

SJAiT

ISSUE special edition

BROJ posebno izdanje

VOLUME

GODIŠTE

48

YEAR

GODINA

2026

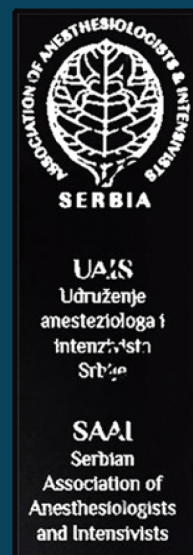
**Serbian Journal of Anesthesia
and Intensive Therapy
Srpski časopis Anestezija
i intenzivna terapija**

**Zbornik poster prezentacija
Proceedings of Poster Presentations**



**15th Congress of
Anesthesiologists
and Intensivists
of Serbia**

2nd & 3rd Oct, 2026.
Sava Center, Belgrade, Serbia



ISSN **2466-488X** (ONLINE)

SERBIAN JOURNAL OF ANESTHESIA AND INTENSIVE THERAPY

Official Journal of Serbian Association of Anesthesiologists and Intensivists

Volume 48; September 2026; Special edition

SRPSKI ČASOPIS ANESTEZIJA I INTENZIVNA TERAPIJA

Časopis Udruženja anesteziologa i intenzivista Srbije

Godište 48; Septembar 2026; Posebno izdanje

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Udruženje anesteziologa i intenzivista Srbije

Dizajn korica / Cover Design

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Prelom i kompjuterska obrada

Studio znak, Ivankovačka 10/2

Otvoreni pristup / Open Access

Adresa uredništva / Editorial Office

Časopis SJAiT

Odeljenje anestezije i reanimacije pri Klinici za digestivnu hirurgiju,
Centar za anesteziologiju i reanimatologiju, Univerzitetski klinički centar Srbije,
Pasterova 2, 11000 Beograd,
E-mail: journal.sjait@yahoo.com

Časopis dostupan na sajtu: SJAiT | Serbian Journal of Anesthesia and Intensive Therapy – <https://sjait.uais.rs>

Dear Friends and Colleagues,

Allow me, at the very beginning of this address, to express my sincere gratitude for your longstanding support of the Association of Anesthesiologists and Intensivists of Serbia. Your support has meant a great deal to us, as without it our decades-long efforts in promoting anesthesiology and intensive care medicine would have been far less visible and impactful.

The Association of Anesthesiologists and Intensivists of Serbia (UAIS) is the leading professional association of anesthesiologists and intensivists in Serbia, continuing the tradition of the former Association of Anesthesiologists of Yugoslavia. Today, UAIS brings together nearly one thousand anesthesiologists from across Serbia. As a non-profit professional organization, for decades we have remained committed to promoting our profession within the wider social context, while also focusing on educational activities and continuous professional development.

Particularly over the last decade, UAIS has grown into a highly respected association and an important partner to leading international professional organizations in the fields of anesthesiology, intensive care medicine, and pain management.

It is with great pleasure and enthusiasm that, in my capacity as President of UAIS, I invite you to join us at the 15th Jubilee Congress of Anesthesiologists and Intensivists of Serbia with significant international participation.

The captivating capital of Serbia, especially beautiful at the beginning of autumn, will welcome us at the magnificent Sava Centar, where more than one hundred distinguished speakers from Serbia and abroad will take part in a comprehensive scientific programme. Through twenty plenary sessions, numerous pre-congress courses, and practical workshops, more than one thousand participants from Serbia and the region will have the opportunity to engage with the latest trends and advancements in our profession.

I warmly invite you to once again be our trusted partner during this first October weekend and support us in achieving the ambitious goals we have set.

At the same time, we encourage you to take advantage of the opportunity to become part of our industry-friendly exhibition area, which this year will extend across an impressive 1,200 square metres. The main congress hall will serve as a meeting point for science, medicine, and industry — a space where, through industry symposia and presentations, you will be able to introduce congress participants to your business portfolio and showcase the latest innovations resulting from years of investment and research within your companies.

The official organizational partner of the congress is once again Easy Travel & Events, which has prepared attractive congress packages and full logistical support for all participants and partners. We look forward to meeting you again and continuing our successful cooperation.

Please *Save the Date* and remember to reserve October 2nd and 3rd in your business calendars. We look forward to welcoming you to Belgrade!



Prof. Dr. Radmilo Janković
President of the Association of Anesthesiologists and Intensivists of Serbia



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PERIFERNI NERVNI BLOKOVI KAO ALTERNATIVA ENDOTRAHEALNOJ INTUBACIJI KOD PEDIJATRIJSKOG PACIJENTA SA ARTROGRIPOZOM I KONGENITALNOM SUBGLOTIČNOM STENOZOM: PRIKAZ SLUČAJA

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Ključne reči: periferni nervni blokovi, regionalna anestezija, pedijatrijska anestezija, ortopedija, artrogripoza

Uvod: Artrogripozu karakterišu kongenitalne kontraktуре i često kraniofacijalne anomalije, suženje laringusa i subglotičnog prostora, što predstavlja izuzetan anesteziološki izazov zbog visokog rizika od otežane ili nemoguće endotrahealne intubacije.

Prikaz slučaja: Petogodišnji dečak težak 15 kg primljen je radi elektivne tenotomije Ahilove tetive, posteromedijalnog oslobađanja stopala i epifiziodenze tibije desne noge u sklopu artrogripoze. Prethodno je podvrgnut heiloplastici tokom koje je utvrđena izrazito otežana intubacija usled laringealne i subglotične stenozе. Drugih komorbiditeta nije bilo. Doneta je odluka o izvođenju intervencije u uslovima perifernih nervnih blokova i proceduralne sedacije, uz očuvano spontano disanje. Primenjen je osnovni monitoring vitalnih funkcija (EKG, TA, SpO₂) kao i neinvazivno merenje ekspirijumske koncentracije ugljen-dioksida (EtCO₂) i kiseonična potpora preko nazalne kanile. U pripravnosti je bila oprema neophodna za hitno zbrinjavanje disajnog puta. Nakon premedikacije (atropin 0,15 mg, deksametazon 1,5 mg), na uvodu je intravenskim putem dat fentanil 40 mcg i propofol 30 mg, a sedacija je održavana kontinuiranom infuzijom propofola uz očuvano spontano disanje. U uslovima asepse pod kontrolom ultrazvuka izvedeni su femoralni, poplitealni, i blok kanala aduktora ukupnom primenom 3 ml 2% lidokaina i 12 ml 0,25% levobupivakaina. Ultrazvučno je uočeno značajno odstupanje od očekivane anatomije i anatomskih odnosa, uzrokovano osnovnom bolešću. Postavljena je natkolena pneumatska poveska i pacijent je okrenut u potrbušni položaj. Tokom operacije koja je trajala 240 minuta pacijent je bio hemodinamski i respiratorno stabilan. U dva navrata je registrovan skok srčane frekvence do 20% vrednosti pre uvida, koji je uspešno kupiran bolusima fentanila (ukupno 30 mcg). Pred kraj procedure pacijent je vraćen u leđni položaj, a infuzija propofola je titrirana nishodno uz uvođenje redovnog venskog metamizola (3x50 mg/kg). Postoperativno, bol je praćen putem NRS (*eng. Numeric Rating Scale*) i Wong-Baker skale, pri čemu je u slučaju uočenog/prijavljenog intenziteta bola 3 ili više propisan acetaminofen, a u slučaju opstajanja bola tramadol intravenski. U prva 24 časa nije bilo potrebe za dodatnim analgeticima, a ukupna perioperativna potrošnja opioida svedena je na 4 mcg/kg fentanila.

Zaključak: Periferni nervni blokovi donjih ekstremiteta u uslovima sedacije i spontanog disanja mogu predstavljati bezbednu i efikasnu alternativu opštoj anesteziji kod pedijatrijskih pacijenata sa artrogripozom i otežanim disajnim putem.

RAZLIKE U PREPREKAMA ZA SPROVOĐENJE ENTERALNE ISHRANE IZMEĐU HIRURŠKIH I NEHIRURŠKIH JEDINICA INTENZIVNE NEGE: MULTICENTRIČNO ISTRAŽIVANJE

Aleksandar Božić, DMITAR Vlahović, Nataša Tomić, Aleksandra Plećaš Đurić, Jovan Matijašević,
Peđa Kovačević, Radmila Popović, Gordana Jovanović

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Ključne reči: enteralna ishrana, jedinica intenzivnog lečenja, nutritivna podrška, prepreke
u kliničkoj praksi

Uvod: Enteralna ishrana (EI) predstavlja jedan od osnovnih elemenata suportivnog lečenja kritično obolelih pacijenata. Međutim, njeno sprovođenje često je otežano organizacionim preprekama i preprekama povezanim sa kliničkom praksom, od kojih se mnoge mogu modifikovati. Cilj ovog istraživanja bio je da se uporede prepreke za sprovođenje EI između nehirurških jedinica intenzivnog lečenja (NSICU) i hirurških jedinica intenzivnog lečenja (SICU).

Metodologija: Multicentrično istraživanje sprovedeno je putem elektronskog upitnika u periodu od februara do juna 2024. godine u šest ustanova. Korišćen je prilagođeni validirani upitnik koji je sadržao 23 stavke raspoređene u pet domena, pri čemu je svaka stavka ocenjivana na Likertovoj skali od pet stepeni. Ispitanici su razvrstani prema tipu jedinice intenzivnog lečenja (JIL) na zaposlene u NSICU i SICU. Ukupno je učestvovalo 120 zdravstvenih radnika, od kojih je 87 bilo zaposleno u NSICU, a 33 u SICU.

Rezultati: Utvrđene su jasne razlike između tipova JIL. Zaposleni u NSICU češće su kao prepreke navodili kašnjenje usled čekanja na radiografsku potvrdu položaja sonde za enteralnu ishranu ($2,9 \pm 1,5$ prema $2,3 \pm 1,4$; $p = 0,036$) i davanje prioriteta drugim aspektima nege u odnosu na ishranu ($3,5 \pm 0,9$ prema $2,9 \pm 1,2$; $p = 0,019$). Zaposleni u SICU češće su prijavljivali zahteve lekara koji ne rade u jedinici intenzivne nege da se EI privremeno prekine ($3,6 \pm 1,2$ prema $3,1 \pm 1,2$; $p = 0,030$). Najizraženija razlika odnosila se na podršku dijetetičara odnosno nutricioniste. Ispitanici iz SICU češće su navodili odsustvo stalno zaposlenog stručnjaka ($3,9 \pm 1,1$ prema $3,3 \pm 1,3$; $p = 0,028$), slabiju dostupnost konsultacija ($4,0 \pm 1,0$ prema $3,3 \pm 1,1$; $p = 0,002$) i veći ukupan skor u domenu 5 ($12,2 \pm 2,6$ prema $10,5 \pm 3,1$; $p = 0,006$).

Zaključak: Prepreke za sprovođenje EI značajno se razlikuju između nehirurških i hirurških JIL. U NSICU su izraženiji operativni zastoji i konkurentni prioriteti u zbrinjavanju pacijenata, dok su SICU više opterećene prekidima enteralne ishrane na zahtev lekara izvan JIL i nedovoljnom podrškom dijetetičara odnosno nutricioniste. Ciljane intervencije prilagođene specifičnostima pojedinačnih tipova JIL mogle bi unaprediti sprovođenje enteralne ishrane.

ULOGA CT PERFUZIJJE U DIJAGNOSTICI SIMPTOMATSKOG CEREBRALNOG VAZOSPAZMA NAKON ANEURIZMATSKOG SUBARAHNOIDALNOG KRVARENJA: PRIKAZ SLUČAJA

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Ključne reči: aSAH, CT perfuzija, DCI, vazospazam

Uvod: Cerebralni vazospazam i odložena cerebralna ishemija (DCI) predstavljaju značajne uzroke neurološkog pogoršanja nakon aneurizmatiskog subarahnoidalnog krvarenja (aSAH). Dijagnostika može biti otežana kada transkranijalna dopler ultrasonografija nije izvodljiva, dok kompjuterizovana tomografija (CT) još ne pokazuje znake moždanog infarkta. Ovaj prikaz slučaja ističe ulogu CT perfuzije (CTP) u proceni hemodinamskog značaja vazospazma i donošenju odluke o urgentnom endovaskularnom lečenju.

Prikaz slučaja: Pacijentkinja starosti 62 godine primljena je zbog naglo nastale intenzivne glavobolje, mučnine i povraćanja. Neuroradiološkim ispitivanjem utvrđen je aSAH, nastao rupturom *blood blister-like* aneurizme desne unutrašnje karotidne arterije. Zbog nepovoljne morfologije aneurizme sprovedeno je endovaskularno lečenje implantacijom *flow-diverter stenta* uz dvojni antiagregacionu terapiju. Sedmog dana nakon rupture dolazi do pogoršanja neurološkog statusa, sa somnolencijom, dizatrijom, centralnom parezom facijalnog nerva i parezom leve ruke. Transkranijalnu dopler ultrasonografiju nije bilo moguće izvesti zbog neadekvatnih temporalnih koštanih prozora. Nekontrastni CT mozga nije pokazao akutnu ishemijsku leziju, dok je CT angiografija ukazala na suženje M1 i M2 segmenata desne srednje moždane arterije i distalnog dela stentiranog segmenta. CT perfuzija je pokazala smanjen cerebralni protok krvi, relativno očuvan cerebralni volumen krvi i produžene vrednosti srednjeg tranzitnog vremena i Tmax u desnoj parijetotemporalnoj regiji, ukazujući na zonu reverzibilne ishemije. Na osnovu CTP nalaza, primenjen je intraarterijski nimodipin na mestu vazospazma, uz zadovoljavajuće angiografsko poboljšanje.

Zaključak: CT perfuzija može imati ključnu ulogu u potvrđivanju hemodinamski značajnog vazospazma nakon aneurizmatiskog subarahnoidalnog krvarenja, naročito kada transkranijalni dopler nije izvodljiv, a nekontrastni CT ne pokazuje moždani infarkt. Ova metoda može usmeriti pravovremeno endovaskularno lečenje vazospazma i prevenciju daljeg sekundarnog oštećenja mozga.

TUNNELED CATHETERS, PICCS, AND PORTS: DIFFERENT DEVICES, DIFFERENT INDICATIONS

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Keywords: vascular access devices; tunneled catheter; PICC; totally implantable venous access port; central venous catheter;

Abstract

Background: The expanding use of vascular access devices (VADs) has significantly improved the delivery of intravenous therapies across a wide range of clinical settings. However, selecting the most appropriate central venous access device remains a complex clinical decision that should be individualized according to the patient's condition, treatment characteristics, and expected duration of therapy. Inappropriate device selection is associated with increased complications, reduced patient satisfaction, and unnecessary healthcare costs.

Aim: To review the current indications, advantages, limitations, and evidence-based selection criteria for tunneled central venous catheters, peripherally inserted central catheters (PICCs), and totally implantable venous access ports (TIVAPs).

Methods: A narrative review of contemporary international guidelines and recent literature was performed, including recommendations from GAVeCeLT, INS, ESPEN, ESMO, ASCO, and other relevant societies. The review compares the three devices regarding indications, insertion techniques, duration of use, complication profiles, maintenance requirements, patient quality of life, and cost-effectiveness.

Results: Each central venous access device fulfills distinct clinical needs. Tunneled catheters remain the preferred option for patients requiring continuous or frequent long-term therapy, such as home parenteral nutrition, hematopoietic stem cell transplantation, or dialysis, when external access is necessary. PICCs provide a minimally invasive, ultrasound-guided solution for intermediate- to long-term intravenous therapy and are particularly suitable for antibiotic therapy, chemotherapy, and difficult venous access when the anticipated duration of treatment is limited. Totally implantable venous access ports offer the lowest long-term infection rates, minimal maintenance, unrestricted daily activities, and excellent patient satisfaction, making them the preferred choice for patients receiving intermittent long-term systemic anticancer therapy. Device selection should be guided by treatment duration, infusate characteristics, vascular anatomy, thrombosis risk, expected frequency of access, and patient preferences.

Conclusions: No single vascular access device is appropriate for every patient. Optimal outcomes depend on selecting the right device for the right patient at the right time using evidence-based algorithms and multidisciplinary decision-making. Individualized vascular access planning reduces complications, improves treatment efficiency, enhances patient quality of life, and supports cost-effective healthcare delivery.

PRIMENA LUMBALNOG PLEKSUS BLOKA U ORTOPEDSKOJ HIRURGIJI

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Ključne reči: lumbalni plexus blok, ultrazvuk, ortopedska hirurgija

SAŽETAK

Uvod: Lumbalni plexus blok (LPB) je napredna, visoko efikasna tehnika RA koja unapređuje perioperativno zbrinjavanje pacijenata sa povredama i oboljenjima donjih ekstremiteta. U kombinaciji sa opštom anestezijom smanjuje dozu opioda i komplikacije njihove upotrebe. Smanjuje skor bola i obezbeđuje hemodinamsku stabilnost. U odnosu na centralne blokove smanjen je rizik od hipotenzije a neurološke komplikacije su ređe. Na Institutu za ortopediju „Banjica” je metoda izbora za reinterventne ortopedske operacije kuka, nakolenice i kolena posebno kod pacijenata sa značajnim komorbiditetima.

SUMMARY

Introduction: Lumbar plexus block (LPB) is an advanced highly effective technique that improves the perioperative management of patients with lower extremity injuries and diseases. In combination with general anesthesia, it reduced the dose of opioids and the complications of their use, reduces the pain score and ensures hemodynamic stability. Compared to central block, the risk of hypotension is reduced and neurological complications are less frequent. In Institute for orthopedics “Banjica” is the method of choice for reinterventional orthopedic surgeries of the hip, femur and knee, especially in patients with significant comorbidities.

DISKUSIJA

Indikacije za primenu LPB :

- Operacije kuka, nadkolenice i kolena u kombinaciji sa OET
- Operacije nadkolenice, kolena i podkolenice RA u kombinaciji sa blokadom n.ischiadicusa
- Repozicije kolena, redresman i obezbojavanje kod fizikalnih procedura
- Th akutnih i chr bolova u predelu kuka i nadkolenice (prelomi, lumboischialgija, Herpes zoster, dijabetička polineuropatija, CRPS)
- Okluzivna oboljenja arterija i loša perfuzija ekstremiteta
- Nakon hirurške neurolize i reimplantacije nerava radi bolje reinervacije
- Kod visoko rizičnih pacijenata za operacije kuka u kombinaciji sa blokadom n. ishiadikusa paraskralno uz propofol-ketamin intravensku infuziju
- Th malignog bola, kod postradiacionog edema ekstremiteta
- Th fantomskog bola posle postamputacione hirurgije

Način izvođenja

Pacijent se postavlja u bočni dekubitalni položaj sa nogom savijenom u kuku i kolenu. Ultrazvučna konveksna sonda se postavlja uzdužno uz kičmu na nivou L2 i L3 pršljena. Ciljna struktura je zadnja trećina mišića psoas majora gde se nalazi lumbalni plexus koji je formiran od prednjih grana paravertebralnih nerava od L1-L4 sa promenljivim udelom i Th 12 i L5. Ubrizgavanjem LA pod kontrolom ultrazvuka uz istovremenu primenu neurostimulatora blokiraju se femoralni, obturatorni i lateralni femoralni kožni nervi. Obavezno korišćenje kolor doplera radi identifikacije krvnih sudova i održavanje pritiska ubrizgavanja LA ispod 20 psi.

DOZE LA: Bupivacain, L-Bupivacain 0,25-0,5% i Lidocaine 1,2-1,5% 0,3-0,5 ml/kg TT za odrasle 0,2 ml/kg TT preko 70 god.

Doze LA za kontinuirano davanje 0,05-0,1mg/kg/h
0,125% ili 0,25% Bupivacain ili L-Bupivacain

Kontraindikacije: Apsolutne

- Nepristanak pacijenta
- Alergija na LA
- Infekcije na mestu insercije igle
- Skolioza kičme
- Stanja posle hirurgije u retroperitonealnoj regiji
- Nelečena koagulopatija
- Teška oštećenja funkcije jetre
- Primena antikoagulatne th kod embolijskog sy

Relativne

- Psihološka i emocionalna nestabilnost pacijenta
- Antikoagulantna profilaksa(INR veći od 1,5)
- Epy i progresivna neurološka oboljenja

Komplikacije :

Sistemska toksičnost

- Alergije
- kožne
- bronhospazam
- znaci KV nestabilnosti
- anafilaksa

Infekcije

- Neuralne lezije
- Neuropathie
- Neuritisi

Lokalne

- Hematomi-retroperitonealni ili psoas hematom
- pneumotorax,
- spinal
- epiduralno širenje(2-16%)
- intraabdominalne povrede-povrede bubrega-subkapsularni hematom
- povrede velikih krvnih sudova-v.cava inf. aorta,dorzalne grane lumbalne arterije
- bol usled spazma paravertebralne lumbalne muskulature

Terapija sistemske toksičnosti

- odmah obustaviti davanje LA
- praćenje svesti
- potpora ventilacije(100% O2)
- potpora cirkulacije(iv.nadoknada volumena,vazopresori,antiaritmici)
- rastvor Intralipida 20%(1,5 ml/kg iv.bolus+kontinuirana inf.0,25ml/kg do max. doze od 8ml/kg)
- terapija konvulzija:Diazepam 0,05 mg/kg iv.ili Dormicum 0,05-0,2mg/kg,Tiopental 1-2mg/kg ili Propofol 1,5-2,5 mg/kg
- KPCR

ZAKLJUČAK

Za dobre rezultate u primeni RA tehnika neophodno je poštovanje savremenih protokola, kontinuirana edukacija, obavezna primena ultrazvuka, kao i dobra saradnja sa pacijentom i kolegama hirurških grana. Izbor anestezije se donosi na osnovu kliničkog iskustva anesteziologa, individualnih zahteva pacijenta i potencijalnih postoperativnih komplikacija.

LPB ima značajno mesto kako u anesteziji i th bola kod povreda, operacija i oboljenja na donjim ekstremitetima. Smanjenjem doza analgetika, obezbeđivanje stabilne hemodinamike i dobre postoperativne analgezije postignuta je veća bezbednost pacijenta. LPB direktno doprinosi boljem ukupnom ishodu lečenja, ubrzavajući rehabilitaciju ortopedskih pacijenata.

