaction, and hospital stay were evaluated.

Results: While the second hour dynamic VAS scores were similar (p=0.067), the resting VAS score was found to be significantly lower in the M-TAPA group (p=0.018). The fourth and eighth hour resting and dynamic VAS scores were found to be statistically significantly lower in the M-TAPA group (p=0.002, p=0.003, p=0.024, p=0.045, respectively). The resting and dynamic VAS scores at the 12^{th} and 24^{th} hours were found to be similar between the groups. The time required for the first additional analgesic requirement was found to be statistically significantly longer in the M-TAPA group (p=0.041).

Conclusion: It was observed that M-TAPA block reduced postoperative pain scores more than ESP block in laparoscopic cholecystectomy operations. In addition, since the first analgesia requirement is later in M-TAPA block, we believe that it is appropriate to prefer it for postoperative analgesia in cholecystectomy operations.

OP-33

Abstract Only

Cluster Headache with Greater Occipital Nerve (GON) Block - Case Report

Anil Kilinc, Ebru Canakci

Ordu University, Faculty of Medicine, Department of Anesthesiology and Reanimation Ordu, Türkiye

ABSTRACT

Objective: Cluster headache is characterized by unilateral orbital attacks lasting from one week to three months (1). The term "cluster" refers to the seasonal or monthly recurrence of attacks (2). It is the third most common primary headache after migraine and tension-type headache. First described by Hadden in 1940, the greater occipital nerve (GON) block targets trigeminal and upper cervical sensory fibers (3).

Case Presentation: We present a 45-year-old male physician with no comorbidities. One month post-septoplasty, he developed severe left periorbital pain (VAS 9–10) lasting 2–3 hours and disrupting sleep. He was initially diagnosed with frontal sinusitis and treated for two weeks with elevated head positioning advised during sleep. Despite paracetamol and tramadol, symptoms persisted, and temporary relief was achieved through sphenopalatine ganglion blockade during acute episodes. One month later, he presented to the pain clinic with new-onset right-sided retroorbital throbbing pain, rhinorrhea, conjunctival injection, and lacrimation. He was diagnosed with cluster headache. An ultrasound-guided ipsilateral GON block was performed using 5 mg bupivacaine and 2 mg dexamethasone. When contralateral pain occurred the next day, a contralateral GON block was administered, leading to complete symptom resolution.

Conclusion: Cluster headache typically occurs at night, lasting 15 minutes to 3 hours. In this case, attacks began around 2 a.m. and lasted two hours. The condition is nine times more prevalent in men, with onset commonly between ages 35–50. Smoking and alcohol are known triggers. Our patient, a 45-year-old smoker, exhibited typical ipsilateral symptoms such as rhinorrhea, lacrimation, and conjunctival injection (4).

The GON, composed of C2 and C3 sensory fibers, was first used in cluster headache treatment by Anthony in 1984 (5). The addition of steroids enhances the efficacy of local anesthetics. Aspiration was performed before injection to avoid intravascular administration, a known risk.

Acute treatments include 100% oxygen, triptans, and octreotide; preventive options include calcium channel blockers, corticosteroids, GON and sphenopalatine nerve blocks (6).

Conclusion: GON blockade is a valuable option for patients unable to access oxygen therapy or use triptans due to cardiovascular contraindications.

REFERENCES

1. Leone M, ProiettiCecchini A. Advances in theunderstanding of clusterheadache. ExpertRevNeurother 2017;17:165–172.
2. Buture A, Gooriah R, Nimeri R, Ahmed F. CurrentUnderstanding on PainMechanism in Migraineand Cluster Headache. AnesthPainMed 2016;23:6:e35190.
3. Hadden S. Neuralgic headache and facial pain. Arch Neurol Psychiatr 1940;43:405-8.
4. HeadacheClassificationSubcommittee of the International HeadacheSociety (2004) Theinternationalclassification of headachedisorders, 2nd edition. Cephalalgia 24[Suppl 1]:1–160
5. Anthony M (1987) The role of theoccipitalnerve in unilateralheadache. In: Rose FC (ed) Currentproblems in neurolog
6. Ekbom K, Solomon S (2000) Management of clusterheadaches. In: Olesen J, Tfelt-Hansen P, Welch KMA (eds) Theheadaches, 2nd edn. Lippincott Williams &Wilkins, Philadelphia, pp 731–740

OP-34

Abstract Only

Impact of Nausea and Vomiting Management on Postoperative Recovery in Oncologic Surgeries

Belkis Yilmaz, Ayse Menekse Cakir, Mensure Kaya

Dr. Abdurrahman Yurtaslan Ankara Oncology Training and Research Hospital, Ankara, Türkiye

ABSTRACT

Objective: The aim of this study is to evaluate the effect of perioperative management of postoperative nausea and vomiting (PONV) on postoperative recovery and length of hospital stay in oncologic surgeries.

Methods: Following the acquisition of ethical approval and informed consent, a prospective observational study was undertaken involving patients undergoing oncologic surgery under general anesthesia. Data collected included demographics, ASA, surgery type, PONV risk factors, intraoperative prophylactic medication, postoperative antiemetic needs within 24 hours, incidence of PONV, and length of hospital stay. All statistical analyses were conducted using IBM SPSS Statistics 27.

Results: Analysis of 324 patients revealed that PONV occurred in 30.2% of cases (Table 1). No significant association was found between PONV development and gender, ASA score, opioid type, smoking status, or inhalation anesthesia ($p > 0.05$). A statistically significant relationship was observed between a history of motion sickness and elevated FiO2 levels with PONV development ($p < 0.05$) (Table 2). A significant association was found between the type of medication used for prophylaxis and PONV development ($p < 0.001$). A negative correlation (-0.346*) existed between PONV development and the use of dual prophylaxis (Table 3). The presence of PONV was associated with a significantly extended length of hospital stay compared to patients who did not experience PONV ($p < 0.05$) (Table 4).

Discussion: Motion sickness and elevated FiO2 are confirmed as risk factors for PONV. Dual prophylactic medication use reduces both PONV incidence and hospital stay. Our PONV incidence was 30.2%. Motion sickness is a known PONV risk factor (1), and high intraoperative FiO2 is associated with increased PONV (2). Combined PONV prophylaxis is more effective (3). Single-drug prophylaxis in our study resulted in a fourfold increase in PONV compared to dual prophylaxis. While opioids are generally considered a weak risk factor for PONV with no difference between types, Tramadol was associated with a higher PONV rate. Effective PONV prophylaxis reduces hospital stay and readmissions (4, 5); our study showed a 3-day reduction in hospital stay for patients without PONV.

Conclusion: Effective management of postoperative nausea and vomiting facilitates early oral nutrition and reduces hospital stay. Standardized protocols for managing nausea and vomiting in oncological surgeries are recommended.

Table 1. Demographic and Clinical Characteristics

Variable (n=324)	n	%
ASA Score		
1	3	0.9
2	193	59,5
3	126	38,8
4	2	0.6
Gender		
Female	244	75,3
Male	80	224,6
Surgery Type		
Oncological Surgery	156	52.9
General Surgery	37	10.3
Gynecologic Oncology	131	36.3
Disease Diagnosis		
Breast Carcinoma	67	67.7
Colon Carcinoma	90	24.8
Ovarian Carcinoma	68	18.9
Endometrial Carcinoma	46	12.8
Other	50	15.4
History of Motion Sickness		
No	191	59.6
Yes	131	40.4
Smoking Status		
No	206	63.6
Yes	118	36.4
Opioid Type Used		
Tramadol HCl	32	8.9
Morphine HCl	290	80.8
Other	2	0.6
Prophylaxis Nausea-Vomiting		
Dexamethasone	2	0.6
Metoclopramide	4	1.1
Ondansetron	178	49.5
Ondansetron + Dexamethasone	137	38.5
None	2	0.6
Post-operative Nausea-Vomiting Status		
No	226	69,8
Yes	98	30,2

*Data are presented as number of patients n (percentage)
***ASA:** American Society of Anesthesiologists

Table 2. Demographic and Clinical Characteristics - Patients with and without PONV (n=324)"

Variable (N=324)	PONV No (n=226)	PONV Yes (n=98)	p-value
ASA Score			0.443
1	2 (66.7%)	1 (33.3%)	
2	141 (73.1%)	52 (26.9%)	
3	82 (65.1%)	44 (34.9%)	
4	1 (50.0%)	1 (50.0%)	
Gender			0.956
Female	171 (70.1%)	73 (29.9%)	
Male	55 (68.8%)	25 (31.2%)	
Disease Diagnosis			0.324
Breast Carcinoma	49 (73.1%)	18 (26.9%)	
Colon Carcinoma	61 (68.5%)	28 (31.5%)	
Ovarian Carcinoma	52 (76.5%)	16 (23.5%)	
Endometrial Carcinoma	24 (52.2%)	22 (47.8%)	
Other	40 (74.1%)	14 (25.9%)	
History of Motion Sickness			**0.000***
No	152 (78.8%)	41 (21.2%)	
Yes	74 (56.5%)	57 (43.5%)	
Smoking Status			0.562
No	146 (70.9%)	60 (29.1%)	
Yes	80 (67.8%)	38 (32.2%)	
Opioid Type Used			0.108
Morfin HCl	207 (71.1%)	84 (28.9%)	
Tramadol HCl	19 (57.6%)	14 (42.4%)	
High FiO_2			**0.005***
No	216 (71.3%)	87 (28.7%)	
Yes	5 (35.7%)	9 (64.3%)	

*$p \leq 0.05$, data are presented as number of patients n (percentage).
***ASA:** American Society of Anesthesiologists

Table 3. Relationship Between Types of Prophylaxis and PONV (n=324)

Prophylaxis Type	PONV No (n=226)	PONV Yes (n=98)	p-value
Prophylaxis Type			**0.000***
None	2 (100.0%)	0 (0.0%)	
Ondansetron	103 (57.9%)	75 (42.1%)	
Dexamethasone	0 (0.0%)	2 (100.0%)	
Ondansetron + Dexamethasone	120 (87.0%)	18 (13.0%)	
Metoclopramide HCl	1 (25.0%)	3 (75.0%)	
Number of Prophylaxis Agents			**0.000***
Single Drug	104 (56.5%)	80 (43.5%)	
Two Drugs	120 (87.0%)	18 (13.0%)	
None	2 (100.0%)	0 (0.0%)	

* $p \leq 0.05$, data are presented as number of patients n (percentage)

Table 4: Comparison of Age, BMI, and Length of Hospital Stay by Postoperative Nausea and Vomiting Status (n=324)

Variable	PONV No(n=226)	PONV Yes (n=98)	p-value
Age (years)	56.75 ± 12.77	58.42 ± 11.01	0.262
BMI (Body Mass Index)	27.37 ± 6.71	27.24 ± 6.07	0.869
Length of Hospital Stay (days)	4.38 ± 2.54	7.55 ± 5.32	**0.000***

BMI: Body Mass Index, *$p \leq 0.05$, Data are presented as Mean ± Standard Deviation.

REFERENCES

1. Carlisle J, Stevenson CA. Drugs for preventing postoperative nausea and vomiting. Cochrane Database Syst Rev 2006;3:CD004125.
2. Markwei MT, Babatunde IO, Kutlu-Yalcin E, Essber HA, Mascha EJ, Liu L, Kurz AM, Sessler DI. Perioperative Supplemental Oxygen and Postoperative Nausea and Vomiting: Subanalysis of a Trial, Systematic Review, and Meta-analysis. Anesthesiology 2023;138(1):56-70.
3. Apfel CC, Korttila K, Abdalla M, Kerger H, Turan A, Vedder I, Seyfried T, Schildan W, Roewer N. A factorial trial of six interventions for the prevention of postoperative nausea and vomiting. N Engl J Med 2004;350(24):2441-51.
4. Jin Z, Gan TJ, Bergese SD. Prevention and Treatment of Postoperative Nausea and Vomiting (PONV): A Review of Current Recommendations and Emerging Therapies. Ther Clin Risk Manag 2020; 16:1305-1317.
5. Daniel C. Sizemore; Abhishek Singh; Anterpreet Dua; Karampal Singh; Brian W. Grose. Postoperative Nausea. [Updated 2022 Nov 9]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK500029/.

OP-35

Abstract Only

Effectiveness of Combined Fascial Plane Blocks for Postoperative Pain in Gynecologic Cancer Surgery

Ayse Menekse Cakir, Mensure Kaya

Dr. Abdurrahman Yurtaslan Ankara Oncology Training and Research Hospital, Ankara, Türkiye

ABSTRACT

Objective: Effective postoperative analgesia is crucial for enhancing recovery and reducing complications after major surgeries (1). This study evaluates the efficacy of combining ultrasound-guided fascial plane blocks—specifically, rectus sheath block (RSB) or quadratus lumborum block (QLB) with transversus abdominis plane (TAP) block—compared to TAP block alone in managing postoperative pain in gynecologic oncology surgeries.

Methods: Following ethical approval, 94 patients (ASA I–IV) undergoing elective gynecologic cancer surgery were enrolled. Participants received one of three analgesic protocols postoperatively: TAP block (n=27), TAP + QLB (n=34), or TAP + RSB (n=33). Pain intensity was assessed using the Visual Analog Scale (VAS) at multiple intervals within 24 hours. Morphine consumption, need for additional analgesics, gastrointestinal recovery, mobilization time, sedation levels, and other postoperative recovery parameters were recorded and compared.

Results: Baseline ASA status and cancer types were similar across groups ($p>0.05$). TAP block alone resulted in significantly higher morphine consumption (3.44 ± 1.42 mg) compared to TAP+QLB (1.29 ± 1.55 mg) and TAP+RSB (1.27 ± 1.1 mg) groups ($p<0.05$). VAS scores were also significantly higher in the TAP-only group. Recovery milestones, including time to first oral intake, gas passage, and mobilization, were significantly delayed in the TAP group. Incidence of nausea/vomiting and NSAID requirement were notably higher in the TAP-only group.

Conclusion: The combination of QLB+TAP and RKB+TAP blocks may provide advantages in postoperative pain management, mobilization, the normalization of bowel function, and reduction in opioid consumption in gynecologic cancer surgery. In the group receiving TAP block, higher morphine consumption, delayed mobilization, and longer hospital stay were notably observed. These findings support the integration of multimodal regional anesthesia techniques for enhanced postoperative outcomes (3).

