



28. SIMPOZIJUM INFEKTOLOGA

**BOSNE I HERCEGOVINE
SA MEĐUNARODNIM UČEŠĆEM**

02-04.10.2026, Hotel Courtyard by Marriott, Banja Luka

Savremeni izazovi
u dijagnostici,
terapiji i prevenciji
infektivnih bolesti

**KNJIGA
SAŽETAKA**

ASOCIJACIJA INFEKTOLOGA U BOSNI I HERCEGOVINI

**28. SIMPOZIJUM INFEKTOLOGA BOSNE I HERCEGOVINE
SA MEĐUNARODNIM UČEŠĆEM**

*Savremeni izazovi u dijagnostici,
terapiji i prevenciji infektivnih bolesti*

KNJIGA SAŽETAKA

OKTOBAR 2026.

IZDAVAČ

Štamparija Topredo, Banja Luka

GLAVNI I ODGOVORNI UREDNIK

Prof. dr Antonija Verhaz

ORGANIZACIONI ODBOR

Antonija Verhaz, predsjednik

Tatjana Roganović, podpredsjednik

Branka Antešević

Olja Čuković

Maja Đukić Milinković

Dilista Piljić

Milan Petrović

Snežana Ritan

Ljiljana Pašić

Zvezdana Vuković

Denis Žepić

NAUČNI ODBOR:

Antonija Verhaz

Tatjana Roganović

Jurica Arapović

Rusmir Baljić

Refet Gojak

Svjetlana Grgić

Rahima Jahić

Jadranka Nikolić

Siniša Skočibušić

Dilista Piljić

Jasminka Petrović

CIP - Каталогизacija u publikaciji
Народна и универзитетска библиотека
Републике Српске, Бања Лука

616.9(048.3)(0.034.2)

СИМПОЗИЈУМ инфектолога Босне и Херцеговине са међународним учешћем (28 ; 2026 ; Бања Лука)

Savremeni izazovi u dijagnostici, terapiji i prevenciji infektivnih bolesti [Elektronski izvor] : knjiga sažetaka / 28. simpozijum infektologa Bosne i Hercegovine sa međunarodnim učešćem, 02-04.10.2026., Banja Luka ; [glavni i odgovorni urednik Antonija Verhaz]. - Onlajn izd. - Ел. књига. - Banja Luka : Štamparija Torpedo, 2026

Системски захтјеви нису наведени. - Način pristupa (URL): <https://aiubih.org/>. - Насл. са насловног екрана. - Ел. публикација у ПДФ формату опсега 83 стр. - Опис извора дана 30.09.2026.

ISBN 978-99976-087-7-2

COBISS.RS-ID 144848641

SADRŽAJ

PREDAVANJA PO POZIVU	7
KARDIOLOŠKI UZROČNICI FEBRILNIH STANJA NEPOZNATOG POREKLA: DIJAGNOSTIČKI IZAZOV U KLINIČKOJ PRAKSI.....	8
<i>Biljana Popovska Jovičić, Ivana Lešnjak, Sofija Sekulić Marković, Ivana Raković, Sara Petrović, Andrijana Krstić, Nemanja Đorđević, Jagoda Gavrilović, Ružica Radojević Marjanović</i>	
NOVI STARI MODEL UPRAVLJANJA BOLNIČKIH INFEKCIJA U SKB MOSTAR.....	10
<i>Izv. prof. dr. sc. Svjetlana Grgić, prim. dr. med.</i>	
PRENATALNA DIJAGNOSTIKA – TORCH	12
<i>Ružica Radojević Marjanović, Sofija Sekulić Marković, Ivana Raković, Ivana Lešnjak, Nemanja Đorđević, Andrijana Krstić, Biljana Popovska Jovičić</i>	
ZASTUPLJENOST INFEKTIVNIH I NEINFEKTIVNIH BOLESTI HOSPITALIZIRANIH PACIJENATA NA ODJELU ZA INFEKTIVNE BOLESTI KANTONALNE BOLNICE ZENICA U 2019. 2025. I 2026.GODINI	14
<i>Eldira Hadžić, Nerma Mušić, Medina Mujić Begić, Sanda Branković</i>	
CURRENT ISSUES IN TUBERCULOSIS CONTROL: A WHO PERSPECTIVE.....	16
<i>Erwin Cooreman, Special Representative,</i>	
NEUROINFEKCIJE KOD ODRASLIH – KLINIČKI, DIJAGNOSTIČKI I TERAPIJSKI IZAZOVI DANAŠNJICE	17
<i>Tatjana Roganović</i>	
PREDIKTIVNE VRIJEDNOSTI LIKVORNOG FERITINA U KOGNITIVNOJ PROCJENI PACIJENATA NAKON AKUTNIH INFEKCIJA CENTRALNOG NERVNOG SISTEMA	19
<i>Belma Gazibera</i>	
NEUROINFEKCIJE U KLINICI ZA INFEKTIVNE BOLESTI UNIVERZITETSKOG KLINIČKOG CENTRA REPUBLIKE SRPSKE (UKC RS) U DESETOGODIŠNJEM PERIODU: RETROSPEKTIVNA STUDIJA.....	21
<i>Snežana Ritan, Tatjana Roganović, Milan Petrović, Olja Čuković, Maja Milinković Đukić, Tanja Macanović Kostić</i>	
KLINIČKE, EPIDEMIOLOŠKE I LABORATORIJSKE KARAKTERISTIKE LEPTOSPIROZE TOKOM EPIDEMIJE U KANTONU SARAJEVO 2025. GODINE	23
<i>Amila Muratspahić, Alma Sejtarija-Memišević, Dževad Šaćić, Anes Jogunčić, Rusmir Baljić</i>	
LISTERIOZA U PERINATOLOGIJI	25
<i>Prof. prim. dr. sc. Deni Karelović</i>	
VODIČ ZA IMUNIZACIJU ODRASLIH OSOBA U FEDERACIJI BOSNE I HERCEGOVINE: SADRŽAJ, KLJUČNE PREPORUKE I MOGUĆNOSTI PRIMJENE.....	26
<i>Siniša Skočibušić, Sanjin Musa, Mia Blažević, Almedina Hadžihasanović-Moro, Ankica Mijić Marić, Senad Dorić</i>	
HEPATITIS C MEĐU ZAVISNICIMA U UKCV	28
<i>Prof.dr Tomislav Preveden, Doc.dr Maria Pete</i>	

ACUTE LIVER FAILURE IN ACUTE HBV INFECTION: CLINICAL CHARACTERISTICS, TREATMENT, AND OUTCOMES – A SINGLE-CENTER EXPERIENCE	29
<i>Dr Ivana Đuković Savović, Dr Ana Bujanja Merdović</i>	
PRELAZAK SA EFAVIRENZA NA DORAVIRIN BAZIRANI REŽIM: REAL-WORLD ISKUSTVA KLINIKE ZA INFektivNE BOLESTI BANJA LUKA	30
<i>Ljiljana Pašić Grubišić, Antonija Verhaz, Maja Milinković Đukić, Borko Pavlica, Sanja Tadić, Vesna Pavlović, Snežana Ritan</i>	
GENI, HIV I METABOLIČKI SINDROM: ULOGA POLIMORFIZMA HIF-1α rs11549465	33
<i>Nemanja Đorđević, Jovan Ranin, Ivana Gmizić, Nemanja Jovičić, Biljana Ljujić, Sofija Sekulić Marković, Ivana Raković, Ivana Lešnjak, Andrijana Krstić, Marko Marković, Jovana Ranin, Ivan Rajković, Biljana Popovska Jovičić</i>	
PODUDARNOST NEINVAZIVNIH METODA ZA PROCJENU FIBROZE KOD HCV INFEKCIJE	35
<i>Alma Trnačević, Emir Trnačević</i>	
SAVREMENI PRINCIPI ANTIRETROVIRUSNE TERAPIJE U SRBIJI	37
<i>Jovan Ranin</i>	
IZAZOVI RACIONALNE PRIMJENE REZERVNIH ANTIBIOTIKA U SITUACIJAMA UPITNOG KLINIČKOG BENEFITA	38
<i>Rusmir Baljić</i>	
REZISTENCIJA NA ANTIMIKROBNE LIJEKOVE IZ INVAZIVNIH IZOLATA U REPUBLICI SRPSKOJ I ZNAČAJ NOVIH BIOMARKERA U NJENOJ PREVENCIJI.....	39
<i>Prof. dr. Maja Travar, Prim. dr. Višnja Mrđen</i>	
STVARNA UČINKOVITOST ANTIMIKROBNE UROPROFILAKSE U PREVENCIJI REKURENTNIH INFEKCIJA MOKRAČNOG SUSTAVA: REZULTATI KOHORTNE STUDIJE S UPARIVANJEM PREMA SKLONOSTI LIJEČENJU	41
<i>Božo Šušak, Antea Milošević, Svjetlana Grgić</i>	
NAJČEŠĆI BAKTERIJSKI UZROČNICI U URINU I NJIHOVA ANTIMIKROBNA REZISTENCIJA: ISKUSTVO JEDNOG CENTRA	43
<i>Mirela Topić, Igor Hadžimulić, Mirela Zirić, Senad Hadžipašić, Ismir Kukić, Enisa Šabotić, Velida Gaković, Mejra Durmišević</i>	
ŠTO JE NOVO U MIKROBIOLOŠKIM ZNAČAJKAMA UZROČNIKA SEPSE?	45
<i>Prof. dr. sc. Jadranka Nikolić, dr. med., specijalist infektologije, Doc. dr. sc. Božo Šušak, dr. med, specijalist infektologije, Viši asistent Monika Dalmatin Dragišić, dr. med., specijalist infektologije</i>	
KLINIČKE KARAKTERISTIKE, DIJAGNOSTIKA, LIJEČENJE I JEDNOGODIŠNJI ISHODI BOLESNIKA S INFEKTIVNIM ENDOKARDITISOM	47
<i>Maja Milinković Đukić, Ljiljana Pašić Grubišić, Antonija Verhaz, Snežana Ritan, Sandra Toprek, Vesna Pavlović</i>	
INVAZIVNE GLJIVICNE INFEKCIJE KOD IMUNOKOMPROMITOVANIH PACIJENATA – GDE SMO DANAS?	49
<i>Prof. Dr. Gordana Dragović</i>	

POSTER PREZENTACIJE	51
KRIPTOKOKNI MENINGOENCEFALITIS KOD PACIJENTICE S TRANSPLANTIRANOM JETROM	52
<i>Edina Šuvalić, Petrović Jasminka, Rahima Jahić, Ammar Brkić</i>	
TUBERKULOZNI MENINGOENCEFALITIS U SKLOPU DISEMINOVANE MILIJARNE TUBERKULOZE -PRIKAZ SLUČAJA.....	54
<i>Tanja Macanović Kostić, Milan Petrović, Tatjana Roganović, Snezana Ritan, Vanja Momić</i>	
PRIKAZ SLUČAJA MENINGITISA UZROKOVANOG BETA HEMOLITIČKIM STREPTOKOKOM GRUPE A	55
<i>Sanja Tadić, Antonija Verhaz, Snezana Ritan, Ljiljana Pašić Grubišić, Bojana Arambašić, Branka Antešević</i>	
TUBERKULOZNI MENINGOENCEFALITIS REZISTENTAN NA IZONIAZID, ETAMBUTOL I STREPTOMICIN UZ OSJETLJIVOST NA RIFAMPICIN: DIJAGNOSTIČKI I TERAPIJSKI IZAZOV – PRIKAZ SLUČAJA	57
<i>Senad Hadžipašić, Igor Hadžimulić, Mirela Zirić, Mirela Topić, Ismir Kukić, Enisa Šabotić, Velida Gaković, Mejra Durmišević</i>	
VZV MENINGITIS BEZ OSIPA KOD IMUNOKOMPETENTNOG, MLADOG PACIJENTA-PRIKAZ SLUČAJA.....	59
<i>Ivana Milanović, dr Milan Petrović, doc. dr Tatjana Roganović, prof. dr sc. med. Antonija Verhaz, Sandra Toprek, Jelena Milovanović</i>	
MORBILI BEZ OSIPA SA PNEUMONIJOM- PRIKAZ SLUČAJA	61
<i>Olja Čuković, Tatjana Roganović, Antonija Verhaz, Tanja Macanović Kostić</i>	
SEPTIČKI ŠOK UZROKOVAN PAENICLOSTRIDIUM SORDELLII – PRIKAZ SLUČAJA	62
<i>Ana Bubanja Merdović</i>	
EPIDEMIOLOŠKE KARAKTERISTIKE LEPTOSPIROZE NA PODRUČJU TUZLANSKOG KANTONA U PERIODU OD 2009.-2025. GODINE.....	64
<i>Selma Palavrić, Amela Mušanović, Jasmina Brkić Džambić</i>	
PRVA ISKUSTVA U LIJEČENJU HIV INFEKCIJE NA ODJELU ZA INFEKTIVNE BOLESTI KANTONALNE BOLNICE ZENICA.....	66
<i>Zahirović Nadira, Hadžić Eldira</i>	
ISTOVREMENA DIJAGNOZA HIV INFEKCIJE I MAJMUNSKIH BOGINJA (MPOX): PRVI DOKUMENTOVANI SLUČAJ U REPUBLICI SRPSKOJ	68
<i>Ljiljana Pašić Grubišić, Andrej Trubajić, Antonija Verhaz, Zvezdana Vuković, Maja Milinković Đukić, Jelena Milovanović</i>	
HBV REAKTIVACIJA KOD BOLESNIKA SA REUMATOIDNIM ARTRITISOM LIJEČENIM RITUKSIMABOM – PRIKAZ SLUČAJA.....	70
<i>dr Snežana Ostojić, prof. dr sc. med. Antonija Verhaz, dr Milan Petrović, dr Snežana Ritan, dr Branka Antešević, dr Svetlana Milinković</i>	
AKUTNA Q-GROZNICA - PRIKAZ SLUČAJA.....	71
<i>Bojana Nježić Nedić, Antonija Verhaz, Vesna Pavlović, Sanja Tadić, Branka Antešević, Željka Petrušić</i>	

HOLESTAZNI HEPATITIS A, MOGUĆNOSTI LEČENJA – PRIKAZ SLUČAJA.....	73
<i>Ivana Raković, Nemanja Đorđević, Biljana Popovska Jovičić, Jagoda Gavrilović, Sara Petrović, Sofija Sekulić Marković, Ivana Lešnjak, Andrijana Krstić, Željko Mijailović</i>	
EKONOMSKI ASPEKT LIJEČENJA INFEKCIJA UZROKOVANIH CLOSTRIDIODES DIFFICILE BAKTERIJOM U SKB MOSTAR.....	76
<i>Linda Soldo, Svjetlana Grgić, Nives Vasilj, Matea Kokić, Helien Bebek Ivanković</i>	
VARIČELA KOD HOSPITALIZIRANIH PACIJENATA NA ODJELU ZA INFEKTIVNE BOLESTI KB ZENICA: KLINIČKE KARAKTERISTIKE, KOMPLIKACIJE I ISHODI LIJEČENJA U PERIODU 2024–2026.....	78
<i>Meliha Šehić Arslan</i>	
VODIČ ZA NAJBOLJE PRAKSE I SIGURNOST IMUNIZACIJE: STANDARDIZACIJA POSTUPAKA I NADZORA NAD NEŽELJENIM POJAVAMA U FEDERACIJI BOSNE I HERCEGOVINE	80
<i>Rozalija Nedić, Sanjin Musa, Mia Blažević, Siniša Skočibušić</i>	
SINUS HISTIOCITOZA SA GENERALIZOVANOM LIMFADENOPATIJOM.....	82
<i>Maja Milinković Đukić, Ljiljana Pašić Grubišić, Antonija Verhaz, Svetlana Milinković, Borko Pavlica, Branka Antešević</i>	

PREDAVANJA PO POZIVU

KARDIOLOŠKI UZROČNICI FEBRILNIH STANJA NEPOZNATOG POREKLA: DIJAGNOSTIČKI IZAZOV U KLINIČKOJ PRAKSI

Biljana Popovska Jovičić, Ivana Lešnjak, Sofija Sekulić Marković, Ivana Raković, Sara Petrović, Andrijana Krstić, Nemanja Đorđević, Jagoda Gavrilović, Ružica Radojević Marjanović
Univerzitet u Kragujevcu, Medicinski fakultet, Katedra za infektivne bolesti
Klinika za infektivne bolesti, Univerzitetski klinički centar Kragujevac

Uvod: Febrilna stanja nepoznatog porekla (FUO) definišu se kao povišena telesna temperatura viša od 38,3°C koja traje duže od tri nedelje, a čiji uzrok ostaje neotkriven i nakon opsežnih kliničkih ispitivanja. Među više od 200 uzročnika, klasifikovanih u pet dijagnostičkih grupa (infektivne, reumatološke i maligne bolesti, razni uzroci i nedijagnostikovani slučajevi), kardiovaskularna oboljenja zauzimaju specifično mesto zbog svoje kompleksne kliničke slike i rizika od fatalnih komplikacija. Kardiogena etiologija FUO obuhvata kako infektivne uzročnike, a odnose se na infektivni endokarditis i različite forme mioperikarditisa, tako i neinfektivne inflamatorne procese.

Cilj rada: Prikazati učestalost, kliničke karakteristike i efikasnost dijagnostičkog algoritma kod bolesnika kod kojih je kardiološko oboljenje identifikovano kao primarni uzrok febrilnog stanja nepoznatog porekla.

Materijal i metode: Retrospektivna studija je obuhvatila 131 pacijenta hospitalizovanog na Klinici za infektivne bolesti Univerzitetskog kliničkog centra Kragujevac u periodu od 2016. do 2026. godine, koji su ispunjavali kriterijume za klasičan tip FUO. Analizirani su demografski podaci, laboratorijski markeri inflamacije, hemokulture, kao i nalazi transtorakalne (TTE) i transezofagealne ehokardiografije (TEE) i magnetne rezonance (MR) srca.