LITERATURA

1. Nielsen MV, Bendisen TF, Borglum J., Syperiority of ultrasaund-guided Sharmrock lumbar plexus block,Minerva Anesthesiol 2018; 84(1):115-21
2. Awad IT, Duggan EM. Posterior lumbar plexus block:anatomy, approaches, and techniquea. Reg. Anesth Pain Med 2005; 3082). 143-9.
3. Gadsen J.C., Lindenmuth D.M., Hadzic A., et al. Lumbar pexus block using high-pressure injection leads to contralateral epidural spread. Anesthesiology 2008, 109849. 683-8

CARDIO-TRANS SCORE FOR PREDICTING RED BLOOD CELL TRANSFUSION IN ADULT CARDIAC SURGERY

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Keywords: Blood Transfusion; Cardiac Surgical Procedures; Risk Assessment; Predictive Value of Tests; Patient Blood Management

Background: Red blood cell (RBC) transfusion remains common in adult cardiac surgery despite widespread implementation of Patient Blood Management (PBM). Early identification of patients at increased transfusion risk is essential for individualized perioperative planning and optimized blood resource utilization. However, existing prediction models have limited clinical applicability and validation. We aimed to develop and prospectively validate a simple preoperative prediction model (Cardio-Trans Score) for estimating the individual probability of RBC transfusion before elective cardiac surgery.

Methods: This prospective observational study included 609 consecutive adult patients undergoing elective cardiac surgery with cardiopulmonary bypass for model development, followed by prospective temporal validation in an independent cohort of 300 consecutive patients. The study was approved by the Institutional Ethics Committee (approval No. 2014- 1/3), and written informed consent was obtained from all participants. Candidate preoperative demographic, clinical, and laboratory variables were evaluated using univariable and multivariable logistic regression analyses to identify independent predictors of RBC transfusion. Model discrimination was assessed by receiver operating characteristic (ROC) analysis, calibration by the Hosmer–Lemeshow goodness-of-fit test, and predictive performance was compared with EuroSCORE.

Results: RBC transfusion was administered in 42.2% of patients. Independent predictors included female sex (OR 3.684, 95% CI 2.326–5.835; $p < 0.0005$), higher EuroSCORE (OR 1.191, 95% CI 1.060–1.339; $p = 0.003$), lower body mass index (OR 0.937, 95% CI 0.893–0.983; $p = 0.008$), lower preoperative hemoglobin (OR 0.951, 95% CI 0.932–0.970; $p < 0.0005$), and lower hematocrit (OR 0.909, 95% CI 0.854–0.967; $p = 0.003$). The Cardio-Trans Score demonstrated excellent discrimination (AUC 0.844, 95% CI 0.810–0.878), good calibration (Hosmer–Lemeshow $p = 0.311$), and significantly outperformed EuroSCORE (AUC 0.690). Prospective temporal validation confirmed sustained predictive performance (AUC 0.817, 95% CI 0.775–0.859), supporting model robustness and reproducibility.

Conclusions: The Cardio-Trans Score is a simple and clinically applicable preoperative prediction model for individualized estimation of RBC transfusion risk in adult cardiac surgery. Based exclusively on routinely available preoperative variables, it can be readily integrated into routine anesthetic assessment without additional laboratory testing or workflow modifications. Prospective temporal validation supports its potential role in individualized patient blood management and more efficient perioperative blood resource utilization.

PREDICTING INTRAOPERATIVE HYPOTENSION BEFORE ANESTHESIA INDUCTION: A PROSPECTIVE STUDY FOR PRECISION HEMODYNAMIC MANAGEMENT IN ADULT CARDIAC SURGERY

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Keywords: General Anesthesia, Intraoperative Hypotension, Cardiac Surgical Procedures, Hemodynamics, Risk Assessment

Background: Intraoperative hypotension (IOH) is a frequent complication during cardiac surgery and is associated with postoperative organ dysfunction, prolonged hospitalization, and increased mortality. Early identification of patients at increased risk may enable individualized hemodynamic management and preventive perioperative strategies. We aimed to identify independent preoperative predictors of IOH and develop a clinically applicable model for preoperative risk stratification in adult cardiac surgery.

Methods: This prospective observational single-center study included 577 consecutive adults undergoing elective cardiac surgery with cardiopulmonary bypass. The study was approved by the Institutional Ethics Committee (Approval No. 527-1/2), and written informed consent was obtained from all participants. Preoperative demographic characteristics, comorbidities, chronic cardiovascular therapy, laboratory findings, and ASA physical status were prospectively collected. IOH was defined as a $\geq 25\%$ reduction in mean arterial pressure (MAP) from baseline lasting ≥ 3 minutes, while during cardiopulmonary bypass hypotension was defined as MAP < 50 mmHg. Independent predictors were identified using multivariable logistic regression. Model discrimination and calibration were evaluated using receiver operating characteristic (ROC) analysis and the Hosmer–Lemeshow goodness-of-fit test.

Results: IOH occurred in 182 patients (31.5%). Independent preoperative predictors included advanced age (OR 1.038; 95% CI 1.013–1.063; $p=0.002$), previous heart failure (OR 5.022; 95% CI 2.478–10.180; $p<0.0005$), atrial fibrillation (OR 1.971; 95% CI 1.256–3.093; $p=0.003$), chronic kidney disease (OR 2.256; 95% CI 1.064–4.784; $p=0.034$), previous cerebrovascular accident (OR 2.493; 95% CI 1.208–5.144; $p=0.013$), anemia (OR 2.031; 95% CI 1.060–4.008; $p=0.010$), and ASA physical status IV (OR 3.035; 95% CI 1.256–7.332; $p=0.014$). The prediction model demonstrated good calibration (Hosmer–Lemeshow $p=0.196$) and acceptable discrimination (AUC 0.786). At the optimal probability threshold of 28.9%, sensitivity was 73.1% and specificity 73.7%.

Conclusions: Routinely available preoperative clinical characteristics can identify patients at increased risk of IOH before anesthesia induction. Incorporating preoperative risk stratification into routine cardiac anesthesia practice may facilitate individualized hemodynamic management, support targeted preventive interventions, and reduce hypotensive exposure in high-risk patients, contributing to precision perioperative care.

DURATION AND SEVERITY OF CARDIOPULMONARY BYPASS HYPOTENSION PREDICT ADVERSE OUTCOMES AFTER ADULT CARDIAC SURGERY

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Keywords: General anesthesia, Intraoperative hypotension, Cardiopulmonary bypass,
Cardiac surgery, Postoperative complications

Background: Intraoperative hypotension remains one of the most debated modifiable risk factors in cardiac anesthesia. Although inadequate tissue perfusion during cardiopulmonary bypass (CPB) has been associated with postoperative organ dysfunction, the duration and severity of hypotension that become clinically relevant remain insufficiently defined. We investigated the association between CPB-related hypotension and postoperative complications following adult cardiac surgery.

Methods: This prospective observational study included 609 consecutive adult patients undergoing cardiac surgery with CPB at a tertiary cardiovascular center. The study was approved by the Institutional Ethics Committee (Approval No. 527-1/2). Intraoperative hypotension (IOH) was defined as a $\geq 25\%$ reduction in mean arterial pressure (MAP) from baseline lasting at least 3 minutes, while CPB hypotension was additionally analyzed according to a MAP reduction exceeding 35% from baseline. Logistic regression identified predictors of postoperative complications and quantified the effect of hypotension duration. Receiver operating characteristic (ROC) analysis was performed to determine clinically relevant thresholds.

Results: IOH occurred in 34.0% of patients. Patients experiencing IOH had a markedly higher incidence of postoperative complications compared with those without hypotension (OR 14.48, 95% CI 9.23–22.72; $p < 0.0005$). CPB hypotension independently increased the risk of acute kidney injury, need for renal replacement therapy, postoperative heart failure, sepsis, delirium, cerebrovascular events and prolonged intensive care and hospital stay. Every additional 5 minutes of hypotensive exposure significantly increased the probability of major postoperative complications. ROC analysis identified 3.5 minutes as the optimal duration threshold associated with adverse outcomes (AUC 0.925), while a MAP reduction exceeding 35% represented the level associated with the highest postoperative risk (OR 6.87, 95% CI 2.15–21.95). Patients with CPB hypotension also demonstrated significantly higher in-hospital mortality.

Conclusions: Both the duration and severity of hypotension during cardiopulmonary bypass are strong independent predictors of adverse postoperative outcomes after adult cardiac surgery. These findings support individualized blood pressure management during CPB and suggest that minimizing hypotensive exposure may represent an important strategy for improving perioperative outcomes in contemporary cardiac anesthesia.

THE TULIP AIRWAY MAN AND MANIKIN METANALYSIS

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Keywords: airway management, resuscitation, difficult airway ventilation, anaesthesia, Tulip airway

The Tulip airway was developed as a hands-free, directly connectable oropharyngeal airway designed for inexperienced users (IU's) in both in-hospital and out-of-hospital settings. Debate also exists around the value of manikins in airway research. To address these 2 issues, this study reviewed an identical randomized, controlled, crossover protocol in both manikins and anaesthetised patients in order to evaluate the Tulip airway's performance, ease of use, ventilation success and assess the correlation between the man and manikin results in 2 previously published studies.

Two sequential randomized, controlled, crossover trials were performed using Basic Life Support trained inexperienced users (IU). The same protocol compared ventilation performance using the Tulip airway vs. the Guedel airway and Facemask. The first trial used manikins; the second used anaesthetised human subjects.

IU ~Tulip vs. Guedel/Facemask	MAN	MANIKIN
Tulip Insertion First time	96.7%	93.3%
Guedel Insertion First time	78.3%	98.3%
p-value	p < 0.001	p < 0.001
Tulip Success Rate	100%	100%
Guedel Success Rate	58.3%	80%
p-value	p < 0.001	p < 0.001
Tulip Inadequate Vent.	5%	0%
Guedel Inadequate. Vent.	41.7%	20%
Tulip Assistance Required	0%	0%
Guedel Assistance Required	25%	20%
p-value	p < 0.0001	p < 0.0003
Tulip Average Tidal Volume	501mls	397mls
Guedel Average Tidal Volume	284mls	364mls
Increase by Tulip Ventilation	+76.6%	+9.1%
p-value	p < 1x10 ⁻⁹	p < 0.0423

Ventilation was significantly greater with the Tulip airway in both studies, increasing by 9.1% in manikins and 76.6% in humans. 100% of users successfully ventilated with the Tulip on first contact, with 0% requiring assistance in either study. Assistance was required with a Guedel and Facemask in 20% (manikin) and 25% (human) of attempts.

Failure to adequately ventilate occurred in 41.7% of Guedel users in humans vs. 5% with the Tulip.

User preference for the Tulip was similarly high: 76.7% (manikin) and 78.3% (human). Strong correlation was observed between manikin and human findings, with manikins appearing harder to ventilate but humans presenting greater difficulty with Facemask seal formation. The Tulip's improvement on the Guedel/Facemask technique was most prevalent to point whereby almost all Tulip statistics exceeded the p<0.0005 threshold whereby the Tulip should ethically be used on everybody.

Results demonstrate that manikin performance closely predicts human clinical performance for the Tulip airway, supporting the value of manikin-based research in new airway device development.

The Tulip showed a steep learning curve, high success rates, and clear advantages over the Guedel/Facemask combination even when used by inexperienced providers encountering the device for the first time. Note; no other similar comparative studies were found on search. Our findings support the Tulip airway as a more effective first-line BLS airway for inexperienced users in both clinical and non-clinical environments.

ОПСТРУКТИВНА АПНЕЈА У СНУ КОД ДЕЦЕ

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Сажетак

Опструктивна апнеја у сну (ОАС) у детињству представља стање од великог значаја за јавно здравље, које одликују висока преваленција и озбиљне последице код нелечених пацијената. ОАС се дефинише као појава поновљених епизода делимичне или потпуне опструкције горњих дисајних путева током спавања. Преваленција ОАС код деце школског узраста креће се у распону од 1% до 5%, при чему су аденотонзиларна хипертрофија и гојазност основни фактори ризика у том животном добу. Десатурација, хиперкапнија и фрагментација сна покрећу каскадне процесе упале, оксидативног стреса и измењене симпатичке активности. Код деце са опструктивном апнејом у сну (ОАС) и гојазношћу првенствено се јављају последице по кардиоваскуларни систем – које се испољавају као дисфункција ендотела, поремећај регулације артеријског крвног притиска и ремоделирање срца – као и неурокогнитивни поремећаји и метаболички синдром.

Полисомнографија изведена у специјализованој лабораторији представља „златни стандард“ за дијагностиковање ОАС. Аденотонзилектомија се препоручује као метод лечења деце са ОАС и хипертрофијом аденоида и крајника.

PERIOPERATIVNI IZAZOVI I ZBRINJAVANJE KOMPLIKACIJA KOD KOMPLEKSNOG GRUDNOHIRURŠKOG BOLESNIKA: PRIKAZ SLUČAJA

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Ključne reči: pneumonektomija, delirijum, fistule, fenestra, pneumonija

Uvod: Perioperativni tretman bolesnika u grudnoj hirurgiji predstavlja izuzetan anesteziološki izazov zbog kompleksne preoperativne pripreme i procene. Kod ovih pacijenata takođe su često prisutni brojni komorbiditeti, a rizik od razvoja udruženih kardiorespiratornih komplikacija u postoperativnom periodu je visok.

Prikaz slučaja: Bolesnik, star 63 godine, sa istorijom lečenja karcinoma baze jezika i sprovedenom hemoradioterapijom, hospitalizovan je radi operativnog lečenja skvamoznog karcinoma gornjeg reznja levog pluća (cT3N2Mx). Sem navedenog predhodnog lečenja maligne bolesti kod bolesnika je prisutna i hipertenzija de novo otkrivena. Bivši je pušač a alkohol konzumira svakodnevno. Nakon adekvatne kardiološke i pulmološke evaluacije procenjen je umeren rizik od razvoja perioperativnih komplikacija, nakon čega je bolesnik operisan u uslovima opšte anestezije. Urađena je leva pneumonektomija sa parcijalnom blok resekcijom III–IV rebra. Rani postoperativni tok u jedinici intenzivnog lečenja (JIL) komplikovan je sumnjom na akutni koronarni događaj, što je zahtevalo hitnu kardiološku evaluaciju (EHO srca, CT koronarografiju) i privremenu vazopresornu potporu noradrenalinom. U daljem toku lečenja razvija se rani postoperativni delirijum koji je zahtevao intenzivnu terapiju po protokolu za zbrinjavanje akutnog konfuznog stanja. Dalje lečenje se komplikuje razvojem bronhopleuralne fistule i sekundarnog empijem, zbog čega je indikovana fenestracija toraksa. Tokom rane faze lokalnog zbrinjavanja fenestre dolazi do razvoja teške pneumonije preostalog desnog plućnog krila. Bolesnik je uspešno tretiran u JIL merama neinvazivne ventilatorne potpore, hemodinamske stabilizacije i deeskalacione antibiotske terapije. Nakon sanacije pneumonije i sekundarne refenestracije, bolesnik se otpušta na kućno lečenje u stabilnom opštem stanju.

Zaključak: Angažovanje anesteziologa kod grudnohirurških bolesnika ne završava se uspešnom operacijom, već zahteva produženu i sveobuhvatnu prisutnost u postoperativnom periodu. Multimodalne mere hemodinamske i ventilatorne stabilizacije, uz ciljanu primenu antimikrobne terapije u jedinici intenzivnog lečenja, omogućavaju uspešnu sanaciju teških komplikacija čak i u uslovima kritično smanjene respiratorne rezerve bolesnika.

KONTINUIRANI BLOK LUMBOSAKRALNOG PLEKSUSA KAO IZBOR ZA KONTROLU BOLA U ELEKTIVNOJ ORTOPEDSKOJ HIRURGIJI PACIJENTA SA DIJAGNOZOM DISAUTONOMIJE

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Ključne reči: kontinuirani blok lumbosakralnog pleksusa, disautonomija, anestezija, analgezija, ortopedska hirurgija

Kontinuirani blok lumbosakralnog pleksusa (KBLSP) je napredna tehnika regionalne anestezije (RA) koja pruža produženo ublažavanje bola, smanjuje potrošnju opioda i podstiče raniju mobilizaciju i početak fizikalne terapije pacijenta u poređenju sa tradicionalnim metodama kontrole bola u ortopedskoj hirurgiji. KBLSP se ističe hemodinamskom i respiratornom stabilnošću pacijenta sa značajno manje fluktuacija krvnog pritiska, pojave aritmija i problema sa disanjem.

Pacijent starosti 56 godina planiran je za elektivnu operaciju koksartroze. U perioperativnoj pripremi navodi podatak da unazad 15 godina zna za dijagnozu disfunkcije autonomnog nervnog sistema - disautonomija na terenu trovanja bojnim otrovima. U anamnezi navodi izraženu mišićnu slabost, hronični umor, vertigenozne tegobe i hipotenzivne krize praćene bradikardijom bez gubitka svesti izraženo u naporu. Ističe hipersenzitivnost i hiperalgeziju uz neadekvatno kupiranje analgeticima - NSAIL, paracetamol, trodon. U prilogu aktuelno uredan neurološki i kardiološki nalaz. Za kontrolu bola perioperativno planiran je blok lumbosakralnog pleksusa, plasiran je kateter za KBPLS i napravljena lema analgezije perioperativno. Pre uvida ordinirano je 20ml 0,375% Levobupivacaina. Operacija je urađena u opštoj anesteziji - propofol 1%, rokuronijum 0,6mg/kg, remifentanil 5ml/h i sevoran 0,8vol%. Operacija je trajala oko 1,5h i prošla je bez ikakvih problema od strane kardiovaskularnog sistema, bez potrebe za primenom vazoaktivnih lekova i antiaritmika. Za reverziju bloka korišćen je sugamadeks (Bridion 100mg/ml). Tokom perioperativnog perioda, 48h pacijent je regularno po šemi analgezije dobijao 0,25% Levobupivacaine 6ml/4h. Na numeričkoj skali od buđenja iz anestezije i tokom 48h pacijent intenzitet bola ocenjuje 2-4 i ne navodi bilo kakve tegobe po sistemima. Dan posle operacije započeta je rana fizikalna terapija i otpušten je kući četvrtog postoperativnog dana.

Disautonomija se definiše oštećenjem ANS koji upravlja nesvesnim funkcijama tela (pritisak, srčani ritam, GIT i termoregulacija). Javlja se u sklopu dijabetesa, autoimunih oboljenja, produženi COVID, trovanja. Retka je bolest i može predstavljati izazov za anesteziologa. Opšti tretman mora biti usmeren na obezbeđivanje hemodinamske stabilnosti perioperativno i adekvatnu kontrolu bola jer se oni smatraju najznačajnim stimulusima autonomnih kriza (aritmije, duboke hipotenzije, neurološke i GIT tegobe). Ističe se značajno veća potrebna doza lokalnog anestetika za adekvatan nivo anestezije kod disautonomije. Perioperativni period zahteva detaljno planiranje sa jednim ciljem izbegavanja autonomnih kriza.

FEOHROMOCITOM SA KARDIOGENIM ŠOKOM, VA ECMO PRED KAUZALNOM ADRENALEKTOMIJOM

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Ključne reči: feohromocitom, kardiogeni šok, VA ECMO

Feohromocitom predstavlja redak, ali potencijalno reverzibilan uzrok kateholaminske kardiomiopatije i kardiogenog šoka. Autori prezentuju slučaj 57-godišnjeg pacijenta primljenog u bolnicu zbog akutnog STEMI uspešno rešenog perkutanom koronarnom intervencijom. Unatoč uspešno rešenom STEMI dolazi do progresivnog pogoršanja stanja pacijenta sa hipertenzivnom krizom, ventrikularnim aritmijama, razvoja midventrikularne tako- tsubo kardiomiopatije, te pada ejekcione frakcije leve komore na 10-15%. Stanje je brzo progrediralo u refrakterni kardiogeni šok sa sindromom niskog minutnog volumena, oligoanurijom, hepatalnom i renalnom insuficijencijom. S obzirom na pogoršanje stanja, pacijentu je implantirana mehanička podrška V-A ECMO u femoro-femoralnej konfiguraciji, te započeta kontinuirana eliminacijska metoda. Na CT abdomena je nadjena ekspanzija desnog nadbubrega veličine 36x33 mm. Dijagnoza feohromocitoma je potvrđena i laboratorijski povišenim nivoima metanefrina i normetanefrina u serumu.

Kod pacijenta je realizovana multidisciplinarna intenzivna terapija (anesteziolog, endokrinolog, kardiolog). Hiperkateholaminski sindrom je kontrolisan alfa-blokatorom doksazosinom u kombinaciji sa vazodilatatorom urapidilom. Nakon oporavka sistolijske funkcije leve komore ECMO podrška je odstranjena 8. dan od prijema.

Definitivna kauzalna adenalektomija je realizovana 6 dana po dekanilaciji.

Ovaj slučaj je ilustrovao da pri kateholaminskoj kardiomiopatiji mehanička podrška može poslužiti kao most ka stabilizaciji pacijenta, te odložiti visokorizičnu adenalektomiju u period nakon stabilizacije srčane funkcije.

POPLITEAL AND ADDUCTOR CANAL BLOCK FOR ANKLE FRACTURE IN PATIENT ON ANTICOAGULANT THERAPY WITH INR ABOUT TARGET RANGE

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Keywords: popliteal nerve block, adductor canal block, elevated INR, ultrasound-guided regional anesthesia, high-risk patient

Background: Peripheral block anesthesia in patients on anticoagulants is a challenge due to bleeding risk. But it may be considered when neuraxial techniques are contraindicated, and general anesthesia isn't an option due to severe comorbidities and risk of complications.

Case presentation: We report the case of an 83-year-old female undergoing osteosynthesis of a bimalleolar fracture of the left ankle, in whom adductor canal block and popliteal nerve block was performed despite an elevated INR of 2.99. She was on Rivaroxaban due to recent mitral valve implantation. The patient had a cardiac pacemaker (implanted CRT-D), and atrial fibrillation, EF 38%. She is in NYHA group IV. She also had chronic renal insufficiency, type II diabetes, hypothyroidism, and pleural effusion. We performed a single-shot popliteal nerve block using 20 ml of 0.75% ropivacaine. Additionally, an adductor canal block was performed with 10 ml of 0.75% under continuous ultrasound visualization. A tourniquet was used above the knee. After 30 minutes, complete motor and sensory block was achieved. Real-time monitoring for hematoma was performed. The operation lasted 90 minutes. Opioid supplementation was not needed. Postoperative analgesia lasted 10 hours. No hematoma, bleeding, or neurologic impairment was observed.