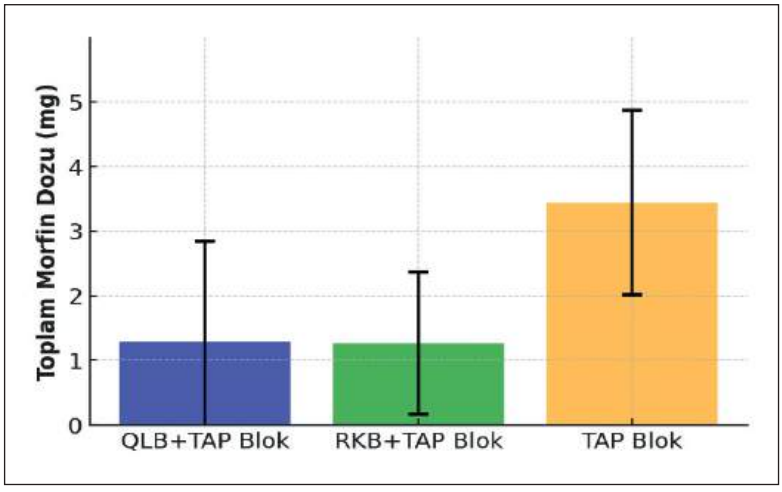


Figure 1. Total morphine consumption according to postoperative analgesia method.

Table 1. Comparison of Postoperative VAS Scores Among Different Analgesic Techniques

VAS Time Points	QLB + TAP a (n=34)	RSB + TAP b (n=34)	TAP c (n=27)	p-value	Difference (Post-hoc)
0 min	1.76 ± 0.82	1.21 ± 0.42	2.19 ± 0.88	0.000**	b < a < c
15 min	2.82 ± 1.71	1.94 ± 1.22	5.19 ± 2.18	0.000**	b < a < c
2 hours	3.38 ± 1.92	2.61 ± 1.73	4.00 ± 1.80	0.015*	b < a < c
6 hours	3.26 ± 1.78	3.61 ± 1.85	4.70 ± 1.59	0.006**	a, b < c
12 hours	4.38 ± 1.54	4.06 ± 1.73	5.22 ± 1.48	0.019*	a, b < c
24 hours	3.71 ± 1.62	3.64 ± 1.64	4.96 ± 1.19	0.002**	a, b < c
Intragroup p-value	0.000**	0.000**	0.000**		
Intragroup Trend	T0 < T1, T2, T3, T5 < T4	T0 < T1 < T2 < T3, T5 < T4	T0 < T1, T2, T3, T4, T5		

*p<0.05, **p<0.01.

Table 2. Comparison of Postoperative Parameters According to Fascial Plane Block Types

Postoperative Parameters	QLB + TAP (n=34)	RSB + TAP (n=34)	TAP (n=27)	p-value
NSAID Requirement				0.043*
None	29 (85.3%) a	30 (90.9%) a	18 (66.7%) b	
Present	5 (14.7%) a	3 (9.1%) a	9 (33.3%) b	
Nausea/Vomiting				0.000**
None	26 (76.5%) a	27 (81.8%) a	8 (29.6%) b	
Present	8 (23.5%) a	6 (18.2%) a	19 (70.4%) b	
Total Morphine Dose (mg)	1.29 ± 1.55 (0–4) a	1.27 ± 1.1 (0–4) a	3.44 ± 1.42 (2–7) b	0.000**
Time to First Gas/Stool (hr)	20.53 ± 7.66 (6–41) a	19.39 ± 6.08 (8–30) a	30.96 ± 6.3 (22–48) b	0.000**
Time to Mobilization (hr)	15.26 ± 4.08 (8–23) a	15.00 ± 4.2 (8–22) a	18.96 ± 4.55 (11–32) b	0.001**
Time to Oral Intake (hr)	13.85 ± 4.56 (8–25) a	12.79 ± 3.86 (7–20) a	16.78 ± 4.38 (8–29) b	0.002**
ICU Stay (days)	0.68 ± 0.47 (0–1) a	0.67 ± 0.48 (0–1) a	0.85 ± 0.53 (0–2) a	0.282
Hospital Stay (days)	3.71 ± 0.87 (3–6) a	3.82 ± 0.92 (3–6) a	4.59 ± 1.08 (3–7) b	0.001**

*p<0.05, **p<0.01, χ^2: Chi-square test (Categorical data), **F:** One Way ANOVA.
Lettering: Indicates the difference between groups.

REFERENCES

1. Reisli R, Akkaya ÖT, Arıcan Ş, Can ÖS, Çetingök H, Güleç MS, vd. Akut postoperatif ağrının farmakolojik tedavisi: Türk Algoloji-Ağrı Derneği klinik uygulama kılavuzu. Agri 2021;33:1-51.
2. Yousef N. Quadratus lumborum block versus transversus abdominis plane block in patients undergoing total abdominal hysterectomy: A randomized prospective controlled trial. Anesth Essays Res 2018;12(3):742.

OP-36

Abstract Only

Pulmonary Edema and Refractory Shock Developing During Coronary Bypass: The Critical Role of RCA Occlusion

Ilker Coskun[1], Ismail Elmali[1], Melih Urkmez[2]

[1]Ordu University Faculty of Medicine, Department of Anesthesiology and Reanimation, Ordu, Türkiye
[2]Ordu University Faculty of Medicine, Department of Cardiovascular Surgery, Ordu, Türkiye

ABSTRACT

Objective: Cardiovascular surgery may lead to early and late pulmonary complications. Pulmonary edema is rarely seen intraoperatively; when it occurs, it rapidly progresses and can become a fatal condition. This case presents a sudden onset of massive pulmonary edema characterized by profuse foamy fluid from the endotracheal tube during weaning from cardiopulmonary bypass. The possible contribution of graft dysfunction and the management of the case are also discussed.

Case Presentation: A 79-year-old male patient presented to the emergency department with chest pain. Echocardiography was normal. Coronary angiography showed 99% stenosis in the LAD, 70% in the CX, 50% in the RCA. CABGx4 was planned. Preoperative PA-CXR and pulmonary function tests were normal. CABG surgery was initiated with regional cerebral oxygen saturation monitoring. No complications were observed during bypass. After removal of the aortic cross-clamp, under ventilation SpO2 was 70–80%, PaO2 was 163 mmHg, and MAP was 50–60 mmHg with vazopressors. Regional cerebral oxygen saturation dropped bilaterally to 40%. Profuse, foamy fluid emerged spontaneously from the endotracheal tube, and 3000 mL was aspirated (Figure 1).

Fiberoptic bronchoscopy revealed large amounts of pink, foamy fluid in the main and segmental bronchi, along with edema and hyperemia of the bronchial mucosa. It was diagnosed as pulmonary edema (Figure 2). Furosemide (100 mg, infusion), methylprednisolone (250 mg, infusion) was administered. As rhythm and circulation could not be restored, the patient was returned to bypass. The RCA graft was found to be occluded and was revised. Due to inadequate cardiac output, and inability to wean from bypass, a temporary pacemaker, intra-aortic balloon pump, and VA-ECMO were applied. Total bypass time was 285 minutes; total surgical time was 450 minutes.The patient was taken to the ICU while intubated. Despite mechanical ventilation and hemodynamic/mechanical support treatments, the pulmonary edema and refractory shock didn't improve (Figure 3). The patient died on postoperative day 6.

Conclusion: Pulmonary edema in cardiac surgery can lead to acute respiratory failure and is associated with poor prognosis (1,2). It is associated with cardiogenic factors that increase pulmonary microvascular pressure, and non-cardiogenic factors that increase pulmonary capillary permeability such as protamine allergy, re-expansion, transfusion, inflammatory mediators (3,4). Although multifactorial mechanisms like hemodynamic changes due to cardiopulmonary bypass, graft dysfunction, volume overload, and immune responses are involved, intraoperative pulmonary edema is usually due to left ventricular dysfunction/failure (5,6). Edema and cardiogenic shock occurring immediately after weaning from bypass require urgent treatment, including ECMO (6). In this case, both massive edema and cardiogenic shock developed. When returning to bypass, the RCA graft was found to be occluded. If RCA branches supplying the sinus and AV nodes are affected, severe conduction disorders and low cardiac output (hypotension unresponsive to inotropes/vasopressors) may develop (7). The hemodynamic collapse in the patient suggested that RCA graft occlusion contributed to left heart failure. Bronchoscopy findings confirmed increased capillary permeability. Although ECMO can be lifesaving in massive edema and refractory shock, poor prognosis may occur in elderly patients with diffuse coronary artery disease and failed RCA grafts, as in this case. In critical LMCA/RCA stenoses, the blood supply to the sinus nodes may be affected, it is important not to ignore this in the preoperative evaluation and to verify the graft functions intraoperatively. Intraoperative use of transesophageal echocardiography, bronchoscopy and ultrasonography is useful for early detection and treatment of cardiac surgery complications. The fact that the case resulted in mortality despite intensive hemodynamic/mechanical support has once again demonstrated the high risk of complications in cardiac surgery and the necessity of a multidisciplinary approach.

Keywords: CABG, Pulmonary edema, Graft occlusion, IABP, ECMO

Figure 1. Stages of aspiration of frothy fluid from the lungs.

Figure 2. Fiberoptic bronchoscopy views.

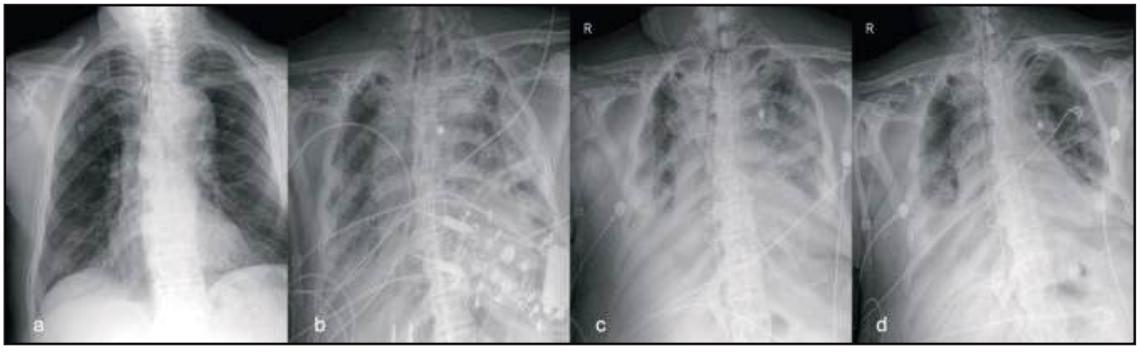


Figure 3. Patient's Lung Radiographs (a: Preoperative; b: Postoperative 1st day; c: Postoperative 3rd day; d: Postoperative 5th day).

REFERENCES

1. Wynne R, Botti M. Postoperative pulmonary dysfunction in adults after cardiac surgery with cardiopulmonary bypass: clinical significance and implications for practice. Am J Crit Care 2004; 13:384-93.
2. Jianfeng Zeng, Yongxing Li, Jing Liu, Li Li . Severe noncardiogenic pulmonary edema after cardiopulmonary bypass: Case report. Heliyon 2023;9(10):e20846.
3. Şerif Esad, Kurt B Kratzert, Benjamin Shelley, Malcolm B Friedman, Albert Perrino Jr. Assessment of Pulmonary Edema: Principles and Practice. J Cardiothorac Vasc Anesth 2018;32(2):901-14.
4. Petiot A, Tawk S, Ghaye B. Re-expansion pulmonary oedema. Lancet 2018;392(10146):507.
5. Güray D, Bedih B, Murat D, Halil ÇE, Gülay E, Zafer Ç, Oya H. Ekstrakorporeal Dolaşım Sırasında Gelen Masif Akciğer Ödem: Olgu sunumu. GKDA Derg 2014:20(2):118-20.
6. Takahiro Arima, Takayuki Tatebayashi, Sakashi Noji. Management of fulminating non cardiogenic pulmonary edema following cardiac surgery. J Surg Case Rep 2023;2023(1): rjac625.
7. Biswa Ranjan Panda, Anil Prabhu, Sylvio Provenzano, Tom Karl. Use of extracorporeal life support for emergency coronary artery bypass grafting. Interact Cardiovasc Thorac Surg 2013;16(6):897-9.

OP-37

Abstract Only

Intra-Arterial Foreign Body: An Unusual Complication of Femoral Artery Cannulation

Ilker Coskun[1], Omur Ilban[1], Ugur Kiris[1], Fatih Akkaya[2]

[1]Ordu University Faculty of Medicine, Department of Anesthesiology and Reanimation, Ordu, Türkiye
[2]Ordu University Faculty of Medicine, Department of Cardiology, Ordu, Türkiye

ABSTRACT

Objective: Arterial catheters are routinely used in intensive care units and for hemodynamic monitoring in critical patients in the operating room. Arterial cannulation, allowing repeated blood sampling and blood gas analysis. Generally safe procedures, with serious complications being rare (1). In this case, we report a critically ill patient from whom a broken piece of the femoral catheter was interventionally removed from the distal femoral artery.

Case Presentation: A 64 year old female patient with a history of DM, HT, CAD, previous stroke was intubated and connected to mechanical ventilation on the first day of admission due to bronchopneumonia and respiratory failure. As the radial artery catheter inserted on the first day became dysfunctional, a catheter was inserted into the left femoral artery using the Seldinger technique (Arterial Leadercath PE, Vygon) on day 10 of hospitalization. No catheter-related complications were observed during follow-up. Due to loss of hemodynamic monitoring and absence of blood return from the catheter it was removed from the femoral artery on day 20. Approximately 6 cm of the catheter tip was missing. The broken piece couldn't be detected via X-ray or ultrasound imaging. In the angiography unit antegrade access through the ipsilateral femoral artery revealed migration of the cannula fragment to the distal femoral artery. It was removed from the superficial femoral artery using percutaneous snare technique. Angiographic images are presented in Figure1 and the removed cannula piece is shown in Figure2.

Conclusion: The use of peripheral arterial catheters for hemodynamic monitoring is common. The radial artery is most often used due to its low complication rates and ease of access, followed by the femoral artery. The femoral artery is preferred for catheterization due to its large caliber, which allows for more accurate pressure waveform recordings that closely approximate aortic pressure, and its easy palpability even in hypotensive patients (2). Arterial cannulations, including iatrogenic injuries related to femoral artery cannulas, may result in major complications such as temporary occlusion, ischemic damage, pseudoaneurysm, local infection, sepsis, hematoma, and bleeding (2,3). Catheter fractures may result from various factors that compromise structural integrity over time, including mechanical stress from repeated insertions, inadequate placement, or excessive manipulation of the catheter (4). Detached fragments can cause thrombosis, distal embolization, thrombophlebitis, arterial spasm, hematoma, air embolism, catheter-related infection, and injury to nerves, tendons, or ligaments (5). Though surgical intervention is often required, angiographic intervention may be successful, as in our case. When there is no blood return or waveform from a femoral artery catheter, the removal process should be done carefully, considering the possibility of fracture and migration. The removed catheter should be visually inspected for integrity. Recognizing the mechanisms behind catheter fractures and implementing preventive strategies, performing catheter care according to guidelines, and providing regular training on catheter use and maintenance are important for improving patient outcomes and minimizing serious complications.