Rezultati: Od ukupnog broja pacijenata sa FUO, kardiološki uzrok je potvrđen kod 13 (10%) bolesnika. Najučestalija dijagnoza bio je infektivni endokarditis, identifikovan kod 10 pacijenata, dok je kod dva pacijenta dijagnostikovao akutni perikarditis, a kod jednog mioperikarditis. Hemokulturama su najčešće izolovani gram-pozitivni mikroorganizmi, a među njima se posebno izdvojio *Streptococcus viridans*. Transtorakalni i transezofagealni ultrazvuk srca (TEE) pokazali su visoku senzitivnost u vizuelizaciji vegetacija, dok je MR srca bila ključna za detekciju miokarditisa.

Zaključak: Kardiološki uzročnici febrilnih stanja nepoznatog porekla nose visok rizik od morbiditeta. Rana primena ehokardiografskih tehnika (TTE i TEE), uz napredne metode poput MR srca, od presudnog je značaja za postavljanje tačne dijagnoze i blagovremeno započinjanje ciljane terapije.

Ključne reči: febrilno stanje nepoznatog porekla, infektivni endokarditis, ehokardiografija, miokarditis, hemokulture.

CARDIOLOGICAL CAUSES OF FEVER OF UNKNOWN ORIGIN: A DIAGNOSTIC CHALLENGE IN CLINICAL PRACTICE

Biljana Popovska Jovičić, Ivana Lešnjak, Sofija Sekulić Marković, Ivana Raković, Sara Petrović, Andrijana Krstić, Nemanja Đorđević, Jagoda Gavrilović, Ružica Radojević Marjanović
University of Kragujevac, Serbia, Faculty of Medical Sciences, Department of Infectious diseases
Clinic of infectious diseases, University clinical centre Kragujevac

Introduction: Fever of unknown origin (FUO) is defined as a prolonged body temperature higher than 38.3°C lasting for more than three weeks, with the cause remaining undiscovered even after extensive clinical investigations. Among more than 200 etiologies classified into five diagnostic groups (infectious, rheumatologic, and malignant diseases, miscellaneous causes, and undiagnosed cases), cardiovascular diseases occupy a specific place due to their complex clinical presentation and the risk of fatal complications. The cardiogenic etiology of FUO encompasses both infectious causes, which refer to infective endocarditis and various forms of myopericarditis, as well as non-infectious inflammatory processes.

Objective: To present the incidence, clinical characteristics, and efficacy of the diagnostic algorithm in patients in whom a cardiological disease was identified as the primary cause of fever of unknown origin.

Material and Methods: This retrospective study included 131 patients hospitalized at the Clinic for Infectious Diseases of the University Clinical Center Kragujevac in the period from 2016 to 2026, who met the criteria for classic FUO. Demographic data, laboratory markers of inflammation, blood cultures, as well as the findings of transthoracic (TTE) and transesophageal echocardiography (TEE) and cardiac magnetic resonance imaging (MRI) were analyzed.

Results: Out of the total number of patients with FUO, a cardiological cause was confirmed in 13 (10%) patients. The most frequent diagnosis was infective endocarditis, identified in 10 patients, followed by acute pericarditis in two patients, and myopericarditis in one patient. Blood cultures most commonly isolated Gram-positive microorganisms, among which *Streptococcus viridans* was particularly prominent. Transthoracic and transesophageal echocardiography (TEE) showed high sensitivity in visualizing vegetations, while cardiac MRI was crucial for the detection of myocarditis.

Conclusion: Cardiological causes of fever of unknown origin carry a high risk of morbidity. Early application of echocardiographic techniques (TTE and TEE), along with advanced methods such as cardiac MRI, is of crucial importance for establishing an accurate diagnosis and the timely initiation of targeted therapy.

Keywords: fever of unknown origin, infective endocarditis, echocardiography, myocarditis, blood cultures.

References:

1. Lesnjak I, Jovicic BP, Jankovic K, Canovic A, Stanojkovic T, Gajic M, Markovic S, Manojlovic A, Mijailovic SS, Jankovic SM, Barjaktarevic AM, Kostic OZ, Stevic MR, Mojsilovic JV, Kostic MJ. Fever of unknown origin: cost of illness study. *Open Med (Wars)*. 2026 Apr 30;21(1):20261409. doi: 10.1515/med-2026-1409. PMID: 42292135; PMCID: PMC13263420.
2. Popovska Jovičić B, Čanović P, Gajović O, Raković I, Mijailović Ž. Febrilno stanje nejasne etiologije - najčešći uzroci kod odraslih bolesnika. *Vojnosanitetski pregled*. 2016;73(1):21-5. doi: 10.2298/VSP140820128P
3. Poposki K, Grozdanovski K, Dimzova M, Georgievska D, Bosilkovski M. Fever of unknown origin: diagnostic challenges from infectious diseases perspective. *Acad Med J*. 2025;5(3):10–20.
4. Smid J, Scherner M, Wolfram O, Groscheck T, Wippermann J, Braun-Dullaes RC. Cardiogenic Causes of Fever. *Dtsch Arztebl Int*. 2018 Mar 23;115(12):193-199. doi: 10.3238/arztebl.2018.0193. PMID: 29642989; PMCID: PMC5963599.
5. Elisavet Stavropoulou, Pierre Monney, Georgios Tzimas, Nicoleta Ianculescu, Piergiorgio Tozzi, Matthias Kirsch, Benoit Guery, Matthaios Papadimitriou-Olivgeris, Predictors of Persistent Fever Among Patients With Suspected Infective Endocarditis: Think Outside the box, *Clinical Infectious Diseases*, 2025; 80 (4):795–803, <https://doi.org/10.1093/cid/ciae588>

NOVI STARI MODEL UPRAVLJANJA BOLNIČKIH INFEKCIJA U SKB MOSTAR

*Izv. prof. dr. sc. Svjetlana Grgić, prim. dr. med.
Sveučilišna klinička bolnica Mostar, Bosna i Hercegovina*

Bolničke infekcije i antimikrobna rezistencija predstavljaju kritične izazove suvremenih zdravstvenih sustava, zahtijevajući kontinuiranu transformaciju strategija kontrole. Svrha ovog rada je prikazati implementaciju i evaluaciju "novog starog" modela upravljanja bolničkim infekcijama u Sveučilišnoj kliničkoj bolnici Mostar, koji je razvijen i unaprijeđen u sklopu međunarodnog partnerskog projekta s Kraljevinom Švedskom. Model se temelji na sinergiji reaktiviranih, tradicionalnih higijensko-epidemioloških standarda i suvremenih, tehnološki naprednih alata kontrole. Metodologija rada obuhvaća analizu integriranog sustava nadzora koji nadilazi isključivo promatranje higijene ruku i radnih površina, radnih postupaka i med. osoblja. Ključnu komponentu novog modela čini uvođenje sustava za elektronsko praćenje i rano prepoznavanje bolničkih infekcija, što omogućuje brzu obradu podataka u realnom vremenu. Ovaj digitalni nadzor izravno je uvezan s kliničkom mikrobiologijom i Uredom za praćenje infekcija povezanih sa zdravstvenim sustavom, čime je osigurana brza identifikacija multirezistentnih patogena i ciljano praćenje epidemioloških trendova unutar bolničkih odjela. Operacionalizacija modela počiva na djelovanju multidisciplinarnog tima (infektolozi, epidemiolozi, mikrobiolozi, kliničari različitih specijalnosti i obučene medicinske sestre za kontrolu infekcija). Ovakav sustav osigurava i kvalitetan nadzor nad potrošnjom antibiotika (antimicrobial stewardship) te mogućnost promptnog reagiranja na potencijalna žarišta. Rezultati primjene ovog sveobuhvatnog pristupa, oblikovanog prema švedskim standardima i preporukama, pokazuju značajno skraćivanje vremena od detekcije patogena do izolacije bolesnika te racionalizaciju primjene antimikrobnih lijekova. Zaključno, integracija elektronskih alata, rane mikrobiološke dijagnostike i multidisciplinarne suradnje u SKB Mostar dokazuje da povratak bazičnoj disciplini, kada je vođen modernom tehnologijom i timskim radom, stvara održiv i visoko učinkovit model kontrole bolničkih infekcija.

Ključne riječi: bolničke infekcije, SKB Mostar, projekt Švedska, elektronsko praćenje, multidisciplinarni tim, klinička mikrobiologija

THE "NEW OLD" MODEL OF HEALTHCARE-ASSOCIATED INFECTION MANAGEMENT AT SKB MOSTAR

*Assoc. Prof. Svjetlana Grgić, MD, PhD,
University Clinical Hospital Mostar, Bosnia and Herzegovina*

Abstract: Healthcare-associated infections and antimicrobial resistance represent critical challenges for modern healthcare systems, requiring continuous transformation of control strategies. The purpose of this paper is to present the implementation and evaluation of the "new old" model of healthcare-associated infection management at the University Clinical Hospital (SKB) Mostar, which was developed and improved as part of an international partnership project with the Kingdom of Sweden. The model is based on the synergy of reactivated, traditional hygienic-epidemiological standards and modern, technologically advanced control tools. The methodology encompasses the analysis of an integrated surveillance system that goes beyond the exclusive observation of hand and work surface hygiene, work procedures, and medical staff. A key component of the new model is the introduction of a system for electronic monitoring and early detection of healthcare-associated infections, enabling rapid real-time data processing. This digital surveillance is directly linked with clinical microbiology and the Office for Healthcare-Associated Infection Surveillance, ensuring rapid identification of multidrug-resistant pathogens and targeted monitoring of epidemiological trends within hospital departments. The operationalization of the model rests on the activities of a multidisciplinary team (infectious disease specialists, epidemiologists, microbiologists, clinicians of various specialties, and trained infection control nurses). Such a system also ensures quality oversight of antibiotic consumption (antimicrobial stewardship) and the ability to react promptly to potential outbreaks. The results of applying this comprehensive approach, shaped according to Swedish standards and recommendations, show a significant reduction in the time from pathogen detection to patient isolation, as well as the rationalization of antimicrobial drug use. In conclusion, the integration of electronic tools, early microbiological diagnostics, and multidisciplinary collaboration at SKB Mostar proves that a return to basic discipline, when guided by modern technology and teamwork, creates a sustainable and highly effective model for healthcare-associated infection control.

Keywords: healthcare-associated infections, SKB Mostar, Sweden project, electronic monitoring, multidisciplinary team, clinical microbiology

PRENATALNA DIJAGNOSTIKA - TORCH

Ružica Radojević Marjanović, Sofija Sekulić Marković, Ivana Raković, Ivana Lešnjak, Nemanja Đorđević, Andrijana Krstić, Biljana Popovska Jovičić
Klinika za infektivne bolesti, Univerziteti klinički centar Kragujevac

TORCH infekcije predstavljaju dijagnostički i terapijski izazov za lekare. Serološki skrining pre trudnoće, vakcinacija i mere prevencije od značaja su za sprječavanje ozbiljnih posledica po fetus. Testiranje primarne infekcije majke važno je nakon otkrivanja ultrazvučnih abnormalnosti u trudnoći. Seropozitivnost trudnice u IgM klasi At na ispitivane uzročnike mora se dopuniti testom aviditeta IgG At, Western blot ili PCR metodom. Suspektna intrauterina infekcija zahteva dijagnostiku amnionske tečnosti i krvi fetusa. U odabiru testova za rano otkrivanje važna je visoka osetljivost i specifičnost. Potpuna automatizacija od primarne epruvete do rezultata, kalibratori i kontrole spremni za upotrebu minimiziraju mogućnost ljudske greške. Vreme uzorkovanja, izbor dijagnostičke metode i tumačenje nalaza predmet je multidisciplinarnog pristupa ginekologa, mikrobiologa, infektologa, neonatologa, genetičara i pravnika.

Ključne reči: TORCH, prenatalna dijagnostika, serološki skrining, intrauterine infekcije

Reference:

1. Fitzpatrick D, Holmes NE, Hui L. A systematic review of maternal TORCH serology as a screen for suspected fetal infection. *Prenatal Diagnosis*, 2022;42(1):87–96. DOI: 10.1002/pd.6073.
2. Abu Shqara R, Kaufman M, Or S, Glikman D, Lowenstein L, Frank Wolf M. The Utility of Serologic TORCH Testing During Pregnancy for Maternal-related Versus Fetal-related Indications: A Retrospective Study. *The Pediatric Infectious Disease Journal*, 2025;44(3):257–262. DOI: 10.1097/INF.0000000000004591.
3. Batra P, Batra M, Singh S. Epidemiology of TORCH Infections and Understanding the Serology in Their Diagnosis. *Journal of Fetal Medicine*, 2020;7:25–29. DOI: 10.1007/s40556-019-00232-8.
4. Abdel-Fattah SA, Bhat A, Illanes S, Bartha JL, Carrington D. TORCH test for fetal medicine indications: only CMV is necessary in the United Kingdom. *Prenatal Diagnosis*, 2005;25:1028–1031. DOI: 10.1002/pd.1242.

PRENATAL DIAGNOSTICS – TORCH

Ružica Radojević Marjanović, Sofija Sekulić Marković, Ivana Raković, Ivana Lešnjak, Nemanja Đorđević, Andrijana Krstić, Biljana Popovska Jovičić
Clinic of Infectious Diseases, University Clinical Centre Kragujevac

TORCH infections represent a diagnostic and therapeutic challenge for physicians. Pre-pregnancy serological screening, vaccination, and preventive measures are important for preventing serious consequences for the fetus. Testing for maternal primary infection is crucial after detecting ultrasound abnormalities during pregnancy. Maternal seropositivity for IgM class antibodies against the investigated pathogens must be supplemented with an IgG antibody avidity test, Western blot, or PCR method. Suspected intrauterine infection requires diagnostics of amniotic fluid and fetal blood. High sensitivity and specificity are important when selecting tests for early detection. Full automation from the primary tube to the result, along with ready-to-use calibrators and controls, minimizes the possibility of human error. The timing of sampling, choice of diagnostic method, and interpretation of findings are the subject of a multidisciplinary approach involving gynecologists, microbiologists, infectious disease specialists, neonatologists, geneticists, and legal experts.

Key words: TORCH, prenatal diagnostics, serological screening, intrauterine infections

ZASTUPLJENOST INFEKTIVNIH I NEINFEKTIVNIH BOLESTI HOSPITALIZIRANIH PACIJENATA NA ODJELU ZA INFEKTIVNE BOLESTI KANTONALNE BOLNICE ZENICA U 2019. 2025. I 2026.GODINI

*Eldira Hadžić, Nerma Mušić, Medina Mujić Begić, Sanda Branković
Odjel za infektivne bolesti, Kantonalna bolnica Zenica, Zenica*

Infektivne bolesti su sa svojom epidemijskom, endemijskom i pandemijskom dinamikom javljanja uvijek aktuelne u svijetu.

Cilj rada je prikazati zastupljenost infektivnih i neinfektivnih bolesti koje su liječene na Odjelu za Infektivne bolesti Kantonalne bolnice Zenica(KBZ).

Rezultati: Analizirani su protokoli i prijave infektivnih bolesti hospitaliziranih pacijenata 2019. godine, 2025.g. i prvih sedam mjeseci 2026 godine, na Odjelu za infektivne bolesti KBZ. 2019 godine ukupno je hospitalizirano 1253 pacijenta, od toga je 934 (74,54%) prijavljeno kao infektivna bolest, 319 (25,46%) nije. 2025 godine je hospitalizirano 1094 pacijenta, od toga 725 (66,27%) je imalo prijavu infektivne bolesti a 369 (33,73%) nije. Od 01.01.2026 do 31.07.2026.g. hospitalizirano je 638 pacijenata, od toga 381 (59,71%) je imalo prijavu infektivne bolesti, a 257(40,29%) nije. Veliki udio pacijenata sa bakterijskim upalama pluća i uroinfekcijama participira u ukupnom broju hospitaliziranih, ali ne podliježu prijavi infektivnih bolesti (upala pluća 13,28%, uroinfekcija 8,05%).

Zaključak: Na Odjelu za infektivne bolesti kontinuirano se liječi veliki broj pacijenata sa dijagnozama koje podliježu prijavi infektivne bolesti. Posebno je izraženo zadnjih godina od kada je usvojen novi obrazac za prijavu infektivnih bolesti, koji daje sliku o smanjenom broju infektivnih bolesti.

Ključne riječi: infektivne bolesti, prijava infektivnih bolesti

PREVALENCE OF INFECTIOUS AND NON-INFECTIOUS DISEASES AMONG PATIENTS HOSPITALIZED IN THE DEPARTMENT OF INFECTIOUS DISEASES OF CANTONAL HOSPITAL ZENICA IN 2019, 2025, AND 2026

*Eldira Hadžić, Nerma Mušić, Medina Mujić Begić, Sanda Branković
Department of Infectious Diseases, Cantonal Hospital Zenica, Zenica*

Infectious diseases, with their epidemic, endemic, and pandemic patterns of occurrence, remain an ongoing global concern.

Objective: The aim of this study was to present the prevalence of infectious and non-infectious diseases treated in the Department of Infectious Diseases of Cantonal Hospital Zenica (CHZ).

Results: The records of infectious diseases among patients hospitalized in the Department of Infectious Diseases of CHZ were analyzed for 2019, 2025, and the first seven months of 2026. In 2019, a total of 1,253 patients were hospitalized, of whom 934 (74.54%) were reported as having an infectious disease, while 319 (25.46%) were not. In 2025, 1,094 patients were hospitalized, of whom 725 (66.27%) had a reported infectious disease, while 369 (33.73%) did not. From January 1, 2026, to July 31, 2026, a total of 638 patients were hospitalized, of whom 381 (59.71%) had a reported infectious disease, while 257 (40.29%) did not. A substantial proportion of hospitalized patients had bacterial pneumonia and urinary tract infections, contributing significantly to the total number of hospitalizations, but these cases are not reported as infectious diseases (pneumonia: 13.28%; urinary tract infections: 8.05%).

Conclusion: A large number of patients with diagnoses of reported infectious diseases are continuously treated in the Department of Infectious Diseases. This has been particularly evident in recent years, since the introduction of the new infectious disease application form, which indicate a decrease in the number of infectious diseases.