Discussion: Elevated INR increases the risk of bleeding, including during deep nerve blocks as Popliteal block. This case shows that with planning and ultrasound guidance, peripheral nerve blocks can be safely performed in selected patients with high INR.

Learning points: When neuraxial anesthesia is contraindicated and general anesthesia carries high complication risk, popliteal and adductor canal block under ultrasound and minimal needle passes is an effective alternative for surgical anesthesia for ankle fracture fixation.

References:

1. Gogarten W, Vandermaulen E, Van Aken H, Kozek S et al. Regional anesthesia in patients on antithrombotic drugs: joint ESAIC/ESRA guidelines (4 edition). *Eur J Anaesthesiol*. 2022;39(2):100-32.
2. Karm MH, Lee S, Yoon SH, et al. A case report: the use of ultrasound guided peripheral block during above knee amputation in severely cardiovascular compromised patient who required continuous anticoagulation. *Medicine (Baltimore)* 2018;97:e9374

RISK STRATIFICATION FOR SURGICAL SITE INFECTION IN COLORECTAL CANCER SURGERY. AN OBSERVATIONAL COHORT PILOT STUDY.

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Keywords: colorectal cancer; neoadjuvant therapy; NNIS score; SENIC score; surgical site infection

Background: Surgical site infection (SSI) is a frequent complication after colorectal cancer (CRC) surgery, potentially delaying recovery and return to oncological treatment. The aim of this study was to evaluate perioperative risk factors for SSI, with particular focus on neoadjuvant therapy, and assessing the predictive value of the SENIC (Study on the Efficacy of Nosocomial Infection Control) and NNIS (National Nosocomial Infections Surveillance) risk indices.

Methods: This retrospective single-center cohort study was conducted in a tertiary teaching hospital, including 62 patients undergoing elective CRC surgery. Demographic, clinical, laboratory, and perioperative data were extracted from medical records. SSI was diagnosed by clinical criteria with or without microbiological confirmation. SENIC and NNIS scores were calculated, and associations with SSI were analyzed.

Results: SSI occurred in 17.7% of patients. No significant associations were identified between SSI and diabetes mellitus, anemia, perioperative transfusion and the anatomical site of the procedure (rectum or colon), but strong associations were found with surgical wound contamination class 3–4 ($p < 0.001$; $\phi = 0.944$) and significant intraoperative adverse events (ClassIntra grade ≥ 3 ; $p = 0.019$; $\phi = 0.436$). Neoadjuvant therapy showed no significant association with SSI. Optimal cut-offs for hemoglobin, leukocyte, and neutrophil counts were identified but require external validation. However, SSI could not be predicted based on neutrophil to lymphocyte ratio (NLR) (AUC = 0.56; $p = 0.495$). Both SENIC ($p < 0.001$; $\phi = 0.669$) and NNIS ($p < 0.001$; $\phi = 0.789$) scores correlated with SSI, with NNIS showing higher predictive value. SSI was associated with prolonged ICU and hospital stay and extended antibiotic use.

Conclusions: SSI after CRC surgery is strongly linked to wound contamination and intraoperative complications. NNIS and SENIC scores are found to be useful for risk stratification in CRC patients, and laboratory parameters may offer additional prognostic value. Preventive strategies targeting modifiable risk factors are essential to improve postoperative recovery and timely resumption of oncological therapy.

Ethical approval number: 4/24/3-5228/2-9

CAN NUTRITION PREVENT INFECTION? NUTRITIONAL ADEQUACY AND THE BURDEN OF HOSPITAL-ACQUIRED INFECTIONS AFTER SEVERE TRAUMA

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Keywords: Nutrition, Infection, Proteins, Severe trauma

Background: Hospital-acquired infections (HAIs) remain a major cause of morbidity and mortality after severe trauma, particularly in the era of increasing antimicrobial resistance. Although nutritional therapy is an integral part of intensive care, studies evaluating its association with HAIs have reported conflicting results, partly due to differences in study design, patient populations, and definitions of nutritional adequacy. We investigated the burden of HAIs and the association between nutritional adequacy and infection risk in critically ill trauma patients.

Methods: We conducted a prospective observational study including 286 consecutive adults with severe trauma (Injury Severity Score ≥ 15) admitted to two tertiary intensive care units. The study was approved by the Ethics Committee of the University Clinical Centre of Serbia (Approval No. 1600/57). Nutritional intake was prospectively recorded during the first 10 intensive care unit days. Energy requirements were determined by indirect calorimetry whenever feasible and by predictive equations otherwise. HAIs were defined according to CDC/NHSN criteria and sepsis according to Sepsis-3 definitions. Multidrug-resistant (MDR), extensively drug-resistant (XDR), and pandrug-resistant (PDR) pathogens were classified according to international criteria. Independent predictors of HAIs were evaluated using multivariable competing-risk regression.

Results: HAIs occurred in 60.1% of patients, with a median time to infection of five days. The most frequent infectious complications were ventilator-associated pneumonia (42.0%), sepsis (40.6%), septic shock (30.1%), primary bloodstream infection (30.4%), and central line-associated bloodstream infection (25.9%). Positive microbiological cultures were obtained from bronchial aspirates in 65.0% of patients, central venous catheter blood cultures in 45.8%, and peripheral blood cultures in 38.5%. Extensively drug-resistant (XDR) pathogens accounted for 66.8% of isolates, while multidrug-resistant (MDR) and pandrug-resistant (PDR) organisms each represented 16.1%. Greater nutritional adequacy was independently associated with a lower risk of HAIs (HR 0.68, 95% CI 0.48–0.98; $p=0.036$). Higher protein intake, adjusted for total energy delivery, was also independently associated with a lower infection risk (HR 0.29, 95% CI 0.09–0.96; $p=0.043$). Age, injury severity, APACHE II, SOFA score, and Charlson Comorbidity Index were not independently associated with HAIs.

Conclusions: Hospital-acquired infections remain highly prevalent after severe trauma and are frequently caused by extensively drug-resistant pathogens. Greater nutritional adequacy was independently associated with a lower risk of infection, suggesting that optimizing nutritional therapy may represent an important—and potentially modifiable—component of infection prevention in critically ill trauma patients.

PERIOPERATIVE CHALLENGES OF SUSPECTED HEYDE SYNDROME: A TWO CASE EXPERIENCE

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Keywords: Heyde syndrome, Aortic stenosis, Cardiac anesthesia, Perioperative management, Patient blood management

Heyde syndrome is characterized by the association of severe aortic stenosis, gastrointestinal angiodysplasia and acquired von Willebrand syndrome. For anesthesiologists, its relevance extends beyond the risk of gastrointestinal bleeding. Severe aortic stenosis may complicate diagnostic procedures requiring sedation, while cardiac surgery and cardiopulmonary bypass introduce additional haemostatic challenges. We present two patients with suspected Heyde syndrome to highlight the perioperative considerations relevant to anesthetic management.

Case presentation: Two patients with severe symptomatic aortic stenosis and atrial fibrillation underwent surgical bioprosthetic aortic valve replacement, pulmonary vein isolation and left atrial appendage exclusion.

The first patient was a 66-year-old man with previously confirmed colonic angiodysplasia. The second was a 76-year-old woman with severe iron-deficiency anemia (hemoglobin 77 g/L) of unexplained origin. Fecal occult blood testing was negative, while gastrointestinal endoscopy was deferred because of the procedural risk associated with severe aortic stenosis. Heyde syndrome was therefore considered in both patients, although acquired von Willebrand syndrome was not confirmed by specific functional or multimer testing. Von Willebrand factor antigen levels were 115% and 207%, respectively.

Both patients underwent surgery with cardiopulmonary bypass. Perioperative haemostasis was assessed using rotational thromboelastometry (ROTEM), including assessment after separation from cardiopulmonary bypass. No excessive postoperative bleeding was observed, and postoperative recovery was uneventful in both patients.

Conclusion: Suspected Heyde syndrome presents a distinctive perioperative challenge for anesthesiologists. Management requires recognition of the possible association between severe aortic stenosis and otherwise unexplained gastrointestinal bleeding or iron-deficiency anemia, careful assessment of the risk of diagnostic procedures requiring sedation, and anticipation of haemostatic disturbances during cardiac surgery. Point-of-care coagulation testing may support individualized transfusion management after cardiopulmonary bypass. These cases emphasize that perioperative management of Heyde syndrome extends beyond treating bleeding itself and requires coordinated diagnostic, hemodynamic and haemostatic decision-making.

ACTIVATION OF THE BEZOLD-JARISCH REFLEX IN THE BEACH CHAIR POSITION FOR HUMERUS SURGERY UNDER GENERAL ANESTHESIA

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Keywords: general anesthesia, beach chair position, hemodynamic instability

Abstract

Introduction: The Bezold-Jarisch reflex (BJR) is a physiological cardioinhibitory reflex, characterised by bradycardia, vasodilatation and hypotension. It occurs when mechanoreceptors in the wall of the left heart chamber are stimulated by weaker filling of the chamber. It most often appears during neuraxial anesthesia and peripheral nerve blockade, especially with an interscalene block performed for upper extremity surgery and shoulder surgery in the beach chair position.

Case report: We present a 22-year-old patient who was scheduled for surgery of a right proximal humerus fracture. During patient preparation for surgery, as well as in the operating room, the monitor showed sinus rhythm, non-invasive blood pressure (NIBP) 140/90 mmHg, heart rate (HR) 90/min, and peripheral oxygen saturation (SpO₂) 98%. After adequate preparation, he was put under general anesthesia. The patient was positioned in a semi-sitting position (beach chair), upright between 50- 60 degrees. After positioning, bradycardia occurred; the heart rate was 38 beats per minute, then 35 beats per minute. Measured blood pressure was 50/35mmHg. Atropine sulfate 1 mg and ephedrine 15 mg were given intravenously. The patient was returned to the supine position. After the applied therapy, the vital parameters were stable: NIBP 100/60 mmHg, HR 88/min. The operation was performed in the supine position. Surgery went without complications. After the operation, the patient was transferred to the intensive care unit, extubated, with stable vital parameters.

Conclusion: In this article, we emphasise the importance of early recognition of intraoperative hemodynamic instability and remind you that BJR can cause severe complications. We want to highlight that it is necessary to maintain adequate preload and adjust the patient's position during the operation for both the surgeon and the patient, because patient safety is the most important.

References

1. Hossain, N., Hossain, N., Al-Sadawi, M., & Haq, S. (2020). Bezold-Jarisch reflex-mediated asystole during dobutamine stress testing: a case report. *European heart journal. Case reports*, 4(6), 1–6. <https://doi.org/10.1093/ehjcr/ytaa348>
2. Akyol, F., Binici, O., Özmen, Ö., Büyükfırat, E., Erol, M. K., & Karahan, M. A. (2020). Rejyonel anesteziye nadir görülen unutulması durumunda yüksek risk taşıyan bir refleks: Bezold-Jarisch refleksi [Rare reflex in regional anesthesia which have a high-risk in case of forgotten: Bezold-Jarisch reflex]. *Agri : Agri (Algoloji) Dernegi'nin Yayın organidir = The journal of the Turkish Society of Algology*, 32(3), 168–170. <https://doi.org/10.5505/agri.2018.62687>
3. So, J., Shin, W. J., & Shim, J. H. (2013). A cardiovascular collapse occurred in the beach chair position for shoulder arthroscopy under general anesthesia -A case report-. *Korean journal of anesthesiology*, 64(3), 265–267. <https://doi.org/10.4097/kjae.2013.64.3.265>

ANESTHETIC MANAGEMENT OF A PATIENT WITH RECENTLY TREATED DRESS SYNDROME

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Keywords: drug hypersensitivity, DRESS syndrome, iatrogenic Cushing

DRESS syndrome (Drug Reaction with Eosinophilia and Systemic Symptoms) is a rare but severe, potentially lethal, delayed-type idiosyncratic drug hypersensitivity reaction characterized by a triad of fever, maculopapular exanthema, and multiorgan involvement, typically accompanied by eosinophilia and lymphocytosis, treated by corticosteroids^{1,2}. Surgical procedures and anesthesia carry high immunological risks due to rapid exposure to multiple drugs³.

Case Report: A 55-year-old female was admitted for the scheduled surgical kidney treatment of RCC at university clinic. She already treated hypertension, hypothyroidism, chronic lumbal pain, also reported several drug allergic reactions. Three months earlier due to fever, elevated laboratory markers of inflammation and verified spondylodiscitis she was hospitalized for the C3-C4 epidural abscess treatment. During treatment, she developed DRESS syndrome directly attributed to vancomycin and levofloxacin administration. She developed high fever, maculopapular rash, eosinophilia, mild liver enzymes increase, leaving residual hyperpigmented macules and marked cutaneous xerosis. She was treated by infectious disease specialist, allergist, endocrinologist, dermatologist with systemic therapy. At surgical hospital admission she was with clearly manifested iatrogenic Cushingoid habitus resulting from prolonged high-dose prednisolon therapy, currently decreasing. This habitus, a conservatively managed cervical extradural abscess with limited head-neck extension, wide and short neck, small IIG, short TMD posed a high risk of difficult intubation. Treatment with hydrocortison preoperatively was started. The prescribed allergy protocol premedication 7 hours and 1 hour preoperatively (pantoprazole, metilprednizolone, levocetirizine) was administered. Hydrocortisone "stress full daily dose" iv substitution was administered, followed by gradual postoperative tapering and oral intake after the hospital discharge. Pharmacologically unrelated antibiotics were recommended. Meropenem was initially considered safe based on past tolerance. However, urticaria and pruritus appeared on the fourth postoperative day, forcing all antibiotics discontinuation. Intubation was successfully performed by standard laryngoscopy as all other anesthetic and urological procedures which proceeded without complications.

Conclusion: An individualized strategy is essential for safely managing complex surgical cases involving DRESS syndrome history and its treatment complications. Precise pharmacological preparation, difficult airway awareness, strict adherence to endocrine substitution protocols and careful selection of alternative antibiotic therapy represent the standard for preventing fatal complications in extreme drug hypersensitivity.

References

1. Husain Z, Reddy BY, Schwartz RA. DRESS syndrome: Part I. Epidemiology, pathogenesis, and clinical manifestations. *J Am Acad Dermatol*. 2013;68(5): 693.e1-14.
2. Shunkert EM, Divito SJ. Updates and Insights in the Diagnosis and Management of DRESS Syndrome. *Current Dermatology Reports* 2021; 10:192–204.
3. Kadam PG, Nama R, Modi MP. Anesthetic Management of a Patient with DRESS Syndrome for Renal Transplantation. *Int J Organ Transplant Med*. 2016;7(4):234-236.

PATIENT SATISFACTION AFTER SPINAL ANESTHESIA FOR CESAREAN DELIVERY: COMPARISON OF FOUR INTRATHECAL DRUG REGIMENS

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Keywords: Obstetrics, anesthesia, cesarean section, patient satisfaction

Background: Spinal anesthesia is widely used for cesarean delivery. However, the extent to which different intrathecal drug combinations influence maternal satisfaction and perioperative experience remains clinically relevant. The aim of this study was to compare patient satisfaction and perioperative outcomes among four intrathecal drug regimens.

Materials and methods: This prospective, randomized study was conducted at UCCV over a 6-month period following Ethics Committee approval (00-34/5). Women undergoing elective or non-elective cesarean delivery on weekdays were included. Participants were divided into four groups according to the intrathecal regimen: G1, hyperbaric bupivacaine 0.5% alone; G2, hyperbaric bupivacaine 0.5% plus morphine 100 µg; G3, hyperbaric bupivacaine 0.5% plus fentanyl 15 µg and morphine 100 µg; and G4, hyperbaric bupivacaine 0.5% plus fentanyl 20 µg and morphine 100 µg. The primary outcome was patient satisfaction. Secondary outcomes included intraoperative unpleasant sensations, prolonged motor or sensory block, micturition problems, willingness to choose the same anesthesia in a future cesarean delivery, and willingness to recommend spinal anesthesia. Patient satisfaction was assessed using a 1–5 questionnaire.

Results: A total of 460 participants aged 18–52 years were included; 80% underwent elective cesarean delivery, and 64% had a previous cesarean delivery. 89.52% reported that spinal anesthesia met their expectations, and in 67.17% the decision for spinal anesthesia was made before hospital admission. Pain differed significantly among the four regimens ($P < 0.001$), with the lowest pain score in G4 (4.20) and the highest in G1 (6.45). Ketorolac and acetaminophen consumption also differed significantly among groups ($P = 0.02$). The proportions of patients who were “very satisfied” were 86.52% preoperatively, 81.52% with the operating-theatre experience, and 49.35% with overall hospitalization. Patient satisfaction did not differ by cesarean-delivery urgency or intrathecal drug regimen. After spinal anesthesia, 10.24% reported complaints; among these, back pain was reported by 42.86%, prolonged numbness by 20.41%, and prolonged motor block by 18.37%. Overall, 96.73% would choose spinal anesthesia again, and 98.03% would recommend it.

Conclusion: Patient satisfaction with spinal anesthesia for cesarean delivery was high and did not differ among the four intrathecal drug regimens. Most participants would choose spinal anesthesia again and recommend it for cesarean delivery.

Literature

1. Vatsalya T, Gupta VK, Thakur R, Awasya S. Spinal anaesthesia to caesarean section: Patient satisfaction. *Bioinforma-tion*. 2025 Mar 31;21(3):459–462. doi: 10.6026/973206300210459. PMID: 40599929; PMCID: PMC12208259.

ANESTHETIC MANAGEMENT FOR CAROTID ENDARTERECTOMY IN A PATIENT WITH CHARCOT MARIE-TOOTH DISEASE TYPE II: A CASE REPORT

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Keywords: cervical plexus block, carotid endarterectomy, Charcot Marie-Tooth, regional anesthesia.

Introduction: Regional anesthesia in patients with Charcot-Marie-Tooth (CMT) disease is somewhat controversial and has traditionally been avoided due to the potential risk of nerve injury and the toxic effects of local anesthetics on demyelinated nerves (1,2). Literature on the use of cervical plexus block for carotid endarterectomy in CMT patients is limited.

Case Report: A 70-year-old male patient (ASA III) presented with symptomatic stenosis of the left carotid artery requiring emergency endarterectomy. A 75% stenosis manifested as a transient ischemic attack, characterized by intermittent right arm muscle weakness lasting for two months. The patient had hypertension, hyperlipidemia, and a sporadic form of hereditary motor and sensory neuropathy, presenting with peroneal muscle atrophy. No prior anesthesiology assessment had been performed, and concurrent consultations with other medical specialists were not feasible. Given the recent lipid-rich meal, a Mallampati class III airway, reduced cervical mobility, and a high risk of stroke, superficial and deep cervical plexus blocks were performed under ultrasound guidance using 14 mL of 2% lidocaine, 20 mL of 0.5% isobaric levobupivacaine, and 50 µg of fentanyl. No additional lidocaine was applied during dissection of the carotid sheath. During carotid artery cross-clamping, which lasted 20 minutes, the patient exhibited no neurological or motor changes. The postoperative course in the intensive care unit was uneventful, with no adverse events. On the following day, the patient was transferred to the surgical ward in stable condition.

Discussion: The patient rated satisfaction with the block and intraoperative pain management as 5 out of 5 on the Likert scale. Postoperative pain was effectively managed with metamizole 2500 mg every twelve hours and paracetamol 1 g every eight hours.

Conclusion and Learning points: Anesthesiologists should remain vigilant for potential complications of cervical plexus block, particularly local anesthetic-related nerve injury and local anesthetic systemic toxicity. This case suggests that cervical plexus block may be a feasible anesthetic option for carotid endarterectomy in patients with CMT disease.

References:

1. McClain RL, Rubin DI, Bais KS, Navarro AM, Robards CB, Porter SB. Regional anesthesia in patients with Charcot-Marie-Tooth disease: a historical cohort study of 53 patients. *Can J Anaesth*. 2022 Jul;69(7):880-884. English. doi: 10.1007/s12630-022-02258-5. Epub 2022 Apr 25. PMID: 35469042.
2. Amaral S, Zerriny S, Alrayashi W. Pediatric Charcot-Marie-Tooth disease and peripheral nerve blocks: a retrospective cohort study of 25 patients. *Can J Anaesth*. 2024 Oct;71(10):1372-1378. English. doi: 10.1007/s12630-024-02832-z. Epub 2024 Sep 17. PMID: 39289259.

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Declaration of conflicts of interest: The authors declare that they have no conflict of interest.

PROCENA NUTRITIVNOG STATUSA KRITIČNO OBOLELIH U MEŠOVITOJ JEDINICI INTENZIVNOG LEČENJA

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Ključne reči: malnutricija, nutritivni status, intenzivno lečenje, nutritivna potpora, kritično oboleli bolesnici.

Uvod: Nutritivna potpora predstavlja sastavni deo terapije kritično obolelih. Pravilna procena nutritivnih potreba i nutritivnog statusa važna je za prevenciju i lečenje malnutricije, očuvanje funkcionalnog statusa i povoljan ishod lečenja.

Cilj: Procena nutritivnog statusa bolesnika primenom Subjektivnog obrasca za globalnu procenu (SGA) i utvrđivanje učestalosti nutritivne ugroženosti u Mešovitoj jedinici intenzivnog lečenja.

Materijal i metode: Prospektivna studija preseka sprovedena je u Mešovitoj jedinici intenzivnog lečenja Opšte bolnice Vrbas, nakon dobijanja saglasnosti Etičkog odbora.

Istraživanjem je obuhvaćeno 50 odraslih bolesnika tokom hospitalizacije. Nutritivni status procenjivan je primenom SGA upitnika, koji obuhvata procenu promene telesne mase, unosa hrane, gastrointestinalnih simptoma, funkcionalnog statusa i kliničkog nalaza.