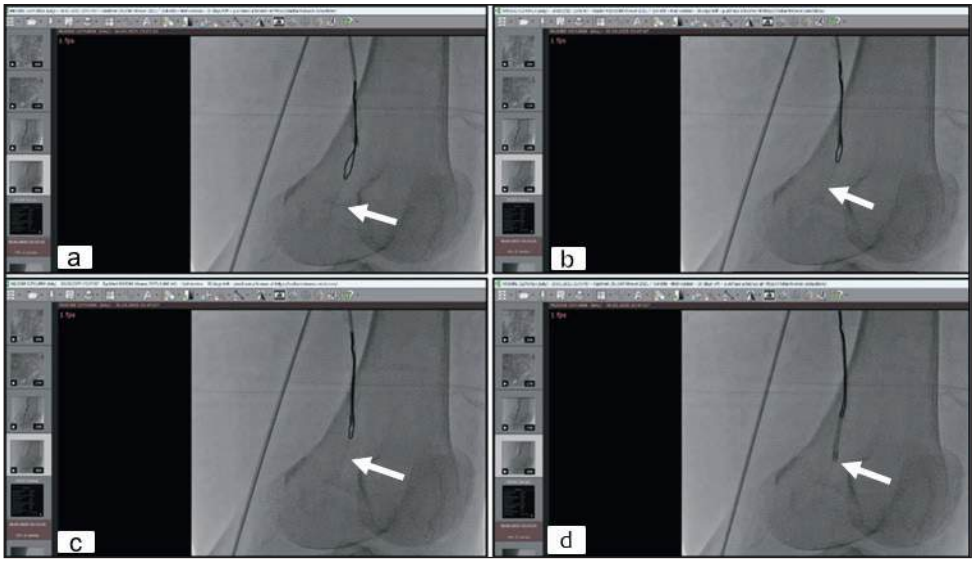


Figure 1. Steps of removing the broken piece from the superficial femoral artery using percutaneous snare technique in the angiography unit. The broken catheter piece (6 cm) is indicated with a white arrow.

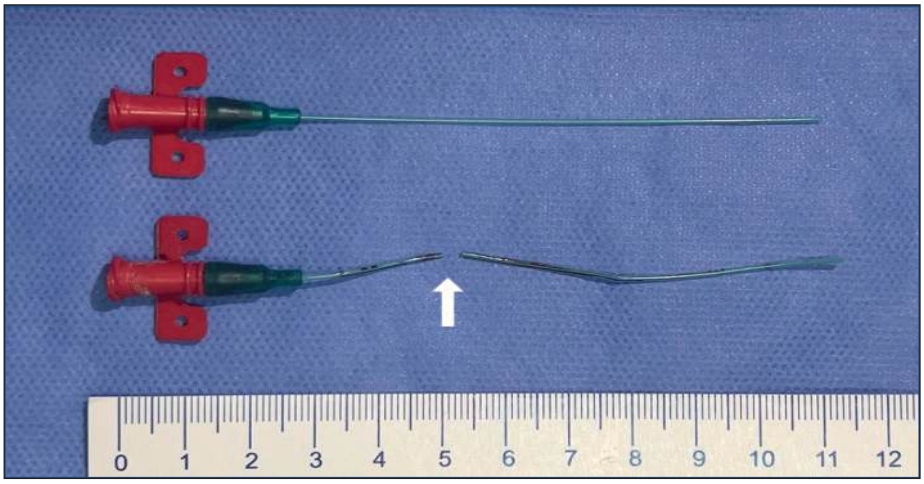


Figure 2. Arterial Leadercath PE catheter (3Fr, 20G, length: 8cm, inner diameter: 0.6 mm, outer diameter: 0.9 mm). The migrated fragment removed using the percutaneous snare technique (6 cm in length) and the fracture point are indicated with a white arrow.

REFERENCES

1. Gardner RM. Direct arterial pressure monitoring. Curr Anaesth Crit Care 1990; 1:239-46.
2. Bernd Volker Scheer, Azriel Perel, Ulrich J Pfeiffer. Clinical review: Complications and risk factors of peripheral arterial catheters used for haemodynamic monitoring in anaesthesia and intensive care medicine. Critical Care 2002;6 (3):198-204.
3. Bisdas T, Beutel G, Warnecke G, Hoeper MM, Kuehn C, Haverich A, Teebken OE. Vascular complications in patients undergoing femoral cannulation for extracorporeal membrane oxygenation support. Ann Thorac Surg 2011;92:626-31.
4. Chiao-Fen Luo, Chih-Chieh Mao, Bai-Chuan Su, Huang-Ping Yu. An Iatrogenic Complication of Radial Artery Cannulation. Acta Anaesthesiol Taiwan 2010;48(3):145-7.
5. Alan I Smith. Retained radial artery catheter fragment. Oxf Med Case Reports 2024;2024(6): omae053.

OP-38

Abstract Only

Anesthesia Management of a Patient with Lissencephaly 9 and Complex Brainstem Malformation: The Role of Genetic Makeup in Guiding Anesthesia

Aysun Ersen Yungul, Seyda Ozkan, Halil Calli, Levent Ozturk, Ezgi Erkilic

Ankara Bilkent City Hospital, Anesthesiology and Reanimation Clinic, Ankara, Türkiye

ABSTRACT

Objective: The microtubule actin crosslinking factor 1 (MACF1) gene is involved in coding proteins. Mutations and variants in this gene cause a variety of syndromes and diseases with different presentations. Lissencephaly-9 with complex brainstem malformation is characterized by developmental delay, impaired intellectual development, poor or absent speech, and dysphagia, which are the most common symptoms. In this study, we aimed to review the anesthesia management of a patient with Lissencephaly 9 and complex brainstem malformation, who has a rare heterozygous MACF1 c19027 A>G variant.

Case Presentation: Informed consent was obtained from the patient's parents for this presentation. An 8-year-old girl weighing 15,4 kg and 113 cm in height was evaluated in the preoperative period for adenotonsillectomy and bilateral ear ventilation tube insertion. She was born at 34 weeks of gestation via cesarean section, weighing 1280 grams. On examination, she had growth retardation, microcephaly, strabismus, dysphagia, hearing loss, and spasticity. No premedication was administered prior to the surgery. After induction with inhalation anesthetics in the operating room, an intravenous line was established on the dorsum of the left hand. The patient was intubated with a suitable size spiral tube. Throughout the operation, the patient remained stable, and extubation was performed with sugammadex. There were no issues in the recovery room, and the patient was transferred to the ward.

Conclusion: Knowing the genetic makeup in syndromic individuals is valuable for preparing the necessary precautions before anesthesia management. In patients with craniofacial abnormalities and developmental brain disorders, anesthesia management requires special attention. Careful preparation should be made, focusing particularly on airway management, aspiration risk, malignant hyperthermia, and the triggering of epileptic activities.

OP-39

Abstract Only

Retrospective Analysis of Patient-Controlled Analgesia Follow-Up in Postoperative Pain Management

Aysun Ersen Yungul, Erdal Ozcan

Ankara Bilkent City Hospital, Anesthesiology and Reanimation Clinic, Ankara, Türkiye

ABSTRACT

Objective: Patient-Controlled Analgesia (PCA) devices are widely used in postoperative pain management. The patient self-administers bolus injections within pre-programmed dose limits and lockout periods based on their needs. The aim of this study is to identify factors affecting the effective use of PCA.

Methods: The records of 205 patients who underwent surgery in the general surgery clinic and received PCA devices between January 2024 and January 2025 were retrospectively reviewed. The following data were analyzed: age, gender, ASA scores, postoperative ICU or ward discharge, PCA method used, type and amount of medication administered, PCA device settings, VAS scores, duration of PCA use, reasons for PCA termination, additional analgesics used, and vital signs.

Results: A total of 105 female and 100 male patients were evaluated. PCA was administered to 140 patients via epidural catheter and to 105 patients intravenously (IV). Of these, 17 received thoracic epidural catheters and 123 received lumbar epidural catheters. Postoperatively, 34 patients receiving IV PCA were followed in the general surgery ward, and 31 patients were followed in the surgical ICU. 32 patients receiving epidural PCA were followed in the general surgery ward, and 108 patients in the surgical ICU. The average duration of PCA use was 0.815 days for IV administration and 1.036 days for epidural catheter administration. The reasons for PCA termination were as follows: 50.244% due to the completion of device use, 36.098% under anesthesia control, 4.878% due to discharge, 3.415% at the patient's request, 3.415% due to catheter displacement, 0.976% due to complications, and 0.976% due to worsening of the patient's condition.

Conclusion: Although PCA is controlled by the patient, the dosage and duration of the analgesic are determined by the anesthesiologist. PCA termination may occur prematurely due to device warnings, technical failures, or postoperative care providers' insufficient knowledge of PCA methods (2). Abrolat et al. suggested that effective and safe PCA use requires educating the anesthesiologist, postoperative care providers, and patients (3). For safer postoperative pain management, PCA use, patient education, monitoring, and treatment evaluation should be incorporated into healthcare teams' in-service training programs.

REFERENCES

1. Iddagoda MT, Nienaber A, Pretorius C, Flicker L. Patient Controlled Analgesia and its effect on postoperative outcomes in an older cohort of patients undergoing orthopaedic procedures: A retrospective observational study. J Perioper Pract 2023;33(6):190-6.
2. Chumbley G, Mountford L. Patient-controlled analgesia infusion pumps for adults. Nurs Stand 2010;25(8):35-40.
3. Abrolat M, Eberhart LHJ, Kalmus G, Koch T, Nardi-Hiebl S. Patientenkontrollierte Analgesie: Methoden, Handhabung und Ausbaufähigkeit [Patient-controlled Analgesia (PCA): an Overview About Methods, Handling and New Modalities]. Anasthesiol Intensivmed Notfallmed Schmerzther 2018;53(4):270-80.

OP-40

Abstract Only

Saddle Block for Anesthetic Management of a Patient with Becker's Muscular Dystrophy Undergoing Pilonoidal Sinus Surgery: A Case Report

Ulku Ceren Koksoy[1], Fatos Korkulu[2], Sevil Kalbiyeva[2]

[1]Yüksek İhtisas University Faculty of Medicine, Department of Anesthesiology and Reanimation, Ankara, Türkiye
[2]Medicalpark Ankara Hospital, Anesthesiology and Reanimation Clinic, Ankara, Türkiye

ABSTRACT

Objective: Becker's muscular dystrophy (BMD) is a rare, inherited degenerative muscular disorder, mostly seen in males (0.1-0.2/10,000) with a higher prevalence in Asian countries. It is caused by a mutation in the subsarcolemmal protein dystrophin. Although BMD has a delayed and mild presentation there is no effective treatment. BMD patients exposed to anesthesia are at risk of developing perioperative complications such as hyperkalemia, rhabdomyolysis, malignant hyperthermia, congestive cardiac failure, dysrhythmia, and respiratory depression.

Case Presentation: A 27-year-old male patient with 70 kg weight, 174 cm height, normal physical examination and history of Becker's Muscular Dystrophy which was diagnosed via muscle biopsy from his leg. He was scheduled for pilonidal sinus surgery due to swelling and pain in the sacral area. The patient had mild weakness in his proximal lower limb muscles but was able to perform his daily life activities. He had a white blood cell count of 9.55 K μL^{-1}, slightly elevated liver enzyme levels, normal kidney function tests and INR:1.26. The patient opted for regional anesthesia and underwent surgery with a saddle block. The patient received 15 mg 0.5% hyperbaric bupivacaine through a 27-gauge Quincke tip spinal needle in a sitting position. After the onset of the block, he was placed in prone position and remained hemodynamically stable through the perioperative period (55 minutes). The patient was delivered to the surgical ward after the effects of the block diminished and motor function was restored (85 minutes). He was discharged from the hospital without any complications.

Conclusion: In patients with BMD pseudohypertrophy of the calf muscles is typical. Diagnosis is done using DNA testing or muscle biopsy. It often represents with progressive muscular weakness and wasting, starting from the proximal lower limb and pelvic muscles, progressing to the arms, shoulder, and neck. Exposure to succinylcholine and halogenated agents may lead to atypical reactions during anesthesia including cardiac arrest as 90% of patients with BMD develop disorders of both conduction and contractility of the heart, leading to dilated cardiomyopathy. As such, patients with BMD need a detailed preoperative evaluation, careful intraoperative anesthetic management, and good postoperative care.

REFERENCES

1. Thada PK, Bhandari J, Forshaw KC, et al. Becker Muscular Dystrophy. [Updated 2024 Jan 30]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan-.
2. Echeverry-Marín, Piedad Ceciliaa; Bustamante-Vega, Ángela Maríab. Anesthetic implications of muscular dystrophies. Colombian Journal of Anesthesiology 2018;46(3):228-39.

OP-41

Abstract Only

Anaesthesia Management of an Adolescent Child with Mitochondrial Disease Undergoing Laparoscopic Cholecystectomy: A Case Study

Ulku Ceren Koksoy[1], Sevil Kucuk Karabacak[2]

[1]Yüksek İhtisas University Faculty of Medicine, Department of Anesthesiology and Reanimation, Ankara, Türkiye
[2]Medicalpark Ankara Hospital, Anesthesiology and Reanimation Clinic, Ankara, Türkiye

ABSTRACT

Objective: Mitochondrial diseases, even though considered rare, are an important cause of neurological, cardiac, muscle and endocrine disorders. High-energy requiring tissues are dependent on the energy delivered by mitochondria therefore their dysfunctions, caused by mutations in mitochondrial proteins, affect the function of the central nervous system, heart and muscular system more.

Case Presentation: A 17 year old female patient with mild mental retardation, 70 kg weight, 155 cm height, normal physical examination had a medical history of premature delivery and a lengthened postpartum hospital stay accompanied by a thoracal tube insertion was subsequently diagnosed with mitochondrial disease. She had several surgeries including a tethered chord operation and 14 dental procedures under general anesthesia with no significant complications during her early childhood. The patient was scheduled for laparoscopic cholecystectomy due to epigastric pain, vomiting and flatulance causing severe agitation. She had elevated white blood cell levels (13.06 K μL^{-1}), normal liver and kidney function tests and an INR of 1.34. The patients family opted for general anesthesia; after anesthesia induction with intravenous propofol 3 mg kg^{-1} and rocuronium 0.6 mg kg^{-1} she underwent endotracheal intubation (tube no: 6.5) followed by sevoflurane anesthesia. The patients heart rate, blood pressure, peripheral oxygen saturation were monitorised perioperatively and remained stable within normal values throughout surgery (50 minutes) and anaesthesia (57 minutes). Postoperative analgesia was provided with intravenous paracetamol 700 mg. No complications involving heart, lung, central nervous system or motor functions arised postoperatively.