Keywords: infectious diseases, infectious disease reports

CURRENT ISSUES IN TUBERCULOSIS CONTROL: A WHO PERSPECTIVE

*Erwin Cooreman, Special Representative,
World Health Organization, Country Office in Bosnia and Herzegovina*

Tuberculosis (TB) remains one of the world's leading infectious causes of death despite being both preventable and curable. The persistence of TB reflects not only biological and clinical challenges, but also inequalities in access to health care, poverty, undernutrition, overcrowding, migration, conflict and weaknesses in health systems. This lecture reviews current global and regional challenges in TB control from a World Health Organization perspective, with particular attention to recent scientific and programmatic developments.

Major challenges include delayed diagnosis and persistent diagnostic gaps, drug-resistant TB, TB among vulnerable populations, TB/HIV co-infection, underdiagnosis in children and adolescents, and the continuing impact of stigma. Important advances that are reshaping TB control are also discussed. Rapid molecular diagnostics and universal drug-susceptibility testing are enabling earlier and more accurate diagnosis, while genomic surveillance and artificial intelligence offer new opportunities for outbreak detection, screening and programme monitoring. At the same time, shorter treatment regimens and highly effective all-oral regimens for drug-resistant TB are improving treatment outcomes and reducing toxicity and treatment burden. Developments in TB vaccine research offer further hope for more effective prevention beyond the protection provided by BCG.

Within the WHO European Region, progress has been substantial but uneven, with drug-resistant TB, diagnostic delays, migration, vulnerable populations and humanitarian emergencies continuing to pose significant challenges. Bosnia and Herzegovina has achieved considerable reductions in TB incidence and maintains important strengths in TB services, providing an opportunity to move progressively from TB control towards elimination. Priorities include maintaining clinical expertise, expanding rapid diagnostics and preventive treatment, strengthening digital surveillance, ensuring continuity of care, and improving preparedness for cross-border and humanitarian health threats.

Ultimately, scientific innovation must be accompanied by sustained political commitment, adequate financing, equitable access and action on the social determinants of TB. Only by combining these approaches can the global End TB goals become achievable.

NEUROINFEKCIJE KOD ODRASLIH – KLINIČKI, DIJAGNOSTIČKI I TERAPIJSKI IZAZOVI DANAŠNJICE

Tatjana Roganović

Klinika za infektivne bolesti UKC RS, Medicinski fakultet Univerziteta u Banjoj Luci, Banjaluka, Republika Srpska, Bosna i Hercegovina

Uvod: Neuroinfekcije predstavljaju hitna stanja u infektologiji zbog brzog razvoja komplikacija, visokog mortaliteta i mogućih trajnih neuroloških sekvela. Napredak dijagnostike je unaprijedio liječenje, ali i dalje postoje brojni izazovi u ranom prepoznavanju i liječenju oboljelih.

Cilj rada: Prikazati aktuelne kliničke, dijagnostičke i terapijske izazove u liječenju neuroinfekcija kod odraslih kao i karakteristike oboljelih od autoimunog encefalitisa i liječenih u UKC RS.

Materijal i metode: Izvršen je pregled relevantne literature i smjernica objavljenih u posljednjih nekoliko godina. Prikazani su dijagnostički i terapijski izazovi sa kojima se suočavaju ljekari u Klinici za infektivne bolesti UKC RS, uz poseban osvrt na autoimune encefalitise.

Rezultati i diskusija: Rana klinička sumnja i hitna analiza cerebrospinalne tečnosti ostaju ključni za postavljanje dijagnoze. Primjena PCR i multiplex PCR metoda značajno skraćuje vrijeme i unapređuju identifikaciju uzročnika. Empirijsku antimikrobnu terapiju potrebno je započeti odmah po postavljanju sumnje na neuroinfekciju, uz naknadno prilagođavanje prema mikrobiološkim nalazima. Poseban izazov predstavljaju neuroinfekcije kod imunokompromitovanih bolesnika i diferencijalna dijagnoza infektivnih od autoimunih encefalitisa.

Zaključak: Rano prepoznavanje, savremene dijagnostičke metode, rano započinjanje odgovarajuće terapije i multidisciplinarni pristup predstavljaju osnovne preduslove za poboljšanje ishoda liječenja odraslih bolesnika sa neuroinfekcijama. Autoimuni encefalitis se više ne mogu smatrati isključivo rijetkom bolesti a broj prepoznatih slučajeva vremenom raste.

Ključne riječi: neuroinfekcije, dijagnostika, terapija, autoimuni encefalitis

Literatura

1. World Health Organization (WHO), 2026. WHO guidelines on the diagnosis, medical management and prevention of bacterial meningitis. Geneva: WHO. Available at: who.int [Accessed 26 July 2026].
2. Association of British Neurologists and British Infection Association. Management of Suspected Viral Encephalitis in Adults: National Guidelines Summary. Produced on behalf of the National Encephalitis Guidelines Development Group and the Encephalitis Society; 2012.
3. Misra UK (2025) Specialty grand challenge in neuroinfectious diseases. Front. Neurol. 16:1557610. doi: 10.3389/fneur.2025.1557610
4. Dolev M. Autoimmune encephalitis: symptoms, diagnosis, treatment, and prognosis based on current medical data. Health Facts (iLive). Updated March 20, 2026. Available from: https://m.iliveok.com/health/autoimmune-encephalitis-symptoms-diagnosis-treatment-and-prognosis-based-current-medical-data_136662i15946.html

NEUROINFECTIONS IN ADULTS – CONTEMPORARY CLINICAL, DIAGNOSTIC AND THERAPEUTIC CHALLENGES

Tatjana Roganović

Clinic of Infectious Diseases, University Clinical Centre of the Republic of Srpska; Faculty of Medicine, University of Banja Luka, Banja Luka, Republic of Srpska, Bosnia and Herzegovina

Introduction: Neuroinfections represent medical emergencies in infectious diseases due to the rapid development of complications, high mortality, and the risk of permanent neurological sequelae. Advances in diagnostic methods have improved treatment outcomes; however, significant challenges remain in the early recognition and management of affected patients.

Aim: To present the current clinical, diagnostic, and therapeutic challenges in the management of neuroinfections in adults, as well as the characteristics of patients with autoimmune encephalitis treated at the University Clinical Centre of the Republic of Srpska (UCC RS).

Materials and Methods: A review of relevant literature and clinical guidelines published in recent years was conducted. Diagnostic and therapeutic challenges encountered by physicians at the Clinic for Infectious Diseases, University Clinical Centre of the Republic of Srpska, are presented, with particular emphasis on autoimmune encephalitis.

Results and Discussion: Early clinical suspicion and prompt cerebrospinal fluid analysis remain essential for establishing the diagnosis. The implementation of PCR and multiplex PCR techniques has significantly reduced diagnostic turnaround time and improved pathogen identification. Empirical antimicrobial therapy should be initiated immediately upon suspicion of a neuroinfection and subsequently adjusted according to microbiological findings. Neuroinfections in immunocompromised patients and the differential diagnosis between infectious and autoimmune encephalitis remain major clinical challenges.

Conclusion: Early recognition, the use of modern diagnostic methods, timely initiation of appropriate therapy, and a multidisciplinary approach are essential prerequisites for improving treatment outcomes in adult patients with neuroinfections. Autoimmune encephalitis can no longer be considered an exclusively rare disease, as the number of recognized cases continues to increase over time.

Keywords: neuroinfections, diagnostics, therapy, autoimmune encephalitis

PREDIKTIVNE VRIJEDNOSTI LIKVORNOG FERITINA U KOGNITIVNOJ PROCJENI PACIJENATA NAKON AKUTNIH INFEKCIJA CENTRALNOG NERVNOG SISTEMA

Belma Gazibera

Klinika za infektivne bolesti, Klinički Centar Univerziteta u Sarajevu

Uvod: Infekcije centralnog nervnog sistema (CNS) predstavljaju jedinstveni izazov kliničarima zbog značajnog morbiditeta, rizika od dugoročnih sekvela, velikog troška liječenja i mortaliteta. Klinički imperativ predstavlja rano prepoznavanje i potvrda dijagnoze bolesti. Efekti feritina, kao dokazanog reaktanta akutne infekcije, tokom bakterijske CNS infekcije su posljedica povećane propustljivosti krvno-moždane barijere i prodora serumskog feritina gdje se sintetizira, ali i sinteze u upalnim ćelijama mozga, izlučivanjem iz ishemijskih i nekrotizirajućih nervnih ćelija zahvaćenih upalnim procesom.

Cilj istraživanja je da se ispita kolika je prediktivna moć proteina feritina na stepen kognitivnog oštećenja kod pacijenata koji su prebolovali neku od CNS infekcija.

Materijal i metode: istraživanje je sprovedeno u trogodišnjem periodu sa uključenih 90 ispitanika prema prethodno nominiranim kriterijima. Podijeljeni su u tri grupe, i to dvije „ispitivane“ i jedna „kontrolna“. Ispitivane grupe su podrazumijevale seroznu i gnojnu CNS infekciju, dok su kontrolnu grupu činili ispitanici čiji je likvor bio uredan. Procjena kognitivnog statusa ispitanika je obavljena pomoću mini-mental status testa (MMST). Protokol izvođenja MMST obavljao je kliničar na dan otpusta (MMST I) i na kontrolnom pregledu 6 mjeseci nakon otpusta (MMST II).

Rezultati rada i diskusija: Poremećaj pojedinačnih domena kognicije mjereno MMST I, kao što su „pažnja“, „računanje“ i „memorija“ su bile izražajnije kod gnojnih CNS infekcija, dok u kontrolnom mjerenju, šest meseci od akutne infekcije (MMSE II) zaostaje „računanje“, takođe u kategoriji gnojne CNS infekcije.

Zaključak: rezultati nisu pokazali da povišene vrijednosti likvornog feritina imaju negativan uticaj na kogniciju. Kognicija je u određenim domenima narušena nakon gnojne infekcije u odnosu na seroznu.

Literatura:

1. Parikh V, Tucci V, Galwankar S. Infections of the nervous system. International journal of critical illness and injury science, 2012; 2(2): 82.
2. Creavin ST, et al. Mini-Mental State Examination for the detection of dementia in clinically unevaluated people aged 65 and over in community and primary care populations. Cochrane Database of Systematic Reviews, 2016. doi:10.1002/14651858.cd011145.pub2.
3. Garcia PCR, Barcelos ALM, Tonial CT, Fiori HH et al. Accuracy of cerebrospinal fluid ferritin for purulent meningitis. Arch Dis Child, 2020; 0: 1–4. 2020.
4. Quist-Paulsen E, Ormaasen V, Kran AM, Dunlop O et al. Encephalitis and aseptic meningitis: short-term and long-term outcome, quality of life and neuropsychological functioning. Scientific Reports, 2019; 9(1): 16158.
5. Griem J, Harris L, Gummery A, Marsh L, Defres S, Bhojak M et al. Neuropsychological and psychiatric outcomes in encephalitis: A multi-centre case-control study. PLoS ONE, 2020; 15(3): e0230436.

PREDICTIVE VALUES OF CSF FERRITIN IN COGNITIVE ASSESSMENT OF PATIENTS AFTER ACUTE CENTRAL NERVOUS SYSTEM INFECTIONS

Belma Gazibera

Clinic for Infectious Diseases, Clinical Center of the University of Sarajevo

Introduction: Central nervous system (CNS) infections represent a unique challenge for clinicians due to significant morbidity, risk of long-term sequelae, high cost of treatment and mortality. Early recognition and confirmation of the diagnosis of the disease is a clinical imperative. The effects of ferritin, as a proven reactant of acute infection, during bacterial CNS infection are a consequence of increased permeability of the blood-brain barrier and the penetration of serum ferritin where it is synthesized, but also synthesis in inflammatory cells of the brain, by secretion from ischemic and necrotizing nerve cells affected by the inflammatory process.

The aim of the study is to examine the predictive power of the ferritin protein on the degree of cognitive impairment in patients who have suffered from one of the CNS infections.

Material and methods: the research was conducted over a three-year period with 90 subjects included according to previously nominated criteria. They were divided into three groups, two "examined" and one "control". The examined groups included serous and purulent CNS infection, while the control group consisted of subjects whose cerebrospinal fluid was normal. The cognitive status of the subjects was assessed using the mini-mental status test (MMST). The MMST performance protocol was performed by a clinician on the day of discharge (MMST I) and at the control examination 6 months after discharge (MMST II).

Results and discussion: Impairment of individual domains of cognition measured by MMST I, such as "attention", "calculation" and "memory" were more pronounced in purulent CNS infections, while in the control measurement, six months after the acute infection (MMSE II), "calculation" lags behind, also in the category of purulent CNS infection.

Conclusion: The results did not show that elevated CSF ferritin levels negatively affect cognition. Cognition is impaired in certain domains after purulent infection compared to serous infection.

References:

1. Parikh V, Tucci V, Galwankar S. Infections of the nervous system. *International journal of critical illness and injury science*, 2012; 2(2): 82.
2. Creavin ST, et al. Mini-Mental State Examination for the detection of dementia in clinically unevaluated people aged 65 and over in community and primary care populations. *Cochrane Database of Systematic Reviews*, 2016. doi:10.1002/14651858.cd011145.pub2.
3. Garcia PCR, Barcelos ALM, Tonial CT, Fiori HH et al. Accuracy of cerebrospinal fluid ferritin for purulent meningitis. *Arch Dis Child*, 2020; 0: 1–4. 2020.
4. Quist-Paulsen E, Ormaasen V, Kran AM, Dunlop O et al. Encephalitis and aseptic meningitis: short-term and long-term outcome, quality of life and neuropsychological functioning. *Scientific Reports*, 2019; 9(1): 16158.
5. Griem J, Harris L, Gummery A, Marsh L, Defres S, Bhojak M et al. Neuropsychological and psychiatric outcomes in encephalitis: A multi-centre case-control study. *PLoS ONE*, 2020; 15(3): e0230436.

NEUROINFEKCIJE U KLINICI ZA INFEKTIVNE BOLESTI UNIVERZITetskOG KLINIČKOG CENTRA REPUBLIKE SRPSKE (UKC RS) U DESETOGODIŠNJEM PERIODU: RETROSPEKTIVNA STUDIJA

Snežana Ritan¹, Tatjana Roganović^{1,2}, Milan Petrović¹, Olja Čuković¹, Maja Milinković Đukić¹, Tanja Macanović Kostić¹

¹ Klinika za infektivne bolesti, Univerzitetski klinički centar Republike Srpske

² Medicinski fakultet, Univerzitet u Banjoj Luci

Uvod

Neuroinfekcije predstavljaju hitna stanja sa značajnim morbiditetom i mortalitetom, a njihova etiološka dijagnostika i dalje predstavlja veliki klinički izazov zbog širokog spektra infektivnih i neinfektivnih uzroka (1,2).

Cilj rada

Prikazati epidemiološke, kliničke i etiološke karakteristike hospitalizovanih pacijenata sa neuroinfekcijama u desetogodišnjem periodu te ukazati na značaj savremenih dijagnostičkih metoda u određivanju etiologije oboljenja.

Materijal i metode

Retrospektivno je analizirana medicinska dokumentacija svih pacijenata hospitalizovanih u Klinici za infektivne bolesti UKC RS od 1. aprila 2014. do 1. aprila 2024. godine pod dijagnozom neuroinfekcije. Analizirani su demografski podaci, klinička prezentacija, nalaz cerebrospinalnog likvora, etiologija, potreba za liječenjem u jedinici intenzivne njege i ishod liječenja.

Rezultati i diskusija

U analizu su uključena 353 pacijenta, od kojih su 233 (66,0%) bili muškarci. Srednja životna dob iznosila je 46,5 godina (2–89 godina). Serozni likvor registrovan je kod 253 (71,7%), a purulentni kod 100 (28,3%) pacijenata. Najčešća klinička manifestacija bio je encefalitis (208), zatim meningitis (132), dok su apsces mozga (13), cerebelitis (8) i mijelitis (7) bili rjeđi. Među virusnim uzročnicima dominirali su HSV-1 (20), VZV (17) i virus influence (12), a među bakterijskim *Streptococcus pneumoniae* (22), *Haemophilus influenzae* (10) i *Listeria monocytogenes* (4). Dijagnostikovano je i devet autoimunih encefalitisa. U jedinici intenzivne njege liječeno je 70 pacijenata, a zabilježen je 41 smrtni ishod. Dobijeni rezultati odgovaraju objavljenim evropskim serijama u kojima dominiraju virusni encefalitis i pneumokokni meningitis kao najčešći bakterijski uzrok neuroinfekcija (1,4,5). Prepoznavanje autoimunih encefalitisa u našoj ustanovi odražava primjenu savremenih dijagnostičkih algoritama (3).

Zaključak

Uvođenje PCR dijagnostike i testiranja na antineuronska antitijela unaprijedilo je etiološku dijagnostiku i omogućilo prepoznavanje autoimunih encefalitisa, u skladu sa savremenim preporukama (2,3).

Literatura

1. Granerod J, Ambrose HE, Davies NWS, et al. Causes of encephalitis and differences in their clinical presentations in England: a multicentre, population-based prospective study. *Lancet Infect Dis.* 2010;10:835-844.
2. Venkatesan A, Tunkel AR, Bloch KC, et al. Case definitions, diagnostic algorithms, and priorities in encephalitis. *Clin Infect Dis.* 2013;57:1114-1128.
3. Graus F, Titulaer MJ, Balu R, et al. A clinical approach to diagnosis of autoimmune encephalitis. *Lancet Neurol.* 2016;15:391-404.
4. Tunkel AR, Hartman BJ, Kaplan SL, et al. Practice guidelines for the management of bacterial meningitis. *Clin Infect Dis.* 2004;39:1267-1284.
5. van de Beek D, Cabellos C, Dzupova O, et al. ESCMID guideline: diagnosis and treatment of acute bacterial meningitis. *Clin Microbiol Infect.* 2016;22(Suppl 3):S37-S62.