Rezultati: U istraživanju je učestvovalo 50 bolesnika, 33 muškarca (66%) i 17 žena (34%). Prema klasifikaciji Američkog udruženja anesteziologa (ASA), svi ispitanici pripadali su ASA II grupi. Najveći broj bolesnika bio je podvrgnut abdominalnim hirurškim intervencijama, 38 (76%), zatim urološkim 5 (10%), ortopedskim 4 (8%) i ginekološkim 3 (6%). Neadekvatan unos

hranljivih materija registrovan je kod 40 bolesnika (80%). Kod 18 bolesnika (41,9%) neadekvatan unos bio je posledica unosa tečnosti ili samo oralnih dodataka ishrani, dok je kod 15 (34,9%) postojao minimalan unos hrane ili gladovanje. Blagi ili umereni gubitak telesne mase zabeležen je kod 76% bolesnika. Više od polovine ispitanika (54%) nije imalo edeme ni ascites. Na osnovu SGA procene, svi bolesnici imali su blag ili umeren stepen nutritivne ugroženosti.

Zaključak: Nutritivna ugroženost predstavlja čest problem kod kritično obolelih. Rano prepoznavanje rizika omogućava pravovremeno uključivanje odgovarajuće nutritivne potpore i kontinuiranu procenu njenog efekta tokom lečenja.

ASSESSMENT OF THE NUTRITIONAL STATUS OF CRITICALLY ILL PATIENTS IN A MIXED INTENSIVE CARE UNIT

Keywords: malnutrition, nutritional status, intensive care, SGA, nutritional support, critically ill patients.

Introduction: Nutritional support is an integral part of the treatment of critically ill patients. Appropriate assessment of nutritional requirements and nutritional status is important for prevention and treatment of malnutrition and favorable treatment outcomes.

Objective: To assess nutritional status using the Subjective Global Assessment (SGA) and determine the prevalence of nutritional impairment in a Mixed Intensive Care Unit.

Material and Methods: A prospective cross-sectional study was conducted in the Mixed Intensive Care Unit of General Hospital Vrbas, following approval by the Ethics Committee. The study included 50 adult patients. Nutritional status was assessed using the SGA questionnaire, which evaluates body weight changes, food intake, gastrointestinal symptoms, functional status, and clinical findings.

Results: The study included 50 patients, 33 men (66%) and 17 women (34%). According to the American Society of Anesthesiologists (ASA) classification, all patients were classified as ASA

II. Most patients underwent abdominal surgery, 38 (76%), followed by urological surgery, 5 (10%), orthopaedic surgery, 4 (8%), and gynaecological surgery, 3 (6%). Inadequate nutritional intake was recorded in 40 patients (80%). In 18 patients (41.9%), inadequate intake was due to fluid intake or oral supplements alone, while 15 (34.9%) had minimal food intake or were fasting. Mild or moderate weight loss was recorded in 76% of patients. More than half (54%) had neither oedema nor ascites. Based on SGA assessment, all patients had mild or moderate nutritional impairment.

Conclusion: Nutritional impairment is common in critically ill patients. Early recognition enables timely nutritional support and assessment of its effect. Early intervention may contribute to better tolerance of treatment, preservation of functional capacity, and improved overall outcomes.

ENDOVASKULARNA TERAPIJA AKUTNOG AORTALNOG SINDROMA

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Ključne reči: Akutni aortalni sindrom, endovaskularna terapija

U akutni aortalni sindrom (AAS) spadaju: disekcija aorte, intramuralni hematom, penetrirajući ulkus aorte, traumatska povrede aorte. Endovaskularnom terapijom, odnosno uvođenjem stentgrafta može biti tretiran AAS luka aorte (hibridne procedure), descendente i abdominalne aorte. Endovaskularna intervencije je indicirana u slučaju nastanka komplikacija kao što su ruptura aorte, pleuralni izliv, hemo-perikard, malperfuzija visceralnih organa, renalna malperfuzija, ishemija ekstremiteta, nekontrolisana hipertenzija, uvećanje aorte za više od 5 cm od poslednje kontrole, progresija disekcije, perzistentni bol. Inicijalna terapija je medikamentozna (kontrola pritiska, analgezija) uz invazivni monitoring. U nastavku prezentujemo dve kazuistike pacijenata sa AAS.

Pacijentkinja L.T. 47 godina

Primljena u bolnicu zbog bolova u leđima sa širenjem u epigastrijum, nekontrolisane hipertenzije, povraćanja, razlika arterijskih pritisaka na rukama, agitiranost. Na CT aortografiji je bio nalaz disekcije torakoabdominalne aorte Stanford B, disekcije arteria subclavia l. sin., disekcija arteria mesenterica superior, okluzija art. renalis l. dxt., stenoza art. renalis l. sin., okluzija art. iliaca comunis l. dxt., disekcija art. Iliaca comunis l. sin. Realizovan akutni TEVAR (grudni stentgraft) sa okluzijom odstupa art. subclavia l. sin. u opštoj endotrahealnoj anesteziji. 1. dan zbog akutne ishemije leve ruke realizovan by-pass ACC- a. axilaris l. sin., fenestracija perikarda /echo nalaz izliva / 2. dan- paraplegija donjih ekstremiteta, permisivna hipertenzija sa dobrim efektom.

Pacijent E.T. 54 godine

Motociklista, nakon sudara sa kamionom, primljen na urgentni prijem regionalne bolnice, svestan, dezorijentisan, hipotenzija, tahikardija, desaturacija. Na CT celog tela nadjena bilateralna serijska fraktura rebra, apikalni pneumotorax desno, veliki hemotorax levo, fraktura desne lopatice, fraktura desnog zapešća, pokrivena ruptura descendente aorte sa aktivnim leakom u periaortalni hematom. Realizovan akutni TEVAR u analgoz sedaciji sa dobrim efektom.

Broj pacijenata sa dijagnozom akutnog aortalnog sindroma se u poslednje vreme povećava. Terapija AAS zahteva saradnju intervencijskog radiologa, anesteziologa, kardiologa, vaskularnog hirurga i kardiohirurga, te može biti realizovana samo u visoko specijaliziranim ustanovama. Anestezija može biti lokalna sa sedacijom i opšta endotrahealna uz adekvatan monitoring. Ukoliko je moguće treba dati prednost lokalnoj anesteziji /kraći boravak u intenzivnoj nezi, kraća hospitalizacija, neurološka evaluacija/. Cilj anestezije je hemodinamska stabilnost, adekvatan intravaskularni volumen i oksigenacija u cilju prevencije nastanka komplikacija /oštećenje bubrega, moždani udar, ishemija kičmene moždine /.

THE USE OF TAPENTADOL FOR POSTOPERATIVE ANALGESIA AFTER TOTAL HIP AND KNEE ARTHROPLASTY

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Keywords: tapentadol; hip arthroplasty; knee arthroplasty; postoperative pain; multimodal analgesia.

Introduction

Postoperative pain following total hip and knee arthroplasty can significantly impair early mobilization, rehabilitation, and overall patient recovery. Current strategies for postoperative analgesia are based on a multimodal approach aimed at providing adequate pain control while minimizing opioid requirements and opioid-related adverse effects. Tapentadol, an analgesic with a dual mechanism of action, represents a potential option for postoperative pain management.

Aim

In this study, we aimed to compare the analgesic efficacy of tapentadol with other conventionally used opioid analgesics in patients during the early postoperative period following total hip and knee arthroplasty.

Materials and Methods:

This prospective observational study included 141 patients (male N=60) who underwent total hip or knee arthroplasty. Patients were categorized into five groups based on the postoperative analgesic regimen received: M—morphine hydrochloride (n=14), T—tapentadol (n=85), B—intermittent tramadol (n=16), C—continuous intravenous tramadol infusion (n=21), and N—peripheral nerve block (n=5). Postoperative pain intensity was assessed using the Numeric Rating Scale (NRS). Differences in NRS values between groups were analyzed using the Kruskal–Wallis test, while categorical variables were analyzed using the χ^2 test.

Results:

The tapentadol group had a mean NRS score of 1.78 ± 1.32 , while the highest mean NRS score was observed in the morphine group (3.17 ± 2.00). The overall difference in pain intensity among the five groups was not statistically significant ($p=0.097$). After correction for multiple comparisons, none of the pairwise comparisons reached statistical significance. Postoperative pain after knee arthroplasty was independently associated with a higher NRS score ($\beta=0.771$; 95% CI 0.256–1.287; $p=0.003$).

Conclusion:

Tapentadol demonstrated favorable postoperative pain control within a multimodal analgesic regimen. However, this study did not demonstrate a statistically significant difference in postoperative pain intensity between the investigated analgesic regimens. These findings suggest that tapentadol may represent a useful option within multimodal analgesia following total hip and knee arthroplasty. However, its statistical superiority over other analgesic regimens cannot be confirmed based on the results of this study.

References:

1. Laigaard J, Karlsen A, Maagaard M, Haxholdt Lunn T, Mathiesen O, Overgaard S. Perioperative Analgesic Interventions for Reduction of Persistent Postsurgical Pain After Total Hip and Knee Arthroplasty: A Systematic Review and Meta-analysis. *Anesth Analg*. 2025 Oct 1;141(4):765-778. doi: 10.1213/ANE.0000000000007246. Epub 2024 Oct 17. PMID: 39418206.
2. Wainwright TW, Gill M, McDonald DA, Middleton RG, Reed M, Sahota O, Yates P, Ljungqvist O. Consensus statement for perioperative care in total hip replacement and total knee replacement surgery: Enhanced Recovery After Surgery (ERAS®) Society recommendations. *Acta Orthop*. 2020 Feb;91(1):3-19. doi: 10.1080/17453674.2019.1683790. Epub 2019 Oct 30. Update in: *Acta Orthop*. 2020 Jun;91(3):363. doi: 10.1080/17453674.2020.1724674. PMID: 31663402; PMCID: PMC7006728.

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Declaration of conflicts of interest: The authors declare that they have no conflict of interest.

Ethical approval: The study was approved by the Ethics Committee of the General Hospital “Dr Radivoj Simonović”, Sombor, on August 18, 2025, under reference number 23-5690/2025.

MULTIDISCIPLINARY INTENSIVE CARE MANAGEMENT OF A PATIENT FOLLOWING TRAUMATIC UPPER ARM AMPUTATION WITH FAILED REPLANTATION: A CASE REPORT

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Keywords: traumatic amputation; replantation; acute respiratory distress syndrome; mechanical ventilation; multidisciplinary management

Introduction: Traumatic upper-extremity amputations are rare and severe injuries requiring urgent surgical management and continuous multidisciplinary care. The success of replantation attempts depends not only on surgical reconstruction but also on the timely recognition and management of local and systemic complications.

Case report: We present the case of a 22-year-old patient with no significant previous comorbidities who was admitted following a traumatic amputation of the right upper arm sustained at the workplace. After initial assessment and stabilization, an emergency replantation was attempted with multidisciplinary surgical management. During the intraoperative and early postoperative periods, the patient developed hemodynamic instability, acid-base disturbances, and signs of significant muscle injury. Due to an unfavorable local and systemic clinical course, the replanted limb was deemed nonviable, and secondary amputation was performed. The subsequent clinical course was complicated by severe respiratory failure with the development of acute respiratory distress syndrome, prolonged mechanical ventilation, and a hospital-acquired infection. Weaning from mechanical ventilation was further complicated by marked psychomotor agitation, anxiety, and panic episodes, necessitating continuous psychiatric monitoring and adjustment of therapy. Following gradual improvement in respiratory, hemodynamic, and psychological status, the patient was successfully weaned from mechanical ventilation and transferred for further surgical management.

Conclusion: This case highlights the importance of a multidisciplinary approach in the management of patients with complex traumatic amputation and failed replantation. Timely recognition and treatment of respiratory, hemodynamic, infectious, and psychological complications were crucial for achieving a favorable outcome.

KLINIČKI ZNAČAJ BRZE MOLEKULARNE DIJAGNOSTIKE SEPSA U JEDINICI INTENZIVNOG LEČENJA KARDIOVASKULARNIH BOLESNIKA

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Ključne reči: sepsa, T2Bacteria, T2Resistance, hemokultura, antimikrobna

Uvod: Rana identifikacija patogenih mikroorganizma u krvi od ključnog je značaja za pravovremeno uvođenje ciljne antimikrobne terapije kod kritično obolelih pacijenata sa sumnjom na sepsu. U jedinici intenzivnog lečenja kardiovaskularnih bolesnika postoperativni sistemski inflamatorni odgovor često imitira infekciju, dok empirijska primena antibiotika širokog spektra može smanjiti osetljivost konvencionalnih hemokultura, odlažući mikrobiološku potvrdu i optimizaciju terapije. Brze molekularne dijagnostičke metode imaju potencijal da unaprede rano donošenje kliničkih odluka i doprinesu racionalnijoj primeni antimikrobne terapije.

Metode: Sprovedena je retrospektivna opservaciona studija koja je obuhvatila 30 odraslih pacijenata sa sumnjom na sepsu, lečenih u jedinici intenzivnog lečenja Nacionalnog instituta za srce i krvne sudove „Dedinje“ u periodu od juna 2024. do juna 2025. godine. Kod svih ispitanika istovremeno su urađeni T2Bacteria Panel, T2Resistance Panel i konvencionalne hemokulture. Studiju je odobrio Etički komitet ustanove (br. 5372/2025). Analizirani su podudarnost dijagnostičkih metoda, vreme do dobijanja rezultata, identifikacija uzročnika i gena rezistencije, izmene antimikrobne terapije i kratkoročni klinički ishodi.

Rezultati: Ukupna podudarnost između T2Bacteria Panel-a i hemokultura iznosila je 80% (24/30). Kod osam pacijenata obe metode bile su pozitivne, kod šesnaest negativne, dok je kod šest registrovana nepodudarnost nalaza. T2Bacteria Panel pokazao je 100% senzitivnost i specifičnost za patogene obuhvaćene panelom, dok su hemokulture detektovale 75% ovih uzročnika. Medijana vremena do identifikacije uzročnika iznosila je 4,06 sati za T2Bacteria Panel u poređenju sa 103 sata za hemokulture ($p < 0,001$). Antimikrobna terapija izmenjena je kod 6 od 10 (60%) T2-pozitivnih pacijenata, što je omogućilo raniju eskalaciju ciljne terapije kod infekcija izazvanih multirezistentnim gram-negativnim bakterijama ili deeskalaciju nepotrebne antimikrobne terapije. T2Resistance Panel omogućio je ranu detekciju klinički značajnih gena za karbapenemaze i ESBL pre dobijanja rezultata konvencionalnog testiranja osetljivosti. Hemokulture su ostale nezamenljive za identifikaciju uzročnika koji nisu obuhvaćeni panelom, kao i za kompletno fenotipsko određivanje antimikrobne osetljivosti.

Zaključak: Kod pacijenata sa sumnjom na sepsu nakon kardiovaskularnih hirurških intervencija, brza molekularna dijagnostika značajno skraćuje vreme do mikrobiološke dijagnoze i omogućava ranije donošenje odluka o antimikrobnoj terapiji zasnovanih na dokazima. T2Bacteria i T2Resistance paneli ne predstavljaju zamenu za konvencionalne hemokulture, već njihovu vrednu dopunu, omogućavajući pravovremeniju optimizaciju antimikrobne terapije i unapređenje programa racionalne primene antibiotika kod kritično obolelih pacijenata.

COAGULATION FACTOR REPLACEMENT IN THE CONSERVATIVE MANAGEMENT OF A LARGE WARFARIN-ASSOCIATED ABDOMINAL WALL HEMATOMA – A CASE REPORT

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Keywords: Warfarin, Hematoma, Blood Coagulation Factors

Abstract

Background: Major bleeding is a serious complication of vitamin K antagonist therapy, particularly in elderly patients with multiple comorbidities. Large abdominal wall hematomas may cause substantial blood loss and hemorrhagic shock. Rapid correction of coagulopathy combined with bedside ultrasound monitoring may facilitate successful conservative management and avoid high-risk surgical intervention.

Case presentation: A 75-year-old woman with atrial fibrillation treated with warfarin presented with left-sided abdominal pain, weakness, and malaise. Initial hemoglobin was 117 g/L and INR 4.24. Within 24 hours, her condition deteriorated, with hemoglobin decreasing to 93 g/L and INR increasing to 4.83. Ultrasonography demonstrated a large anterior abdominal wall hematoma (132 × 85 × 53 mm) and a pelvic hemorrhagic collection (102 × 71 × 102 mm). Computed tomography confirmed an extensive abdominal wall hematoma with abdominal and pelvic extension.

Following further deterioration with pallor, oliguria, and collapse, she was transferred to the intensive care unit (ICU). Hemoglobin decreased to 75 g/L and INR reached approximately 5.0. Intensive conservative treatment focused on rapid hemostatic resuscitation and targeted substitution therapy, including three units of packed red blood cells, four-factor prothrombin complex concentrate (Octaplex, 1,500 IU), fibrinogen concentrate, vitamin K, and tranexamic acid, together with supportive intensive care.

A key component of conservative management was serial bedside point-of-care ultrasound (POCUS), performed by the anesthesiologist in the ICU. Repeated examinations enabled close monitoring of intra-abdominal free fluid and hemorrhagic collections alongside serial hemoglobin, coagulation parameters, and hemodynamic assessment, supporting ongoing evaluation of the need for surgical intervention.

Coagulopathy was rapidly corrected, with INR decreasing from approximately 5.0 to 1.1, while hemoglobin progressively increased to 109 g/L. Serial clinical and POCUS assessments showed no evidence requiring emergency surgery, and the patient was successfully managed non-operatively.

Conclusion: Targeted coagulation factor replacement with PCC and fibrinogen concentrate, combined with anesthesiologist-performed serial POCUS/FAST monitoring in the ICU, may provide an effective strategy for conservative management of severe warfarin-associated bleeding in carefully selected elderly patients, potentially avoiding the additional morbidity of surgical intervention.

COMPARISON OF REVISED BAUX AND SOFA SCORES FOR ICU MORTALITY PREDICTION IN ADULT BURN PATIENTS

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Keywords: burn injury, Revised Baux Score, SOFA score, intensive care

Background: Burn injuries are still an important clinical problem, associated with substantial mortality, morbidity and long-term complications. Early identification of burn patients at high risk of death is essential for clinical decisions in the intensive care unit (ICU). The Revised Baux Score is a prognostic model incorporating age, total body surface area burned, and inhalation injury. In contrast, the Sequential Organ Failure Assessment (SOFA) score reflects the severity of organ dysfunction in critically ill patients. Direct comparisons of their prognostic performance in burn ICU populations remain limited.

Aim: To compare the ability of the Revised Baux Score and admission SOFA score to predict ICU mortality in critically ill adult burn patients.

Methods: This retrospective single-center cohort study included 72 adult burn patients admitted to the ICU at the University Clinical Center of Vojvodina between 2023 and 2026. We obtained demographic characteristics, burn severity, inhalation injury, Revised Baux Score, admission SOFA, and ICU outcome from medical records. The primary outcome of this study was ICU mortality. Receiver operating characteristic (ROC) curve analysis was used to assess discrimination, and areas under the ROC curves were compared using DeLong's test. The optimal Revised Baux cut-off was determined using the Youden index.

Results: Overall ICU mortality was 55.6%. Patients who died had significantly higher Revised Baux Scores than survivors (119.8 ± 27.8 vs. 74.0 ± 19.3 , $p < 0.001$). The Revised Baux Score demonstrated excellent discrimination for ICU mortality (AUC 0.942, 95% CI 0.894–0.989), while the admission SOFA score showed good discrimination (AUC 0.846, 95% CI 0.766–0.927). The Revised Baux Score had significantly greater discriminative ability than the SOFA score (difference in AUC 0.096, DeLong $p = 0.036$). A Revised Baux Score of 94 was identified as the optimal cut-off, with 87.5% sensitivity and 87.5% specificity for ICU mortality.

Conclusion: The Revised Baux Score showed a very good ability to predict ICU mortality and performed better than the SOFA score calculated at admission. As it is simple to calculate and includes variables directly related to burn injury, it may be useful for early assessment of mortality risk in critically ill burn patients.

DEXMEDETOMIDINE AS AN ADJUVANT TO BUPIVACAINE TO PROLONG SPINAL ANESTHESIA FOR REVISION ARTHROPLASTY

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Keywords: spinal anesthesia, intrathecal dexmedetomidine, revision arthroplasty, elderly, regional anesthesia

Introduction: Revision hip and knee arthroplasty may require prolonged anesthesia and presents particular challenges in elderly patients with significant cardiopulmonary comorbidities. To avoid general anesthesia (GA), intrathecal dexmedetomidine, as an adjuvant to bupivacaine, may prolong spinal sensory and motor block, potentially expanding the applicability of spinal anesthesia (SA) (1).

Case Series: Five elderly patients with coronary artery disease and chronic obstructive pulmonary disease (COPD) underwent revision arthroplasty under SA: two revision hip and three revision knee arthroplasties. Intrathecal injection consisted of 0.5% bupivacaine (14–15 mg), fentanyl (15 µg), morphine (100 µg), and dexmedetomidine (5 µg). Antibiotic prophylaxis and tranexamic acid were administered preoperatively. Intravenous paracetamol and ketoprofen were administered intraoperatively and continued postoperatively, along with a single dose of dexamethasone. Supplemental oxygen was provided via face mask. Hypotension occurred in two patients and was successfully treated with intravenous phenylephrine. No bradycardia or oxygen desaturation was observed. All procedures, lasting 3.5–4.5 hours, were completed without conversion to GA. Motor block resolved within 1–3 hours postoperatively, and no patient required rescue analgesia during the first 24 postoperative hours.

Discussion: GA in patients with COPD is associated with a significantly increased risk of postoperative respiratory complications (2). Owen et al. demonstrated that SA may offer favorable perioperative outcomes in revision hip (3) and knee (4) arthroplasty. Ollosu et al. demonstrated that intrathecal dexmedetomidine improves early analgesia, but also prolongs motor block and increases the incidence of bradycardia (5).

Conclusion: Intrathecal dexmedetomidine added to bupivacaine and morphine enabled successful completion of revision hip and knee arthroplasty in five high-risk elderly patients, without conversion to GA or need for rescue analgesia during the first 24 hours. This outcome reflects a multimodal analgesic regimen, with intrathecal dexmedetomidine effectively prolonging SA and potentially allowing safer, more predictable perioperative management in this population. Overall, this case series demonstrates that dexmedetomidine-augmented SA can provide anesthesia of sufficient duration and robust postoperative analgesia even in prolonged procedures, broadening the applicability of SA in elderly patients previously considered candidates for GA by default, and thereby enhancing perioperative safety.