Conclusion: Mitochondrial diseases can cause various physiologic changes, resulting in encephalopathies, seizures, cerebellar ataxias, cardiomyopathies, myopathies, gastrointestinal and hepatic disease. As all general anaesthetic drugs depress mitochondrial function, the perioperative period must be monitored with continuous cardiopulmonary function, temperature and electroencephalografic monitorisation. Small doses of propofol, benzodiazepines and ketamine, sevoflurane, short-acting opioid boluses and continuous infusion of dexmedetomidine and opioids are considered safer choices for anaesthesia induction and maintenance. Electrolyte solutions without lactate are recommended. Following these guidelines, our patient who had multiple surgeries under general anesthesia experienced no complications. However as mitochondrial diseases may represent with different enzyme defects, symptoms might vary and therefore each patient should be evaluated individually.

REFERENCES

1. Niezgoda J, Morgan PG. Anesthetic considerations in patients with mitochondrial defects. Paediatr Anaesth 2013;23(9):785-93.
2. Hsieh VC, Krane EJ, Morgan PG. Mitochondrial Disease and Anesthesia. J Inborn Errors Metab Screen 2017;5:1-5.

OP-42

Abstract Only

Evaluation of Intubated Patients with a Colonization of the Lower Respiratory Tract by Candida Species

Duygu Kayar Calili[1], Demet Bolukbasi[2], Sumeyye Kazancioglu[3], Melih Gaffar Gozukara[4], Seval Izdes[1]

[1]Yıldırım Beyazıt University, Faculty of Medicine, Department of Anesthesiology and Reanimation, Ankara, Türkiye
[2]Ankara Bilkent City Hospital, Intensive Care Clinic, Ankara, Türkiye
[3]University Of Health Sciences Ankara Bilkent City Hospital, Department of Infectious Diseases and Clinical Microbiology, Ankara, Türkiye
[4]Yıldırım Beyazıt University, Faculty of Medicine, Department of Public Health, Ankara, Türkiye

ABSTRACT

Objective: Candida colonization in mechanically ventilated (MV) patients is associated with increased respiratory tract (RT) bacterial infections and hospital mortality (1,2). Our aim was to determine the risk factors, bacterial species causing ventilator-associated pneumonia (VAP) and clinical outcomes in intubated patients with lower RT colonization by Candida species.

Methods: Patients intubated in the ICU between 2020 and 2024 with Candida species growing in tracheal aspirate (DTA) cultures were retrospectively evaluated. Patient demographics, clinical characteristics, risk factors for fungal colonization, concomitant fungal and bacterial isolates, therapeutic interventions, and clinical outcomes were recorded.

Results: A total of 135 patients were analyzed. The most common diagnosis for ICU admission was pneumonia (46.7%), and the mean APACHE-II score was 26.77±8.92. In addition to Candida growth on DTA, 63.7% of patients had candiduria and 34.1% had candidemia. Candida albicans was the most frequently isolated species (61.5%). Antifungal treatment was given to 65.2% of patients. The median time between Candida colonization and initiation of antifungal therapy was 7.5 days. Bacterial growth was observed on DTA in 68.1% of patients after Candida colonization, and Pseudomonas aeruginosa was the most commonly isolated bacterium (26.7%). All patients had a history of antibiotic use and a central venous catheter (83.7% of jugular). Vasopressor treatment was required in 71.1% of patients, the median duration of MV was ICU length of stay was 26 and 32 days respectively, and the mortality rate was 67.4%.

Conclusion: Candida species can cause infections that prolong MV and lead to fatal outcomes. Risk factors for invasive fungal infections include colonization, antibiotic use, catheterization, parenteral nutrition, etc. (2,3). In our study, Candida albicans was the most commonly isolated species, with similar mortality to literature (3), The presence of Candida in the RT has been highlighted as being potentially associated with VAP, and Pseudomonas is often identified as the most common bacterium, as observed in our study (4). The efficacy of antifungal therapy in patients with respiratory Candida colonization remains controversial (2,4). We believe that prospective, placebo-controlled studies of Candida-bacteria interactions and the timing of antifungal therapy are necessary to reduce mortality in patients with Candida colonization of the RT.

REFERENCES

1. Timsit JF, Schwebel C, Styfalova L, et al. Impact of bronchial colonization with Candida spp. On the risk of bacterial ventilator-associated pneumonia in the ICU: the FUNGIBACT prospective cohort study. Intensive Care Med 2019;45(6):834-43.
2. Huang D, Qi M, Hu Y, et al. The impact of Candida spp airway colonization on clinical outcomes in patients with ventilator-associated pneumonia: A systematic review and meta-analysis. Am J Infect Control 2020;48(6):695-701.
3. McCarty TP, White CM, Pappas PG. Candidemia and Invasive Candidiasis. Infect Dis Clin North Am 2021;35(2):389-413.
4. Pendleton KM, Huffnagle GB, Dickson RP. The significance of Candida in the human respiratory tract: our evolving understanding. Pathog Dis 2017;75(3):ftx029.

OP-43

Abstract Only

Anesthesia Management in Moyamoya Disease: A Pediatric Case Series

Ahmet Murat Gul

Ankara Etlik City Hospital, Anesthesiology and Reanimation Clinic, Ankara, Türkiye

ABSTRACT

Objective: Moyamoya disease (MMD) is a rare and progressive cerebral vasculopathy, predominantly observed in children and young adults, with a prevalence ranging from 0.09-10/100,000. It most commonly affects children aged 5-7 years and young adults in their fourth decade. MMD is characterized by stenosis of the distal internal carotid arteries and their branches. Patients may present with ischemic stroke due to inadequate blood supply or hemorrhagic stroke due to collateral vessel fragility. Transient ischemic attacks (TIA), headaches, or epilepsy can also occur. Sickle cell disease, trisomy 21, and Type I neurofibromatosis are most frequently associated with MMD. Surgical treatment involves revascularization through direct or indirect bypass methods. Direct bypass is preferred for adult patients but is a challenging technique for pediatric patients. Indirect bypass aims to induce angiogenesis to increase oxygen supply to ischemic brain regions and is suitable for pediatric patients, with successful outcomes reported. During MMD surgeries, there are differing views on anesthesia management. Cerebral vasoconstriction, hypotension, hypovolemia, and anemia should be avoided to maintain cerebral blood flow and oxygenation. Hypoxemia, hypocapnia, and hypercapnia should also be avoided during controlled ventilation. This study reviews anesthesia approaches during 11 surgical procedures in 7 pediatric patients with MMD.

Methods: Pediatric patients who underwent surgery for MMD between October 2023-March 2025 were evaluated. Demographic data, ASA physical status scores, comorbidities, anesthesia management, intraoperative vasoconstrictor requirements, blood product usage, anesthesia and surgical durations, and analgesia management were recorded.

Results: General anesthesia was administered to 7 pediatric patients for 11 surgical procedures. Demographic and preoperative clinical data are provided in Table 1. Perioperative clinical data of the patients are presented in Table 2.

Conclusion: There is insufficient evidence to suggest that any anesthesia technique or agent during induction and maintenance in MMD patients is associated with better outcomes. The goal of anesthesia, regardless of the technique used, is to maintain the balance between oxygen supply and demand to avoid neurological morbidity. Laryngoscopy, endotracheal intubation, and the increase in cerebral oxygen consumption associated with surgery can be minimized with appropriate anesthesia management.

Table 1. Demographic and Clinical Data of the Patients

Patient	Age (year)	Weight (kg)	ASA score	Comorbidities	Medications	Previous surgeries	Mortality
1	6	22	II	-	-	-	-
2	7	20	II	-	ASA, KEPRA	-	-
3	9	25	II	-	-	-	-
4	5	20	II	-	ASA, KEPRA	-	-
5	6	20	II	-	-	-	-
6	6	20	III	Down syndrome	ASA	Closure of VSD	-
7	4	20	III	Down syndrome	-	Closure of VSD	Postop 17th day exitus

ASA: Acetylsalicylic acid, **KEPRA:** Levetiracetam

Table 2. Perioperative Clinical Data of the Patients

Patient		Surgery	Anesthesia time (min)	Surgery time (min)	Anesthesia management	Scalp block	Vasoconstrictor	Blood product	Analgesic Agents
1	1st surg	EDAS (right)	310	290	Sevoflurane + remifentanil	-	-	-	Paracetamol
	2nd surg	EDAS (left)	320	300	Sevoflurane + remifentanil	-	-	-	Paracetamol
2	1st surg	EDAS (right)	345	325	Sevoflurane + remifentanil	-	Ephedrine	-	Paracetamol
	2nd surg	EDAS (left)	310	290	Sevoflurane + remifentanil	+	-	-	Tramadol+ paracetamol
3	1st surg	EDAS (left)	315	295	Sevoflurane + remifentanil	-	Ephedrine	-	Tramadol+ paracetamol
	2nd surg	EDAS (right)	330	310	Sevoflurane + remifentanil	+	-	-	Paracetamol
4	1st surg	EDAS (left)	330	310	Sevoflurane + remifentanil	-	-	-	Paracetamol
	2nd surg	EDAS (right)	305	285	Sevoflurane + remifentanil	-	-	-	Paracetamol
5		EDAS (Bilateral)	270	240	Sevoflurane + remifentanil	+	Ephedrine	-	Paracetamol
6		EDAS (right)	310	290	Sevoflurane + remifentanil	-	Ephedrine	10 mL/kg ES	Tramadol+ paracetamol
7		Indirect bypass with multiple burrholes	110	95	Sevoflurane + remifentanil	-	-	-	Tramadol+ paracetamol

EDAS: Encephaloduroarteriosynangiosis (indirect revascularization surgery)

REFERENCES

1. Baykan N, Ozgen S, Ustalar ZS, Dagcinar A, Ozek MM. Moyamoya disease and anesthesia. Paediatr Anaesth 2005;15:1111-5.
2. Parray T, Martin TW, Siddiqui S. Moyamoya disease: a review of the disease and anesthetic management. J Neurosurg Anesthesiol 2011;23:100-9.
3. Giustini AJ, Stone SA, Ramamoorthy C. Moyamoya disease in children and its anesthetic implications: A review. Paediatr Anaesth 2020;30:1191-8.

OP-44

Abstract Only

Application of Sciatic and Femoral Nerve Block with Anterior Approach and Single Needle Entry in Distal Femur Osteosarcoma Surgery

Gokhan Erdem

University of Health Sciences Ankara Bilkent City Hospital, Department of Anesthesiology and Reanimation, Ankara, Türkiye

ABSTRACT

Objective: Osteosarcoma is a primary bone tumor originating from mesenchymal tissue and more common under the age of 20. Most of these tumors are seen around the knee joint. Primary treatment is surgical removal of the tumor (1). The most common complication in the postoperative period is pain (2). In this case, sciatic and femoral nerve blocks performed with an anterior approach and a single needle entry for postoperative analgesia in a patient who underwent surgery for osteosarcoma in the distal femur are presented.

Case Report: A 20-year-old male patient with no additional disease applied to our hospital with complaints of swelling and pain in the right knee that had been growing for approximately 4-5 months (Figure 1). In the MRI examination, a mass measuring 10×13 cm and containing chondroblastic areas protruding into the soft tissue in the distal femur was detected. The patient, who had no signs of metastasis, was prepared for surgery with the recommendation of oncology. Tumor resection and total knee replacement surgery were performed under general anesthesia. 1 gram of paracetamol and 50 mg of dexketoprofen were administered intravenously 15 minutes before skin closure. For multimodal analgesia, it was decided to perform sciatic and femoral nerve block before extubation. The desired imaging area was determined using a convex probe on ultrasonography (USG) approximately 2 cm below the inguinal ligament (Figure 2). The block needle was first directed towards the sciatic nerve between the adductor magnus and hamstring muscles on USG. It was confirmed with the nerve stimulator that the needle was in the desired imaging area on USG. Nerve stimulation was performed with the stimulator at a frequency of 2 Hz and a current of 1 mA. When a response was obtained, the stimulation intensity was gradually reduced to 0.4 mA and 20 mL of 0.25% bupivacaine was injected. After the injection, the needle was withdrawn and directed towards the femoral nerve. After confirming the location with the same method, the second injection (20 mL, 0.25% bupivacaine) was performed. 3x1 gram paracetamol and 3x100 mg tramadol were administered intravenously in the ward. The pain level assessed with VAS at 0, 2, 6, 12 and 24 hours postoperatively was recorded as 0, 1, 2, 3 and 2, respectively. The patient, who was mobilized at 24 hours, was discharged after 5 days of follow-up and treatment.

Conclusion: The osteosarcoma treatment process is challenging and requires a multidisciplinary approach. In distal femur osteosarcoma surgery, femoral and sciatic nerve blocks can be successfully applied with an anterior approach and single needle entry for postoperative pain prophylaxis.

Figure 1. Swelling in the right knee.

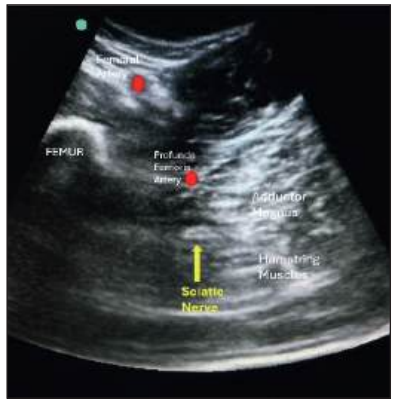


Figure 2. Ultrasonographic view of sciatic nerve.

REFERENCES

1. Pilavaki P, Gahanbani Ardakani A, Gikas P, Constantinidou A. Osteosarcoma: Current Concepts and Evolutions in Management Principles. J Clin Med 2023;12(8):2785.
2. Yu T, Tang HY, Wang TS, Wei W. Effectiveness of electrical stimulation for postoperative pain in patients with osteosarcoma: A systematic review protocol of clinical controlled trial. Med (United States) 2019;98(32):32–34.

OP-45

Abstract Only

The Decision of Performing HIPEC in Advanced Stage Ovarian Cancer: Evaluation of Two Cases from the Anesthesiological Side of Operating Table

Gamze Haras, Akkan Mahmud, Nukhet Akovali, Asude Ayhan

Ankara Başkent University Hospital, Department of Anesthesiology and Reanimation, Ankara, Türkiye

ABSTRACT

Objective: Cytoreductive surgery (CRS) with hyperthermic intraperitoneal chemotherapy (HIPEC) has an established role in the management of selected patients with ovarian cancer. Most complications of CRS occur with diaphragmatic and pericardial manipulation. We aimed to present 2 illustrative cases with advanced stage ovarian cancer who underwent CRS with HIPEC, and those who had intraoperative complications focusing on anaesthesiologic management.