NEUROINFECTIONS AT THE CLINIC FOR INFECTIOUS DISEASES, UNIVERSITY CLINICAL CENTER OF THE REPUBLIC OF SRPSKA (UKC RS), OVER A TEN-YEAR PERIOD: A RETROSPECTIVE STUDY

Snežana Ritan¹, Tatjana Roganović^{1,2}, Milan Petrović¹, Olja Čuković¹, Maja Milinković Đukić¹, Tanja Macanović Kostić¹

¹ Clinic for Infectious Diseases, University Clinical Centre of the Republic of Srpska

² Faculty of Medicine, University of Banja Luka

Introduction

Neuroinfections are acute conditions associated with significant morbidity and mortality. Etiological diagnosis remains challenging due to the wide spectrum of infectious and non-infectious causes (1,2).

Aim

To present epidemiological, clinical, and etiological characteristics of hospitalized patients with neuroinfections and the importance of modern diagnostic methods in determining disease etiology.

Materials and Methods

A retrospective analysis was performed on medical records of patients hospitalized at the Clinic for Infectious Diseases, UKC RS, from April 1, 2014, to April 1, 2024, with a diagnosis of neuroinfection. Demographic data, clinical presentation, cerebrospinal fluid findings, etiology, intensive care unit treatment, and outcomes were analyzed.

Results and Discussion

The study included 353 patients, of whom 233 (66.0%) were male. The mean age was 46.5 years (range 2–89 years). Serous cerebrospinal fluid was observed in 253 (71.7%) and purulent in 100 (28.3%) patients. The most common diagnoses were encephalitis (208) and meningitis (132), followed by brain abscess (13), cerebellitis (8), and myelitis (7). The most frequent viral pathogens were HSV-1 (20), VZV (17), and influenza virus (12), while bacterial pathogens included *Streptococcus pneumoniae* (22), *Haemophilus influenzae* (10), and *Listeria monocytogenes* (4). Nine cases of autoimmune encephalitis were diagnosed. Seventy patients required intensive care, and 41 deaths were recorded. The findings are consistent with European series showing viral encephalitis and pneumococcal meningitis as leading causes of neuroinfections (1,4,5).

Conclusion

PCR diagnostics and testing for antineuronal antibodies improved etiological diagnosis and enabled recognition of autoimmune encephalitis, in accordance with current recommendations (2,3).

References

1. Granerod J, Ambrose HE, Davies NWS, et al. Causes of encephalitis and differences in their clinical presentations in England: a multicentre, population-based prospective study. *Lancet Infect Dis.* 2010;10:835-844.
2. Venkatesan A, Tunkel AR, Bloch KC, et al. Case definitions, diagnostic algorithms, and priorities in encephalitis. *Clin Infect Dis.* 2013;57:1114-1128.
3. Graus F, Titulaer MJ, Balu R, et al. A clinical approach to diagnosis of autoimmune encephalitis. *Lancet Neurol.* 2016;15:391-404.
4. Tunkel AR, Hartman BJ, Kaplan SL, et al. Practice guidelines for the management of bacterial meningitis. *Clin Infect Dis.* 2004;39:1267-1284.
5. van de Beek D, Cabellos C, Dzupova O, et al. ESCMID guideline: diagnosis and treatment of acute bacterial meningitis. *Clin Microbiol Infect.* 2016;22(Suppl 3):S37-S62.

KLINIČKE, EPIDEMIOLOŠKE I LABORATORIJSKE KARAKTERISTIKE LEPTOSPIROZE TOKOM EPIDEMIJE U KANTONU SARAJEVO 2025. GODINE

Amila Muratspahić¹, Alma Sejtarija-Memišević¹, Dževad Šaćić¹, Anes Jogunčić², Rusmir Baljić¹

¹ Klinika za infektivne bolesti, Klinički centar Univerziteta u Sarajevu, Sarajevo, BiH

² Zavod za javno zdravstvo Kantona Sarajevo, Sarajevo, BiH

Uvod: Leptospiroza je akutna bakterijska zoonoza od javnozdravstvenog značaja, čija se pojava povezuje s izloženošću kontaminiranoj vodi i nepovoljnim okolišnim uslovima. Tokom 2025. godine u Kantonu Sarajevo registrovana je jedna od najvećih epidemija leptospiroze u posljednjim decenijama, koja je zahtijevala koordiniran odgovor epidemiološke i zdravstvene službe.

Cilj rada: Prikazati kliničke, epidemiološke i laboratorijske karakteristike oboljelih od leptospiroze tokom epidemije u Kantonu Sarajevo 2025. godine.

Materijal i metode: Retrospektivno su analizirani podaci za 92 bolesnika s potvrđenom ili vjerovatnom leptospirozom koji su prijavljeni tokom epidemije. Analizirani su demografski podaci, teritorijalna distribucija slučajeva, kliničke manifestacije, laboratorijski nalazi i primijenjena terapija korištenjem deskriptivne statistike.

Rezultati i diskusija: Među oboljelima dominirali su muškarci (66,7%), a prosječna životna dob iznosila je 44,7±13,1 godina. Najveći broj slučajeva registrovan je na području općine Novi Grad, ukazujući na izraženu prostornu koncentraciju epidemije. Kliničkom slikom dominirali su febrilnost i gastrointestinalne tegobe, dok su laboratorijski nalazi pokazali umjereno izraženu inflamatornu reakciju (medijana vrijednosti C-reaktivnog proteina od 77 mg/L) uz umjereno povišene vrijednosti jetrenih enzima (AST 65 U/L i ALT 95 U/L) što odgovara tipičnoj kliničkoj slici leptospiroze. Većina bolesnika liječena je ambulantno, a doksiciklin je bio najčešće primijenjeni antibiotik, što ukazuje na to da je kod najvećeg broja oboljelih bolest imala blaži do umjereno težak klinički tok.

Zaključak: Epidemija leptospiroze u Kantonu Sarajevo tokom 2025. godine pokazala je karakterističan epidemiološki obrazac s prostornim grupisanjem slučajeva i tipičnom kliničko-laboratorijskom prezentacijom bolesti. Dobijeni rezultati doprinose boljem razumijevanju epidemiologije leptospiroze u urbanoj sredini i mogu predstavljati osnovu za unapređenje sistema nadzora, ranog prepoznavanja i pravovremenog odgovora na buduće epidemije.

Literatura:

1. Zavod za javno zdravstvo Federacije Bosne i Hercegovine. Leptospiroza – smjernice za nadzor. Sarajevo: Zavod za javno zdravstvo Federacije Bosne i Hercegovine; 2025. Dostupno na: <https://www.zzjzfbih.ba/wp-content/uploads/2025/05/Leptospiroza-2025-smjernice-za-nadzor.pdf>
2. Federacija Bosne i Hercegovine. Zakon o zaštiti stanovništva od zaraznih bolesti. Službene novine Federacije BiH. 2005;29/05. Dostupno na: <https://fmoh.gov.ba/zakoni/9/zakon-o-zastiti-stanovnistva-od-zaraznih-bolesti>
3. Haake DA, Levett PN. *Leptospira species (Leptospirosis)*. U: Bennett JE, Dolin R, Blaser MJ, urednici. Mandell, Douglas, and Bennett's Principles and Practice of Infectious Diseases. 9. izd. Philadelphia: Elsevier; 2020. str. 3145–3165.
4. European Centre for Disease Prevention and Control (ECDC). Leptospiroza. U: Annual Epidemiological Report 2022. Stockholm: ECDC; 2024.

CLINICAL, EPIDEMIOLOGICAL, AND LABORATORY CHARACTERISTICS OF LEPTOSPIROSIS DURING THE 2025 OUTBREAK IN SARAJEVO CANTON

Amila Muratspahić¹, Alma Sejtarija-Memišević¹, Dževad Šaćić¹, Anes Jogunčić², Rusmir Baljić¹

¹ Clinic for Infectious Diseases, Clinical Center of the University of Sarajevo, Sarajevo, Bosnia and Herzegovina

² Institute of Public Health of Sarajevo Canton, Sarajevo, Bosnia and Herzegovina

Introduction: Leptospirosis is an acute bacterial zoonosis of major public health importance, associated with exposure to contaminated water and environmental conditions conducive to disease transmission. During 2025, Sarajevo Canton experienced one of the largest leptospirosis outbreaks recorded in recent decades, requiring a coordinated response by epidemiological and healthcare services.

Objective: To describe the clinical, epidemiological, and laboratory characteristics of patients diagnosed with leptospirosis during the 2025 outbreak in Sarajevo Canton.

Materials and methods: A retrospective analysis was conducted on data from 92 patients with confirmed or probable leptospirosis reported during the outbreak. Demographic characteristics, geographical distribution of cases, clinical manifestations, laboratory findings, and treatment modalities were analyzed using descriptive statistics.

Results and Discussion: Males accounted for the majority of cases (66.7%), with a mean age of 44.7±13.1 years. The highest number of cases was recorded in the Municipality of Novi Grad Sarajevo, suggesting that the outbreak was geographically concentrated in this area. The predominant clinical manifestations were fever and gastrointestinal symptoms. Laboratory findings demonstrated a mildly pronounced inflammatory response, with a median C-reactive protein level of 77 mg/L, accompanied by moderately elevated liver enzyme levels (AST 65 U/L and ALT 95 U/L), consistent with the typical clinical presentation of leptospirosis. Most patients were treated on an outpatient basis, and doxycycline was the most frequently prescribed antibiotic, suggesting that the majority of cases had a mild to moderate clinical course.

Conclusion: The 2025 leptospirosis outbreak in Sarajevo Canton demonstrated a characteristic epidemiological pattern with geographical clustering of cases and a typical clinical and laboratory presentation. These findings contribute to a better understanding of the epidemiology of leptospirosis in an urban setting and may serve as a basis for improving surveillance systems, early case recognition, and timely response to future outbreaks.

References

1. Institute of Public Health of the Federation of Bosnia and Herzegovina. Leptospirosis – Surveillance Guidelines. Sarajevo: Institute of Public Health of the Federation of Bosnia and Herzegovina; 2025. Available from: <https://www.zzjzfbih.ba/wp-content/uploads/2025/05/Leptospiroza-2025-smjernice-za-nadzor.pdf>
2. Federation of Bosnia and Herzegovina. Law on the Protection of the Population from Communicable Diseases. Official Gazette of the Federation of Bosnia and Herzegovina. 2005;29/05. Available from: <https://fmoh.gov.ba/zakoni/9/zakon-o-zastiti-stanovnistva-od-zaraznih-bolesti>
3. Haake DA, Levett PN. *Leptospira* species (Leptospirosis). In: Bennett JE, Dolin R, Blaser MJ, editors. Mandell, Douglas, and Bennett's Principles and Practice of Infectious Diseases. 9th ed. Philadelphia: Elsevier; 2020. p. 2898-2904.
4. European Centre for Disease Prevention and Control (ECDC). Leptospirosis. In: Annual Epidemiological Report 2022. Stockholm: ECDC; 2024.

LISTERIOZA U PERINATOLOGIJI

*Prof. prim. dr. sc. Deni Karelović
Medicinski fakultet Sveučilišta u Splitu*

Uvod: *Listeria monocytogenes* (LM) je gram pozitivna bakterija, koja može uzrokovati listeriozu, zaraznu bolest životinja i čovjeka. Listerioza je rijetka, ali potencijalno smrtonosna bolest. Očituje se neinvazivnim oblikom - febrilnim gastroenteritisom ili invazivnim oblikom bolesti kao što su: sepsa, meningoencefalitis i perinatalna infekcija. Rizične skupine su trudnice, imunokompromitirani i stariji od 60 godina. Trudnice imaju 20 puta veći rizik razvoja bolesti u odnosu na opću populaciju i čine 27% svih slučajeva i 60% oboljelih u dobi od 10 do 40 godina. Više od 30% inficiranih trudnica rezultirati će pobačajem, mrtvorođenošću ili prijevremenim porođajem. Tijekom trudnoće LM se na fetus može prenijeti transplacentarno ili tijekom porođaja, što može rezultirati: pobačajem, mrtvorođenošću, generaliziranom infekcijom (Granulomatosis infantiseptica), sepsom ili meningitisom. Dijagnoza se postavlja kulturom ili lančanom reakcijom polimeraze (engl. Polymerase Chain Reaction – PCR).

Cilj: U Splitu smo svjedočili intenzivnim izvještajima medija o čak dvije smrti novorođenčadi u Splitu, kojima je dokazana listerioza. To je bio povod da ispitamo koliko je bilo dokazano oboljele novorođenčadi od listerioze u razdoblju od deset godina.

Materijal i metode: Retrospektivno su analizirane povijesti bolesti novorođenčadi hospitaliziranih u Odjelu neonatologije Klinike za ženske bolesti i porode KBC-a Split.

Rezultati: U klinici za ženske bolesti i porode KBC-a Split u deset godina dokazana su četiri slučaja listerioze novorođenčadi. Oba su egzistirala u prvim satima života. Jedno je rođeno u 23., a drugo u 27. tjednu trudnoće. Preostala dva su rođena na terminu, izliječena i otpuštena kući.

Zaključci: Listerioza je rijetka, no potencijalno opasno - smrtonosna bolest, koja u slučaju transplacentarnog prijenosa, osobito vezana uz nedonošenost može rezultirati smrću novorođenčadi. Trudnice se neopravdano nedovoljno educiraju o opasnostima konzumiranja potencijalno opasne hrane za razvoj listerioze.

VODIČ ZA IMUNIZACIJU ODRASLIH OSOBA U FEDERACIJI BOSNE I HERCEGOVINE: SADRŽAJ, KLJUČNE PREPORUKE I MOGUĆNOSTI PRIMJENE

Siniša Skočibušić^{1,5}, Sanjin Musa^{1,2}, Mia Blažević¹, Almedina Hadžihasanović-Moro³, Ankica Mijić Marić^{4,5}, Senad Dorić¹

¹ *Zavod za javno zdravstvo Federacije Bosne i Hercegovine, Sarajevo/Mostar, Bosna i Hercegovina*

² *Medicinski fakultet Univerziteta Sarajevo School of Science and Technology, Sarajevo, Bosna i Hercegovina*

³ *Opća bolnica "Prim. dr. Abdulah Nakaš", Sarajevo, Bosna i Hercegovina*

⁴ *Odjel obiteljske medicine, Dom zdravlja Mostar, Mostar, Bosna i Hercegovina*

⁵ *Medicinski fakultet Sveučilišta u Mostaru, Mostar, Bosna i Hercegovina*

Uvod

Imunizacija odraslih u Federaciji Bosne i Hercegovine često se provodi oportunistički, bez rutinske procjene cjepnog statusa pri svakom kontaktu sa zdravstvenim sustavom. Starenje stanovništva, kronične bolesti, imunokompromitirajuća stanja i profesionalna izloženost povećavaju potrebu za cjeloživotnim pristupom imunizaciji.

Cilj rada

Predstaviti strukturu, ključne preporuke i mogućnosti praktične primjene novog Vodiča za imunizaciju odraslih osoba u Federaciji Bosne i Hercegovine.

Materijal i metode

Provedena je deskriptivna analiza Vodiča objavljenog 2026. godine. Analiza je obuhvatila ciljne skupine, preporučena cjepiva, sheme nadoknade propuštene imunizacije, organizacijske standarde, sigurnost i komunikacijske alate. Preporuke su razmatrane u odnosu na važeći regulatorni okvir Federacije Bosne i Hercegovine i međunarodne izvore navedene u Vodiču.

Rezultati i rasprava

Vodič na 72 stranice izradila je multidisciplinarna radna skupina, a sadržaj je organiziran u devet tematskih poglavlja: influenza, pertusis, pneumokokna bolest, nadoknada imunizacije protiv poliomijelitisa, morbila, rubeole, parotitisa i hepatitisa B, docjepljivanje protiv difterije, tetanusa i pertusisa, mikroplaniranje, provođenje imunizacije u obiteljskoj medicini, sigurnost imunizacije i komunikacija. Naglašeni su godišnja imunizacija protiv influence, jedna doza cjepiva Tdap prethodno necijepljenim odraslim osobama te jedna doza u svakoj trudnoći, pneumokokna imunizacija starijih osoba i osoba s povećanim rizikom te načelo prema kojem se prekinuta serija ne započinje ponovno. Praktični dio preporučuje procjenu statusa imunizacije pri svakom relevantnom kliničkom kontaktu, jasnu preporuku zdravstvenog radnika, dokumentiranje, održavanje hladnog lanca, praćenje nakon imunizacije i prijavljivanje neželjenih pojava. Vodič je usmjeren na cjepiva koja su dostupna i relevantna za programsku provedbu u lokalnom kontekstu, pa predstavlja početni operativni okvir, a ne iscrpan kalendar svih cjepiva za odrasle.

Zaključak

Vodič povezuje kliničke preporuke s organizacijom usluge i komunikacijom s pacijentima. Njegova primjena može smanjiti propuštene prilike za imunizaciju i podržati uvođenje sustavne, cjeloživotne imunizacije odraslih u svakodnevnu kliničku praksu.

Literatura

1. Musa S, ur. Vodič za imunizaciju odraslih osoba. Sarajevo/Mostar: Zavod za javno zdravstvo Federacije Bosne i Hercegovine; 2026.

2. Pravilnik o načinu provođenja obavezne imunizacije, imunoprofilakse i hemoprofilakse protiv zaraznih bolesti te o osobama koje se podvrgavaju toj obavezi. Službene novine Federacije BiH. 2025;(23, 53).

3. Naredba o programu obaveznih imunizacija stanovništva protiv zaraznih bolesti u 2026. godini. Službene novine Federacije BiH. 2026;(5).

4. Centers for Disease Control and Prevention. Recommended Adult Immunization Schedule for Ages 19 Years or Older, United States, 2026.