References:

1. Giaccari LG, Coppolino F, Aurilio C, et al. Is intrathecal bupivacaine plus dexmedetomidine superior to bupivacaine in spinal anesthesia for a cesarean section? A systematic review and meta-analysis. *Eur Rev Med Pharmacol Sci*. 2024;28(15):4067-4079. doi: 10.26355/eurrev_202408_36638.
2. Tseng L, Bartkowiak B, Lan H, et al. Regional versus General Anesthesia in the Elderly: A Nuanced Approach. *Curr Anesthesiol Rep*. 2025;15(1):46. doi:10.1007/s40140-025-00701-z.
3. Owen AR, Amundson AW, Fruth KM, et al. Spinal Versus General Anesthesia in Contemporary Revision Total Hip Arthroplasties. *J Arthroplasty*. 2023;38(7Suppl):S184-S188.e1. doi: 10.1016/j.arth.2023.03.013.
4. Owen AR, Amundson AW, Larson DR, et al. Spinal Versus General Anesthesia in Contemporary Revision Total Knee Arthroplasties. *J Arthroplasty*. 2023;38(6Suppl):S271-S274.e1. doi: 10.1016/j.arth.2023.01.053.
5. Ollosu M, Tripodi VF, Cardia C, et al. Efficacy and safety of intrathecal adjuvants in lower limb orthopaedic surgery: a systematic review and network meta-analysis of randomised controlled trials. *J Anesth Analg Crit Care*. 2026. doi: 10.1186/s44158-026-00427-2.

INCIDENTALLY DETECTED INTERNAL JUGULAR VEIN THROMBOSIS DURING CENTRAL VENOUS CATHETERIZATION

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Keywords: Thrombosis, Ultrasound, Central venous catheter, Jugular vein, Complication

Introduction: Thrombosis of the internal jugular vein (IJV) may have an asymptomatic course, particularly in patients with malignancies and an increased risk of thromboembolic events (1). Ultrasound assessment of the vessel prior to central venous catheterization not only facilitates the selection of the puncture site but also enables the detection of previously undiagnosed vascular pathology (2,3).

Case report: A 45-year-old male patient with a diagnosis of a left renal tumor was admitted to the Department of Urology, for surgical treatment—left radical nephrectomy. During the pre-anesthetic assessment, the patient denied any chronic diseases or regular medication use, as well as any clinical signs or symptoms suggestive of IJV thrombosis. Preoperative internal medicine, anesthesiology assessments, and laboratory results, (including a D-dimer), were within normal limits. The patient remained hemodynamically stable throughout the procedure. Due to the size of the tumor (120mm × 83mm × 80mm) and the anticipated risk of significant intraoperative bleeding, a central venous catheter (CVC) was inserted into the right IJV, without initial ultrasound guidance and secured at a depth of 17 cm. The procedure was completed without immediate complications. The distal lumen was patent; however, blood aspiration through the proximal lumen was not possible. Ultrasound examination confirmed the intravascular position of the catheter and simultaneously revealed thrombotic material within the right IJV through which the CVC was passing. Postoperative course showed no clinical signs of thromboembolic complications. Following consultation with a vascular surgeon, the CVC was removed while therapeutic-dose Nadroparin Calcium was initiated and adjusted according to anti-Xa activity until discharge. Ultrasound examination confirmed thrombotic masses in the right internal jugular vein, with no evidence of thrombosis in the contralateral vein. Follow-up ultrasound examination three months later, demonstrated recanalization of the right IJV after which anticoagulant therapy was discontinued.

Conclusion: This case highlights the importance of preprocedural ultrasound assessment of the patency of the target vein, regardless of their preoperative clinical status, age or absence of chronic diseases and symptoms. Targeted ultrasound evaluation should also be considered in cases of unexpected CVC dysfunction, as it may reveal previously undiagnosed venous thrombosis.

References:

1. Scerrati A, Menegatti E, Zamboni M, Malagoni AM, Tessari M, Galeotti R, et al. Internal jugular vein thrombosis: etiology, symptomatology, diagnosis and current treatment. *Diagnostics* (Basel). 2021;11(2):378.
2. Saugel B, Scheeren TWL, Teboul JL. Ultrasound-guided central venous catheter placement: a structured review and recommendations for clinical practice. *Crit Care*. 2017;21(1):225.
3. Lamperti M, Biasucci DG, Disma N, et al. European Society of Anaesthesiology guidelines on peri-operative use of ultrasound-guided for vascular access (PERSEUS vascular access). *Eur J Anaesthesiol*. 2020; 37(5):344-376

LOW-DOSE SPINAL ANESTHESIA FOR HIP FRACTURE SURGERY IN GERIATRIC PATIENT WITH HIGH CARDIOVASCULAR RISK DUE TO AORTIC STENOSIS. IS IT SAFE AND EFFECTIVE?

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Keywords: Low-dose spinal anesthesia, Severe aortic stenosis, Hip Fracture

Introduction: Hip fractures in geriatric patients are associated with significant perioperative morbidity and mortality. Severe aortic stenosis represents a major anesthetic challenge, as fixed cardiac output limits the ability to compensate for sudden decreases in systemic vascular resistance. Neuraxial anesthesia has therefore traditionally been considered contraindicated in severe aortic stenosis due to risk for sympathetic blockade, hypotension, and impaired coronary perfusion. However, carefully titrated low-dose spinal anesthesia combined with regional analgesia may be a feasible option in selected high-risk patients (1,2,3).

Case Description: An 82-year-old patient with a hip fracture was admitted for urgent surgical intervention. Preoperative echocardiography demonstrated severe aortic stenosis with an aortic valve area of 0.91 cm², a mean pressure gradient of 42 mmHg and an ejection fraction of 40%. Comorbidities include hypertension and severe stage of chronic obstructive pulmonary disease. Following brief preoperative optimization, surgery was scheduled. Premedication consisted of intravenous Aminophylline (125 mg) and Methylprednisolone (40 mg), as well as inhaled Ipratropium- bromide (500 µg). Anesthesia was performed using low-dose spinal anesthesia with 1.5 ml of 0.5% Levobupivacaine (6.5 mg) and Fentanyl (25 mcg) administered intrathecally. Continuous invasive arterial pressure, oxygen saturation, electrocardiographic, and respiratory monitoring were maintained throughout the procedure. The level of anesthesia was satisfactory throughout the operation; the depth of motor block was tested with the Bromage scale (a score of 2) and the level of sensory block was tested with cold solutions. Hemodynamic parameters were stable without the need for vasopressor support and no clinically significant hypotension or bradycardia occurred. Postoperative analgesia was achieved with a pericapsular nerve group block (PENG) with 15 ml of 0.25 % Levobupivacaine and intravenous administration of Paracetamol (1g). Adequate pain control (NRS 1–3) facilitated early mobilization and recovery.

Conclusion: In carefully selected patients with severe aortic stenosis, low-dose spinal anesthesia combined with regional analgesia and vigilant monitoring may represent an effective anesthetic strategy for hip fracture surgery in high-risk elderly patients. Further studies are warranted to establish the safety, efficacy, and optimal application of this approach in this high-risk patient population.

References:

1. White SM. A retrospective, observational, single-centre, cohort database analysis of the haemodynamic effects of low-dose spinal anaesthesia for hip fracture surgery. *BJA Open*. 2024;9:100261. doi:10.1016/j.bjao.2024.100261.
2. Tabrizi NS, Demos RA, Schumann R, Musuku SR, Shapeton AD. Neuraxial anesthesia in patients with aortic stenosis: a systematic review. *J Cardiothorac Vasc Anesth*. 2024;38(2):505-516. doi:10.1053/j.jvca.2023.09.027.
3. Olsen F, Hård af Segerstad M, Dalla K, Ricksten SE, Nellgård B. Fractional spinal anesthesia and systemic hemodynamics in frail elderly hip fracture patients. *F1000Res*. 2023;12:210. doi:10.12688/f1000research.130387.3.

Declaration of conflicts of interest: The authors declare that they have no conflict of interest.

WHEN EVERY MINUTE MATTERS: TIMELY REVERSAL OF ACENOCOUMAROL- ASSOCIATED INTRACRANIAL HEMORRHAGE

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Keywords: Acenocoumarol, Anticoagulation reversal, Intracranial hemorrhage, Prothrombin complex concentrate

Background: Intracranial hemorrhage (ICH) in patients receiving vitamin K antagonists (VKAs) is a life-threatening condition requiring urgent reversal of anticoagulation. The risk of early hematoma expansion underscores the importance of prompt and effective correction of coagulopathy. In patients with a mechanical mitral valve and atrial fibrillation, anticoagulation reversal poses an additional therapeutic challenge due to the high risk of thromboembolic complications (1).

Case Presentation: A middle-aged patient was admitted with acute headache, altered mental status, dysarthria, and gait instability. Medical history included arterial hypertension, atrial fibrillation, previous mechanical mitral valve replacement, and tricuspid valve annuloplasty. Chronic therapy included antihypertensive and antiarrhythmic agents, as well as oral anticoagulation with acenocoumarol. Head CT revealed a right frontal intracerebral hematoma with significant mass effect and midline shift, accompanied by a lamellar subdural hematoma and traces of subarachnoid hemorrhage. Following admission, the patient developed further neurological deterioration. Laboratory testing showed markedly prolonged coagulation parameters (PT [R] 5.05; aPTT [R] 2.17). Given the life-threatening ICH and the need for urgent neurosurgical intervention, four-factor prothrombin complex concentrate (4F-PCC) was administered at a dose of 40 IU/kg, together with intravenous vitamin K 10 mg. Repeat coagulation testing immediately before surgery confirmed adequate reversal of anticoagulation. Emergency evacuation of the intracerebral and subdural hematomas was performed, with an uneventful postoperative course. Following multidisciplinary assessment of thromboembolic and rebleeding risks, low-molecular-weight heparin was cautiously initiated. On postoperative day 7, the patient was discharged home in stable condition without neurological deficits.

Discussion: In VKA-associated ICH, both the choice of reversal agent and the time to adequate coagulation correction are critical. Delayed correction may allow hematoma expansion, worsening neurological outcomes and complicating urgent neurosurgical management. Administration of 4F-PCC enables rapid reversal of VKA anticoagulation and may shorten the time to hemostatic correction. This case highlights the importance of a coordinated, time-sensitive approach aimed at minimizing the interval between ICH diagnosis and effective anticoagulation reversal.

Conclusion: In life-threatening ICH, every minute matters. Rapid reversal with 4F-PCC and vitamin K is crucial for timely hemostatic correction and urgent neurosurgical management.

References:

1. Li M, Frontera JA. Emergency reversal of antithrombotics in intracerebral hemorrhage: an update. *Curr Neurol Neurosci Rep.* 2025;25(1):81.

ENDOTELNI BIOMARKERI KAO PROGNOСТИČKI POKAZATELJI KOD BOLESNIKA SA INFEKTIVNIM ARDS-OM

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Ključne reči: ARDS, biomarkeri, prognoza, mortalitet, personalizovana medicina

Uvod: Akutni respiratorni distress sindrom (ARDS) karakterišu hipoksemijska respiratorna insuficijencija i visoka smrtnost. Endotelno oštećenje i poremećaj funkcije alveolokapilarne barijere imaju centralnu ulogu u patogenezi ARDS-a, zbog čega biomarkeri endotelnog oštećenja mogu imati prognostički značaj. Cilj studije bio je utvrditi granične vrednosti, senzitivnost, specifičnost i prediktivne vrednosti endokana i angiopoetina-2 u predikciji 28-dnevnog mortaliteta kod bolesnika sa infektivnim ARDS-om.

Materijal i metode: Sprovedena je retrospektivna kohortna studija u Jedinici intenzivne nege Instituta za plućne bolesti Vojvodine. Uključeni su punoletni bolesnici koji su ispunjavali kriterijume Berlinske definicije ARDS-a. Isključeni su bolesnici mehanički ventilirani duže od 48 sati pre uzorkovanja i oni sa komorbiditetima koji mogu uticati na vrednosti biomarkera. Uzorci krvi uzimani su u prvih 48 sati, a serum analizirani ELISA metodom. Prognoštička vrednost biomarkera procenjena je logističkom regresijom i analizom preživljavanja.

Rezultati: U studiju je uključen 121 bolesnik, prosečne starosti $55,5 \pm 15,0$ godina; 63,6% bili su muškarci. Težak ARDS bio je najzastupljeniji (47,9%), dok je virusna etiologija registrovana kod 53,7% bolesnika. Kod umrlih su zabeležene više vrednosti endokana i angiopoetina-2, bez statistički značajnih razlika. Optimalna granična vrednost endokana iznosila je 0,62 ng/ml (senzitivnost 86,7%; specifičnost 33,8%), a angiopoetina-2 6,7 ng/ml (senzitivnost 41,7%; specifičnost 80,0%).

Zaključak: Endotelni biomarkeri mogu doprineti proceni težine i prognostičkoj stratifikaciji ARDS-a. Potrebna su dalja istraživanja radi njihove validacije i primene u personalizovanom pristupu lečenju.

Studija je sprovedena u skladu sa principima Helsinške deklaracije, a odobrena je od strane Stručnog i Etičkog odbora Instituta za plućne bolesti Vojvodine (broj protokola 109-VI, datum odobrenja 5. novembar 2020. godine).

ENDOTHELIAL BIOMARKERS AS PROGNOSTIC INDICATORS IN PATIENTS WITH INFECTIOUS ARDS

Introduction: Acute respiratory distress syndrome (ARDS) is characterized by hypoxemic respiratory failure and high mortality. Endothelial damage and disruption of the alveolocapillary barrier function play a central role in the pathogenesis of ARDS, which is why biomarkers of endothelial damage may have prognostic significance. The aim of the study was to determine the threshold values, sensitivity, specificity and predictive values of endocan and angiopoietin-2 in the prediction of 28-day mortality in patients with infectious ARDS.

Material and methods: A retrospective cohort study was conducted in ICU of the Institute for Pulmonary Diseases of Vojvodina. Adult patients who fulfilled the criteria of Berlin definition of ARDS were included. Patients mechanically ventilated for more than 48 hours before sampling and those with comorbidities that may affect biomarker values were excluded. Blood samples were taken in the first 48 hours, and sera were analyzed by the ELISA method. The prognostic value of biomarkers was assessed by logistic regression and survival analysis.

Results: The study included 121 patients, average age 55.5 ± 15.0 years; 63.6% were men. Severe ARDS was the most prevalent (47.9%), viral etiology was registered in 53.7% of patients. In those who died, higher values of endocan and angiopoietin-2 were recorded, without statistically significant differences. The optimal limit value of endocan was 0.62 ng/ml (sensitivity 86.7%; specificity 33.8%), and angiopoietin-2 was 6.7 ng/ml (sensitivity 41.7%; specificity 80.0%).

Conclusion: Endothelial biomarkers may contribute to severity assessment and prognostic stratification of ARDS. Further research is needed for validation and application in a personalized treatment approach.

The study was conducted in accordance with the principles of the Declaration of Helsinki, and was approved by the Professional and Ethical Committee of the Institute for Lung Diseases of Vojvodina (protocol number 109-VI, approval date November 5, 2020).

DIAGNOSTIC AND THERAPEUTIC CHALLENGES IN SEPSIS AND SEPTIC SHOCK OF UNKNOWN ETIOLOGY – A CASE REPORT

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Keywords: sepsis, septic shock, sepsis of unknown etiology, multidisciplinary approach, antibiotic therapy.

Introduction: Sepsis and septic shock remain leading causes of mortality in intensive care units despite modern protocols for early recognition and treatment. Despite extensive microbiological investigations, the causative pathogen may remain unidentified, placing such patients in the category of culture-negative sepsis.

Case Presentation: A middle-aged female patient was admitted with a clinical presentation of sepsis. Twenty-four hours after admission, her condition deteriorated, with the development of respiratory failure and hemodynamic instability, necessitating invasive mechanical ventilation and vasoactive support. All available supportive treatment measures were implemented. According to current guidelines and given the suspicion of sepsis originating from the genital tract, empirical triple antibiotic therapy (piperacillin–tazobactam, azithromycin, and metronidazole) was initiated immediately. The patient underwent comprehensive microbiological sampling, with no positive results identifying the source of sepsis. Due to the lack of response to the initial antibiotic therapy, the regimen was changed to imipenem–cilastatin, vancomycin, and fluconazole, following which the patient's condition improved. A detailed radiological work-up was performed; however, the source of infection remained unidentified. Repeated microbiological sampling of biological specimens again failed to isolate a causative pathogen. The clinical course was complicated by prolonged difficulty in weaning from mechanical ventilation, necessitating percutaneous tracheostomy, as well as the development of pneumonia, which responded favorably to adjusted antibiotic therapy with imipenem–cilastatin–relebactam. Despite an exceptionally severe and prolonged clinical course, a coordinated multidisciplinary approach enabled gradual recovery, and the patient was discharged home for further treatment and care.

Discussion: This case illustrates a key diagnostic challenge in intensive care medicine, the management of severe septic shock in the absence of microbiological confirmation despite the use of available diagnostic methods. Therapeutic decisions must be based on clinical assessment, biomarker trends, and the patient's response to empirical therapy. A multidisciplinary approach, combined with timely escalation of supportive measures, proved crucial for a favorable outcome despite the prolonged and complicated hospital course.

Conclusion: A successful outcome in severe septic shock can be achieved even without identification of the causative pathogen, through early recognition, aggressive supportive therapy, and a multidisciplinary approach.

Reference:

1. Prescott GC, Antonelli M, Alhazzani W, Mooler MH, Alshaamsi F, Azevedo LCP, et al. Surviving Sepsis Campaign: International Guidelines for Management of Sepsis and Septic Shock 2026. *Crit Care Med.* 2026;54(4):725-812.

PRONE POSITIONING AS RESCUE THERAPY FOR SEVERE REPERFUSION LUNG INJURY AFTER PULMONARY THROMBOENDARTERECTOMY

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Keywords: Pulmonary thromboendarterectomy (PTE), reperfusion lung injury (RLI), prone positioning (PP)

Introduction. Reperfusion lung injury (RLI) is a life-threatening complication of pulmonary thromboendarterectomy (PTE).¹ It is characterized by new pulmonary opacities within 72 hours of surgery, hypoxemia ($\text{PaO}_2/\text{FiO}_2 < 300$ with $\text{PEEP} \geq 5 \text{ cmH}_2\text{O}$) after exclusion of pneumonia and cardiac decompensation. Severe RLI is treated with extracorporeal membrane oxygenation (ECMO), while prone positioning (PP) has been reported as a strategy when ECMO is unavailable or unsuitable.² We report the early use of PP in the management of severe RLI following PTE.

Case presentation. A 65-year-old male patient with Chronic Thromboembolic Pulmonary Hypertension (CTEPH) had been treated for three years with riociguat 2.5mg (Adempas®, Bayer AG, Leverkusen, Germany) TID, bosentan 125mg (Cascata®, Hemofarm A.D., Vrsac, Serbia) bid, and balloon pulmonary angioplasty (BPA). Organizing thromboembolus involved the main pulmonary artery with extension into the segmental branches (Jamieson type III). In the preceding year, a stent was implanted in the ostium of the A4 segmental pulmonary artery during BPA for management of worsening heart failure (NYHA III/IV), resulting in temporary improvement to NYHA II/III. Owing to subsequent clinical deterioration, PTE was performed under deep hypothermic circulatory arrest (58 minutes). Following endarterectomy, PVR decreased from 557 to 206 $\text{dyn} \cdot \text{s} \cdot \text{cm}^{-5}$, while pulmonary artery pressure decreased from 85/26 to 36/23 mmHg.

Progressive hypoxemia developed on the first postoperative day (POD). Chest radiography demonstrated new right basal opacities and lung ultrasound revealed B-lines in the R2 and R4 regions, with a LUS score of 3 (Figure 1). Hemodynamic assessment revealed CO 5.5L/min, CI 2.8L/min/m² and SV 69.5mL. Despite mechanical ventilation with FiO_2 1.0 and neuromuscular blockade (rocuronium), PaO_2 decreased to 40mmHg ($\text{PaO}_2/\text{FiO}_2 = 47$), prompting early PP and continuation of riociguat and bosentan.

Figure 1. New basal opacities on chest radiography (left) and B-lines on lung ultrasound (right).

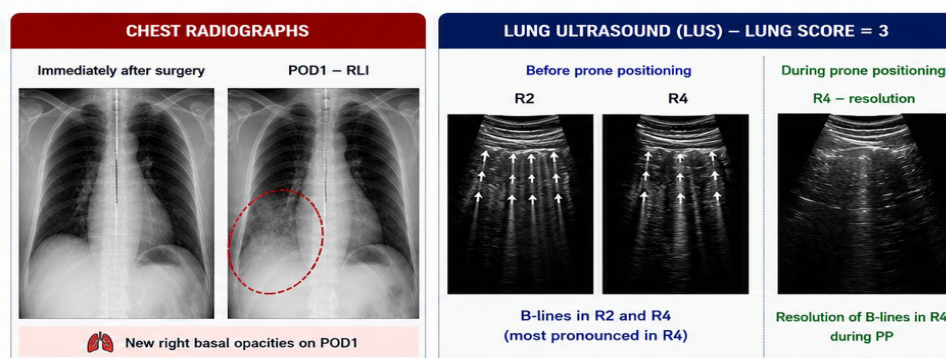
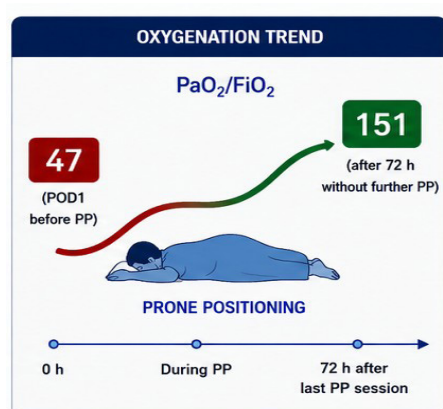


Figure 2. Improvement in the P/F ratio after 94 hours of PP.



Five PP sessions (cumulative duration 94 hours) were performed as rescue therapy for refractory hypoxemia, improving $\text{PaO}_2/\text{FiO}_2$ to 151 (Figure 2). After 72 hours without PP, percutaneous tracheostomy was performed on POD 20. The subsequent course was complicated by VAP (MDR *Acinetobacter baumannii*), and the patient died on POD 25.

Conclusion. In selected patients, early PP may provide effective rescue therapy for refractory hypoxemia in RLI, improving oxygenation and potentially obviating the need for ECMO.