Case Presentation: (Case 1) A 39-year-old female patient who previously treated for ovarian cancer was planned for a CRS and HIPEC due to disease recurrence. After general anaesthesia and invasive monitoring, a CRS including pelvic sidewall and right diaphragmatic mass resections were performed. A right-sided chest tube was placed intraoperatively, then HIPEC with cisplatin was started. Ventilatory parameters and vital signs were normal at the end of HIPEC, and a total of 600 ml drainage was observed in the chest tube after extubation. The patient was transferred to the intensive care unit (ICU). The chest tube was removed on week 1 and the patient was discharged on the 10th postoperative day.

(Case 2) A 74-year-old female patient who previously treated for ovarian cancer was planned for a CRS and HIPEC due to disease recurrence. Following general anaesthesia with thoracic epidural anaesthesia, mass excision from the liver, diaphragm and pericardiophrenic sinus was performed. After diaphragmatic repair, a chest tube was inserted. HIPEC was abandoned due to pericardial opening. The patient was transferred to ICU after extubation with stable ventilatory parameters and vital signs. The chest tube was removed on week 1 and the patient was discharged on the 8th postoperative day.

Conclusion: CRS and HIPEC are proven to be safe with low mortality rates in selected cases. Pleural effusion was more common in patients with diaphragm manipulation, and most cases can be treated with chest tube placement. Ischemic damage to the myocardium can occur during pericardiectomy, and conduction disturbances may occur.

In conclusion, for patients undergoing diaphragmatic and pericardial manipulation, a multidisciplinary approach and collaboration with the surgical team are essential, and the decision on performing HIPEC should be based on the patient's current clinical and surgical findings to avert the complications.

Keywords: Cytroreductive surgery, hypertermic intraperitoneal chemoteraphy, diaphragmatic resection, pericardiac resection

REFFERENCES

1. Craus-Miguel A, Segura-Sampedro JJ, González-Argenté X, Morales-Soriano R. Diaphragmatic Peritonectomy and Full-Thickness Resection in CRS/HIPEC May Allow Higher Completeness of Cytoreduction Rates with a Low Rate of Respiratory Complications. Ann Surg Oncol 2021;28(8):4676-82.
2. Sullivan BJ, Bekhor EY, Carpiniello M, et al. Diaphragmatic Peritoneal Stripping Versus Full-Thickness Resection in CRS/HIPEC: Is There a Difference? Ann Surg Oncol 2020;27(1):250-8.
3. Mehta SS, Gelli M, Agarwal D, Goéré D. Complications of Cytoreductive Surgery and HIPEC in the Treatment of Peritoneal Metastases. Indian J Surg Oncol 2016;7(2):225-9.
4. Solli P, Brandolini J, Pardolesi A, et al. Diaphragmatic and pericardial reconstruction after surgery for malignant pleural mesothelioma. J Thorac Dis. 2018;10(2):S298-S303.

OP-46

Abstract Only

Hypertensive Crisis During TIVA in a Morbidly Obese Patient Undergoing Cytoreductive Surgery for Recurrent Ovarian Carcinoma: A Case Report

Akkan Mahmud, Gamze Haras, Nukhet Akovali, Asude Ayhan

Ankara Başkent University Hospital, Department of Anesthesiology and Reanimation, Ankara, Türkiye

ABSTRACT

Objective: Morbid obesity (BMI ≥40 kg^{-2}) significantly increases perioperative risk and poses challenges for anesthetic management. It is associated with a spectrum of comorbidities including cardiovascular disease, hypertension, diabetes mellitus, obstructive sleep apnea syndrome (OSAS), and altered pharmacodynamics. This report presents a case of intraoperative hypertensive crisis in a morbidly obese patient undergoing cytoreductive surgery for recurrent ovarian carcinoma, highlighting the interplay between obesity-related comorbidities and anesthetic care.

Case Presentation: A 66-year-old female (BMI 45.4 kg m^{-2}, weight 128 kg, height 168 cm) with recurrent ovarian carcinoma was scheduled for cytoreductive surgery. Her medical history included atherosclerosis of the circumflex artery with an unsuccessful stenting attempt hypertension and OSAS. Preoperative assessments noted right suprarenal gland metastasis. General anesthesia was induced with midazolam, lidocaine, propofol, and rocuronium, and maintained via total intravenous anesthesia (TIVA) with propofol and remifentanil infusion. Intraoperative monitoring included BIS, train-of-four, pulse oximetry, ECG, and invasive blood pressure. Approximately one hour post-induction, the patient developed significant hypertension (SBP 145–175 mmHg, DBP 105–115 mmHg). Initial treatment with intravenous glyceryl trinitrate boluses and infusion was ineffective. Nicardipine infusion was initiated, leading to successful blood pressure control. The patient remained hemodynamically stable following intervention and the surgery proceeded without further major events.

Conclusion: Morbid obesity is linked with increased perioperative complications, particularly cardiovascular instability. In this patient, preexisting cardiovascular disease, altered drug metabolism due to excess adipose tissue, and underlying hypertension OSAS may have contributed to the hypertensive response during TIVA. There are also case reports of ovarian epithelial cell carcinoma causing persistent hypertensive crisis that have been resolved with calcium channel blockers. In our case, the histopathological evaluation showed carcinosarcoma related tumoral invasion of the suprarenal gland. Managing such patients requires proactive planning, individualized anesthetic strategies, and vigilant monitoring. Resistance to standard antihypertensive agents can be observed, necessitating the use of continuous infusions and advanced hemodynamic management techniques. This case underscores the complex interplay of comorbidities in morbidly obese patients undergoing major oncologic surgery. A multidisciplinary approach and comprehensive intraoperative monitoring are vital for ensuring patient safety. Anesthesiologists must be prepared for atypical responses to anesthetic agents and hemodynamic challenges in this high-risk population.

REFERENCES

1. Sharma S, Arora L. Anesthesia for the Morbidly Obese Patient. Anesthesiol Clin 2020;38(1):197-212.
2. Lemmens HJ. Perioperative pharmacology in morbid obesity. Curr Opin Anaesthesiol 2010;23(4):485-91.
3. Alrobaiq BM, Alharbi RS, Alhoshan FS, Alnasyan MA, Alahideb A, Omair A. Hypertension and Ovarian Cancer: A Case-Control Study in Saudi Arabia. Cureus 2023;15(2):e35294.

OP-47

Abstract Only

Monitored Anesthesia Care in Pediatric Cardiac Angiography Unit: A Single Center Experience

Edvin Bihorac, Elvin Kesimci, Nukhet Akovali, Akkan Mahmud

Baskent University Ankara Hospital, Department of Anesthesiology and Reanimation, Ankara, Türkiye

ABSTRACT

Objective: Congenital heart disease (CHD) remains the most prevalent congenital anomaly worldwide, necessitating early detection and prompt intervention to optimize outcomes. Cardiac catheterization plays a pivotal role in both diagnosis and minimally invasive treatment of these conditions. This study aims to evaluate the efficacy and safety of cardiac catheterization procedures performed under monitored anesthesia care (MAC).

Methods: We conducted a retrospective analysis of all pediatric patients who underwent cardiac catheterization at our institution between January 2024 and January 2025. Data collection focused on patient demographics, type of the procedure (diagnostic vs interventional) and MAC related complications.

Results: Among 370 pediatric patients (mean age: 5.7 ± 5.4 years; 53% male and 47% female), diagnostic catheterization was performed in 270 cases (66.8%), while 100 patients (32.7%) underwent interventional procedures. Propofol was used for sedation with an induction dose of 1.5 to 2.5 mg kg^{-1} IV and 125 to 150 mcg kg^{-1} min^{-1} for maintenance with fentanyl as an opioid adjunct (1mcg kg^{-1}). Patients had notably stable hemodynamics throughout the procedure. In regard to periprocedural complications 6 patients faced respiratory or cardiac arrest following desaturation (~70-80%) and had to be converted to general anesthesia, accounting for a complication rate of 1.62%.

Conclusion: Both diagnostic and interventional cardiac catheterization procedures can be performed safely and effectively in pediatric patients under MAC. Monitored anesthesia care has the advantage of shorter procedure time and hospital stay compared to general anesthesia.

OP-48

Abstract Only

Comparison of High Flow Nasal Oxygenization (HFNO) and Nasal Oxygen Therapy in Sedationed Gastrointestinal Endoscopy Colonoscopy Patients

Gulsen Kupelikilinc, Ezgi Erkilic

Ankara Bilkent City Hospital, Anesthesiology and Reanimation Clinic, Ankara, Türkiye

ABSTRACT

Objective: Hypoxemia is one of the most common complications during sedated endoscopy and colonoscopy procedures. The aim of this study was to compare nasal cannula standard oxygenation therapy with high flow nasal oxygenation therapy in terms of hypoxemia and hemodynamics in patients undergoing sedated endoscopy-colonoscopy procedures.

Methods: Following approval from the ethics committee and informed consent from patients, a total of 224 cases classified as ASA (American Society of Anesthesiologists) II-III and scheduled for sedated endoscopy or colonoscopy were included in the study. After patients were taken to the procedure room, a 22-gauge intravenous catheter was inserted on the dorsum of the hand. Monitoring included ECG, pulse oximetry, non-invasive blood pressure cuff, and Bispectral index. In addition to baseline values, recordings were made at 5-minute intervals during the procedure. Patients were randomly divided into 2 groups. Group I patients who received nasal oxygen were preoxygenated with a face mask at an oxygen flow rate of 8 L min^{-1} for three minutes before induction. 5 L min^{-1} oxygen was administered through a nasal cannula during the procedure. Group II patients receiving HFNO were preoxygenated with 100% FiO_2 at 40 L min^{-1} for 3 min before induction. During the procedure, 40 L min^{-1} 50% oxygen was given. Premedication was performed with midazolam and fentanyl 1 min before induction. During induction, lidocaine was administered before propofol to prevent injection pain and 1% propofol was administered afterwards. According to the BIS value of the patients, additional dose of propofol was administered and the total drug dose was recorded. The amount of propofol was adjusted to keep the BIS value between 60-80. Propofol was discontinued or the dose was decreased in patients with BIS score <60. Airway interventions applied to desaturated patients were recorded.

Results: No significant difference was observed between the groups in terms of demographic characteristics, ASA, comorbidities, smoking and alcohol use. SpO_2 values were found to be higher in Group II from admission to 30^{th} minute. There was no difference in pulse rate values between the groups, whereas blood pressure values were higher in Group I. However, although there was no statistically significant difference, more stable blood pressure parameters were observed in Group II. The number of airway interventions was higher in Group I.

Conclusion: We found that the use of HFNO as supplemental oxygen during sedated endoscopy colonoscopy procedures decreased the incidence of hypoxemia, increased oxygenation and reduced airway interventions.

Keywords: Sedation, gastrointestinal endoscopy-colonoscopy, standard oxygen therapy, HFNO

OP-49

Abstract Only

Waardenburg Syndrome and Anesthesia Management

Gizem Nasuhbeyoglu Kayan, Ozer Tuc, Eda Uysal Aydin, Huriye Bilge Tuncer, Ezgi Erkilic

Bilkent City Hospital, Anestesiology and Reanimation Clinic, Ankara, Türkiye

ABSTRACT

Objective: Waardenburg Syndrome (WS) is a rare genetic disorder also known as an auditory-pigmentary syndrome. It is characterized by features such as a white forelock, vitiligo, heterochromia, and sensorineural hearing loss. Patients with WS often require surgical procedures due to associated organ involvement. Difficult airway, accompanying congenital heart diseases, limited neck mobility and limb contractures, as well as electrolyte imbalances, are important considerations in anesthesia management. Here, we aim to report the anesthesia management of a patient with WS undergoing left radical mastoidectomy surgery.

Case Presentation: Informed consent was obtained from the patient for this presentation. A 25-year-old male patient diagnosed with WS was evaluated for left radical mastoidectomy surgery. Physical examination revealed characteristic bright blue irises, broad nasal root, hypoplastic nasal alae, dystopia canthorum, vitiligo, upper extremity contracture, and bilateral sensorineural hearing loss. Laboratory values, electrocardiogram, and chest X-ray were within normal limits. The patient was assessed as Mallampati class II. After all necessary precautions were taken in the operating room, anesthesia induction was initiated. The patient was intubated with an appropriately sized endotracheal tube. The laryngeal view was classified as Cormack-Lehane Grade 2. Total intravenous anesthesia with propofol and remifentanil was administered for maintenance. Bispectral index monitoring was used. The patient was extubated without complications at the end of the surgery and transferred to the ward.

Conclusion: A thorough preoperative evaluation is crucial in patients with WS. Preparation for potential airway, cardiac, and other complications is essential. Special attention must also be paid to positioning, particularly in the presence of spasticity in the limbs and neck.

OP-50

Abstract Only

Comparison of the Effects of Peripheral Nerve Blocks on Pain Control and Mobilization in Total Knee Replacement Surgery: A Progressive Observational Study

Erce Can Uresin, Guldeniz Argun

Dr. Abdurrahman Yurtaslan Oncology Training Research Hospital, Anesthesiology and Reanimation Clinic, Ankara, Türkiye

ABSTRACT

Objective: Acute pain following total knee arthroplasty (TKA) significantly impacts early recovery and mobilization, posing challenges for effective management. Multimodal analgesic approaches are preferred for optimal pain control. Among these methods, peripheral nerve blocks play a crucial role in reducing opioid consumption and improving patient mobilization.

This study aimed to compare the analgesic effectiveness, postoperative opioid consumption, and mobilization effects of routinely applied peripheral nerve blocks (Adductor Canal + IPACK block and Fascia Iliaca Plane Block) in patients undergoing total knee arthroplasty under spinal anesthesia within the first 24 hours.

Methods: After obtaining ethical committee approval, 90 patients who will undergo TKA under spinal anesthesia were included in the study.

Fascia iliaca plane block (Group F) or adductor canal block + IPACK block (Group A) were applied to the patients before the operation. Opioid consumption in the first 24 hours postoperatively, pain levels at 0, 2, 6, 12 and 24 hours, time of first analgesic requirement, mobilization and opioid-related side effects of the two patient groups were compared.

Results: The average opioid consumption was significantly lower in the Group A (22,3 mg) compared to the Group F (28.7 mg, $p<0.001$). The average NRS scores were significantly lower at all time points in the Grup A ($p<0.05$).

According to the mobilization assessment, 75% of patients in the Group A could walk more than 20 meters at 24 hours, compared to 58% in the Group F with the difference being statistically significant ($p=0.0015$). No significant differences were observed between the groups in terms of opioid-related side effects (nausea, vomiting, itching, sedation).

Conclusion: The Adductor Canal + IPACK block provides superior analgesia, significantly reduces opioid consumption, and positively impacts early mobilization compared to the Fascia Iliaca Plane Block. Therefore, the Adductor Canal + IPACK block is recommended for pain management and early mobilization objectives following TKA.