ADULT IMMUNIZATION GUIDE IN THE FEDERATION OF BOSNIA AND HERZEGOVINA: CONTENT, KEY RECOMMENDATIONS AND IMPLEMENTATION OPPORTUNITIES

Siniša Skočibušić^{1,5}, Sanjin Musa^{1,2}, Mia Blažević¹, Almedina Hadžihasanović-Moro³, Ankica Mijić Marić^{4,5}, Senad Dorić¹

¹ *Zavod za javno zdravstvo Federacije Bosne i Hercegovine, Sarajevo/Mostar, Bosna i Hercegovina*

² *Medicinski fakultet Univerziteta Sarajevo School of Science and Technology, Sarajevo, Bosna i Hercegovina*

³ *Opća bolnica "Prim. dr. Abdulah Nakaš", Sarajevo, Bosna i Hercegovina*

⁴ *Odjel obiteljske medicine, Dom zdravlja Mostar, Mostar, Bosna i Hercegovina*

⁵ *Medicinski fakultet Sveučilišta u Mostaru, Mostar, Bosna i Hercegovina*

Introduction

Adult immunization in the Federation of Bosnia and Herzegovina is often delivered opportunistically, without routine assessment of vaccination status at every contact with the health system. Population ageing, chronic diseases, immunocompromising conditions and occupational exposure increase the need for a life-course approach to immunization.

Objective

To present the structure, key recommendations and opportunities for practical implementation of the new Adult Immunization Guide in the Federation of Bosnia and Herzegovina.

Materials and methods

A descriptive analysis of the Guide published in 2026 was performed. Target groups, recommended vaccines, catch-up schedules, organizational standards, safety guidance and communication tools were reviewed. Recommendations were considered in relation to the current regulatory framework of the Federation of Bosnia and Herzegovina and the international sources cited in the Guide.

Results and discussion

The 72-page Guide was developed by a multidisciplinary working group and is organized into nine thematic chapters: influenza, pertussis, pneumococcal disease, catch-up vaccination against poliomyelitis, measles, mumps, rubella and hepatitis B, diphtheria, tetanus and pertussis boosters, microplanning, vaccination in family medicine, immunization safety and communication. Key messages include annual influenza vaccination, one Tdap dose for previously unvaccinated adults and one dose during every pregnancy, pneumococcal vaccination of older adults and adults at increased risk, and the principle that interrupted vaccine series should not be restarted. The operational sections recommend assessment of vaccination status at every relevant clinical encounter, a clear healthcare-worker recommendation, documentation, cold-chain maintenance, post-vaccination observation and reporting of adverse events following immunization. The Guide prioritizes vaccines that are locally available and programmatically relevant; it is therefore an initial operational framework rather than an exhaustive adult vaccination schedule.

Conclusion

The Guide links clinical recommendations with service organization and patient communication. Its implementation may reduce missed vaccination opportunities and support systematic, life-course adult immunization in routine clinical practice.

References

1. Musa S, editor. Adult Immunization Guide. Sarajevo/Mostar: Institute for Public Health of the Federation of Bosnia and Herzegovina; 2026.
2. Rulebook on mandatory immunization, immunoprophylaxis and chemoprophylaxis against infectious diseases. Official Gazette of the Federation of Bosnia and Herzegovina. 2025;(23, 53).
3. Order on the Mandatory Immunization Programme against Infectious Diseases for 2026. Official Gazette of the Federation of Bosnia and Herzegovina. 2026;(5).
4. Centers for Disease Control and Prevention. Recommended Adult Immunization Schedule for Ages 19 Years or Older, United States, 2026.

HEPATITIS C MEĐU ZAVISNICIMA U UKCV

Prof.dr Tomislav Preveden, Doc.dr Maria Pete

Skrinig testom pomoću određivanja Anti-HCV antitela Elisa metodom testirani su zavisnici od opijata u Univerzitetskom kliničkom centru Vojvodine na Klinici za psihijatriju u Novom Sadu. Anti HCV pozitivni pacijenti su potom testirani na prisustvo HCV RNA u serumu PCR metodom na Klinici za infektivne bolesti UKCV. HCV RNA pozitivni pacijenti su uključeni na antivirusnu terapiju direktno delujućim antivirusnim lekovima (Epclusa i Maviret). Uspeh lečenja je određivan 12 nedelja posle završene terapije PCR tehnikom, određivanjem prisustva ili odsustva HCV RNA u serumu.

Ispitivanje još traje te će se naknadno prikazati broj pacijeneta, rezultati ispitivanja i uspeh lečenja.

ACUTE LIVER FAILURE IN ACUTE HBV INFECTION: CLINICAL CHARACTERISTICS, TREATMENT, AND OUTCOMES – A SINGLE-CENTER EXPERIENCE

*Dr Ivana Đuković Savović, Dr Ana Bubanja Merdović
Clinic for infectious diseases, Clinical Center of Montenegro*

Introduction: Acute HBV infection most commonly follows a favorable course, whereas acute liver failure (ALF) represents a rare but most severe complication, associated with high mortality.

Objective: To analyze the clinical characteristics, laboratory findings, therapeutic approach, and outcomes of hospitalized patients with acute HBV infection, with particular emphasis on the development of ALF.

Materials and Methods: A retrospective analysis was conducted of 28 patients hospitalized for acute HBV infection from July 2025 to July 2026. Patients were divided into two groups: those with ALF (n=6) and those without ALF (n=22). ALF was defined as the development of coagulopathy and hepatic encephalopathy in the setting of acute liver injury, in the absence of pre-existing chronic liver disease. Demographic characteristics, laboratory parameters at admission and their peak values during hospitalization, therapeutic approach, and outcomes were analyzed.

Results and Discussion: ALF developed in 6/28 (21.4%) hospitalized patients. All patients with ALF developed hepatic encephalopathy; two cases were classified as hyperacute, three as acute, and one as subacute ALF. The median age was 63.5 years in the ALF group compared with 43 years in the non-ALF group. The median INR at admission was 3.05 compared with 1.20, while the median peak INR was 8.65 compared with 1.20. The median peak AST values were 5109 versus 1393.5 IU/L, while median peak ALT values were 6036 versus 2524 IU/L. These findings indicate more pronounced coagulopathy and hepatocellular injury in patients with ALF. All patients with ALF were treated with tenofovir. Therapeutic plasma exchange was performed in one patient, while one patient underwent liver transplantation but subsequently died. Mortality in the ALF group was 100% (6/6).

Conclusion: In this hospitalized cohort, ALF was associated with more pronounced coagulopathy, hepatic encephalopathy, higher transaminase levels, and high mortality. These findings underscore the need for early identification of high-risk patients and timely referral to a liver transplant center.

References

1. Wendon J, et al. EASL Clinical Practical Guidelines on the management of acute (fulminant) liver failure. *Journal of Hepatology*. 2017;66(5):1047–1081.
2. European Association for the Study of the Liver. EASL Clinical Practice Guidelines on the management of hepatitis B virus infection. *J Hepatol*. 2025;83(2):502–583.
3. Ledoux N. Hepatitis B and Acute Liver Failure. *Crit Care Nurs Clin North Am*. 2022 Sep;34(3):259-265. doi: 10.1016/j.cnc.2022.04.012.

PRELAZAK SA EFAVIRENZA NA DORAVIRIN BAZIRANI REŽIM: REAL-WORLD ISKUSTVA KLINIKE ZA INFektivNE BOLESTI BANJA LUKA

Ljiljana Pašić Grubišić¹, Antonija Verhaz^{1,2}, Maja Milinković Đukić¹, Borko Pavlica¹, Sanja Tadić¹, Vesna Pavlović¹, Snežana Ritan¹

¹ Univerziteti klinički centar Republike Srpske, Klinika za infektivne bolesti, Banja Luka, B&H

² Medicinski fakultet Univeziteta u Banjoj Luci, , Banja Luka, B&H

Uvod: Savremeno liječenje HIV infekcije podrazumjeva napuštanje ranije korištenog Efavirenza (EFV) I zamjenu sa Doravirinom zbog povoljnijih kako neuropsihijatrijskih tako I kardiometaboličkih efekata(1-7).

Cilj rada je procijeniti virusološku efikasnost, sigurnost, metaboličke efekte nakon prelaska sa efavirenza na doravirin-bazirani terapijski režim.

Materijal i metode: Retrospektivna opservaciona studija koja obuhvata 13 ispitanika koji su prevedeni sa EFV na DOR-bazirani ART režim. Analizirani su demografski parametri, dužina liječenja, HIV-1 RNK, CD4+ly, lipidogram, FIB-4 indeks, upotreba statina; za statističku analizu korišćen je Wilcoxonov test.

Rezultati: U grupi 13 ispitanika, većinu čine muškarci (92,9%) , prosječne starosti 46,6 godina, dužine trajanja ART 9,4 godina, a nakon šest mjeseci su svi imali stabilan virusološki odgovor i broj CD4 ly. Zabilježeno je značajno smanjenje triglicerida sa 1,52 na 1,26 mmol/L (-17,5%; p=0,045). Vrijednosti LDL (3,12 prema 2,80 mmol/L; -10,4%) i ukupnog holesterola (4,66 prema 4,55 mmol/L) pokazale su trend poboljšanja, ali bez statističke značajnosti. FIB-4 indeks je ostao stabilan. Statinsku terapiju je primalo 57,1% ispitanika. Tokom perioda praćenja verifikovan je stabilan BMI I nepromjenjena statinska terapija.

Diskusija: uprkos ograničenjima (mali uzorak, kratko praćenje), ovo je prva real-world analiza ovog terapijskog protokola u Bosni I Hercegovini. Smanjenje triglicerida (-17,5%, p=0,045; Cohenov d=0,53) u skladu je sa studijom DRIVE-SHIFT (1) I velikim real-world kohortama (1,5); dok izostanak značajnosti kod LDL holesterola (p=0,115) vjerovatno proizilazi iz manje kohorte. U poređenju sa SCOLTA kohortom naša populacija pokazuje izraženiji pad triglicerida (2), što odražava heterogenost prethodnih režima i visok kardiometabolički rizik(57,1% na statinima) (4). Dostupni podaci dodatno potvrđuju visoku virusološku efikasnost doravirina čak i kod odabranih bolesnika sa arhiviranom mutacijom M184V/I (4-6), što dodatno podržava njegovu primjenu u strategijama optimizacije antiretrovirusne terapije.

Zaključak: Doravirin predstavlja efikasnu i metabolički povoljniju opciju za optimizaciju terapije kod virusološki suprimiranih osoba koje žive sa HIV-om, posebno kod bolesnika sa povećanim kardiovaskularnim rizikom.

Ključne riječi: HIV Infekcija, Efavirenz, Doravirin, kardiometabolički efekti, antiretrovirusna terapija

Literatura:

1. Johnson M, Kumar P, Molina JM, Rizzardini G, Cahn P, Bickel M, et al. Switching to doravirine/lamivudine/tenofovir disoproxil fumarate (DOR/3TC/TDF) maintains HIV-1 virologic suppression through 48 weeks: results of the DRIVE-SHIFT trial. J Acquir Immune Defic Syndr. 2019;81(4):463-472. doi:10.1097/QAI.0000000000002056.
2. Ciccullo A, Baldin G, Borghi V, Giacomelli A, Sterrantino G, Cossu MV, et al. Changes in metabolic profile and body weight in people living with HIV switching to a doravirine-based regimen: data from the SCOLTA cohort. J Antimicrob Chemother. 2023;78(7):1689-1694.
3. Mazzitelli M, Trunfio M, Putaggio C, Celani L, Ricciardi A, Castelli V, et al. Effectiveness of switching to doravirine-based antiretroviral therapy: a real-world multicentre cohort study. HIV Med. 2024;25(3):314-325
4. REPRIEVE Trial Investigators. Grinspoon SK, et al. Pitavastatin to prevent cardiovascular disease in HIV infection. N Engl J Med. 2023;389:687-699. doi:10.1056/NEJMoa2304146. (REPRIEVE studija)
5. Johnson M, Molina JM, Rizzardini G, Kumar P, Cahn P, Bickel M, et al. Brief report: Switching to doravirine/lamivudine/tenofovir disoproxil fumarate maintains HIV-1 virologic suppression through Week 144 in the DRIVE-SHIFT trial. J Acquir Immune Defic Syndr. 2021;86(3):339-343.
6. Oomen PGA, Wit FWNM, Brinkman K, Vrouwenraets SME, Mudrikova T, van Welzen BJ, et al.; ATHENA National Observational Cohort Study. Real-world effectiveness and tolerability of switching to doravirine-based antiretroviral therapy in people with HIV: a nationwide, matched, prospective cohort study. Lancet HIV. 2024;11(9):e576-e585.

7. Soulié S, Santoro MM, Charpentier C, Storto A, Sayon S, Flandre P, et al. No evidence of an effect of the M184I/V mutation on the doravirine short-term treatment response in heavily pretreated patients. *J Antimicrob Chemother.* 2024;79(2):412-418. Available from: nih.gov

SWITCHING FROM EFAVIRENZ TO A DORAVIRINE-BASED REGIMEN: REAL-WORLD EXPERIENCES OF THE CLINIC FOR INFECTIOUS DISEASES BANJA LUKA

Ljiljana Pašić Grubišić¹, Antonija Verhaz^{1,2}, Maja Milinković Đukić¹, Borko Pavlica¹, Sanja Tadić¹, Vesna Pavlović¹, Snežana Ritan¹

¹ University Clinical Centre of the Republic of Srpska, Clinic for Infectious Diseases, Banja Luka, B&H

² Faculty of Medicine, University of Banja Luka, Banja Luka, B&H

Introduction: Modern HIV treatment is moving away from efavirenz (EFV) because of its unfavorable neuropsychiatric and metabolic adverse effects, shifting toward doravirine (DOR), which provides durable virological suppression together with a more favorable cardiometabolic and safety profile (1-3).

Objective: To evaluate the virological efficacy, safety and metabolic effects after switching from TDF/FTC+EFV to DOR/TDF/3TC in routine clinical practice.

Materials and Methods: This retrospective observational study included 13 patients switched from an EFV- to DOR-based regimen. Demographic characteristics, ART duration, HIV-1 RNA, CD4 lymphocytes count, lipid profile, FIB-4 index and statin use were analyzed. Statistical analysis was performed using Wilcoxon signed-rank test.

Results: Among the 13 participants, 92.9% were male, with mean age 46.6 years. After six months complete virological suppression was maintained together with stable CD4+ cell count. A statistically significant reduction in triglycerides was (1.52 vs. 1.26 mmol/L; -17.5%; p=0.045). LDL cholesterol (3.12 vs. 2.80 mmol/L; -10.4%) and total cholesterol (4.66 vs. 4.55 mmol/L) showed favorable trends without reaching statistical significance. The FIB-4 index remained stable. Statins were used by 57.1% of participants, while BMI and lipid-lowering therapy remained unchanged throughout follow-up.

Discussion: Despite the limitations of a small sample size and short follow-up this represents the first real-world evaluation of switching to doravirine in Bosnia and Herzegovina. The observed reduction in triglycerides (-17.5%; p=0.045; Cohen's d=0.53) is consistent with findings from the DRIVE-SHIFT study (1) and real-world cohorts (2,3). The absence of statistical significance for LDL cholesterol (p=0.115) is likely attributable to limited statistical power. Compared with SCOLTA cohort, our patients demonstrated a greater relative reduction in triglycerides (3), probably reflecting previous regimen heterogeneity and substantial baseline cardiometabolic risk. Furthermore, published evidence indicates that doravirine maintains high virological efficacy even in selected patients with archived M184V/I mutations (4,5), supporting its role in ART optimization strategies.

Conclusion: Doravirine represents an effective and metabolically favorable option for optimizing antiretroviral therapy in virologically suppressed people living with HIV, particularly among patients at increased cardiovascular risk.

Key words: HIV infection, Efavirenz, Doravirine, cardiometabolic effects, antiretroviral therapy

GENI, HIV I METABOLIČKI SINDROM: ULOGA POLIMORFIZMA HIF-1 α rs11549465

Nemanja Đorđević^{1,2}, Jovan Ranin^{3,4}, Ivana Gmizić^{3,4}, Nemanja Jovičić⁵, Biljana Ljujić⁶, Sofija Sekulić Marković^{1,2}, Ivana Raković^{1,2}, Ivana Lešnjak^{1,2}, Andrijana Krstić^{1,2}, Marko Marković^{3,4}, Jovana Ranin^{3,4}, Ivan Rajković^{3,4}, Biljana Popovska Jovičić^{1,2}

¹ Klinika za infektivne bolesti, Univerzitetski klinički centar Kragujevac, Kragujevac, Srbija

² Katedra za infektivne bolesti, Fakultet medicinskih nauka, Univerzitet u Kragujevcu, Kragujevac, Srbija

³ Klinika za infektivne i tropske bolesti, Univerzitetski klinički centar Srbije, Beograd, Srbija,

⁴ Katedra za infektivne bolesti, Medicinski fakultet, Univerzitet u Beogradu, Beograd, Srbija,

⁵ Katedra za histologiju i embriologiju, Fakultet medicinskih nauka, Univerzitet u Kragujevcu, Kragujevac, Srbija

⁶ Katedra za genetiku, Fakultet medicinskih nauka, Univerzitet u Kragujevcu, Kragujevac, Srbija

Uvod: Osobe koje žive sa HIV-om lečene antiretrovirusnom terapijom (ART) izložene su povećanom riziku od razvoja metaboličkog sindroma. Cilj ovog istraživanja bio je ispitivanje povezanosti polimorfizma gena HIF-1 α rs11549465 sa metaboličkim sindromom kod osoba koje žive sa HIV-om lečenih ART.

Metode: U ovu multicentričnu, retrospektivnu studiju preseka tipa slučaj–kontrola uključena je 121 osoba koja živi sa HIV-om. Genotipizacija polimorfizma HIF-1 α rs11549465 sprovedena je metodom PCR-a u realnom vremenu, primenom TaqMan testa. Analizirani su klinički i metabolički parametri, kao i parametri povezani sa HIV infekcijom. Nezavisni činioci povezani sa prisustvom metaboličkog sindroma utvrđeni su multivarijantnom logističkom regresijom.

Rezultati: Metabolički sindrom utvrđen je kod 47 ispitanika (38,8%), dok su 74 ispitanika (61,2%) činila kontrolnu grupu. Učestalost minor T alela polimorfizma HIF-1 α rs11549465 iznosila je 24%. Prisustvo T alela, kao i CT/CT+TT genotipova, bilo je povezano sa značajno manjom verovatnoćom metaboličkog sindroma ($p < 0,05$). Stratifikovana analiza pokazala je da je zaštitna povezanost CT genotipa bila izraženija kod ispitanika sa kraćim trajanjem HIV infekcije i kraćom izloženošću ART ($p < 0,05$). U multivarijantnoj analizi, povišene vrednosti triglicerida i glikemije natašte bile su najsnažniji nezavisni činioci povezani sa metaboličkim sindromom, dok je CT+TT genotip HIF-1 α rs11549465 ostao nezavisno povezan sa manjom verovatnoćom metaboličkog sindroma ($p < 0,05$).