References

1. Sanada TJ et al. Involvement of pulmonary arteriopathy in the development and severity of reperfusion pulmonary edema after pulmonary endarterectomy. *Pulm Circ.* 2019;9:2045894019846439.
2. Su L, et al. Efficacy and safety of early prone position in postoperative cardiac surgery adults with acute respiratory distress syndrome: a single-center retrospective cohort study. *J Thorac Dis.* 2024;31;16:4967-4976.

A SEVERE BRADYCARDIC EVENT AND CEREBRAL HYPOPERFUSION DURING DEXMEDETOMIDINE SEDATION IN A PATIENT WITH SUBARACHNOID HEMORRHAGE

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Keywords: cerebral hypoperfusion, dexmedetomidine, SAH

Introduction: Dexmedetomidine may have potential neuroprotective effects in patients with subarachnoid hemorrhage (SAH) due to its ability to attenuate cerebral vasospasm, preserve the blood–brain barrier, suppress cortical spreading depolarization, modulate fibrinolysis, and maintain intracerebral homeostasis (1). It has been reported that a loading dose of dexmedetomidine may reduce cerebral blood flow, particularly in patients with pre-existing neurological disorders and hemodynamic instability (2).

Case presentation: A 61-year-old man was admitted to the intensive care unit following a diagnosis of diffuse SAH with intraventricular extension. On admission, the patient was awake and able to speak but was disoriented. He was breathing spontaneously, normotensive, in sinus rhythm, and afebrile, with ataxia and right-sided hemiparesis. His medical history was significant for hypertension.

Continuous intravenous infusion of nimodipine was initiated at 15 µg/kg/h. Due to agitation (Richmond Agitation-Sedation Scale [RASS] score +3), dexmedetomidine infusion was started at 0.7 µg/kg/h and carefully titrated to maintain a target RASS score of –2 to –3. The patient was continuously monitored using invasive blood pressure monitoring, electrocardiography, and pulse oximetry.

On the fourth hospital day, the patient suddenly became unresponsive, severely bradycardic (heart rate, 28 beats/min), and hypotensive (blood pressure, 85/42 mmHg), with several episodes of apnea and subsequent coma (Glasgow Coma Scale score, 3/15). The patient was resuscitated, intubated, and placed on invasive mechanical ventilation. Due to persistent hypotension, a norepinephrine infusion was initiated. Neurological examination revealed isocoric, constricted pupils with sluggish reaction to light, and generalized hypotonia.

Cranial computed tomography revealed new ischemic changes, considered to be associated with the episode of severe bradycardia, hypotension, and cerebral hypoperfusion. Two days later, the patient was successfully weaned from mechanical ventilation. After a further five days, he was discharged in stable general condition to a regional rehabilitation center. Three months after discharge, mild right-sided hemiparesis persisted.

Conclusion: This case highlights the potentially life-threatening hemodynamic adverse effects associated with dexmedetomidine in a patient with SAH. Anesthesiologists should remain vigilant when using dexmedetomidine in patients with acute neurological injury, with close and continuous monitoring of cardiovascular and neurological status. Further studies are warranted to better define its safety and optimal use in this high-risk population.

References:

1. Liu, H., Busl, K. M., & Doré, S. (2020). Role of Dexmedetomidine in Aneurysmal Subarachnoid Hemorrhage: A Comprehensive Scoping Review. *Journal of Neurosurgical Anesthesiology*, 34(2), 176–182. <https://doi.org/10.1097/ANA.0000000000000728>
2. Arulvelan A, Manikandan S, Easwer HV, Krishnakumar K. Cerebral vascular effects of loading dose of dexmedetomidine: A Transcranial Color Doppler study. *Indian J Crit Care Med*. 2016 Jan;20(1):9-13. doi: 10.4103/0972-5229.173680. PMID: 26955211; PMCID: PMC4760000.

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Declaration of conflicts of interest: The authors declare that they have no conflict of interest.

OPIOID-FREE ANESTHESIA FOR LAPAROSCOPIC SURGERY IN A PATIENT WITH LVAD: THE ROLE OF ESPB

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Keywords: Opioid free anesthesia, cardiac surgery, ESPB, LVAD

Background: Ventricular assist devices (VADs) are used as a bridge to recovery, transplantation, or destination therapy. Technological advances have improved survival and quality of life with newer-generation VADs. Consequently, the number of VAD patients requiring non-cardiac surgery continues to rise. Opioid-free anesthesia relies on non-opioid drugs, with or without regional techniques. Given growing evidence of its safety and benefits, as well as concerns about opioid misuse, we chose an opioid-free technique combined with an erector spinae plane block (ESPB).

Case presentation: A 63-year-old man with a HeartMate 3 LVAD, implanted at the age of 55 for severe cardiac failure, had experienced four episodes of acute cholecystitis in recent years. He underwent laparoscopic cholecystectomy.

Premedication followed ERAS recommendations and consisted of acetaminophen, gabapentin, and a commercial carbohydrate drink. Before induction, a left radial arterial cannula was inserted and a right-sided ESPB was performed at the T7 level with 20 ml of 0.25% levobupivacaine; a catheter was left in situ for postoperative analgesia. A dexmedetomidine infusion was started at 0.5 µg/kg/h, and the soft palate and base of the tongue were sprayed with 10% lidocaine.

Anesthesia was induced with es-ketamine 0.5 mg/kg and propofol 0.5 mg/kg, followed by rocuronium 0.6 mg/kg. After intubation, a 4-lumen antimicrobial central venous catheter and a sheath were placed in the right internal jugular vein. Maintenance was achieved with dexmedetomidine and sevoflurane titrated to a BIS of approximately 60, together with a continuous ketamine infusion at 0.25 mg/kg/h. Monitoring included invasive arterial blood pressure, SpO₂, central venous pressure, and five-lead ECG.

The procedure was completed without complications. The patient was transferred intubated to the ICU and extubated after 2 hours. Postoperative analgesia consisted of acetaminophen 1 g and 5 ml of 0.125% levobupivacaine via the ESPB catheter, administered alternately every 3 hours. Pain was assessed with a numeric rating scale every 8 hours; rescue analgesia was given only if the score was >3. Postoperative care was conducted according to protocol, and after full recovery the patient was discharged home.

Conclusion: Opioid-free anesthesia combined with an erector spinae plane block can be used safely even in complex patients with LVADs.

References

1. Alamouti-Fard E, Garg P, Yazji J, Brigham T, Jacob S, Wadiwala IJ, Pham SM. Outcomes after noncardiac surgery in patients with left ventricular assist devices: a systematic review. *Front Cardiovasc Med.* 2024;11:1414444. doi: 10.3389/fcvm.2024.1414444.
2. Guinot PG, Besch G, Jonval L, Nguyen M, Grelet T, Bouhemad B; for the OFACAR study group. Opioid-free Anesthesia in Cardiac Surgery: The OFACAR Randomized Clinical Trial. *Anesthesiology.* 2026;145(3):557-568. doi: 10.1097/ALN.0000000000006164.
3. Rauseo M, Mirabella L, Carrideo AA, Padovano FP, Cantatore LP, Vetusch P, Da Lima S, Paternoster G, Cinnella G. Opioid-sparing Anesthesia in Cardiac Surgery: A Meta-analysis. *J Cardiothorac Vasc Anesth.* 2025;39(11):3140-3153. doi: 10.1053/j.jvca.2025.06.040.

ANESTEZIOLOŠKI MENADŽMENT I PERIOPERATIVNI ISHODI KOD TAVI PROCEDURE – NAŠA ISKUSTVA

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Ključne reči: TAVI, opšta anestezija, analgosedacija, komplikacije

Uvod: Transkateterska zamena aortne valvule (TAVI) je manje invanzivna opcija za zamenu aortne valvule u odnosu na hiruršku tehniku, a pogotovo kod visoko rizičnih pacijenata. Procedura može da se izvede u više vrsta anestezije (opšta anestezija, lokalna anestezija sa ili bez analgosedacije). Cilj ove studije je evaluacija trenutne kliničke prakse u našoj ustanovi, kako bi se postavio osnov za buduće prospektivno istraživanje i optimizaciju anesteziološkog lečenja pacijenata.

Metode: Retrospektivna studija sa 413 pacijenta kojima je TAVI procedura rađena od januara 2025. do aprila 2026. godine. Analizirani su demografski podaci (pol), komorbiditeti pacijenata, vrsta anestezije i primenjeni lekovi, potreba za hemodinamskom podrškom (vazopresori/inotropi), proceduralne komplikacije i dužina hospitalizacije pacijenata.

Rezultati: Od ukupno 413 pacijenta, 211 su osobe ženskog, a 202 muškog pola. Prosek godina je iznosio 78.95 ± 8.7 . U opštoj anesteziji je vođeno 37(9%) pacijenata, a 376 (91%) pacijenata u analgosedaciji. Od komorbiditeta izdvajamo hipertenziju 94.2%, hroničnu bubrežnu insuficijenciju 25,7%, dijabetes melitus 24%, perifernu vaskularnu bolest 22.8%, hroničnu opstruktivnu bolest pluća 7.7%. Srčana insuficijencija je dokumentovana kod 57.4%, a prosek ejekcione frakcije leve komore $50.72\% \pm 12.1$. Uredan tok bez komplikacija je zabeležen kod 309 (74.8%) pacijenata. Najčešće komplikacije: ugradnja pejsmejke kod 88 pacijenata (21.3%) – privremeni 35 (8.5%), stalni 53 (12.8%), krvarenje u predelu punkcionog mesta 32 (7.7%), intraoperativni srčani zastoj 14 (3,4%), delirijum 11 (2.7%), cerebrovaskularni insult 2 (0.5%). Dužina hospitalizacije je iznosila od 1 do 59 dana (prosečno 3.97). Duže zadržavanje, odnosno zadržavanje preko 3 dana zabeleženo je kod 117 (28.3%) pacijenata. Analizom učestalosti primene inotropne i/ili vazopresorne potpore u odnosu na vrstu anestezije, u značajno većem procentu je primena istih zastupljena kod pacijenata u opštoj anesteziji $p < 0.001$. Pacijenti koji su vođeni u opštoj anesteziji proveli su duže od 1 dana u jedinici intenzivnog lečenja (123 (32.7%) vs 28 (75.7%)) $p < 0.001$; duže zadržavanje od 3 dana je takođe veće u ovoj grupi 67.6% vs 32.4%.

Zaključak: Učestalost komplikacija je ujednačena bez obzira na vrstu anestezije. Međutim, opšta anestezija češće zahteva primenu inotropne i vazopresorne potpore, uz produžen boravak u intenzivnoj nezi i dužu ukupnu hospitalizaciju.

Broj odobrenja etičkog komiteta 3554.

PERIOPERATIVE HEMOSTATIC ABNORMALITIES IN BRAIN TUMOR SURGERY

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Keywords: Brain Neoplasms, Blood Coagulation, Fibrinogen, Neurosurgery, Perioperative Care

Introduction: Perioperative hemostatic abnormalities in brain tumor surgery increase the risk of intracranial bleeding and may increase the need for transfusion therapy.

Objective: To investigate the incidence of perioperative hemostatic abnormalities in different types of brain tumors and their association with transfusion requirements and postoperative outcomes.

Methods: This retrospective study included 100 patients undergoing surgery for brain tumors. Perioperative laboratory parameters of hemostasis, intraoperative blood loss, transfusion requirements, and postoperative outcomes were analyzed. Appropriate parametric and non-parametric tests and logistic regression analysis were used, with statistical significance set at $p < 0.05$.

Results: The mean age of the patients was 62.1 ± 13.7 years. Meningioma was diagnosed in 36%, glioblastoma in 32%, metastatic tumors in 17%, and other primary tumors in 15% of patients. Preoperative fresh frozen plasma transfusion was required in 46% of patients. Following surgery, platelet count and fibrinogen concentration significantly decreased ($p < 0.001$), while PT ($p < 0.001$) and aPTT ($p = 0.001$) significantly increased. Postoperative hypofibrinogenemia (< 2.0 g/L) occurred in 33% of patients. Patients with hypofibrinogenemia had lower preoperative fibrinogen levels (2.39 vs. 3.55 g/L; $p < 0.001$) and hemoglobin levels (134.2 ± 9.9 vs. 140.1 ± 14.0 g/L; $p = 0.032$), as well as greater intraoperative blood loss ($p = 0.048$). Multivariable analysis identified lower preoperative fibrinogen concentration as an independent predictor of postoperative hypofibrinogenemia (OR=0.203; 95% CI 0.097–0.427; $p < 0.001$). The incidence of hypofibrinogenemia did not differ significantly according to tumor type ($p = 0.802$). Perioperative red blood cell transfusion was required in 18% of patients and was independently associated with lower preoperative hemoglobin levels and greater intraoperative blood loss. Hypofibrinogenemia was not associated with postoperative hematoma ($p = 0.676$) or reoperation ($p = 1.000$). Reoperation was required in four patients.

Conclusion: Postoperative hypofibrinogenemia is common following brain tumor surgery. Lower preoperative fibrinogen concentration is an independent predictor of its development, whereas tumor type is not significantly associated with its occurrence. Hypofibrinogenemia was not associated with postoperative hematoma or the need for reoperation, which may partly reflect timely correction of fibrinogen deficiency.

Ethical approval for the study was granted by the Ethics Committee of the University Clinical Center of Vojvodina (reference number 00-61/7) 30.7.2026.

MAGIJA FLUIDA I KALORIJA KOD DECE-PREMALO, PREVIŠE I LIČNO

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Ključne reči: jejunostomija, parenteralna ishrana, fluidna ravnoteža, intestinalna insuficijencija, deca

Visoke jejunostome kod dece predstavljaju značajan klinički izazov zbog masivnih enteralnih gubitaka, rizika od dehidracije, malnutricije i sekundarnih komplikacija koje mogu dovesti do teškog pogoršanja opšteg stanja. Prikazujemo slučaj jedanaestogodišnje devojčice hitno prebačene iz drugog centra zbog naglog pogoršanja opšteg stanja, i sumnje na septički šok. Devojčica je bila visoko - febrilna, izmenjenog stanja svesti koje je progrediralo, sa promenama na CT mozga. Devojčica je bila je hipotenzivna, hiperventilirala i imala respiratornu insuficijenciju. Sve ovo je praćeno izrazitom leukopenijom, trombocitopenijom, vrlo visokim CRP i vrednostima transaminaza i alkalne fosfataze iznad 6000. Poslata je intubirana, sedirana, relaksirana, na dvostrukoj inotropnoj potpori.

Četiri sedmice pre prijema operisana je zbog dugotrajnih subokluzivnih smetnji koje su usledile nakon apendektomije,. Operativno je izvedena visoka jejunostoma, i nije bilo mogućnosti angažovanja distalnog tankog creva i kolona. Nakon operacije lečena je glukosalinom, enteralnim preparatima i suplementima, poslednjih 10 tak dana i parcijalnom parenteralnom ishranom. Imala je obilne stomalne gubitke od 400–1000 ml dnevno i progresivnu malnutriciju (27 kg).

Po prijemu u naš centar sprovedena je intenzivna reanimacija i rehidracija, nakon čega je devojčica uspešno ekstubirana već nakon dva sata, sa potpunim oporavkom svesti i bez neuroloških ispada. U narednim danima došlo je do stabilizacije inflamatornih parametara, normalizacije leukocita i trombocita i ukidanja inotropa. Uvedena je totalna parenteralna ishrana sa kalorijskim unosom prema ciljnoj težini, bez oslanjanja na energiju iz očuvanog enteralnog unosa, uz nadoknadu tečnosti u skladu sa stomalnim gubicima i ličnim potrebama. Četiri dana nakon prijema prebačena je na odeljenje, stabilna. Telesna masa od 33 kg dostignuta je za oko 1 mesec.

Klinički tok ukazuje da je progresivno pogoršanje, koje je kulminiralo stanjem nalik sepsi, bilo posledica neadekvatne procene kalorijskih potreba, parenteralne nadoknade tečnosti i kvaliteta i kvantiteta enteralnog unosa. Svakom detetu sa intestinalnom insuficijencijom je neophodan Individualni pristup, pažljivi monitoring unosa i gubitaka, i oslanjanje na parenteralnu ishranu u skladu sa brzinom i kvalitetom adaptacije creva.

ATYPICAL COURSE OF SECONDARY INTRA-ABDOMINAL INFECTION IN A PATIENT RECEIVING LONG-TERM TOCILIZUMAB THERAPY FOLLOWING DUODENAL PERFORATION

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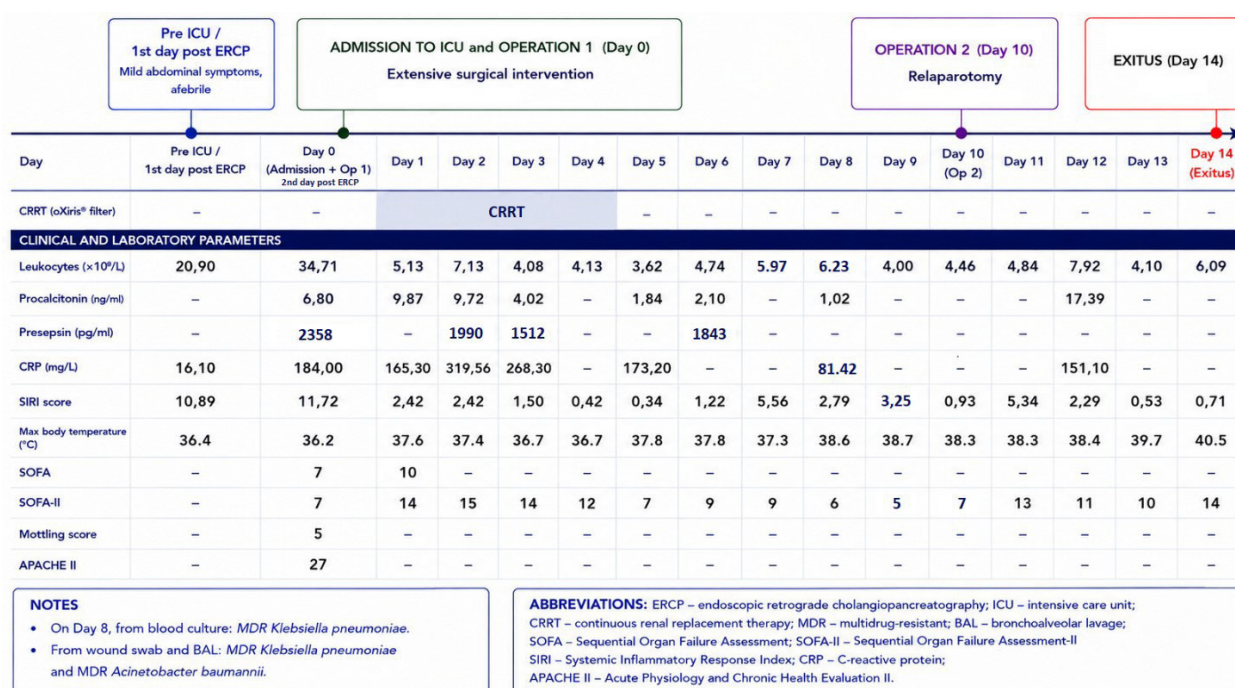
Vojnomedicinska akademija, Beograd, Srbija

Keywords: duodenal perforation, ERCP, tocilizumab, intra-abdominal infection

Background: Duodenal perforation following endoscopic retrograde cholangiopancreatography (ERCP) is a potentially fatal complication with outcome dependent on timely recognition and adequate control of the source of infection. Long-term therapy with interleukin-6 receptor (*IL-6R*) inhibitors may alter the acute-phase inflammatory response, complicating the interpretation of clinical and laboratory markers of inflammation and complicating early diagnosis of infection. We report an atypical course of secondary intra-abdominal infection in a patient receiving chronic *IL-6R* inhibitor therapy.

Case presentation: A 65-year-old man with rheumatoid arthritis receiving long-term subcutaneous tocilizumab (162 mg once weekly; *Actemra*®, *F. Hoffmann-La Roche Ltd, Basel, Switzerland*) and oral prednisone (5 mg once daily; *Prednizon*®, *Bosnalijek d.d, Sarajevo, Bosnia and Herzegovina*) underwent ERCP for choledocholithiasis. On the first post-procedural day, he remained afebrile with mild abdominal symptoms and slightly increased CRP and leukocyte count (Figure 1). On the second day, abdominal

Figure 1.



Note: Day 0 – admission (17:20) and Operation 1 (18:30–01:00); Operation 2 (relaparotomy) on Day 10 (12:00–14:00); Exitus on Day 14 at 18:30.

symptoms progressed; abdominal CT demonstrated D2 duodenal perforation with extensive retroperitoneal collections. Upon admission to the intensive care unit (ICU), APACHE II was 27, SOFA 7, Mottling score 5, with significantly increased inflammatory markers and SIRI 11.7 (Figure 1). Emergency surgery included duodenal repair, subtotal colectomy, terminal ileostomy, retroperitoneal necrosectomy, biliary reconstruction, and additional source-control procedures. The postoperative course was complicated by

refractory septic shock requiring mechanical ventilation and vasopressor support, and acute kidney injury, resulting in an increase in the *SOFA* score to 10 and the initiation of continuous renal replacement therapy (*CRRT*) with an *oXiris*® filter (*Baxter, Deerfield, IL, USA*) during the first four *ICU* days. Inflammatory biomarkers and clinical severity scores (*Figure 1*) showed discordant temporal patterns despite progressive organ dysfunction and multidrug-resistant Gram-negative sepsis. On postoperative day 10, despite a decline in *CRP*, re-laparotomy revealed extensive necrosis of the ileum and sigmoid colon with multiple perforations, dehiscence of the hepaticojejunostomy and enteric anastomosis, and failure of the previously repaired duodenal perforation. The patient died on *ICU* day 14.

Conclusions: In patients receiving long-term tocilizumab therapy, isolated inflammatory biomarkers may be unreliable indicators of infection severity. Further research is warranted to better characterize the host response to infection, particularly sepsis, in patients receiving immunomodulatory therapy.