REFERENCES

1. Kandarian B, Indelli PF, Sinha S, Hunter OO, Wang RR, Kim TE, vd. Implementation of the IPACK (Infiltration between the Popliteal Artery and Capsule of the Knee) block into a multimodal analgesic pathway for total knee replacement. Korean J Anesthesiol . 201
2. Kehlet H, Dahl JB. Anaesthesia, surgery, and challenges in postoperative recovery. Lancet 2003;362(9399):1921-8.

OP-51

Abstract Only

Navigating the Airway: Anesthetic Approach to Accidental Denture Ingestion in an Elderly Patient

Yunus Emre Ses, Serife Yuce Oz, Ucman Cimen, Mehmet Kanbur, Ersen Onur Mindiz, Selin Erel

Gazi University Faculty of Medicine, Department of Anesthesiology and Reanimation, Ankara, Türkiye

ABSTRACT

Objective: Although foreign body aspiration in pediatrics occasionally encountered in anesthesia practice, accidental ingestion of dental prostheses is rare in adults and may lead to serious complications. Therefore, timely airway protection and multidisciplinary intervention are essential. This case report presents the anesthetic management of an elderly patient who inadvertently ingested a lower dental prosthesis, with an emphasis on perioperative decision-making and airway security.

Case Presentation: A 65-year-old male with a medical history of hypertension, diabetes mellitus, ischemic cerebrovascular disease, and neurogenic dysphagia was referred from the emergency department after accidental ingestion of his lower palate denture during breakfast. The patient was scheduled for urgent foreign body removal and subsequent upper gastrointestinal (GI) endoscopy. Preoperative evaluation revealed a conscious, cooperative, and oriented patient, with blood pressure 170/80 mmHg, heart rate 101 bpm, and SpO_2 90%. He had consumed solid food approximately 90 minutes prior and was unable to swallow secretions due to proximal esophageal obstruction by the prosthesis (Figure 1). To minimize secretions before induction, 0.25 mg atropine was administered and oral secretions were aspirated. Following preoxygenation with 100% FiO_2, rapid sequence induction was carried out using intravenous lidocaine (70 mg), fentanyl (75 mcg), propofol (150 mg), and rocuronium (70 mg). Videolaryngoscopy revealed the dental prosthesis lodged at the level of the larynx (Figure 2). Airway was secured with a 7.0 mm spiral endotracheal tube. The prosthesis was successfully retrieved by the ENT team (Figure 3). Subsequent upper GI endoscopy showed no esophageal injury (Figure 4). After aspirating remaining secretions, the 40-minute procedure concluded with smooth extubation using 280 mg sugammadex. The patient was transferred to the ward following stable recovery in the post-anesthesia care unit.

Conclusion: This case underscores the importance of early airway management and multidisciplinary coordination in patients with accidental prosthesis ingestion, especially those with predisposing neurological or swallowing disorders. Delayed intervention can result in catastrophic outcomes such as intestinal perforation. Videolaryngoscopy and rapid sequence induction were critical for airway safety and successful foreign body retrieval.

Figure 1. PA chest x-ray showing the ıngested dental prosthesis.

Figure 2. Videolaryngoscopic View of ıntubation and denture.

Figure 3. Dental prosthesis.

Figure 4. Upper GI endoscopy after denture removal.

OP-52

Abstract Only

Investigation of Factors Affecting the Development of Renal Failure in Pediatric Patients Undergoing Cardiovascular Surgery

Yusuf Celik, Murat Izgi

Hacettepe University Faculty of Medicine, Department of Anesthesiology and Reanimation, Ankara, Türkiye

ABSTRACT

Objective: Cardiac surgeries performed in children are procedures that highly likely require blood transfusion. Infants and children who have undergone cardiac surgery are at risk of developing cardiac surgery-associated acute kidney injury (1). The likelihood of developing complications such as kidney failure, pneumonia, heart failure, prolonged hospital stay, and increased mechanical ventilation duration is higher due to blood transfusion (2). There is no effective prevention for acute kidney injury (AKI) following cardiac surgery, nor is there an effective treatment if AKI occurs. Therefore, identifying modifiable risk factors that contribute to AKI development is crucial. In this study, we aimed to examine the risk level of renal damage associated with the volume of blood transfusion, which is one of the modifiable risk factors for AKI in pediatric patients undergoing cardiac surgery.

Methods: After obtaining ethical committee approval, 205 pediatric patients who underwent cardiac surgery with cardiopulmonary bypass in our hospital between January 2013 and September 2023 and met the study criteria were included. In addition to the patients' baseline demographic and clinical data, intraoperative agents used, anesthesia duration, aortic cross-clamp time, pump time, blood product usage and quantity, fluid intake and output, and postoperative creatinine levels during the first two days were retrospectively analyzed.

Results: Among the included patients, 111 (55.6%) were male, and 94 (44.4%) were female. The average age of the patients was 2.78±3.53 years. The incidence of postoperative AKI was found to be 34.6% (71 patients). The postoperative AKI development rate was 81.7% in patients who received erythrocyte suspension transfusion, while it was 56.7% in those who did not. It was determined that the presence of comorbid disease, vasopressor administration and erythrocyte transfusion were independent risk factors for the development of postoperative AKI.

Conclusion: Our study demonstrated that postoperative AKI significantly affects mortality. It was found that intraoperative erythrocyte suspension transfusion and the amount of transfusion increased the risk of AKI development. We believe that modifications can be made to reduce the risk of AKI following cardiopulmonary bypass. Patients can be assessed for AKI risk factors in the preoperative period, and preventive measures can be taken, while intraoperative risk factors contributing to AKI can be avoided.

Keywords: Acute kidney injury, cardiopulmonary bypass, erythrocyte suspension

REFERENCES

1. Park SK, Hur M, Kim E, Kim WH, Park JB, Kim Y, et al. Risk Factors for Acute Kidney Injury after Congenital Cardiac Surgery in Infants and Children: A Retrospective Observational Study. PLoS One. 2016 11(11):e0166328.
2. Duan ZX, Chen DX, Yang BZ, Zhang XQ. Transfusion Strategies for Pediatric Cardiac Surgery: A Meta-Analysis and Trial Sequential Analysis. Pediatr Cardiol. 2021 42(6):1241-51.

OP-53

Abstract Only

Abdominal Botulinum Toxin Application in Incisional Hernia Repair: A Case Series of Five Patients

Fethi Gultop, Can Ozan Yazar

Etlik City Hospital, Anesthesiology and Reanimation Clinic, Ankara, Türkiye

ABSTRACT

Objective: Repairing large ventral hernias poses a significant technical challenge due to muscle retraction and contracture, which can lead to complications such as abdominal compartment syndrome and hernia recurrence. Botulinum toxin type A (BTA) facilitates fascial closure by inducing temporary paralysis and relaxation of the abdominal wall muscles. In this case series, five patients with incisional hernias received preoperative ultrasound-guided BTA injections. Surgical repair was successfully completed six weeks later, and no complications or recurrences were observed during one-year follow-up. This study aims to demonstrate that BTA injections can be safely performed by anesthesiologists.

Case Presentation: Five patients scheduled for elective surgical repair of incisional hernias were included. Each had a history of previous abdominal surgeries—such as perforated appendicitis, colorectal cancer, or diverticulitis—leading to recurrent incisional hernias. Preoperatively, 200 units of botulinum toxin were diluted in 40 mL of normal saline. The area between the subcostal margin and iliac crest was divided into three equal segments. Under ultrasound guidance, 2 mL (10 units) of the solution was injected into each of the three abdominal wall muscles—internal oblique, external oblique, and transversus abdominis muscles—at each segment bilaterally, totaling 180 units per patient. All patients tolerated the procedure well, were discharged without complications, and underwent successful hernia repair six weeks post-injection.

Conclusion: Botulinum toxin type A injection is a minimally invasive adjunct that enhances fascial closure and improves surgical outcomes, particularly in large hernias. Our findings align with existing literature supporting its effectiveness and safety. A moderate dose (180 units) was preferred to minimize patient discomfort and cost. Unlike higher-volume dilution methods, we used 40 mL of saline to reduce injection-related pain. Botulinum toxin type A's effect emerges within 10 to 28 days, allowing muscle elongation and tension-free closure. Side effects were minimal, with only mild coughing in two cases. BTX is contraindicated in patients with neuromuscular disorders. With ultrasound proficiency, anesthesiologists can safely perform this procedure. Further controlled studies are warranted to optimize dosing and technique.

OP-54

Abstract Only

The Interscalene Nerve Block as a Choice for Intraoperative Anesthesia for an Awake Patient During Shoulder Surgery: A Case Report

Silvana Kraleve[1], Tatiana Trjikj[1,2], Nenad Petkov[3], Iskra Meskhova Shahpazov[1], Natasha Lambevska Nestorovski[1]

[1]City General Hospital "8th September", Department of Anesthesiology and Intensive Care, Skopje
[2]Goce Delcev University, Faculty of Medical Sciences, Stip, North Macedonia
[3]City General Hospital "8th September", Department of Orthopedic Surgery and Traumatology, Skopje

ABSTRACT

Objective: Peripheral nerve blocks have an important role as an anesthetic technique in shoulder surgery combined with beach-chair position, especially in elderly patients. The beach chair position in an awake patient is with a lower risk of hypotension, cerebral desaturation and occurrence of postoperative delirium and cognitive dysfunction.

Case Presentation: Our 76-year-old female patient was admitted in our hospital with arthrosis of the right shoulder, planned for shoulder arthroplasty. A year ago, she had surgery on her left shoulder joint under general anesthesia, but after that, she developed cognitive impairment that lasted for several months, so she refused general anesthesia categorically.

Before the surgery, we did the carotid Doppler test, it showed normal values. CT of the brain showed global cortical reductive changes and consequential dilation of the ventricles. She had hypertension covered with medications. All laboratory tests were normal.

Surgery was performed in a beach-chair position with an interscalene block and mild sedation with midazolam and fentanyl. Local anesthetic Bupivacaine 0,5% 10ml was given. NIRS monitor was used on the both cerebral hemispheres. A facial oxygen mask was put on the patient. The surgery lasted 3 hours. The basal value of cerebral oxygenation (rSO_2) was 45% on both hemispheres, significantly lower than normal values (>55%). BP was 170/95mmHg, HR 60/min, SpO_2 without oxygen was 96%, with oxygenation it increased to 98%. After placing the patient in a sitting position and mild sedation with midazolam and fentanyl, the cerebral oxygenation increased to normal values (max to 88% on the left, 75% on the right side). Vital signs were stable, and no complaints of pain or discomfort. After surgery, the patient was sent to the ward in good condition.

Conclusion: The beach-chair position in shoulder surgery under general anesthesia is associated with orthostatic hypotension and decrease in cerebral saturation, especially in the older patients with a lot of comorbidities. Interscalene block as a sole technique for intraoperative anesthesia in combination with NIRS monitoring are good choice for shoulder surgery in beach-chair position, especially in elderly patients at risk to develop postoperative delirium and cognitive dysfunction.

OP-55

Abstract Only

The Management of Anticipated Difficult Airway in a Patient with an Acute Abdominal Pain: A Case Report

Silvana Kraleva[1], Tatjana Trojikj[1,2], Gordana Bozinovska Beaka[1,2], Biljana Shirgoska[3], Lihnida Matevska[1]

[1]City General Hospital "8th September", Department of Anesthesiology and Intensive Care, Skopje
[2]Goce Delcev University, Faculty of Medical Sciences, Stip, North Macedonia
[3]ENT University Clinic, Department of Anesthesiology, Skopje

ABSTRACT

Objective: Management of a difficult airway is one of the most relevant issues for practicing anesthesiologists, since airway loss in an unconscious patient can lead to brain damage or even death. The incidence of difficult tracheal intubation ranges from 5 to 8%, and failed tracheal intubation from 0.05 to 0.35%. There are many causes for difficult airway, but in our case it was an anatomical problem because our patient had an enlarged thyroid gland – struma nodosa permagna.

Case Presentation: A 76 year-old female patient was admitted in our hospital with severe abdominal pain and pneumoperitoneum, and she needed emergency surgery. She was obese, with short neck and limited neck extension. Her struma was the size of a small child's head, dominantly in front and right side of the neck. She had her struma almost 20 years, with mild difficulty swallowing and breathing. She had a thyroid status done in the past, it was in normal ranges. ENT surgeon on duty did an airway inspection and suggested difficult, even impossible intubation. Mallampati score was 2/3.

So, in the operation room we prepared for difficult intubation: a video-laryngoscope, ET tube number 6, 6.5 and 7, stylet, bougie and a supraglottic airway (laryngeal mask). The ENT surgeon with flexible fiberoptic bronchoscope was behind us. Our plan was to start with 3 minutes preoxygenation, sedation with anesthetic without muscule relaxant and intubation with video-laryngoscope. After preoxygenation, propofol was given intravenously in small doses. After the patient fell asleep, she underwent intubation with the video-laryngoscope. Surprisingly, the visibility of the upper airway and epiglottis with vocal cords was excellent, all structures were recognizable. The patient was intubated with endotracheal tube number 6.5. The ventilation was quite satisfactory, and vital signs were stable all the time.

Conclusion: Airway management remains one of the prime skills of any anaesthesia provider and directly affects patient safety in the surgical or ICU setting. During the last decades, anaesthesia has become increasingly safe, with a practice based on clear guidelines and protocols. In expected difficult airway, good management and preparation for it is essential.

OP-56

Abstract Only

Intrathecal Clonidine Versus Fentanyl Adjuvant for Spinal Anesthesia Cesarean Section Baby Delivery

Churlinov K, Janeva K, Organdziski S, Organdziska V.

Special Hospital for Gynecology & Obstetrics "D-r Organdziski", Stip, Republic of North Macedonia

ABSTRACT

Objective: Fentanyl and clonidine both prolong sensory and motor block and duration of postoperative analgesia when used as an adjuvant with bupivacaine. We found that 50 µcgr of intrathecal clonidine is sufficient to achieve adequate analgesia along with hemodynamic stability in parturients. Revealing effects of adjuvants in co-administration with bupivacaine during spinal anesthesia. Duration, height of the block, and quality of the same. Hemodynamic status, per and postoperative outcomes. Monitoring of gas status and Apgar score in newborns

Methods: A prospective randomized study was carried out among two groups of 50 patients. Spinal anesthesia was administered to all. Patients were given 2.0 ml of isobaric bupivacaine 0.5% with either 50 µcgr of clonidine, or 20 µcgr of fentanyl, intrathecal, respectively. Complete hemodynamic monitoring was performed. Duration of analgesia, onset, peak duration of sensory and motor blockade, VAS and Bromage scale. The severity of pain score and analgesic requirements were recorded in the postoperative period. Postoperative incidence of the common side effects. Use of drugs with side effects treatment.