Zaključak: T alel i CT+TT genotipovi polimorfizma HIF-1 α rs11549465 povezani su sa manjom verovatnoćom prisustva metaboličkog sindroma i hipertenzije kod osoba koje žive sa HIV-om lečenih ART. Ova zaštitna povezanost zadržala se i nakon prilagođavanja za poznate metaboličke faktore rizika, ali je bila manje izražena sa dužim trajanjem HIV infekcije i primene ART.

Ključne reči: HIV, hipoksija, hipoksijom indukovani faktor, HIF-1 α , metabolički sindrom

GENES, HIV, AND METABOLIC SYNDROME: THE ROLE OF HIF-1 α rs11549465

Nemanja Đorđević^{1,2}, Jovan Ranin^{3,4}, Ivana Gmizić^{3,4}, Nemanja Jovičić⁵, Biljana Ljujić⁶, Sofija Sekulić Marković^{1,2}, Ivana Raković^{1,2}, Ivana Lešnjak^{1,2}, Andrijana Krstić^{1,2}, Marko Marković^{3,4}, Jovana Ranin^{3,4}, Ivan Rajković^{3,4}, Biljana Popovska Jovičić^{1,2}

¹Clinic for Infectious Diseases, University Clinical Centre Kragujevac, Kragujevac, Serbia

²Department of Infectious Diseases, Faculty of Medical Sciences, University of Kragujevac, Kragujevac, Serbia

³Clinic for Infectious and Tropical Diseases, University Clinical Centre of Serbia, Belgrade, Serbia,

⁴Department of Infectious Diseases, Faculty of Medicine, University of Belgrade, Belgrade, Serbia,

⁵Department of Histology and embryology, Faculty of Medical Sciences, University of Kragujevac, Kragujevac, Serbia

⁶Department of Genetics, Faculty of Medical Sciences, University of Kragujevac, Kragujevac, Serbia

Background: People living with HIV (PLWH) receiving antiretroviral therapy (ART) are at increased risk of metabolic syndrome (MS). This study aimed to investigate the association between the HIF-1 α rs11549465 polymorphism and MS in PLWH on ART.

Methods: This multicentre retrospective case-control cross-sectional study included 121 PLWH. Genotyping of the HIF-1 α rs11549465 polymorphism was performed using Real-time PCR with a TaqMan assay. Clinical, metabolic, and HIV-related parameters were analysed. Multivariable logistic regression was used to identify independent factors associated with MS.

Results: MS was identified in 47 participants (38.8%), while 74 (61.2%) served as controls. The minor T allele frequency of HIF-1 α rs11549465 was 24%. The presence of T allele and CT/CT+TT genotypes was associated with a significantly lower odds of MS ($p < 0.05$). Stratified analysis indicated that the protective association of the CT genotype was more pronounced at shorter durations of HIV infection and shorter ART exposure ($p < 0.05$). In multivariable analysis, elevated triglycerides and fasting glycemia were the strongest independent predictors correlates of MS, while the HIF-1 α rs11549465 CT+TT genotype remained independently associated with lower odds of MS ($p < 0.05$).

Conclusions: The HIF-1 α rs11549465 T allele and CT+TT genotypes are associated with a significantly lower odds of MS and hypertension in PLWH receiving ART. This protective association remained evident after adjustment for established metabolic risk factors, although it appeared less pronounced with longer HIV infection and ART duration.

Keywords: HIV, Hypoxia, Hypoxia-inducible factor, HIF-1 α , Metabolic syndrome

References:

1. Đorđević N, Ranin J, Gmizić I, Marković M, Rajković I, Ranin J, Ljujić B, Kostić M, Lešnjak I, Minić N and Jovičić BP. Protective association of the HIF-1 α rs11549465 polymorphism with metabolic syndrome in people living with HIV on antiretroviral therapy. *Frontiers in medicine*, 2026, 13:1802450. doi: 10.3389/fmed.2026.1802450.
2. López-Reyes A, Rodríguez-Pérez JM, Fernández-Torres J, Martínez-Rodríguez N, Pérez-Hernández N, Fuentes-Gómez AJ, et al. The HIF1A rs2057482 polymorphism is associated with risk of developing premature coronary artery disease and with some metabolic and cardiovascular risk factors. The genetics of atherosclerotic disease (GEA) Mexican study. *Exp Mol Pathol*. (2014) 96:405–10. doi: 10.1016/j.yexmp.2014.04.010.
3. Ekberg NR, Eliasson S, Li YW, Zheng X, Chatzidionysiou K, Falhammar H, et al. Protective effect of the HIF-1A Pro582Ser polymorphism on severe diabetic retinopathy. *J Diabetes Res*. (2019) 2019:2936962. doi: 10.1155/2019/2936962.
4. Zafar U, Ali Z, Khaliq S, Lone K. Association between hypoxia-inducible factor-1 alpha rs11549465 (1772 C>T) polymorphism and metabolic syndrome. *J Pak Med Assoc*. (2021) 71:1832–7. doi: 10.47391/JPMA.03-434.
5. Worm SW, Lundgren JD. The metabolic syndrome in HIV. *Best Pract Res Clin Endocrinol Metab*. (2011) 25:479–86. doi: 10.1016/j.beem.2010.10.018

PODUDARNOST NEINVAZIVNIH METODA ZA PROCJENU FIBROZE KOD HCV INFEKCIJE

Alma Trnačević¹ Emir Trnačević²

¹ Klinika za infektivne bolesti, Univerzitetski klinički centar Tuzla, Bosnia and Herzegovina

² Poliklinika za laboratorijsku dijagnostiku, Univerzitetski klinički centar Tuzla, Bosnia and Herzegovina

Uvod: Virus hepatitisa C (HCV) čest je uzrok hronične bolesti jetre i njenih komplikacija. Posljednjih godina došlo je do revolucije u liječenju pacijenata s HCV infekcijom u pogledu efikasnosti, jednostavnosti, sigurnosti i trajanja terapije.

Cilj: Procijeniti podudarnost osam često korištenih seroloških bodovnih indeksa za fibrozu i cirozu jetre s tranzijentnom elastografijom (TE) kod pacijenata s hroničnim hepatitisom C (CHC), kako bi se utvrdili serumski indeksi s najvećim stepenom podudarnosti i kliničkom primjenjivošću.

Metode: U studiju su uključena 63 pacijenta s CHC, a rezultati TE upoređeni su s osam neinvazivnih indeksa. Dijagnostička tačnost ovih testova procijenjena je pomoću ROC (Receiver Operating Characteristic) krivulja, uz izračunavanje kappa indeksa za analizu podudarnosti.

Rezultati: Medijan starosti 63 pacijenta iznosio je 54 godine; 42,9% činile su žene. Prema površini ispod ROC krivulje (AUROC), najbolji serumski markeri za značajnu fibrozu jetre (METAVIR $\geq$ F2), uznapredovalu fibrozu jetre ($\geq$ F3) i cirozu (F4) – utvrđene mjerenjima TE ($\geq$ 7,1 kPa, $\geq$ 9,5 kPa, odnosno $\geq$ 12 kPa) – bili su Fibrotest (AUROC = 0,727 za $\geq$ F2) i FIB-4 skor (AUROC = 0,779 za $\geq$ F3 i AUROC = 0,889 za F4). Granična vrijednost Fibrotesta $>0,50$ pokazala je podudarnost s TE u pogledu prisustva značajne fibroze kod 30 pacijenata (od 45; 66,7%), granična vrijednost FIB-4 $<1,45$ pokazala je podudarnost za odsustvo značajne fibroze kod 13 pacijenata (od 18; 72,2%), a granična vrijednost indeksa ciroze Univerziteta u Göteborgu (GUCI) >1 pokazala je podudarnost za prisustvo ciroze kod 16 pacijenata (od 22; 72,7%), ali ne i za isključivanje ciroze.

Zaključak: Serološki bodovni indeksi pokazali su umjerenu ukupnu podudarnost s TE. Predlažemo da se FIB-4 skor, Fibrotest i GUCI koriste u rutinskoj praksi za isključivanje i dijagnosticiranje značajne fibroze, odnosno za dijagnosticiranje ciroze.

Ključne riječi: ciroza jetre; fibroza jetre; neinvazivni markeri.

CONCORDANCE OF NON-INVASIVE METHODS FOR HCV FIBROSIS

Alma Trnačević¹ Emir Trnačević²

¹ Clinic of Infectious Diseases, University Clinical Centre, Tuzla, Bosnia and Herzegovina

² Polyclinic of Laboratory Diagnostics, University Clinical Centre, Tuzla, Bosnia and Herzegovina

Background: Hepatitis C Virus is a common cause of chronic liver disease and its ensuing complications. In the last years, there has been a revolution of the treatment for patients with HCV regarding efficacy, simplicity, safety and duration of treatment.

Aim: To assess concordance of eight frequently used serology-based scoring indices for liver fibrosis and cirrhosis with transient elastography (TE) in chronic hepatitis C (CHC) patients in order to determine serum indices with the highest concordance and clinical usability in clinical practice.

Methods: In this study, 63 CHC patients were included and TE results were compared with eight non-invasive indices. The diagnostic performance of these tests was assessed using receiver operating characteristic curves with kappa index calculated for the concordance analysis.

Results: Median age of 63 patients was 54 years; 42.9% were females. According to areas under the Receiver Operating Characteristics (AUROC), the best performing serum markers for significant liver fibrosis (METAVIR $\geq$ F2), advanced liver fibrosis ($\geq$ F3) and cirrhosis (F4) determined by TE measurements ($\geq$ 7.1kPa, $\geq$ 9.5kPa and $\geq$ 12kPa, respectively) were Fibrotest (AUROC=0.727 for $\geq$ F2) and FIB-4 score (AUROC=0.779 for $\geq$ F3 and AUROC=0.889 for F4). Fibrotest cut-off at >0.50 was concordant with TE for presence of significant fibrosis in 30 (out of 45; 66.7%), FIB-4 cut-off at <1.45 was concordant for absence of significant fibrosis in 13 (out of 18; 72.2%) and Goeteborg University Cirrhosis Index (GUCI) cut-off at >1 was concordant for presence of cirrhosis in 16 (out of 22; 72.7%) patients, but not for exclusion of cirrhosis.

Conclusion: Serology-based scoring indices had moderate overall concordance with TE. We propose that FIB-4 score, Fibrotest and GUCI be used in routine practice to exclude and diagnose significant fibrosis and diagnose cirrhosis, respectively.

Keywords: hepatic cirrhosis; hepatic fibrosis; non-invasive markers.

SAVREMENI PRINCIPI ANTIRETROVIRUSNE TERAPIJE U SRBIJI

Jovan Ranin

Medicinski fakultet, Univerzitet u Beogradu,

Klinika za infektivne i tropske bolesti, UKC Srbije, Beograd

Antiretrovirusna terapija (ART) doprinela je značajnom smanjenju morbiditeta i mortaliteta kod osoba sa HIV infekcijom („Person with HIV“, PWH). Takođe, dovela je i do produžetka i poboljšanja kvaliteta života PWH. Predstavlja istovremenu upotrebu najčešće tri antiretrovirusna leka. Karakteristike savremene ART koje čine ovu strategiju idealnom strategijom u tretmanu osoba koje žive sa HIV infekcijom, u ovom trenutku, su: visoka antivirusna potencija, dobra genetska barijera, odnosno, dobar profil rezistencije, bezbednost, odnosno, odsustvo neželjenih efekata i komforčnost.

Pored virusološkog, imunološkog i kliničkog efekta, ART ima i epidemiološki značaj, obzirom da su osobe sa HIV infekcijom uz ART nezarazne, što dovodi do smanjenja broja novozaraženih osoba, čime se u krajnjem smislu obavlja uspešna kontrola i zaustavljanje HIV pandemije. Prethodno navedeno, predstavlja osnovni princip Svetske zdravstvene organizacije, odnosno UNAIDS, koja za cilj ima da do 2030. godine 95% svih osoba sa HIV infekcijom dijagnostikuje, da 95% dijagnostikovanih leči ART i da od svih lečenih 95% budu uspešno lečeni, odnosno da imaju nedetektibilnu viremiju. Prema tome, rana ART, uz prethodnu rano dijagnostikovanje HIV infekcije, postaje osnovni uslov za uspešnu kontrolu HIV pandemije.

Smatra se da u Srbiji ima oko 4500 PWH. Dijagnostikovano je 3045 (68%), od kojih je 2500 (82%) na ART, a od kojih je 2325 (93%) nedetektibilno, odnosno na uspešnoj je ART. Potrebno je narednih godina unaprediti dijagnostikovanje PWH, njihovo vezivanje za zdravstveni sistem i njihov tretman ART, kako bi se zaustavila HIV epidemija u Srbiji.

IZAZOVI RACIONALNE PRIMJENE REZERVNIH ANTIBIOTIKA U SITUACIJAMA UPITNOG KLINIČKOG BENEFITA

Rusmir Baljić

Klinika za infektivne bolesti, Klinički centar Univerziteta u Sarajevu

Uvod:

Razvoj novih antibiotika, posebno beta-laktam/beta-laktamaza inhibitor kombinacija, značajno je unaprijedio mogućnosti liječenja infekcija uzrokovanih karbapenem-rezistentnim enterobakterijama, karbapenem-rezistentnim *A. baumannii* te određenim rezistentnim sojevima *P. aeruginosa*. Međutim, mikrobiološka aktivnost lijeka ne podrazumijeva uvijek i poboljšanje kliničkog statusa niti promjenu konačnog ishoda liječenja.

Cilj:

Razmotriti kliničke i etičke izazove primjene rezervnih antibiotika kod bolesnika sa izrazito nepovoljnom prognozom, kod kojih je očekivani benefit liječenja neizvjestan ili ograničen.

Diskusija:

Kod dijela bolesnika s infekcijama uzrokovanim multirezistentnim patogenima, ukupni ishod određen je prvenstveno težinom osnovne bolesti, multiorganskim zatajenjem ili uznapređovalim hroničnim bolestima. U takvim okolnostima primjena rezervnih antibiotika može dovesti do mikrobiološkog odgovora bez značajnog uticaja na preživljavanje, funkcionalni oporavak ili kvalitet života. Pored procjene vjerovatnog kliničkog benefita za pojedinačnog pacijenta, odluka o liječenju treba uključiti i etičku dimenziju, odgovorno upravljanje ograničenim antimikrobnim resursima, kao i očuvanje efikasnosti novih lijekova za buduće pacijente.

Zaključak:

Racionalna primjena rezervnih antibiotika ne treba se zasnivati isključivo na prisustvu osjetljivog uzročnika, već i na procjeni mogućnosti da liječenje promijeni klinički ishod. U slučajevima izrazito nepovoljne prognoze, odluka o primjeni ovih lijekova zahtijeva integraciju infektoloških, prognostičkih i etičkih aspekata, s ciljem postizanja stvarne koristi za pacijenta i odgovornog korištenja antimikrobnih resursa.

Ključne riječi: rezervni antibiotici, multirezistentni uzročnici, klinički ishod, medicinska etika.

REZISTENCIJA NA ANTIMIKROBNE LIJEKOVE IZ INVAZIVNIH IZOLATA U REPUBLICI SRPSKOJ I ZNAČAJ NOVIH BIOMARKERA U NJENOJ PREVENCIJI

Prof. dr Maja Travar^{1,2}, Prim. dr Višnja Mrđen^{1,2}

^{1.} Zavod za kliničku mikrobiologiju, Univerzitetski klinički centar Republike Srpske

^{2.} Katedra za mikrobiologiju i imunologiju, Medicinski fakultet, Univerzitet u Banjoj Luci

Antimikrobna rezistencija (AMR) danas predstavlja jedan od najvećih javno-zdravstvenih problema. Procjenjuje se da će do 2050. godine, AMR biti odgovorna za smrt preko 10 miliona ljudi, a da će troškovi vezano za hospitalizacije premašiti 100 triliona američkih dolara. Nadzor nad rezistencijom na antimikrobne lijekove (AMR) za mrežu CAESAR (Central Asian and European Surveillance of Antimicrobial Resistance) fokusira se na invazivne izolate osam ključnih bakterijskih vrsta (*Escherichia coli*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, *Acinetobacter species*, *Streptococcus pneumoniae*, *Staphylococcus aureus*, *Enterococcus faecalis* i *Enterococcus faecium*). Prikazani su trendovi rezistencije izolata iz 6 bolnica u Republici Srpskoj na najčešće korištene antimikrobne lijekove. Najznačajniji trend rasta pokazuje *Klebsiella pneumoniae*, rezistencija na karbapeneme.

Biomarkeri igraju ključnu ulogu u prevenciji antimikrobne rezistencije (AMR) tako što pomažu kliničarima da razlikuju bakterijske od virusnih infekcija, čime se direktno smanjuje nepotrebna i neracionalna upotreba antibiotika.

Od novih biomarkera izdvaja se Myxovirus resistance protein A (MxA). To je protein koji ljudski organizam proizvodi unutar ćelija kao odgovor na prisustvo interferona tipa I. Kombinovani MxA/CRP test je savremena dijagnostička metoda koja omogućava istovremeno kvantitativno određivanje nivoa MxA proteina i CRP-a iz jednog uzorka krvi i koja omogućava precizno razlikovanje virusnih od bakterijskih infekcija u roku od 12 do 30 minuta.

Prema rezultatima brojnih kliničkih studija, upotreba ovog testa omogućava racionalizaciju upotrebe dijagnostičkih testova, te smanjenje nepotrebne upotrebe antibiotika.