BILATERALNI BLOK RADIJALNOG I ULNARNOG NERVA SA OČUVANIM SPONTANIM DISANJEM PRI HIRURŠKOJ KOREKCIJI ŠKLJOCAJUĆEG PALCA KOD TROGODIŠNJEG DETETALazar Jakšić, Emil Bosinci, **Milica Marković***Univerzitetska dečja klinika, Beograd, Srbija*

Ključne reči: periferni nervni blokovi, regionalna anestezija, ortopedija, kongenitalna anomalija, škljocajući palac

Uvod: Škljocajući palac predstavlja čestu kongenitalnu ortopedsku anomaliju šake. Blokovi pojedinačnih nerava na nivou lakta do sada su uspešno primenjivani u njegovom hirurškom zbrinjavanju kod odraslih, dok kod dece taj pristup u kombinaciji sa proceduralnom sedacijom i dalje nije široko ispitivan.

Prikaz slučaja: Dečak star tri i po godine i težak 20 kg primljen je radi elektivne korekcije škljocajućeg palca obe šake. Klasifikovan je kao ASA status 1. Odлучili smo se za obostrane blokove medijalnog i radijalnog živca na nivou lakta u uslovima proceduralne sedacije. Primenjen je osnovni monitoring vitalnih funkcija (EKG, SpO₂, NIKP, neinvazivni EtCO₂) uz kiseoničnu potporu od 3 L/min putem maske. Premediciran je intravenski sa 0,2 mg atropina i 2 mg deksametazona. Na uvodu dato je 40 mcg fentanila, dok je sedacija održavana infuzijom propofola pri 8-10 mg/kg/č. Pod kontrolom ultrazvuka izvedeni su obostrani blokovi radijalnog i medijalnog nerva primenom 1ml 1% lidokaina i 1,5ml 0,5% ropivakaina po nervu (ukupno 2mg/kg lidokaina i 1,5mg/kg ropivakaina). Tokom intervencije od 60 minuta nije bilo respiratornih niti kardiovaskularnih komplikacija koje bi zahtevale intervenciju, kao ni neposrednih komplikacija u vezi sa blokom. Propisan je acetaminofen u dozi od 15 mg/kg u redovnoj analgetskoj terapiji. Postoperativni bol praćen je putem Vong-Bejker skale bola, a u prvih 24 časa nije bilo potrebe za dodatnim analgeticima. Ukupna perioperativna potrošnja opioida svedena je na uvodnu dozu fentanila od 2 mcg/kg.

Zaključak: Blokovi pojedinačnih nerava na nivou lakta omogućavaju selektivnu analgeziju šake i prstiju, za hirurgiju palca konkretno su neophodni blokovi radijalnog i medijalnog nerva. Na ovaj način obezbeđujemo hiruršku anesteziju, a izbegavamo sve potencijalne komplikacije bloka brahijalnog plexusa i možemo da primenimo manju dozu lokalnog anestetika. Uslovi sedacije i očuvanog spontanog disanja omogućavaju nam izbegavanje svih komplikacija intubacije i opšte anestezije, pri čemu u svakom trenutku moramo imati dostupnu opremu za hitno zbrinjavanje disajnog puta. Opioidno-poštedni karakter ove tehnike može zaštititi mlađu decu od neželjenih efekata opioida, na koje osetljivije reaguju.

NON-WERNICKE ENCEPHALOPATHY AS COMPLICATION OF HYPEREMESIS GRAVIDARUM

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VMA, MF VMA, Šabac, Srbija

Keywords: Hyperemesis gravidarum, encephalopathy, malnutrition, psychosis

Background: *Hyperemesis gravidarum* is a severe form of nausea and vomiting, affecting 3% of pregnancies. Symptoms usually improve as pregnancy progresses into the second trimester. However, it may lead to nutritional deficiencies and Wernicke encephalopathy.

Case report: A 33-year-old female patient, 20th week of gestation (3rd pregnancy; one child; one missed abortion) was transferred to the neurology ICU from the OB/GYN Clinic, where she was treated for two months and lost 44% of her initial body mass. She was healthy prior to pregnancy, with a known heterozygous MTHFR polymorphism and a history of *hyperemesis gravidarum* in previous pregnancies. Since she was treated for *hyperemesis gravidarum* from the 4th week of gestation and did not tolerate enteral feeding, her therapy consisted of intravenous fluid therapy and multivitamin supplementation (vitamins B1, B9, B12), and nadroparin calcium. She was diagnosed with acute psychosis and initially treated with haloperidol, followed by olanzapine and escitalopram.

At admission, she was disoriented, dysarthric, and able to follow simple instructions. Neurological examination revealed fast horizontal nystagmus, an abnormal finger-to-nose test, hyperesthesia from the knee level to the umbilicus bilaterally, reduced proximal lower- and upper-extremity strength, and symmetrically decreased DTRs in the upper extremities with absent DTRs in the lower extremities. At admission we noted anemia (hemoglobin 88g/l), malnutrition (urea 1,4mmol/l; creatinine 26μmol/l) and liver function impairment (AST 268U/l; ALT 310U/l; protein 56g/l; amylase 284U/l). Signs of moderate encephalopathy were present on EEG and severe acquired axonal sensorimotor neuropathy on EMNeG. CSF and endocranial NMR was unremarkable. EGDS and biopsies showed complete atrophy of gastric mucosa and duodenal villi. Supportive and symptomatic therapy was continued until C-section delivery in the 27th week of gestation. After delivery the patient was sent to a rehabilitation center.

Conclusion: Prolonged hyperemesis gravidarum and profound weight loss, particularly when enteral nutrition is not tolerated, can cause severe nutritional neurological complications despite multivitamin supplementation. The combination of encephalopathy, nystagmus, ataxia, and peripheral neuropathy should prompt early consideration of vitamin B1 deficiency and encephalopathy. Extensive gastrointestinal mucosal atrophy may further compromise nutrient absorption. Early recognition and treatment of nutritional deficiencies are essential to prevent irreversible neurological sequelae.

REPEATED PERCUTANEOUS TRACHEOSTOMY: A TWO-CASE REPORT

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Percutaneous tracheostomy is a widely accepted technique that can be safely and easily performed in the intensive care unit (ICU) in critically ill patients. Due to its advantages, it has gradually replaced surgical tracheostomy in many ICUs. Several techniques for performing percutaneous tracheostomy have been developed over the years.

For many patients, the need for a tracheostomy gradually goes away. This may occur following recovery from a neurological disorder, successful weaning from mechanical ventilation, improvement in airway protective reflexes, or resolution of the underlying condition that initially necessitated tracheostomy.

However, in certain clinical situations, the need for a tracheostomy may recur after the initial tracheostomy has been closed. For an intensivist, repeated tracheostomy represents a particular challenge, as tissue characteristics following healing of the previous tracheostomy are not always predictable. Scar formation and changes in the local tissue may make the procedure technically more demanding and may affect the course of the new tracheostomy placement.

In our ICU, we encountered two patients in whom a new tracheostomy was required after the previous tracheostomy had been closed. In both cases, the Griggs technique was used. During dilation, greater resistance was encountered due to scar tissue formation, and the movements were performed more slowly. Table 1 presents the basic clinical characteristics related to the repeated percutaneous tracheostomy procedures in these two patients.

Conclusion: In both cases, a percutaneous tracheostomy was successfully re-established at the same site as the previous tracheostomy having completely healed. Both procedures were completed without complications and without any significant differences compared with the initial procedures.

Table 1. Clinical characteristics of two patients with repeated tracheostomy

	Primary diagnosis	Reason for placement of percutaneous tracheostomy	Method of percutaneous tracheostomy	Time from first to second tracheostomy	Note for performing the repeated procedure
Case 1.	Abscessus mediastini anterior superior; Phlegmona profunda colli; Status post incisio et drainage abscessus parapharyngealis l.sin.	Prolonged mechanical ventilation, pulmonary toilet, traheomalacia	The Griggs percutaneous tracheotomy, in both procedures	97 days	Completely healed tracheostomy in the previous place. Repeat procedure performed without complications.
Case 2.	Paralysis plica rum vocalium et larynges l. sin; St. post oclusio a. vertebralis;	Dysphagia	The Griggs percutaneous tracheotomy, in both procedures	29 days	Completely healed tracheostomy in the previous place. Repeat procedure performed without complications.

KOROZIVNA POVREDA JEDNJAKA U DETINJSTVU SA POSLEDIČNOM INTESTINALNOM INSUFICIJENCIJOM: KLINIČKI TOK, ARTEFICIJALNA ISHRANA I PRIPREMA ZA NOVU REKONSTRUKCIJU

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Ključne reči: korozivna povreda jednjaka, intestinalna insuficijencija, parteficijalna ishrana, teduglutid

Korozivne povrede jednjaka i želuca u ranom detinjstvu mogu dovesti do dugotrajnih, kompleksnih anatomske-funkcionalnih posledica koje zahtevaju višestruke hirurške rekonstrukcije, produženu hospitalizaciju i složeno nutritivno zbrinjavanje. Predstavljamo slučaj sedamnaestogodišnje devojke koja je kao odojče popila korozivno sredstvo, što je uslovalo teško oštećenje gornjeg gastrointestinalnog trakta i hroničnu fibrozu medijastinuma. Prvi reverzni gastrični tubus urađen je u drugoj godini života, a imala je više desetina balon-dilatacija jednjaka i epizode teške malnutricije. Poslednji pokušaj rekonstrukcije jednjaka, šest meseci pre prijema kod nas, komplikovao se i završio ezofagotomijom i gastrektomijom. Devojčica je primljena u našu ustanovu sa telesnom masom od 30 kg, hranjena isključivo preko jejunostome, kontinuirano, kliničkim formulama.

Intestinalna cev je prethodno korišćena kao materijal za rekonstrukcije, a ono što je preostalo bio je loše vaskularizovan jejunum, kratak segment ileuma i levi kolon. Ovakav anatomske i funkcionalni status, nemogućnost adekvatne apsorpcije, kao i izrazito veliki enteralni gubici, doveli su je do hronične malnutricije i dehidracije.

Postepeno uvođenje parenteralne ishrane, bez prekida enteralnog unosa preko jejunostome, uz pažljivo titrirane nutritivne suplemente, omogućilo je stabilizaciju nutritivnog statusa i porast telesne mase na 49 kg. Kao dodatni pokušaj stimulacije intestinalne adaptacije uveden je GLP 2 analog-teduglutid.

Uprkos medicinskom napretku, devojčica je 10 meseci neprekidno hospitalizovana, bez mogućnosti boravka kod kuće, što je negativno uticalo na njenu i inače narušenu psihološku dobrobit i socijalnu integraciju. Zakonska mogućnost kućne parenteralne ishrane, otvara prostor za planiranje privremenog i povremenog bezbednog boravka van bolnice, iako je devojčica zavisna od arteficijalne i enteralne i parenteralne ishrane.

Kombinacija enteralne i parenteralne ishrane, uz farmakološku stimulaciju adaptacije creva, omogućila je značajan napredak u nutritivnom statusu i otvorila put ka bezbednijoj, planiranoj etapnoj hirurškoj intervenciji. Boravak kod kuće mogao bi predstavljati važan psihosocijalni podsticaj, značajan za motivaciju, kvalitet života i toleranciju dugotrajnog procesa lečenja kod ove devojčice.

EUGLYCEMIC DIABETIC KETOACIDOSIS WITH SEVERE LACTIC ACIDOSIS AFTER LIVER RESECTION IN A PATIENT RECEIVING AN SGLT2 INHIBITOR

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Keywords: euglycemic diabetic ketoacidosis, SGLT2 inhibitors, lactic acidosis, liver resection

Background: Euglycemic diabetic ketoacidosis (EDKA) is a potentially life-threatening complication of sodium-glucose cotransporter 2 (SGLT2) inhibitor therapy. The perioperative setting may make its recognition challenging, as fasting and surgical stress promote ketogenesis, while liver resection may contribute to postoperative lactate accumulation. In patients receiving metformin, metformin-associated lactic acidosis represents an additional diagnostic consideration. We report a case of severe EDKA with marked lactic acidosis following partial liver resection.

Case presentation: A 60-year-old man with HCV-related liver cirrhosis (Child-Pugh A), hepatocellular carcinoma, hypertension, and type 2 diabetes mellitus was admitted for elective partial liver resection. His treatment included metformin 1000 mg/day and empagliflozin 10 mg/day. Although discontinuation at least 48 hours before surgery was recommended, his last dose was taken less than 24 hours before the procedure. Resection of segments II, IVb, and partially III was performed without complications or hemodynamic instability. Several hours postoperatively, severe high-anion-gap metabolic acidosis developed. Lactate increased from 1.9 to 22 mmol/L, pH decreased to 7.09, and the anion gap reached approximately 30 mmol/L. Postoperative lactic acidosis, including possible metformin-associated lactic acidosis, was initially suspected. Despite fluid resuscitation and bicarbonate therapy, acidosis progressed. Blood glucose remained near-normal, while polyuria and strongly positive urinary ketones led to recognition of EDKA. Insulin and dextrose therapy were initiated. Persistent severe acidosis was followed by respiratory deterioration requiring intubation and mechanical ventilation. Hemodialysis was initiated for refractory metabolic acidosis, followed by rapid improvement. Within 24 hours, lactate decreased to 2.2 mmol/L, with normalization of the anion gap and acid-base status. The patient was extubated on the second postoperative day.

Conclusion: This case highlights the diagnostic difficulty of EDKA when severe postoperative lactic acidosis dominates the clinical presentation. Near-normal blood glucose does not exclude ketoacidosis, and assessment of ketones was decisive in establishing the diagnosis. Recent SGLT2 inhibitor exposure should be considered in patients developing unexplained postoperative high-anion-gap metabolic acidosis, particularly in the setting of fasting and major liver surgery. In this case, insufficient preoperative discontinuation was followed by a severe metabolic complication requiring treatment and timely hemodialysis.

HEMOADSORPTION IN POST-HEPATECTOMY LIVER FAILURE

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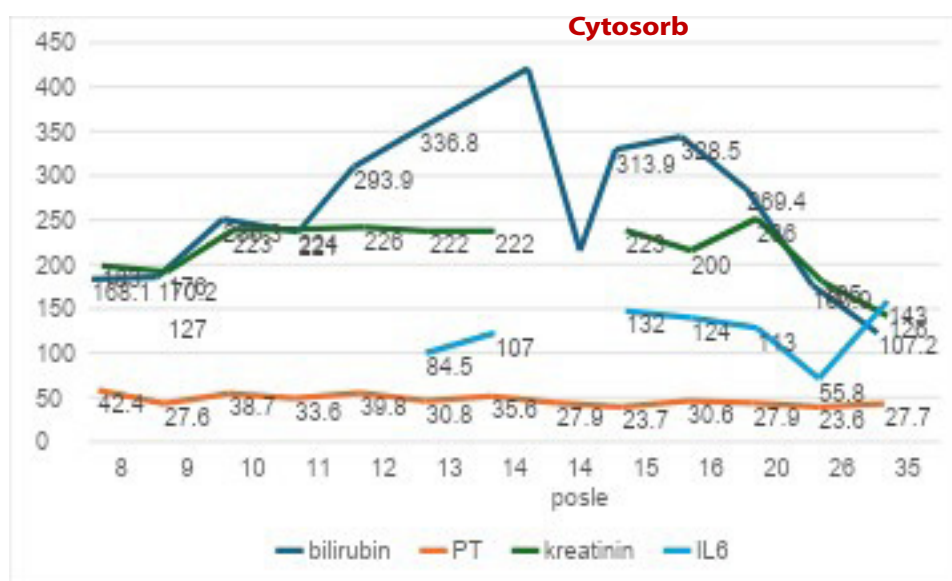
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Ključne reči: hemoadsorption, post-hepatectomy liver failure, CytoSorb®

Introduction: Post-hepatectomy liver failure (PHLF) is severe complication after liver resection, particularly following right hepatectomy. Hemoadsorption with CytoSorb® could be helpful in bilirubin removal in PHLF.

Case presentation: A 74-year-old man was admitted to hospital for right hepatectomy due to cancer treatment. His medical history included mild pulmonary hypertension and malnutrition. On postoperative day (POD) 3, bilirubin was slightly raised, but in the following days values were stable, around 120 $\mu\text{mol/L}$. On postoperative POD 8 patient liver function was deteriorated and hepatic encephalopathy was developed. Treatment according to protocol of acute liver failure was applied. Despite conservative treatment, patient state was worsened with further raising bilirubin's level. On POD 14, patient was unconscious with hepatic encephalopathy, on low dose norepinephrine 0.2mcg/kg/min, with urine output of 200 ml/h. SOFA-2 and MELD scores were calculated at 15 and 37, respectively. Laboratory investigations revealed a markedly elevated bilirubin level with markedly elevated bilirubin (408.5 $\mu\text{mol/L}$), ammonia (121 $\mu\text{mol/L}$), (IL6- 107pg/mL) levels. We decided to perform hemoadsorption using the CytoSorb® adsorber for bilirubin removal. Hemodialysis catheter was inserted after hemostasis correction. Hemoadsorption was performed by PuriFi machine with CytoSorb® at a blood flow rate of 200mL/min for 7 hours (Figure 1). Following the treatment, the serum bilirubin level decreased to 200 $\mu\text{mol/L}$. The

Figure 1. Values of bilirubin ($\mu\text{mol/L}$), creatinine ($\mu\text{mol/L}$), prothrombin time- PT (s), Interleukin- 6 (IL-6) from postoperative day (POD) 8 to 35



hemoadsorption was well tolerated, with the patient hemodynamic improving throughout. The only side-effect which was notified was thrombocytopenia, despite proper systemic anticoagulation with dalteparin. The patient was fully awake 48 hours after hemoadsorption, maintained stable bilirubin levels (Figure 1), was hemodynamically stable without the need for vasopressors, but still needed coagulation

factor supplementation. On POD 35, the patient was conscious and hemodynamically stable, with adequate oral nutritional intake.

Conclusion: Hemoadsorption with CytoSorb[®] can be used in management of bilirubin removal during transitory high bilirubin level following PHLF.

INTENSIVE CARE MANAGEMENT OF CEREBRAL SALT WASTING SYNDROME FOLLOWING INTRACEREBRAL HEMORRHAGE AND NON-CONVULSIVE STATUS EPILEPTICUS: A CASE REPORT

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Keywords: cerebral salt wasting syndrome, hyponatremia, intracerebral hemorrhage, intensive care, non-convulsive status epilepticus.

Introduction: Hyponatremia is a significant complication of acute neurological disorders and may contribute to secondary neurological deterioration. Cerebral salt-wasting syndrome (CSWS) is characterized by hyponatremia, increased renal sodium loss, and reduced effective circulating volume.

Differentiating CSWS from the syndrome of inappropriate antidiuretic hormone secretion (SIADH) is particularly important because these conditions require different therapeutic approaches (1,2).

Case Presentation: A 32-year-old previously healthy male professional athlete was hospitalized with acute-onset right-sided hemiparesis. Non-contrast head computed tomography (CT) revealed a left frontal intracerebral hemorrhage with an estimated volume of approximately 14 mL, accompanied by mild perifocal edema and no significant mass effect. CT angiography of the head and neck showed no vascular malformations or other identifiable angiographic causes of the hemorrhage.

On the second day of hospitalization, the patient developed multiple generalized tonic-clonic seizures refractory to initial antiepileptic therapy. Subsequently, he developed non-convulsive status epilepticus, requiring endotracheal intubation, mechanical ventilation, and escalation of antiepileptic therapy. On the same day, severe hyponatremia was detected, with a nadir serum sodium concentration of 122 mmol/L. Plasma osmolality was 286 mOsm/kg, while urine osmolality was 956 mOsm/kg. Given preserved renal function, normal morning cortisol levels, and close monitoring of urine output, electrolytes, and fluid balance, the patient was diagnosed with cerebral salt-wasting syndrome (CSWS) following endocrinological evaluation.

Treatment consisted of sodium and intravascular volume replacement with 3% and 0.9% NaCl solutions, accompanied by close monitoring of serum sodium levels, urine output, and fluid balance. Gradual correction of hyponatremia was achieved, with subsequent resolution of status epilepticus. The patient was successfully weaned from mechanical ventilation, with no recurrent seizures during hospitalization. Significant neurological recovery was subsequently observed, with only mild residual functional impairment.

Conclusion: CSWS should be considered in patients with acute cerebral injury who develop hyponatremia, particularly when accompanied by polyuria, natriuresis, and reduced intravascular volume. Early recognition of CSWS is essential for appropriate management. Prompt correction of sodium and intravascular volume deficits, with close monitoring of serum sodium levels and fluid balance, may prevent neurological deterioration and improve clinical outcomes.

Reference

1. Hall WA, Thorell W. Cerebral Salt Wasting Syndrome. 2025 Jun 2. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2026 Jan–. PMID: 30521276.
2. Busl KM, Rabinstein AA. Prevention and Correction of Dysnatremia After Aneurysmal Subarachnoid Hemorrhage. *Neurocrit Care*. 2023 Aug;39(1):70-80. doi: 10.1007/s12028-023-01735-z. Epub 2023 May 3. PMID: 37138158.

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Declaration of conflicts of interest: The authors declare that they have no conflict of interest.

VODIČ ZA AUTORE

„Srpski časopis anestezija i intenzivna terapija” (skraćeno SJAiT) predstavlja časopis koji objavljuje naučne i stručne članke o teorijskim i kliničkim aspektima anesteziologije, intenzivne terapije, reanimatologije i terapije bola. Časopis objavljuje i članke iz domena srodnih naučnih disciplina: kliničke farmakologije, kliničke fiziologije i patofiziologije, hirurgije, interne medicine, sudske medicine, urgentne medicine i drugih oblasti medicine koje se bave problemima vezanim za preoperativnu pripremu, anesteziju, reanimaciju, intenzivno lečenje i terapiju bola. Časopis se izdaje na srpskom i engleskom jeziku. Svi članci se recenziraju, a nakon prihvatanja za objavljivanje, svrstavaju se u jednu od sledećih **kategorija**:

1. **Originalno istraživanje (Original article)**
2. **Metaanaliza (Meta-analysis)** – studija o studijama, predstavlja analitičko-sintetičku studiju većeg broja studija o nekoj značajnoj temi, uz analizu suprotstavljenih stavova i procenu praktične primenljivosti; dopušta preporuke i zaključivanje na osnovu tuđih podataka i mora imati jasno formulisani zaključak.
3. **Revijalni članak (Review article)** – razmatra neko savremeno, nerešeno ili kontradiktorno pitanje od teorijskog i praktičnog značaja, uz iznošenje sopstvenih rezultata istraživanja ili najnovijih važnih podataka iz literature. Konstrukcija članka je slobodna i nije obavezan zaključak, ali su poželjne kratke zaključne napomene sa jasnom porukom. Obuhvata i **mišljenje eksperata (Expert opinion)**
4. **Prikaz slučaja (Case report)**
5. **Pismo uredništvu (Letter to the Editor)** – može da se odnosi na tekstove objavljene u SJAiT časopisu, na teme od značaja za medicinsku praksu uopšte, kao i na knjige (monografije) od posebnog medicinskog značaja. Piše se slobodno, uz eventualno navođenje podataka iz literature. Objavljuje se prema odluci glavnog i odgovornog urednika.
6. **Izveštaji sa naučnih i stručnih skupova** – predstavljaju kratak prikaz rada skupa, uz isticanje najvažnijih referata ili zaključaka, odnosno preporuka od značaja za širi krug čitalaca SJAiT-a.
7. **Radovi iz istorije medicine** – konstrukcija članka je slobodna i nije obavezan zaključak, ali su poželjne kratke zaključne napomene sa jasnom porukom.