Results: Demographic profile of parturients, duration of caesarean section. The systolic arterial pressure ratio was 12 ± 7%, with measurement of the diastolic ones. Parturients in the clonidine adjuvant group (I) were more drowsy than those in fentanyl one (II). Duration of anesthesia was 185 ± 18 minutes in group II, 210 ± 34 min in group I. The postoperative analgesia was better in group I, with significant delay in the first request for analgesia and lower VAS and Bromage scores, higher level of sedation and drowsiness. Comparable Apgar score in both groups - no deleterious effect on neonates. Lower incidence of postoperative common side effects in group I as compared with group II. In both groups, hypotension was mild to moderate and didn't affect maternal and neonatal outcome.

Conclusion: Intrathecal clonidine improves the duration and quality of spinal anesthesia, longer duration of postoperative analgesia, without significant side effects. Clonidine is a safe adjuvant to improve spinal anesthesia for cesarean section and also augments postoperative anesthesia. Clonidine causes more perioperative sedation and extended time to motor block recovery

Keywords: Intrathecal clonidine/fentanyl, spinal anesthesia, parturient, cesarean section

OP-57

Abstract Only

The Role of Emergency Medical Services in Mass Casualties

Kiprijanovska B[2], Petrusheva Panovska A[1,2], Demjanski V[1,2], Trposka A[2], Elenova Josheva B[3], Stanoevska M[2]

[1]Medical Faculty,"Ss. Cyril and Methodius" University, Skopje, Republic of North Macedonia
[2]University Clinic for TOARILUC, Skopje, Republic of North Macedonia
[3]General Hospital Kavadarci, Republic of North Macedonia

ABSTRACT

Objective: In less than a decade in the Republic of North Macedonia (RNM), over 155 people have died in mass accidents. The most recent was in the city of Kocani, when 59 young people lost their lives, and hundreds were injured in a fire in a disco. Emergency Medical Services (EMS) are the primary healthcare providers at the scene of significant and mass casualties. This study describes and assesses the role of EMS concerning the national crisis management system and other key stakeholders involved in managing major and mass disasters in our country.

Methods: We undertook a comprehensive qualitative study on the nationwide EMS. We ensured a robust understanding of the current landscape by gathering firsthand data from EMS providers, the Ministry of Health, and the Crisis Management Center.

Conclusion: Our country has 33 Emergency Medical Services. The latest government decree, adopted in 2016, specified the minimum number of teams EMS should have based on the number of residents in the area they cover. Medical team members—previously educated and certified physicians—conduct triage, perform life-saving interventions, and transport the injured from the accident scene to a health facility for further treatment if necessary. The dispatch center coordinates ambulance services, responds to medical requests, and provides on-site care and transportation to healthcare facilities. Since February 2022, the emergency call line 112 has been operating in our country, ensuring the accessibility of emergency services. Collaboration with organizations such as police and fire departments enhances emergency response capabilities. After establishing the safety and security of the scene, EMS teams can efficiently triage, treat, and transport individuals in need, maximizing safety and care during emergencies. In mass accidents, the gap between injuries and available healthcare workers is significant. As a small country, the Republic of North Macedonia must rely on the collaboration of all relevant health organizations, a coordinated approach, and cooperation between states to effectively manage mass accidents and reduce morbidity and mortality. Strengthening our EMS is vital for developing an effective healthcare system and responding to mass-casualty events.

Keywords: Crisis management system, emergency medical services, mass casualties

OP-58

Abstract Only

Early Management of Burns Injuries in Mass Incidents

Tatjana Trojikj[1,2], Silvana Kraleva[2], Natasa Lambevska Nestorovski[2], Nagjenovska Emilija[2]

[1]Goce Delcev Universit, Faculty of Medical Sciences, Stip, North Macedonia
[2]City Hospital 8th September, Skopje, North Macedonia

ABSTRACT

Objective: Massive injuries are challenge for management in any hospital. Calculating the total body surface area (TBSA), taking are adequate care od inhalation injury and early resuscitation are very important for surviving the patients. Aim of this study is to show treatment strategies in massive burn injuries and emphasize the predictive factors who are important for survival of the patients.

Methods: On 16th March in a discotheque in small town there was fire in a night club. Thirty-four people were admitted to our hospital, 8 were intubated at the moment of their admission. All of them were conscious but there were signs of inhalation and burn injuries of respiratory tract. The next day 5 more patients were intubated because of worsening of the situations. All patients were given fluids according to Parkland's formula. All the patients who were intubated had a central venous catheter and a urinary catheter. We sedated them and gave them opioid analgesia. All the patients were examined by ophthalmologists and otorhinolaryngologists. In two patients were found cornea injuries and in all intubated patients were found injuries of upper respiratory tract and in five of not intubated patients were found inflammation of upper respiratory tract. Those who had inhalator injuries were given antibiotics. Patients who were showing the signs of worsening the medical conditions were transferred in other hospitals in foreign countries.

Results: All patients were cardiovascular stable on the day of the admission. In three patients, inotropic drugs were administered on the second day after injury. They all had good urinary output. In five patients there were signs of respiratory changes on x ray images on the second day. Gas analysis were taken on regular basis and patients were treated according to the changes in Acid base status and gas analysis in five patients that were not intubated we included inhalators as supportive therapy. All the patients had early surgical debridements.

Conclusion: Early treatment of patients with burn injuries is essential for survival and avoiding complications. A multidisciplinary approach to the treatment of burn patients is essential.

OP-59

Abstract Only

Why is the Patient Constantly Bleeding: Case Report

Marjana Burmuzoska[1], Ivica Kocevski[2], Vesna Durnev[1], Biljana Kuzmanovska[1], Aleksandra Gavrilovska Brzanov[1]

[1]University Clinic of Anesthesiology, Reanimation and Critical Care, Skopje, North Macedonia
[2]University Clinic of Neurosurgery, Skopje, North Macedonia

ABSTRACT

Objective: Factor XIII (FXIII) deficiency is a rare cause leading to recurrent bleeding and it can be either inherited or acquired. Factor XIII level is not routinely tested and it is underdiagnosed, but deficit can be a reason for moderate to severe bleeding complications. Severe neurological impairment or even death are consequences of neurosurgical postoperative hematomas.

Case Presentation: A 63 years old female patient presented in our hospital in comatose condition due to subdural hematoma formation, without any trauma as a reason but intensive caught lasting almost a month. All necessary investigations were conducted and she was operated the same day. Soon after surgery she was extubated with good level of consciousness. On day 5 due to worsening and rebleeding on brain CT scan, she was operated again. Few days after the revision she had an epistaxis and later on a upper gastrointestinal bleeding was confirmed. She received tranexamic acid, fresh frozen plasma, cryoprecipitate and erythrocyte concentrates. After the third consecutive bleeding an extensive coagulation analysis excluded vWD, FVIII and FIX deficit and she continued to receive transfusions of blood products. Due to positive bleeding history of prolonged menstrual bleeding given by her relatives, a FXIII level was tested and the result 24% confirmed the diagnosis. Sadly her condition continued to deteriorate and she passed away after one month of intensive care.

Conclusion: Factor XIII deficit as a condition is leading to instability of fibrin clots resulting from abnormal cross-linking between fibrin monomers, resulting in enhanced fibrinolytic degradation. The hallmark of FXIII deficit is delayed presentation of spontaneous bleeding on various anatomical sites, leading to increased morbidity and mortality. Positive bleeding history (questionnaire) should be a reason for extending coagulation testing and quantitatively confirming the deficit. Due to it's longer half life of about 11-14 days, it is recommended to correct the level once monthly as a prophylaxis or before intervention so a level of 70% be achieved. The recommended dose is 10-20 IU kg^{-1} of FXIII concentrate or if unavailable cryoprecipitate 1-3 U per 10 kg or fresh frozen plasma.

OP-60

Abstract Only

Severe Tricuspid Regurgitation in a Patient Undergoing Mastectomy

Magdalena Mitreska Pulcheska, Simon Lokoski, Dimitar Arnaudov

General Hospital, Ohrid, N. Macedonia

ABSTRACT

Objective: Severe tricuspid regurgitation (TR) presents significant challenges in perioperative management, particularly in patients undergoing non-cardiac surgery. Tricuspid regurgitation is most associated with end-stage aortic or mitral valve disease, where mitral stenosis and elevated pulmonary artery pressure can lead to right ventricular strain, progressing to right ventricular failure. Isolated TR, though less common, can occur in patients with intravenous drug use, infective endocarditis, or chest trauma. This case highlights anesthetic and perioperative considerations in a patient with severe TR undergoing mastectomy.

Case Presentation: A 76-year-old man with hypertension, atrial fibrillation, chronic kidney disease, and severe TR was scheduled for right-sided mastectomy for breast cancer. Preoperative echocardiography revealed severe TR with right atrial and RV dilation and preserved ejection fraction (50%). Due to the potential for perioperative hemodynamic instability, a multidisciplinary team—including anesthesiologists, cardiologists, and surgeons— collaborated on a comprehensive management strategy. General anesthesia with invasive hemodynamic monitoring was selected, including central venous pressure measurement. Preoperative optimization focused on fluid balance and reduction of right heart strain.

Premedication included midazolam (1 mg) and famotidine (20 mg). Induction was achieved with fentanyl (50 mcg), propofol (100 mg), and rocuronium (40 mg), followed by endotracheal intubation. A transient post-induction hypotension (80/50 mmHg) was managed with dobutamine infusion (5 mcg/kg/min). Anesthesia was maintained with oxygen, sevoflurane, and remifentanil. Mechanical ventilation targeted an end-tidal CO_2 of 23–26 mmHg to reduce pulmonary vascular resistance. Heart rate was kept between 80–100 bpm to minimize TR, and systemic vascular resistance was maintained to avoid hypotension. Ceftriaxone (2 g IV) was administered for endocarditis prophylaxis. Surgery proceeded without complications. The patient was extubated successfully, remained hemodynamically stable postoperatively, and was discharged on day three with anesthesiology follow-up.

Conclusion: Non-cardiac surgery in patients with severe TR requires meticulous planning to prevent hemodynamic instability. Preoperative optimization, intraoperative monitoring, and individualized anesthetic strategies—developed through multidisciplinary collaboration—are key to achieving safe outcomes.

Keywords: Tricuspid regurgitation, mastectomy, general anesthesia, perioperative management, right heart failure

OP-61

Abstract Only

The Toxic Megacolon, an Uncommon Presentation of one Undiagnostic Morbus Hirschsprung

Etemi R, Kostovski I, Sulejmani L, Dimcevski D

Clinic for Anesthesia, Resuscitation and Intensive Care, Skopje, Macedonia

ABSTRACT

Objective: Toxic megacolon is a serious complication of inflammatory bowel disease.

Case Presentation: Fourteen year old patient admitted in the digestive surgery clinic with abdominal distension, pain, swelling above the level of the chest, difficulty in breathing, tachypnea and hypertension. The surgical treatment was indicated immediately. After rapid sequence induction, remifentanil has been choised as opioid for maintaining the anesthesia during the intervention the hemodynamic of patient get improved TA 130 70 mmHg, heart rate over 100-110 min^{-1}.

Operation treatment: Laparatomia mediana eplorativa. Colectomia totalis cum ileostoma unipolaris, lavage, drainage. After intervention patient was sent at intensive care unit (ICU) with stable hemodynamic, slow awaking and supervision! The next day patient was transfered to the surgery digestive clinic.

Conclusion: Toxic megacolon is a life treathening complication, rapid sequence induction should be applied to prevent vomiting and aspiration during induction.

Keywords: Toxic megacolon, abdominal distension, remifentanil, colectomia totalis

OP-62
Full Manuscript

Perioperative Management of Complications in Anesthesia

Dardan Ibrahimi, Redjep Etemi Sopaj

Mother Theresa, Clinic for Anesthesia, Resuscitation and Intensive Care, Skopje, North Macedonia

ABSTRACT

The perioperative period is a critical phase in the course of surgical procedures, during which complications related to anesthesia can have a profound impact on patient outcomes. Anesthetic complications may arise at any point—from induction to recovery—and can vary significantly in severity, ranging from mild and self-limiting to acute, life-threatening emergencies that demand immediate recognition and intervention.

This paper explores the most frequently encountered complications in anesthesiology practice, including hypotension, cardiac arrhythmias, hypoxia, bronchospasm, aspiration of gastric contents, allergic reactions, and malignant hyperthermia. Each of these conditions poses unique challenges to the anesthesiologist and the surgical team. The underlying etiologies, pathophysiological mechanisms, clinical presentations, and evidence-based strategies for rapid and effective management are examined in detail. Understanding the causes and risk factors for these complications is essential for improving perioperative safety.

Hypotension, for instance, may result from anesthetic-induced vasodilation or hypovolemia, while arrhythmias can be triggered by electrolyte imbalances, hypoxia, or certain medications. Bronchospasm and allergic reactions, especially in patients with a history of respiratory or atopic conditions, can rapidly progress to critical airway obstruction if not treated promptly. Malignant hyperthermia, a rare but fatal genetic condition, necessitates early recognition and immediate treatment with dantrolene to prevent severe metabolic consequences.

Prevention, early detection, and prompt, targeted therapy are vital for minimizing perioperative morbidity and mortality. Continuous monitoring of vital signs—including blood pressure, heart rate, oxygen saturation, capnography, and temperature—is essential throughout anesthesia administration. In addition, adopting a patient-centered approach by tailoring anesthetic plans according to individual risk factors can further enhance safety. The integration of emergency response protocols, clinical checklists, and up-to-date algorithms ensures a systematic approach to critical situations.

Modern anesthesiology emphasizes not only pharmacological and technical expertise but also anticipatory planning, teamwork, and readiness to respond to complications. By staying vigilant and applying current clinical guidelines, anesthesiologists can significantly reduce the likelihood of adverse events and ensure safer outcomes for surgical patients.

By staying vigilant and applying current clinical guidelines, anesthesiologists can significantly reduce the likelihood of adverse events and ensure safer outcomes for surgical patients.

Keywords: Perioperative management, complications, emergencies, safety patients

INTRODUCTION

Anesthesiology is a distinct medical specialty that encompasses a complex set of practices aimed at ensuring the safe and painless execution of surgical, diagnostic, and therapeutic procedures. Like any medical intervention, it carries inherent risks and the potential for complications.