Ključne riječi: antimikrobna rezistencija, *Klebsiella pneumoniae*, biomarkeri, Myxovirus resistance protein A (MxA)

ANTIMICROBIAL RESISTANCE AMONG INVASIVE ISOLATES IN THE REPUBLIC OF SRPSKA AND THE ROLE OF NOVEL BIOMARKERS IN ITS PREVENTION

Prof. dr Maja Travar^{1,2}, Prim. dr Višnja Mrđen^{1,2}

¹. Institute of Clinical Microbiology, University Clinical Centre of the Republic of Srpska

². Department of Microbiology and Immunology, Faculty of Medicine, University of Banja Luka

Antimicrobial resistance (AMR) is one of the biggest public health problems today. It is estimated that by 2050, AMR will be responsible for the deaths of more than 10 million people, and the cost of hospitalizations will exceed \$100 trillion. The surveillance of antimicrobial drug resistance (AMR) for the Central Asian and European Surveillance of Antimicrobial Resistance (CAESAR) network focuses on invasive isolates of eight key bacterial species (*Escherichia coli*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, *Acinetobacter* species, *Streptococcus pneumoniae*, *Staphylococcus aureus*, *Enterococcus faecalis* and *Enterococcus faecium*). Trends in resistance of isolates from 6 hospitals in the Republic of Srpska to the most commonly used antimicrobial drugs are presented. The most significant growth trend is shown by *Klebsiella pneumoniae*, resistance to carbapenems.

Biomarkers play a key role in the prevention of antimicrobial resistance (AMR) by helping clinicians distinguish between bacterial and viral infections, thereby directly reducing the unnecessary and irrational use of antibiotics.

Myxovirus resistance protein A (MxA) stands out among the new biomarkers. It is a protein produced by the human body inside cells in response to the presence of type I interferons. The combined MxA/CRP test is a modern diagnostic method that allows simultaneous quantitative determination of the level of MxA protein and CRP from a single blood sample and allows for the precise differentiation of viral from bacterial infections within 12 to 30 minutes.

According to the results of numerous clinical studies, the use of this test makes it possible to rationalize the use of diagnostic tests, and reduce the unnecessary use of antibiotics.

Keywords: antimicrobial resistance, *Klebsiella pneumoniae*, biomarkers, Myxovirus resistance protein A (MxA)

STVARNA UČINKOVITOST ANTIMIKROBNE UROPROFILAKSE U PREVENCIJI REKURENTNIH INFEKCIJA MOKRAČNOG SUSTAVA: REZULTATI KOHORTNE STUDIJE S UPARIVANJEM PREMA SKLONOSTI LIJEČENJU

Božo Šušak^{1,2}, Antea Milošević¹, Svjetlana Grgić^{1,2},

¹Klinika za infektivne bolesti, Sveučilišna klinička bolnica Mostar, Mostar, Bosnia and Herzegovina;

²Medicinski fakultet, Sveučilište u Mostaru, Mostar, Bosnia and Herzegovina;

Uvod: Stvarna učinkovitost antimikrobne uroprofilakse u prevenciji rekurentnih infekcija mokraćnog sustava (rIMS) ostaje nejasna jer se profilaksa u kliničkoj praksi pretežito propisuje bolesnicima s najvećim početnim rizikom. Cilj ovoga rada je bio procijeniti učinkovitost uroprofilakse primjenom uparivanja prema sklonosti liječenju (propensity score matching), utvrditi prediktore recidiva, recidiva uzrokovanih multirezistentnim (MDR) uzročnicima i ponovnog bolničkog prijema te usporediti učinkovitost profilakse različitim antibioticima.

Materijal i metode: Provedena je kohortna studija koja je uključila 364 odrasla bolesnika s infekcijom mokraćnog sustava, od kojih 224 nisu primala, a 140 je primalo uroprofilaksu. Provedene su multivarijatne logističke regresijske analize, Coxova regresijska analiza i Poissonova regresijska analiza. Za smanjenje pristranosti zbog indikacije liječenja primijenjeno je „propensity score matching“.

Rezultati: Bolesnici koji su primali uroprofilaksu imali su značajno nepovoljniji početni profil rizika, pri čemu je prethodna rekurentna infekcija mokraćnog sustava bila najznačajniji prediktor primjene uroprofilakse (OR 4,51; $p < 0,001$). U neprilagođenim analizama uroprofilaksa je bila povezana s većom učestalošću recidiva tijekom 12 mjeseci (45,7 % prema 33,5 %; $p = 0,019$) te kraćim razdobljem bez recidiva (248,1 prema 282,7 dana; $p = 0,020$). Međutim, nakon prilagodbe te su razlike nestale. Uroprofilaksa nije bila neovisno povezana s pojavom recidiva (prilagođeni OR 0,86; 95 % CI 0,51–1,43), vremenom do recidiva (HR 0,84; 95 % CI 0,58–1,21), ukupnim opterećenjem recidivima (IRR 1,05; 95 % CI 0,72–1,52), recidivom uzrokovanim MDR uzročnicima niti ponovnim bolničkim prijemom, a rezultati su ostali dosljedni i nakon uparivanja prema sklonosti liječenju. Među bolesnicima koji su primali uroprofilaksu, fosfomicin je pokazao trend prema manjoj učestalosti recidiva u odnosu na nitrofurantoin, bez postizanja statističke značajnosti (prilagođeni OR 0,39; 95 % CI 0,15–1,02; $p = 0,055$). Neovisni prediktori nepovoljnih ishoda bili su prethodna rekurentna infekcija mokraćnog sustava, prisutnost urinarnog katetera, šećerna bolest i urolitijaza, dok je recidiv uzrokovan MDR uzročnikom bio snažno povezan s većim opterećenjem recidivima (IRR 5,65; 95 % CI 3,88–8,20; $p < 0,001$).

Zaključak: Veća učestalost recidiva u bolesnika koji su primali uroprofilaksu u neprilagođenim analizama najvjerojatnije odražava pristranost zbog indikacije liječenja. Nakon prilagodbe primjenom multivarijatnih modela i uparivanja prema sklonosti liječenju uroprofilaksa nije bila neovisno povezana s ishodima vezanim uz recidiv. Fosfomicin je pokazao trend prema manjoj učestalosti recidiva u odnosu na nitrofurantoin, što zahtijeva potvrdu u prospektivnim studijama odgovarajuće statističke snage. Klinički ishodi prvenstveno su bili određeni prethodnim rekurentnim infekcijama mokraćnog sustava, prisutnosti urimarnog katetera, šećernom bolešću i strukturnim abnormalnostima mokraćnog sustava.

Ključne riječi: rekurentna infekcija mokraćnog sustava; uroprofilaksa; fosfomicin; nitrofurantoin; multirezistentni uzročnici; uparivanje prema sklonosti liječenju; recidiv; ponovni bolnički prijem.

REAL-WORLD EFFECTIVENESS OF ANTIMICROBIAL UROPROPHYLAXIS FOR RECURRENT URINARY TRACT INFECTION: INSIGHTS FROM A PROPENSITY SCORE-MATCHED COHORT

Božo Šušak^{1,2}, Antea Milošević¹, Svjetlana Grgić^{1,2},

¹Clinic for infectious disease, University Clinical Hospital Mostar, Mostar, Bosnia and Herzegovina;

²Faculty of Medicine, University of Mostar, Mostar, Bosnia and Herzegovina;

Background: The real-world effectiveness of antimicrobial uroprophylaxis for recurrent urinary tract infections (rUTIs) remains uncertain because prophylaxis is preferentially prescribed to patients at highest baseline risk. We evaluated its effectiveness using propensity score matching, identified predictors of recurrence, multidrug-resistant (MDR) recurrence, hospital readmission, and compared the effectiveness of different antibiotics.

Methods: We conducted a cohort study including 364 adults with urinary tract infection. Multivariable logistic, Cox, and Poisson regression analyses were performed. Propensity score matching was used to reduce confounding by indication.

Results: Patients receiving uroprophylaxis had a substantially higher baseline risk profile, with prior recurrent UTI being the strongest determinant of treatment allocation (OR 4.51, $p < 0.001$). In unadjusted analyses, uroprophylaxis was associated with higher 12-month recurrence rates (45.7% vs. 33.5%, $p = 0.019$) and shorter recurrence-free survival (248.1 vs. 282.7 days, $p = 0.020$). However, these differences disappeared after adjustment. Uroprophylaxis was not independently associated with recurrence (adjusted OR 0.86, 95% CI 0.51–1.43), recurrence-free survival (HR 0.84, 95% CI 0.58–1.21), recurrence burden (IRR 1.05, 95% CI 0.72–1.52), MDR recurrence, or hospital readmission, and findings remained consistent after propensity score matching. Among patients receiving prophylaxis, fosfomycin demonstrated a nonsignificant trend toward fewer recurrences compared with nitrofurantoin (adjusted OR 0.39, 95% CI 0.15–1.02; $p = 0.055$). Independent predictors of adverse outcomes included prior recurrent UTI, urinary catheterization, diabetes mellitus, and urolithiasis, while MDR recurrence markedly increased recurrence burden (IRR 5.65, 95% CI 3.88–8.20, $p < 0.001$).

Conclusions: Higher recurrence rates observed among patients receiving uroprophylaxis in unadjusted analyses most likely reflected confounding by indication. After multivariable adjustment and propensity score matching, uroprophylaxis was not independently associated with recurrence-related outcomes. Fosfomycin showed a trend toward lower recurrence than nitrofurantoin that warrants confirmation in adequately powered prospective studies. Clinical outcomes were primarily driven by prior recurrent UTI, catheter exposure, diabetes mellitus, and structural urinary tract abnormalities.

Keywords: recurrent urinary tract infection; uroprophylaxis; fosfomycin; nitrofurantoin; multidrug-resistant organisms; propensity score matching; recurrence; hospital readmission.

NAJČEŠĆI BAKTERIJSKI UZROČNICI U URINU I NJIHOVA ANTIMIKROBNA REZISTENCIJA: ISKUSTVO JEDNOG CENTRA

Mirela Topić, Igor Hadžimulić, Mirela Zirić, Senad Hadžipašić, Ismir Kukić, Enisa Šabotić, Velida Gaković, Mejra Durmišević

Kantonalna bolnica „Dr. Irfan Ljubijankić“, Odjel za infektivne bolesti, Bihać, Bosna i Hercegovina

Uvod

Infekcije urinarnog trakta (IUT) spadaju među najčešće bakterijske infekcije i predstavljaju značajan uzrok morbiditeta, posebno među starijom populacijom. Porast antimikrobne rezistencije otežava liječenje IUT i ukazuje na značaj lokalnog praćenja bakterijskih uzročnika i njihovih obrazaca osjetljivosti na antimikrobne lijekove.

Cilj rada

Cilj ovog istraživanja bio je utvrditi najčešće bakterijske uzročnike izolovane iz uzoraka urina i analizirati prisustvo antimikrobne rezistencije, sa posebnim osvrtom na izolate koji proizvode beta-laktamaze proširenog spektra (ESBL).

Materijali i metode

Provedeno je retrospektivno opservacijsko istraživanje na Odjelu za infektivne bolesti Kantonalne bolnice Bihać u periodu od 1. juna 2025. do 1. juna 2026. godine. Istraživanjem je obuhvaćeno 60 pacijenata sa mikrobiološki potvrđenom infekcijom urinarnog trakta. Bakterijski izolati identificirani su standardnim mikrobiološkim metodama, prema važećim preporukama EUCAST-a.

Rezultati i diskusija

Kod 60 pacijenata izolovano je ukupno 70 bakterijskih uzročnika. Žene su činile 42 pacijenta (70%), dok je muškaraca bilo 18 (30%). Većina pacijenata bila je starija od 65 godina (43/60; 71,7%). *Escherichia coli* bila je najčešće izolovani uzročnik, sa 37/70 izolata (52,9%). ESBL-produkujući izolati *E. coli* identificirani su kod 9/37 izolata (24,3%), što odgovara 12,9% svih bakterijskih izolata. *Klebsiella pneumoniae* izolovana je u 13/70 slučajeva (18,6%). Enterokokni izolati činili su 13/70 (18,6%), uključujući *Enterococcus* spp. 10/70 (14,3%) i *Enterococcus faecalis* 3/70 (4,3%). *Proteus mirabilis* izolovan je u 4/70 slučajeva (5,7%), dok je *Pseudomonas aeruginosa* izolovana u 2/70 slučajeva (2,9%).

Zaključak

Istraživanje je pokazalo da je *E. coli* najzastupljeniji bakterijski uzročnik izolovan iz uzoraka urina, nakon čega slijede *K. pneumoniae* i enterokoki. Relativno visok udio ESBL-produkujućih izolata *E. coli* ukazuje na značajan problem antimikrobne rezistencije kod infekcija urinarnog trakta. Kontinuirani lokalni mikrobiološki nadzor i redovno praćenje antimikrobne osjetljivosti od ključnog su značaja za pravilan izbor empirijske terapije, racionalnu primjenu antibiotika i sprječavanje širenja rezistentnih bakterijskih uzročnika.

Literatura

1. Filev R, Bogov B, Lyubomirova M, Rostaing L. From pandemic to resistance: addressing multidrug-resistant urinary tract infections in the Balkans. *Antibiotics*. 2025;14:849. doi:10.3390/antibiotics14090849.
2. World Health Organization. Antimicrobial resistance and primary health care. Geneva: World Health Organization; 2018. Available from: who.int. Accessed 31 May 2026.
3. Hart CA, Kariuki S. Antimicrobial resistance in developing countries. *BMJ*. 1998;317:647–650. doi:10.1136/bmj.317.7159.647.

THE MOST COMMON BACTERIAL PATHOGENS IN URINE AND THEIR ANTIMICROBIAL RESISTANCE: A SINGLE-CENTER EXPERIENCE

Mirela Topić, Igor Hadžimulić, Mirela Zirić, Senad Hadžipašić, Ismir Kukić, Enisa Šabotić, Velida Gaković, Mejra Durmišević
Cantonal Hospital "Dr. Irfan Ljubijankić", Department of Infectious Diseases, Bihać, Bosnia and Herzegovina

Introduction

Urinary tract infections (UTIs) are among the most common bacterial infections and represent a significant cause of morbidity, particularly among older patients. Increasing antimicrobial resistance complicates the management of UTIs and highlights the importance of local surveillance of bacterial pathogens and their susceptibility patterns.

Aim

The aim of this study was to determine the most common bacterial pathogens isolated from urine samples and to assess the occurrence of antimicrobial resistance, with particular emphasis on extended-spectrum beta-lactamase (ESBL)-producing isolates.

Materials and methods

A retrospective observational study was conducted at the Department of Infectious Diseases, Cantonal Hospital Bihać, Bosnia and Herzegovina, from June 1, 2025, to June 1, 2026. The study included 60 patients with microbiologically confirmed urinary tract infections. Bacterial isolates were identified using standard microbiological methods, according to current EUCAST recommendations.

Results and discussion

A total of 70 bacterial isolates were recovered from 60 patients. Women accounted for 42 patients (70%), and 18 (30%) were men. The majority of patients were older than 65 years (43/60; 71.7%). *Escherichia coli* was the most frequently isolated pathogen, accounting for 37 of 70 isolates (52.9%). ESBL-producing *E. coli* isolates were identified in 9 of 37 *E. coli* isolates (24.3%), corresponding to 12.9% of all bacterial isolates. *Klebsiella pneumoniae* was isolated in 13 of 70 cases (18.6%). Enterococcal isolates accounted for 13 of 70 (18.6%), including *Enterococcus* spp. in 10 of 70 (14.3%) and *Enterococcus faecalis* in 3 of 70 (4.3%). *Proteus mirabilis* was identified in 4 of 70 isolates (5.7%), and *Pseudomonas aeruginosa* was isolated in 2 of 70 cases (2.9%).

Conclusion

The study demonstrated that *E. coli* was the predominant bacterial pathogen isolated from urine samples, followed by *K. pneumoniae* and enterococci. The relatively high proportion of ESBL-producing *E. coli* highlights the growing problem of antimicrobial resistance in urinary tract infections. Continuous local microbiological surveillance and regular assessment of antimicrobial susceptibility are essential for appropriate empirical therapy, antimicrobial stewardship, and prevention of the spread of resistant bacterial pathogens.

References

1. Filev R, Bogov B, Lyubomirova M, Rostaing L. From pandemic to resistance: addressing multidrug-resistant urinary tract infections in the Balkans. *Antibiotics*. 2025;14:849. doi:10.3390/antibiotics14090849.
2. World Health Organization. Antimicrobial resistance and primary health care. Geneva: World Health Organization; 2018. Available from: who.int. Accessed 31 May 2026.
3. Hart CA, Kariuki S. Antimicrobial resistance in developing countries. *BMJ*. 1998;317:647–650. doi:10.1136/bmj.317.7159.647.

ŠTO JE NOVO U MIKROBIOLOŠKIM ZNAČAJKAMA UZROČNIKA SEPSE?

Prof. dr. sc. Jadranka Nikolić, dr. med., specijalist infektologije ^{1,2}, Doc. dr. sc. Božo Šušak, dr. med, specijalist infektologije ^{1,2}. Viši asistent Monika Dalmatin Dragišić, dr. med., specijalist infektologije ^{1,2}

¹ Sveučilišna klinička bolnica Mostar, Klinika za infektivne bolesti

² Sveučilište u Mostaru, Medicinski fakultet Mostar

Cilj: Glavni cilj ovog rada je utvrditi novosti u mikrobiološkim značajkama uzročnika sepse, s naglaskom na višestruko-rezistentne uzročnike (multidrug-resistant organisms - MDRO).

Materijal i metode: Ova retrospektivna presječno-opisna studija provedena je u Klinici za infektivne bolesti SKB Mostar i obuhvatila je 45 bolesnika s potvrđenom sepsom, a koji su liječeni u razdoblju od 1.1.2022. do 31.12.2024. godine. Analizirane varijable uključivale su: dob, spol, komorbiditete (hipertenzija, šećerna bolest, kronične bolesti pluća i maligne bolesti), kliničku težinu bolesti (umjerena ili teška), mikrobiološke nalaze hemokultura, karakteristike izoliranih uzročnika, režime primjene antibiotika, duljinu hospitalizacije i klinički ishod. Glavni ishodi analize bili su: raspodjela pacijenata prema dobi, spolu, komorbiditetima, težini bolesti, mikrobiološkim karakteristikama izolata, primijenjenim antibioticima, trajanju bolničkog liječenja i ishodu liječenja.