Autori se obavezuju da svoje tekstove, koji su primljeni za objavljivanje u našem časopisu (SJAiT), neće objaviti u nekoj drugoj publikaciji. Prihvatanjem objavljivanja u našem časopisu, autori predaju pravo na odobravanje preštampanja njihovog materijala vlasniku časopisa SJAiT.

Članci koji opisuju klinička istraživanja moraju da poštuju etičke standarde postavljene u Helsinškoj deklaraciji. Nije dozvoljena identifikacija bolesnika ni u pisanom niti u ilustrativnom materijalu. Neophodna je pismena saglasnost bolesnika za objavljivanje fotografskog materijala u kojem je angažovan. Ukoliko rad opisuje rezultate eksperimenta na životinjama, mora postojati jasna potvrda da su uslovi postupanja sa životinjama bili maksimalno humani.

Članci iz kategorije 1 moraju da imaju odobrenje **etičkog odbora** (institucije u kojoj je zaposlen glavni autor ili lokalnog regulatornog tela koje se bavi etičkim pitanjima u domenu istraživanja). Članci iz kategorije 4 moraju da imaju potpisan informisani pristanak od strane pacijenta, kojim se odobrava prikazivanje slučaja kroz objavljivanje u časopisu SJAiT.

Rukopise koji su prispeli elektronskim putem najpre pregleda tehnički urednik i ukoliko evidentira tehničke propuste (nepridržavanja „Vodiča za autore”), rukopis odmah vraća autoru za korespondenciju, radi korekcija propusta. Rukopise koji ispunjavaju tehničke kriterijume, pregleda glavni urednik, da li se tematikom uklapaju u uređivačku politiku, da li su stilski i jezički razumljivi. Ukoliko rukopis ne ispunjava te osnovne kriterijume, urednik može da odbije štampanje i pre (bez) recenziranja.

Rukopis se prihvata za objavljivanje tek nakon odluke dva anonimna recenzenta, koji će procenjivati svaki od prispelih radova.

Autori su dužni da jasno označe grafički materijal koji je pozajmljen iz drugih izvora. Preuzeti materijal neće biti objavljen ukoliko autor nije prethodno pribavio dozvolu za preštampavanje od izvornog urednika i izdavača i priložio je uz rukopis.

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Članak treba da bude napisan u Microsoft Office Word-u, formata A4. Potrebno je da se uredništvu pošalje tekst rukopisa, uključujući i dodatni ilustrativni/grafički materijal. Rukopisi se priređuju u skladu sa „Jedinstvenim zahtevima za pripremu rukopisa koji se podnose biomedicinskim časopisima” [„Uniform Requirements for Manuscripts (URM) Submitted to Biomedical Journals” (*British Medical Journal* 1991; **302**:338–341)]. URM može da se nađe i na internet adresi Međunarodnog komiteta urednika medicinskih časopisa: [The International Committee of Medical Journal Editors (ICMJE) – <http://www.icmje.org>].

- **Margine:** leva margina treba da bude 3,5 cm (1,5 inča), dok sve ostale (desna, gornja i donja) treba da budu 2,5 cm (1 inč). Ne bi trebalo da se koristi funkcija za poravnavanje desne ivice teksta! Trebalo bi kucati isključivo sa funkcijom *left-aligned*, uz korišćenje fonta Times New Roman 12. Potrebno je ostaviti jedan prazan red između pasusa. Nije potrebno povlačiti prvi red pasusa u desno! Originalno istraživanje, revijalni članci i metaanalize ne bi trebalo da pređu 5.000 reči, za prikaz bolesnika i za rad iz istorije medicine do 3.000 reči, a radovi za ostale rubrike do 1.000 reči, uključujući i strane sa prilogima. Nazivi lekova se moraju označavati njihovim generičkim imenima.
- **Listovi treba da se obeleže** redom, arapskim brojevima, počevši od naslovne strane, zaključno sa zadnjim listom literature. Broj stranice se označava u donjem desnom uglu stranice.
- **Broj autora, koautora i saradnika u članku je ograničen na šest.** Ukoliko je u pitanju velika istraživačka ili multicentrična studija, dozvoljen je i veći broj saradnika, uz saglasnost uredništva.
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- **Prilozi** – ukupan broj priloga (slike, tabele, grafikoni) ne bi trebalo da bude veći od 5, osim u izuzetnim slučajevima (ako je u pitanju neka nova tehnika koju je neophodno ilustrovati slikama i slično). Svaki prilog treba da sadrži numeraciju i jasan naslov na vrhu, a legendu (objašnjenje skraćenica) ili objašnjenje priloga na dnu. Potrebno je da se prilozi redom numerišu, arapskim ciframa (1, 2, 3...) i da se označi njihovo mesto u tekstu. Sve slike pošaljite u formatu JPEG i u rezoluciji 1024 x 768 piksela. Potrebno je da se svaki prilog pošalje na posebnoj stranici.

Pored samog rukopisa, neophodno je poslati i Ugovor o prenosu autorskih prava (koji se može pronaći na internet adresi: <http://sjait.uais.rs/sr/kako-poslati-rad/>), kao i Prateće pismo (*Cover letter*).

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Naslovna strana – strana broj 1

Označite naslovnu stranu kao stranu **1** Vašeg rukopisa.

Odštampane naslov VELIKIM SLOVIMA, font 14 bold (**capitals**), preko sredine strane. Ispod naslova (u zagradi), potrebno je dati skraćeni naslov (*running title*) sa maksimalno 50 karaktera, uključujući i razmake (*space*).

Dalje ispod, potrebno je da se odštampaju puna imena i prezimena svih autora. Nije potrebno da se navode titule niti profesionalni status. Ispod imena autora, treba da se navedu puni nazivi ustanova iz kojih autori potiču. Ustanove numerisati rednim brojevima, koje treba povezati sa imenima autora (u superskriptu).

Zatim, treba navesti puno ime i prezime, adresu, e-mail, broj telefona i/ili faksa **autora korespondenta**. Sva dalja prepiska oko korektura, lektorisanja, prepravki rukopisa, itd. obavljaće se preko tog autora. Sve gorenavedene podatke ponoviti na novom listu, ali na engleskom jeziku.

Sažetak – samo za radove koji se u celosti šalju na srpskom jeziku (strana 2)

Ne sme da bude duži od 250 reči. Potrebno ga je započeti na prvoj sledećoj strani (strana 2), a za radove iz kategorije 1 i 2 mora biti strukturisan: Uvod, Metode, Rezultati i Zaključak. Za kategoriju 4 mora imati: Uvod, Prikaz slučaja, Zaključak. Za kategoriju 3 ne mora biti strukturisan, a u ostalim kategorijama sažetak ne mora da postoji. U sažetku ne bi trebalo koristiti skraćenice, niti citirati literaturu.

Na kraju strane 2 potrebno je navesti 3–5 ključnih reči na srpskom jeziku. Između ključnih reči koristite oznaku tačka sa zapetom (;). Ukoliko niste sigurni u korektnost Vaše terminologije ključnih reči, potražite internet adresu MedLine baze podataka: <http://www.ncbi.nlm.nih.gov/PubMed/>. Američka Nacionalna medicinska biblioteka (National Library of Medicine) formirala je **MeSH**, kontrolisani rečnik medicinskih termina, koji se koristi za indeksiranje članaka uvrštenih u MedLine.

Summary – sažetak na engleskom jeziku (strana 3)

Ne sme da bude duži od 250 reči. Potrebno ga je započeti na prvoj sledećoj strani (strana 3) i za radove iz kategorije 1 i 2 mora biti strukturisan: *introduction, methods, results, conclusion*. Za kategoriju 4 mora imati: *introduction, case report, conclusion*. Za kategoriju 3 ne mora biti strukturisan, a u ostalim kategorijama *summary* ne mora da postoji. U sažetku ne bi trebalo koristiti skraćenice, niti citirati literaturu. Na kraju strane 3 potrebno je navesti 3–5 ključnih reči (*key words*) na engleskom jeziku.

Rukopis – strana 4

Za kategorije 1 i 2 treba da sadrži sledeće delove: uvod, cilj, metodologija, rezultati, diskusija, zaključak, literatura. Rukopis za kategoriju 4 treba da sadrži: uvod, prikaz slučaja, diskusija, zaključak. Kod ostalih kategorija konstrukcija članka je slobodna i nije obavezan zaključak, ali su poželjne kratke zaključne napomene sa jasnom porukom.

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U okviru rukopisa, potrebno je da se podnaslovi formiraju na sledeći način:

- **Podnaslovi: Bold italikom** uz levu marginu, neposredno iznad pasusa kojem prethodi.
- **Uvod:** treba da je jasan, da ukazuje na suštinu problema. Potrebno je citirati referentnu literaturu u kojoj je problem obrađivan.

- **Cilj:** treba da sadrži jasno definisan problem istraživanja.
- **Metode:** opšte poznate metodološke postupke ne bi trebalo opisivati u detalje, već usmeriti potencijalnog čitaoca na referentne izvore. Ukoliko dajete nov metod ili modifikaciju postojećeg metoda istraživanja, trebalo bi da detaljno opišete metod. Neophodno je navesti metode korišćene u statističkoj analizi podataka.
- **Rezultati:** trebalo bi da budu precizni i jasni, statistički obrađeni. Rezultati merenja treba da se navode u SI jedinicama. Izuzetak se može napraviti kod rezultata merenja krvnog pritiska, koji se mogu izraziti u mmHg i merenja količine hemoglobina u krvi (g/dL). Nije poželjno koristiti tačke unutar skraćenica. Engleske skraćenice treba da odgovaraju: *Units, Symbols, and Abbreviations. A Guide for Biological and Medical Editors and Authors*, 5th edition (1994), Royal Society of Medicine Press, 1 Wimpole Street, London W1M 8AE, England, U.K.
- **Diskusija:** Rezultate treba diskutovati i uporediti sa rezultatima iz referentnih izvora. Na osnovu učinjenih poređenja, treba izvesti nekoliko ključnih zaključaka.
- **Zaključak:** treba da bude jasan i da proistekne iz ciljeva i rezultata istraživanja.

Izjave zahvalnosti (prva sledeća strana)

Ukoliko rukopis ima izjave zahvalnosti, potrebno ih je započeti na sledećoj numerisanoj strani.

Literatura (prva sledeća strana)

Spisak referentne literature potrebno je započeti na sledećoj numerisanoj strani. Reference treba numerisati redom kako se pojavljuju u tekstu. Potrebno je identifikovati reference u: tekstu rada, prilogima i legendama, pomoću arapskih brojeva, koristiti *superscript*. Reference koje se pojavljuju samo u tabelama ili legendama vezanim za ilustracije treba numerisati shodno mestu pojavljivanja tabele/ilustracije. Ukoliko se jedna referenca više puta spominje u tekstu rada, označava se istim brojem. Sažeci (*summary*), prepiske i neobjavljene studije se ne mogu koristiti kao referentni izvori za navođenje referenci.

Reference se štampaju u obliku prihvaćenom od strane američke Nacionalne medicinske biblioteke (U. S. National Library of Medicine), a koji se koristi u *Index Medicus-u*. Vankuverska pravila precizno utvrđuju redosled podataka i znake interpunkcije. U svakoj pojedinačnoj referenci treba navesti inicijale i prezimena svih autora (ukoliko ih ima šest ili manje). Ako ima više od šest autora, navode se samo prva tri, posle čega se piše *et al.* Posle imena autora navodi se naslov članka, naslov časopisa, skraćen prema pravilima Index Medicus-a, godina štampanja, redni broj godišta (*the volume number*), broj prve i poslednje stranice referisanog članka. Iza naslova knjige, navodi se mesto gde je štampana, izdavač i godina štampanja.

Prilozi – tabele, grafikoni (prva sledeća strana)

Svaki prilog je potrebno odštampati na posebnoj stranici, sa zaglavljem iznad. Naslov priloga treba da je postavljen iznad priloga (*Align text left*) sa numeracijom priloga (Tabela broj____), koja se nalazi ispred naslova priloga. Ispod priloga može da se odštampa objašnjenje koje bliže određuje poreklo predstavljenih podataka. Ukoliko prilog sadrži skraćenice, potrebno je da se ispod priloga objasne skraćenice kroz formu legende. U tabelama bi trebalo da se koristi dvostruki prored (*double-spaced*). Ne treba slati fotografije snimljenih priloga (tabela i grafikona).

Slike (prva sledeća strana)

Sve slike posaljite u obliku JPEG u rezoluciji 1024 x 768 pixels.

Kompjuterska priprema teksta

- Svi tekstualni delovi rada moraju biti unutar jedinstvenog fajla.
- Pokušajte da izbegnete bilo kakvo formatiranje teksta. Drugim rečima, ne bi trebalo koristiti funkciju *style* Vašeg tekst-procesora.
- Ne bi trebalo da koristite taster: *carriage return* (enter) za prelazak u novi red teksta unutar jednog pasusa. Treba pustiti da tekst-procesor to sam odradi.
- Treba isključiti opciju/funkciju *hyphenation*.
- Potrudite se da ne koristite l (malo L) umesto 1 (jedan), O (veliko o) umesto 0 (nula) ili s (nemačko esszett) umesto ß (beta).
- Kako biste razdvojili podatke u tabelama, koristite taster: tab, a ne space.
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Recenzija i Korektura

Nakon dobijanja mišljenja recenzenata, molimo Vas da u zadatom roku odgovorite na primedbe i/ili sugestije. Vaš odgovor se prosleđuje recenzentima i čeka se njihova odluka.

Molimo Vas, ukoliko želite da Vaš rukopis bude objavljen, da ga pripremite prema uputstvima i u elektronskom obliku pošaljete na sledeću e-mail adresu: journal.sjait@yahoo.com.

Svoje pismo naslovite na Uredništvo časopisa SJAiT. Sva komunikacija o statusu Vašeg poslatog rukopisa obavljaće se putem gorenavedene e-mail adrese.

GUIDE FOR the AUTHORS

Serbian Journal of Anesthesia and Intensive Therapy (SJAIT) is the official publication of the Serbian Association of Anesthesiologists and Intensivists. The Journal publishes scientific and professional work on theoretical and clinical aspects of anesthesiology, intensive therapy, resuscitation and pain therapy. The journal also publishes scientific work from other related scientific disciplines: clinical pharmacology, clinical physiology and pathophysiology, surgery, internal medicine, forensic medicine, emergency medicine and other fields of medicine dealing with problems related to preoperative preparation, anesthesia, resuscitation, intensive therapy and pain therapy. The journal is published in Serbian and English.

All articles are reviewed and upon acceptance for publication placed in one of the following **categories**:

1. Original Article

2. **Meta-analyses** – a study on studies, presents an analytic-synthetic study of a number of studies on an important topic, along with an analysis of opposing views and assessment of practical applicability; it allows recommendations and conclusions on the basis of other people's data and must have a clearly formulated conclusion.

3. **Review Articles** – considers a modern, unresolved or contradictory issue of theoretical and practical significance, presenting results of personal research or the latest salient data from the literature. The structure of the article is free and does not necessarily need a conclusion, but short concluding remarks with a clear message are desirable. These comprise **Expert Opinions**.

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5. **Letters to the Editor** – can refer to articles published in the SJAIT journal, on topics of relevance to medical practice in general, as well as books (monographs) of particular medical importance. They are written in a free style, with possible reference to data from the literature. They are published at the discretion of the editor in chief.

6. **Reports from Scientific and Professional Meetings** – represent a brief overview of the meeting, with an emphasis on the most important papers or conclusions, and recommendations of relevance to a wider circle of SJAIT readers.

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Articles describing clinical investigations must adhere to the principles of the Declaration of Helsinki. Identification of patients is not allowed either in written material or illustrations. A patient's written consent is compulsory for publication of photographic material which engages the patient. If a paper describes results of experiments on animals, there must be a clear confirmation that the animal treatment conditions were entirely humane.

Articles in category 1 are to have an approval of the **Ethics committee** (the institution where the main author is employed or of a local regulatory agency that deals with ethical issues in the field of research). Articles in category 4 are to have a signed informed consent by the patient, approving the case report through the publication in the SJAIT journal.

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A manuscript is accepted for publication only after the decision has been made by two anonymous reviewers, who will assess each of the submitted papers.

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Presentation of the manuscripts

Manuscripts should be written in Microsoft Office Word, A4 format. It is necessary to send the manuscript text to the editorial board, along with additional illustration / graphic material. Manuscripts should be prepared in accordance with the "Uniform Requirements for Manuscripts (URM) Submitted to Biomedical Journals" *British Medical Journal* 1991; **302**:338–341). URM can be found on the International Committee of Medical Journal Editors (ICMJE) web site: <http://www.icmje.org>.

- **Margins:** Left margin should be 3.5 cm (1.5 inches), while all others (right, top and bottom) should be 2.5 cm (1 inch). The function to align text right should not be used! Typing should be performed with *left-aligned* function, and Times New Roman 12 font should be used. It is necessary to leave a blank line between paragraphs. It is not necessary to indent the first line of the paragraph to the right! Original articles, review articles and meta-analyses should not exceed 5000 words, case reports and works from the history of medicine should have up to 3000 words, whereas works for other sections up to 1000 words, including pages with appendices. The names of drugs have to be marked using their generic names.
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In addition to the manuscript, it is necessary to send Copyright Transfer Agreement (you can find it at the web site: <http://sjait.uais.rs/how-to-submit-an-article>) and Cover Letter (example you can also find at the web site: <http://sjait.uais.rs/how-to-submit-an-article>).

The cover letter contains a letter to the Editorial Board signed by all the authors, which confirms that all the authors have participated in preparing the manuscript and that they are all familiar / agreed with

the content of the submitted final version. The letter should specifically emphasize that there is no conflict of interest of any of the authors. If a conflict of interest undoubtedly exists, the journal reserves the right to request and publish an appropriate statement of the author or not to accept the manuscript for publication. The cover letter contains a statement of intent to publish in the SJAIT journal.

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Mark the cover page as page 1 of your manuscript.

Print the title in CAPITAL LETTERS, font 14 bold (**capitals**) in the middle of the page. Under the title (in parentheses) give the abbreviated title, the so-called *running title*, of maximum 50 characters including spaces.

Further below, it is necessary to print the full name of all the authors. It is not necessary to give titles or professional statuses. Below the authors' names indicate the full name of the institution they come from. The institutions should be numbered with ordinal numbers, which should be linked to the names of the authors (in superscript).

Finally, the full name, address, e-mail, telephone and / or fax of the corresponding author should be specified. This author is responsible for all further correspondence to do with editing, proofreading, manuscript corrections, etc. All of the above information should be rewritten on a new page but in English.

Abstract – a summary in Serbian (page 2) – ONLY FOR SERBIAN LANGUAGE MANUSCRIPTS

The second page (page 2) should carry an abstract in Serbian. It should not be more than 250 words. Abstracts of manuscripts from categories 1 and 2 should be structured as follows: Introduction, Methods, Results, and Conclusion. For category 4 it must have: Introduction, Case Report, and Conclusion. Abstracts of manuscripts from category 3 do not need to be structured, and for other categories the abstract is optional. Abbreviations should not be used in the abstract, nor should it cite references.

At the end of page 2 it is necessary to provide 3–5 key words in Serbian.

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For categories 1 and 2 the manuscript should contain the following sections: Introduction, Objective, Methodology, Results, Discussion, Conclusion, References. The manuscript for category 4 should contain: Introduction, Case Report, Discussion, and Conclusion. For other categories the manuscript structure is loose and the conclusion is optional, but short concluding remarks with a clear message are desirable.

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Within the manuscript subheadings should be formed as follows:

- **Subtitles:** *Bold italics* along the left margin, just above the paragraph they precede.
- **Introduction:** should be clear and point to the crux of the problem. It is necessary to cite reference literature where the problem has been addressed.
- **Objective:** should contain clearly defined research problem.
- **Methods:** universally known methodological procedures should not be described in detail; directing a potential reader to reference sources will suffice. If you are giving a new method or a modification of an existing research method, the method needs to be explained in detail. It is necessary to specify the methods used in the statistical analysis of data.
- **Results:** should be precise and clear, statistically analyzed. The measurement results should be given in SI units. An exception can be made when results of measurements of blood pressure are given, which can be expressed in mmHg and measuring of the amount of hemoglobin in the blood (g/dL). It is not advisable to use fullstops within an abbreviation. English abbreviations should comply with: *Units, Symbols and Abbreviations. A Guide for Biological and Medical Editors and Authors*, 5th edition (1994), Royal Society of Medicine Press, 1 Wimpole Street, London W1M 8AE, England, U.K.
- **Discussion:** It is necessary to discuss results and compare them with results from reference sources. According to comparisons made, it is necessary to draw several important conclusions.
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If there are acknowledgements, they should start on the next numbered page.

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The list of reference literature should begin on the next numbered page. References should be numbered in the order they appear in the text. It is necessary to identify references: in the manuscript text, appendixes and legends with Arabic numerals using the “superscript”. References that appear only in tables or legends relating to illustrations should be numbered according to where the table / illustration is given. If a reference is mentioned several times in the text, it is marked with the same number. Summaries, correspondence and unpublished studies cannot be used as a reference source for citing references.

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- All parts of the text should be in a single file.
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Upon receiving the review, please respond in a timely manner to the reviewers’ comments and / or suggestions. Your reply will be sent to the reviewers and their decision is then awaited.

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