The core responsibilities in anesthetic care span the **preoperative, perioperative, and postoperative** periods:

1. Preoperative evaluation is a key aspect of anesthetic management, designed to identify potential risks and minimize complications during and after anesthesia. According to Gerlach and Sweitzer, a comprehensive assessment includes:

- A detailed medical history and physical examination
- Laboratory testing and cardiopulmonary evaluation
- Risk stratification using the ASA classification
- Review of current medications and potential interactions with anesthetics

2. The **perioperative period** encompassing the time before, during, and immediately after anesthesia is particularly critical for patient safety. Complications during this phase may be triggered by various factors, including individual patient characteristics, the type of surgical procedure, the anesthetic agents used, and the patient's overall health status. Key principles of perioperative management include:

- Continuous monitoring of hemodynamic parameters (blood pressure, heart rate, oxygen saturation, capnography)

- Prompt recognition and response to complications such as hypotension, arrhythmias, bronchospasm, or allergic reactions
- Optimization of anesthetic techniques based on individual patient characteristics
- Adequate analgesia and balanced sedation

Managing perioperative complications requires rapid identification, timely treatment, and a multidisciplinary approach to improve patient outcomes.

3. The **postoperative period** is critical for detecting and managing potential complications, including:

- **Respiratory issues** – postoperative respiratory depression, hypoxia, aspiration pneumonia
- **Hemodynamic disturbances** – postoperative hypotension, tachycardia, arrhythmias
- **Pain management** – individualized approaches for postoperative analgesia
- **Nausea and vomiting** – administration of appropriate antiemetic therapy
- **Cognitive disorders** – assessment and management of postoperative cognitive dysfunction, particularly in elderly patients.

AIM of the PAPER

Anesthesia is a fundamental component of modern surgical and therapeutic practice, facilitating painless and safe medical procedures. Despite advancements in techniques, equipment, and pharmacologic agents, perioperative complications remain a significant challenge for anesthesiologists and healthcare teams. Timely recognition and appropriate management of these complications are essential for minimizing morbidity and mortality.

This paper aims to:

- Analyze common perioperative complications associated with anesthesia
- Explore their etiological factors and underlying mechanisms
- Present effective prevention and treatment strategies

The paper provides a comprehensive overview of:

- The most frequent and serious complications (e.g., respiratory and cardiovascular events, allergic reactions, malignant hyperthermia, and postoperative cognitive dysfunction)
- Pathophysiological mechanisms for improved prevention and management
- Patient-related risk factors (e.g., age, comorbidities, allergies, previous anesthesia reactions), surgical factors, and anesthetic techniques
- Modern monitoring methods and prediction tools, including both non-invasive and invasive techniques and rapid-response algorithms
- Clinical approaches to complication management, including emergency protocols, pharmacologic and non-pharmacologic interventions, and the importance of multidisciplinary collaboration
- Postoperative monitoring strategies to minimize both short- and long-term consequences of anesthesia

MATERIAL and METHODS

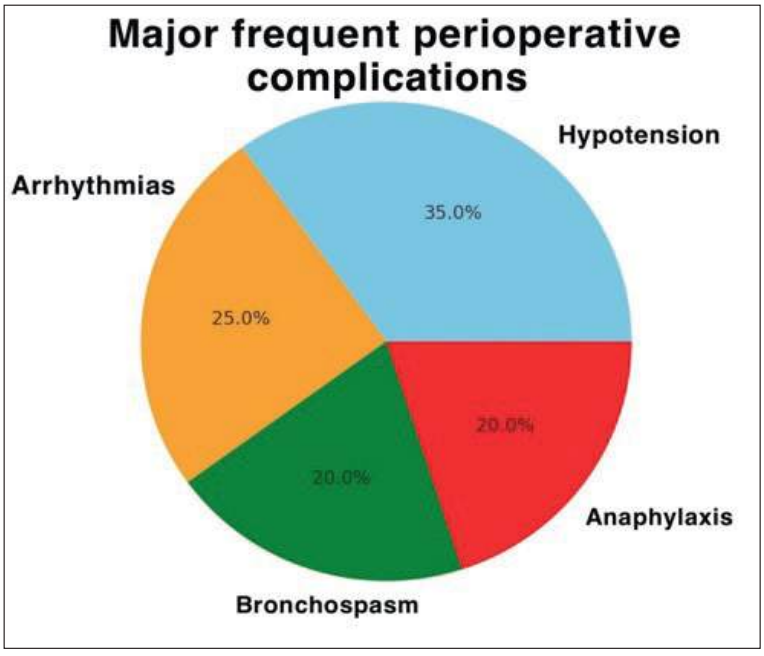
The study utilized the following methods:

- **Retrospective analysis** of medical records from patients who underwent anesthesia for surgical procedures in recent years
- Identification of common complications and their triggers based on chart reviews
- **Risk assessment** using the ASA Physical Status Classification (I–V), with an analysis of how ASA status influenced complication rates
- **Surveys and interviews** with anesthesiologists and surgeons to gather expert opinions and experiences in managing perioperative complications

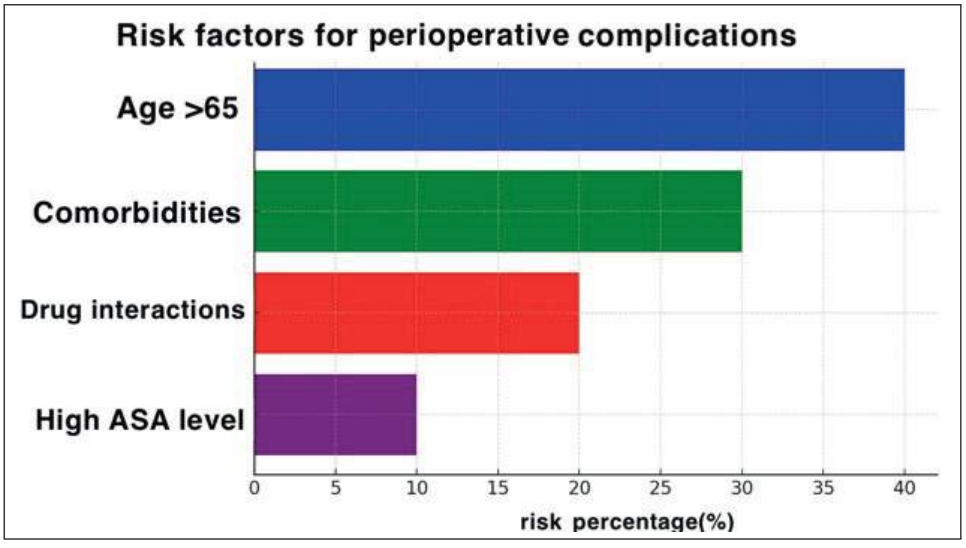
- **Clinical monitoring** of high-risk patients using both non-invasive and invasive techniques
- **Review of current literature** and guidelines from leading anesthesiology associations to support and improve clinical practice

RESULTS

- **Most frequent perioperative complications**: hypotension, arrhythmias, bronchospasm, and anaphylaxis
- **Major risk factors**: advanced age, comorbidities, drug interactions
- **Impact of preoperative evaluation**: significantly reduces complication risk
- **Importance of continuous monitoring and rapid intervention**: leads to improved patient outcomes



A **pie chart** illustrates the distribution of common perioperative complications.



A **bar chart** displays the prevalence of key risk factors for these complications

CONCLUSION

Perioperative complications in anesthesia remain a critical factor influencing surgical outcomes. This study identified hypotension, arrhythmias, bronchospasm, and anaphylaxis as the most frequent complications, especially in patients with higher ASA classifications. Patients classified as ASA III and IV were found to be at significantly increased risk of severe adverse events, emphasizing the necessity of thorough preoperative assessment and optimization.

Preoperative evaluation emerged as a cornerstone in complication prevention. Early identification of high-risk patients allows for targeted interventions and customized anesthetic plans. The use of modern monitoring tools such as invasive arterial pressure monitoring and ca

Capnography ensures real-time evaluation of vital parameters, further improving patient safety.

REFERENCES

1. American Society of Anesthesiologists. (2023). ASA Physical Status Classification System. Retrieved from www.asahq.org
2. Miller, R. D., & Eriksson, L. I. (2020). Miller's Anesthesia (9th ed.). lsevier.
3. Barash, P. G., Cullen, B. F., & Stoelting, R. K. (2017). Clinical Anesthesia (8th ed.). Wolters Kluwer.
4. Apfelbaum, J. L., Hagberg, C. A., & Kaplan, R. A. (2019). Airway management in the perioperative period. Anesthesiology, 130(3), 482–502.
5. Fleisher, L. A. (2021). Preoperative evaluation and risk assessment. New England Journal of Medicine, 385(17), 1607–1617.
6. Smith, I., Kranke, P., & Murat, I. (2018). Perioperative considerations for patients undergoing general anesthesia. British Journal Anaesthesia, 120(4), 701–716.

OP-66

Abstract Only

How We Survived Post-COVID Burnout?

Belma Kadic, Amela Muftic, Enida Halvadzic, Edna Curevac, Elma Becic, Sadija Lusija

University Clinical Center, Clinic for Anesthesiology and Reanimation, Sarajevo

ABSTRACT

During the COVID-19 pandemic healthcare workers were challenged more than ever by stressful and emotional situations, they were exposed to numerous human suffering and death, also there were unique pressures from relationships with the patient, family members, and employers. Healthcare workers worked with ongoing risk for hazardous exposures and the risk of injuries such as from patient handling. Also hard physical work and long and often unpredictably scheduled hours of work were demanded. Due to increased workloads, short staffing and shortages in critical personal protective equipment, many healthcare workers felt anxiety, fatigue, strain, stress and the risk of personal harm.

Due to a rapid rate of transmission of coronavirus (COVID-19) in March 2020, it was labelled by the World Health Organization and reported as a pandemic. In University Clinical Center Sarajevo there was an increased number of hospitalizations, summed up 927 patients with confirmed COVID-19., from July of 2020 until July 2021. The peak of hospitalized patients was in March and April of 2020 with 60 to 70 cases per day. The average number of days from the onset of the disease was 10. Corona virus was specific with its tendency to affect the respiratory system, and the admitted patients had an average saturation 71% on the first day of hospitalization. From the 927 admitted patients, most of patients 321 (34,6%) were in age group 65-74.

In very short period there was a great pressure with COVID-19 pandemic despite all other obligations that healthcare workers had to respond to. These have repercussions not only for healthcare workers on mental health but also on their families, coworkers, quality of care, patient safety and workforce retention and engagement.

Keywords: Covid, burnout, ICU, healthcare workers, mental health, occupational health, pandemic

OP-9

Abstract Only

Anesthesia Management in Critically Patient in Digital Subtraction Angiography: Erector Spinae Plane Block

Seyyid Furkan Kına

Etlik City Hospital, Anesthesiology and Reanimation Clinic, Ankara, Türkiye

ABSTRACT

Objective: Percutaneous nephrostomy (PN) can be applied permanently or temporarily in the treatment of hydronephrosis. Visceral and somatic pain due to PN can cause anxiety in critically ill patients and impair vital parameters (1). Erector spinae plane block (ESPB) can be applied to prevent pain due to hydronephrosis and PN (2). In this case, we present the anesthesia management with ESPB in Digital Subtraction Angiography (DSA) in a patient with low-limited functional capacity.

Case Presentation: 66-year-old male patient; ASA3 due to epilepsy, larynx cancer, laryngectomy, left nephrectomy, thyroidectomy, tracheostomy (Figure 1), metastatic bladder cancer, bilateral pulmonary effusion, hemodialysis. The patient who was followed up in spontaneous respiration in tracheostomy in intensive care was planned to have PN in DSA due to right hydronephrosis (Figure 2). Hemoglobin: 7.2, creatinine: 5.92, TSH: 7.35, the patient was dyspneic (8L oxygen with SpO2: 88), tachycardic (pulse: 126 beats/min), orientation and cooperation were limited. Different sizes of tracheostomy cannula, endotracheal tube, video laryngoscope were prepared for the patient whose vital parameters were borderline. ESPB decision was made for the patient considering the side effects of inhalation, intravenous anesthetics and opioids. Ultrasound-guided ESPB (14 mL 0.5% bupivacaine + 6 ml 2% lidocaine) was applied at the T10 level in the left lateral decubitus position (Figure 3). After ESPB, it was observed that the patient's tachycardia and dyspnea regressed (4L oxygen with SpO2: 94, pulse: 93 beats/min). EtCO2 was monitored with a capnography. The 28 minute surgery, in which intravenous and inhalational anesthetics were not used, was completed without any complications.

Conclusion: ESPB can be applied in various surgeries such as nephrolithotomy, nephrectomy and abdominal surgery (3). Erector spinae plane block for isolated nephrostomy has not been reported in the literature before, and it offers effective anesthesia and analgesia for nephrostomy in DSA. ESPB reduces morbidity and mortality in critically ill patients considering the undesirable side effects of general anesthesia and opioids (4). Erector spinae plane block is a safe and effective nerve block and we support its use in nephrostomy and non-operating room anesthesia.

Keywords: Erector spinae plane block, Non-operating room anesthesia (NORA), nephrostomy, opioid-free anesthesia, digital subtraction angiography

REFERENCES

1. Fernández-Cacho LM, Ayesa-Arriola R. Quality of life, pain and anxiety in patients with nephrostomy tubes. Rev Lat Am Enfermagem 2019;27:e3191.
2. Abdelgalil AS, Ahmed AM, Gamal RM, Elshal MM, Bakeer AH, Shaker EH. Ultrasound Guided Continuous Erector Spinae Plane Block versus Patient Controlled Analgesia in Open Nephrectomy for Renal Malignancies: A Randomized Controlled Study. J Pain Res 2022;15:3093-102.
3. De Cassai A, Bonvicini D, Correale C, Sandei L, Tulgar S, Tonetti T. Erector spinae plane block: a systematic qualitative review. Minerva Anestesiol 2019;85(3):308-19.
4. Luis-Navarro JC, Fornés-Rumbao C, DeLaCalle-Gil AB, Forero M. Multimodal Anesthesia via Opioid-Free Analgesia and Erector Spinae Plane Block. Case Rep Anesthesiol 2020;2020:6062935.

Figure 1. Tracheostomy image of the patient.

Figure 2. Ultrasonographic image of right hydronephrosis.

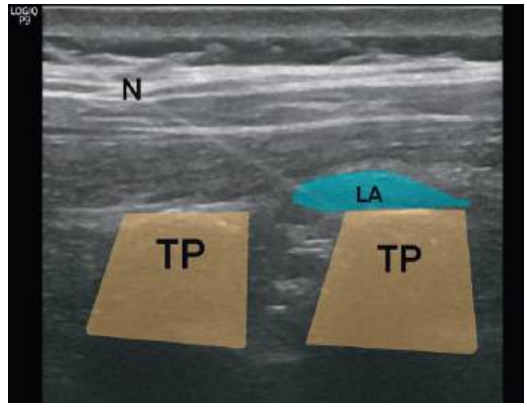


Figure 3. Ultrasonographic image of ESPB at thoracic level 10.