Rezultati: Većina bolesnika sa sepsom bila je starija od 67 godina, uz statistički značajno najviše bolesnika u dobnim skupinama od 67 do 77 i od 78 do 88 godina, dok nije bilo razlike u raspodjela prema spolu. Arterijska hipertenzija bila je najčešći komorbiditet. Većina bolesnika hospitalizirana je s umjerenom kliničkom slikom sepse, dok su svi bolesnici s teškom sepsom imali letalan ishod. Mikrobiološka analiza pokazala je da je *Escherichia coli* bila najčešći uzročnik sepse, a infekcije uzrokovane ESBL sojevima bile su statistički značajno povezane sa smrtnim ishodom. Liječenje antibioticima primarno se temeljilo na ceftriaksonu te kombinaciji koamoksiklava i gentamicina. Većina bolesnika boravila u bolnici 7-10 dana te je otpuštena s poboljšanim kliničkim stanjem. Nije utvrđena statistički značajna razlika u kliničkom ishodu sepse između bolesnika sa smrtnim ishodom i onih s poboljšanjem stanja s obzirom na dob, spol, komorbiditete ili duljinu hospitalizacije.

Zaključak: Dolazi do promjena u mikrobiološkim značajkama uzročnika sepse, jer su MDRO uzročnici sve više odgovorni za etiologiju sepse (20% mikrobioloških izolata u ovoj studiji bili su MDRO uzročnici), što predstavlja veliki izazov u antibiotskom tretmanu.

Ključne riječi: sepsa, etiologija, MDRO uzročnici, antibiotiska terapija, ishod liječenja

Literatura:

1. Duncan CF, Youngstein T, Kirrane MD, Lonsdale DO. Diagnostic Challenges in Sepsis. *Curr Infect Dis Rep.* 2021;23:22.
2. Liborio MP, Harris PNA, Ravi C, Irwin AD. Getting up to speed: rapid pathogen and antimicrobial resistance diagnostics in sepsis. *Microorganisms.* 2024;12:1824.
3. Husna A, Rahman MM, Badruzzaman ATM, Sikder MH, Islam MR, Rahman MT, Alam J, Ashour HM. Extended-Spectrum β -Lactamases (ESBL): Challenges and Opportunities. *Biomedicine.* 2023;11:2937.
4. Alhamyani AH, Alamri MS, Aljuaid NW, Aloubthani AH, Alzahrani S, Alghamdi AA, et al. Sepsis in Aging Populations: A Review of Risk Factors, Diagnosis, and Management. *Cureus.* 2024;16:e74973.
5. Evans L, Rhodes A, Alhazzani W, Antonelli M, Coopersmith CM, French C, Machado FR, et al. Surviving sepsis campaign: international guidelines for management of sepsis and septic shock 2021. *Intensive Care Med.* 2021;47:1181-247.

WHAT IS NEW IN THE MICROBIOLOGICAL FEATURES OF CAUSATIVE AGENTS OF SEPSIS?

Associate professor Jadranka Nikolić, MD, PhD, infectious diseases specialist^{1,2}. Assistant professor Božo Šušak, MD, PhD, infectious diseases specialist^{1,2}. Senior assistant Monika Dalmatin Dragišić, MD, PhD, infectious diseases specialist^{1,2}

¹ University Clinical Hospital Mostar, Clinic for Infectious Diseases

² University of Mostar, Faculty of Medicine, Mostar

Objective: The main objective of this paper is to identify new findings concerning the microbiological characteristics of sepsis-causing pathogens, with an emphasis on multidrug-resistant organisms (MDROs).

Materials and methods: This retrospective, cross-sectional descriptive study was conducted at the Clinic for Infectious Diseases of the University Clinical Hospital Mostar and included 45 patients with confirmed sepsis treated between January 1, 2022, and December 31, 2024. Analyzed variables included: age, gender, comorbidities (hypertension, diabetes mellitus, chronic lung diseases, and malignancies), clinical severity of the disease (moderate or severe), blood culture findings, characteristics of isolated pathogens, antibiotic regimens, length of hospital stay, and clinical outcome. The main outcomes of the analysis were: the distribution of patients according to age, gender, comorbidities, disease severity, microbiological characteristics of isolates, antibiotics administered, duration of hospital treatment, and treatment outcome.

Results: The majority of patients with sepsis were over 67 years of age, with statistically significant the highest numbers found in the 67–77 and 78–88 age groups; there was no difference in distribution by gender. Arterial hypertension was the most common comorbidity. Most patients were hospitalized with a moderate clinical presentation of sepsis, whereas all patients with severe sepsis had a fatal outcome. Microbiological analysis revealed that *Escherichia coli* was the most common causative agent of sepsis, and infections caused by ESBL strains were statistically significantly associated with a fatal outcome. Antibiotic treatment was primarily based on ceftriaxone and a combination of co-amoxiclav and gentamicin. The majority of patients stayed in the hospital for 7–10 days and were discharged with an improved clinical condition. No statistically significant difference was found in the clinical outcome of sepsis, comparing patients who died with those who improved, regarding age, gender, comorbidities, or length of hospitalization.

Conclusion: Changes are occurring in the microbiological characteristics of sepsis-causing pathogens, as multidrug-resistant organisms (MDROs) are increasingly responsible for the etiology of sepsis (20% of microbiological isolates in this study were MDROs), posing a major challenge for antibiotic treatment.

Keywords: sepsis, etiology, MDRO pathogens, antibiotic therapy, treatment outcome

References:

1. Duncan CF, Youngstein T, Kirrane MD, Lonsdale DO. Diagnostic Challenges in Sepsis. *Curr Infect Dis Rep*. 2021;23:22.
2. Liborio MP, Harris PNA, Ravi C, Irwin AD. Getting up to speed: rapid pathogen and antimicrobial resistance diagnostics in sepsis. *Microorganisms*. 2024;12:1824.
3. Husna A, Rahman MM, Badruzzaman ATM, Sikder MH, Islam MR, Rahman MT, Alam J, Ashour HM. Extended-Spectrum β -Lactamases (ESBL): Challenges and Opportunities. *Biomedicines*. 2023;11:2937.
4. Alhamyani AH, Alamri MS, Aljuaid NW, Aloubthani AH, Alzahrani S, Alghamdi AA, et al. Sepsis in Aging Populations: A Review of Risk Factors, Diagnosis, and Management. *Cureus*. 2024;16:e74973.
5. Evans L, Rhodes A, Alhazzani W, Antonelli M, Coopersmith CM, French C, Machado FR, et al. Surviving sepsis campaign: international guidelines for management of sepsis and septic shock 2021. *Intensive Care Med*. 2021;47:1181-247.

KLINIČKE KARAKTERISTIKE, DIJAGNOSTIKA, LIJEČENJE I JEDNOGODIŠNJI ISHODI BOLESNIKA S INFEKTIVNIM ENDOKARDITISOM

Maja Milinković Đukić¹, Ljiljana Pašić Grubišić¹, Antonija Verhaz^{1,2}, Snežana Ritan¹, Sandra Toprek¹, Vesna Pavlović¹

¹Univerzitetski klinički centar Republike Srpske, Klinika za infektivne bolesti, Banja Luka, Bosna i Hercegovina

²Medicinski fakultet Univeziteta u Banjoj Luci, Banja Luka, Bosna i Hercegovina

Uvod: Infektivni endokarditis predstavlja ozbiljnu infektivnu bolest čija je klinička prezentacija raznolika a ishod bolesti zavisi od pravovremene dijagnoze, uzročnika infekcije, komplikacija, antimikrobnog i hirurškog liječenja.

Cilj rada: Analizirati demografske, kliničke, mikrobiološke i ehokardiografske karakteristike bolesnika sa infektivnim endokarditisom, liječenje i ishodi.

Materijal i metode: Retrospektivna studija koja obuhvata 11 pacijenata koji su hospitalizovani u Klinici za infektivne bolesti u periodu od 01.07.2025-01.07.2026. godine a kojima je dijagnostifikovan infektivni endokarditis. Analizirani su demografski parametri, mikrobiološke analize, komplikacije, liječenje, hirurški zahvat te ishod.

Rezultati: Od 11 pacijenata većinu čine muškarci (72,7%), prosječne starosti 66,7 godina, kod kojih su tegobe trajale 10,3 dana prosječno do dijagnostifikovanja bolesti. Kod 63,6% je mikrobiološkom analizom izolovan uzročnik *Staphylococcus aureus*. Kod 90,9% su uočene vegetacije na nativnim valvulama, s tim da su kod 18,1% uočene vegetacije i na nativnoj mitralnoj i biološkoj aortnoj valvuli. Kod 9% je uočena vegetacija na trikuspidnoj valvuli. Prosječna veličina vegetacija je 12,8 mm. Komplikacije u smislu aortne regurgitacije i oštećenja valvula razvile su se kod 54,5% bolesnika. Svi su liječeni antibiotskom terapijom prema protokolu, a 54,5% su hirurški tretirani. Letalni ishod su imali 45,4% pacijenata.

Diskusija: Većinu oboljenih čine muškarci, starije životne dobi što je u skladu sa velikim studijama(1-3). *Staphylococcus aureus* je najčešći uzročnik, povezan sa težim tokom bolesti, komplikacijama i mortalitetom(1-3). Cerebralna embolizacija kod 27,3% bolesnika odgovara objavljenj u učestalosti neuroloških komplikacija (20-40%), 1-2. Visok procenat hirurškog liječenja, posljedica je destrukcija valvula i razvoja srčane insuficijencije(1). Mortalitet od 45,4% veći je od međunarodnih registara (15-30%), vjerovatno zbog malog uzorka i velikog procenta infekcija uzrokovanih *S.aureus*(1-2).

Zaključak: Iako je istraživanje obuhvatilo mali broj bolesnika uz jednog centra, naši rezultati potvrđuju da infektivni endokarditis ostaje bolest sa visokim rizikom od komplikacija i smrtnog ishoda.

Literatura:

1. Delgado V, Ajmone Marsan N, de Waha S, Bonaros N, Brida M, Burri H, et al. 2023 ESC Guidelines for the management of endocarditis. Eur Heart J. 2023;44(39):3948-4042. doi:10.1093/eurheartj/ehad193.
2. Murdoch DR, Corey GR, Hoen B, Miró JM, Fowler VG Jr, Bayer AS, et al. Clinical presentation, etiology, and outcome of infective endocarditis in the 21st century: the International Collaboration on Endocarditis–Prospective Cohort Study. Arch Intern Med. 2009;169(5):463-473.
3. McDonald EG, Aggrey G, Aslan AT, et al. Guidelines for Diagnosis and Management of Infective Endocarditis in Adults: A WikiGuidelines Group Consensus Statement. JAMA Netw Open. 2023;6(7):e2326366.

CLINICAL CHARACTERISTICS, DIAGNOSIS, TREATMENT, AND ONE-YEAR OUTCOMES OF PATIENTS WITH INFECTIVE ENDOCARDITIS

Maja Milinković Đukić¹, Ljiljana Pašić Grubišić¹, Antonija Verhaz^{1, 2}, Snežana Ritan¹, Sandra Toprek¹, Vesna Pavlović¹

¹University Clinical Center of the Republic of Srpska, Department of Infectious Diseases, Banja Luka, Bosnia and Herzegovina

²Faculty of Medicine, University of Banja Luka, Banja Luka, Bosnia and Herzegovina

Introduction: Infective endocarditis is a serious infectious disease with a diverse clinical presentation, while its outcome depends on timely diagnosis, the causative pathogen, complications, and appropriate antimicrobial and surgical treatment.

Aim: To analyze the demographic, clinical, microbiological, and echocardiographic characteristics of patients with infective endocarditis, as well as their treatment and outcomes.

Materials and Methods: A retrospective study was conducted in 11 patients hospitalized at the Department of Infectious Diseases between July 1, 2025 and July 1, 2026, who were diagnosed with infective endocarditis. Demographic characteristics, microbiological findings, complications, treatment, surgical interventions, and outcomes were analyzed.

Results: Of the 11 patients, the majority were men (72.7%), with a mean age of 66.7 years. The mean duration of symptoms prior to diagnosis was 10.3 days. *Staphylococcus aureus* was isolated in 63.6% of patients. Vegetations on native valves were detected in 90.9% of patients; in 18.1%, vegetations were present on both the native mitral valve and a bioprosthetic aortic valve. Vegetation of the tricuspid valve was detected in 9% of patients. The mean vegetation size was 12.8 mm. Complications, including aortic regurgitation and valvular damage, developed in 54.5% of patients. All patients received antibiotic therapy according to the recommended protocol, while 54.5% underwent surgical treatment. The mortality rate was 45.4%.

Discussion: The majority of patients were older men, which is consistent with findings from large studies (1–3). *Staphylococcus aureus* was the most common causative pathogen and was associated with a more severe disease course, complications, and mortality (1–3). Cerebral embolization occurred in 27.3% of patients, consistent with the reported incidence of neurological complications (20–40%) (1–2). The high proportion of patients requiring surgical treatment was likely related to valvular destruction and the development of heart failure (1). The mortality rate of 45.4% was higher than that reported in international registries (15–30%), possibly due to the small sample size and the high proportion of *S. aureus* infections (1–2).

Conclusion: Although this study included a small number of patients from a single center, our findings confirm that infective endocarditis remains a disease associated with a high risk of complications and mortality.

References:

1. Delgado V, Ajmone Marsan N, de Waha S, Bonaros N, Brida M, Burri H, et al. 2023 ESC Guidelines for the management of endocarditis. *Eur Heart J*. 2023;44(39):3948–4042. doi:10.1093/eurheartj/ehad193.
2. Murdoch DR, Corey GR, Hoen B, Miró JM, Fowler VG Jr, Bayer AS, et al. Clinical presentation, etiology, and outcome of infective endocarditis in the 21st century: the International Collaboration on Endocarditis–Prospective Cohort Study. *Arch Intern Med*. 2009;169(5):463–473.
3. McDonald EG, Aggrey G, Aslan AT, et al. Guidelines for Diagnosis and Management of Infective Endocarditis in Adults: A WikiGuidelines Group Consensus Statement. *JAMA Netw Open*. 2023;6(7):e2326366.

INVAZIVNE GLJIVIČNE INFEKCIJE KOD IMUNOKOMPROMITOVANIH PACIJENATA – GDE SMO DANAS?

Prof. Dr Gordana Dragović

Medicinski fakultet, Univerzitet u Beogradu, Institut za farmakologiju, kliničku farmakologiju i toksikologiju, Beograd, Srbija

Invazivne gljivične infekcije (IFI) predstavljaju jedan od vodećih uzroka morbiditeta i mortaliteta kod imunokompromitovanih bolesnika, uprkos značajnom napretku u dijagnostici i razvoju savremene antifungalne terapije. Njihova incidencija kontinuirano raste usled sve šire primene intenzivne imunosupresivne terapije, transplantacije hematopoetskih matičnih ćelija i solidnih organa, savremenih onkoloških terapijskih pristupa, kao i produženog preživljavanja visokorizičnih pacijenata. Invazivna kandidijaza, invazivna aspergiloza i mukormikoza ostaju najznačajniji klinički entiteti, pri čemu sve veći značaj imaju rezistentni sojevi i promene u epidemiologiji uzročnika.

Savremeni terapijski pristup zasniva se na pravovremenom započinjanju ciljane ili empirijske antifungalne terapije, uz istovremenu primenu brzih dijagnostičkih metoda, procenu individualnih faktora rizika i optimizaciju farmakoterapije. Ehinokandini predstavljaju terapiju prvog izbora za većinu bolesnika sa invazivnom kandidijazom, dok su vorikonazol i izavukonazol standard lečenja invazivne aspergiloze. Liposomalni amfotericin B ostaje nezamenljiv u terapiji mukormikoze, ali i kod pojedinih teških ili refraktarnih oblika drugih invazivnih mikoza. Razvoj novih antifungalnih lekova, uključujući ibrexafungerp, olorofim i fosmanogepiks, otvara mogućnost efikasnijeg lečenja infekcija izazvanih multirezistentnim uzročnicima.

Poseban izazov predstavlja optimizacija doziranja antifungalnih lekova kod kritično obolelih pacijenata zbog izražene farmakokinetičke varijabilnosti, prisustva organskih disfunkcija, ekstrakorporalnih procedura i brojnih klinički značajnih interakcija sa imunosupresivima, antineoplastičnim i drugim lekovima.

Terapijski monitoring koncentracija azola danas predstavlja važan alat za postizanje optimalne izloženosti, povećanje efikasnosti lečenja i smanjenje rizika od toksičnosti. Savremeni pristup lečenju IFI podrazumeva individualizaciju antifungalne terapije zasnovanu na principima farmakokinetike/farmakodinamike (PK/PD), antifungalnog stewardshipa i multidisciplinarne saradnje, što predstavlja osnovu za unapređenje ishoda lečenja ove izrazito vulnerabilne populacije bolesnika.

INVASIVE FUNGAL INFECTIONS IN IMMUNOCOMPROMISED PATIENTS – WHERE ARE WE TODAY?

Prof. Dr Gordana Dragović

Faculty of Medicine, University of Belgrade, Institute of Pharmacology, Clinical Pharmacology and Toxicology, Belgrade, Serbia

Invasive fungal infections (IFIs) remain one of the leading causes of morbidity and mortality among immunocompromised patients, despite significant advances in diagnostic techniques and the development of modern antifungal therapies. Their incidence continues to rise due to the increasing use of intensive immunosuppressive therapies, hematopoietic stem cell and solid organ transplantation, novel anticancer treatment strategies, and the prolonged survival of high-risk patients. Invasive candidiasis, invasive aspergillosis, and mucormycosis remain the most clinically relevant IFIs, while the emergence of resistant fungal strains and changes in pathogen epidemiology pose additional therapeutic challenges.

Current therapeutic strategies rely on the timely initiation of targeted or empirical antifungal therapy, supported by rapid diagnostic methods, comprehensive assessment of individual risk factors, and optimization of pharmacotherapy. Echinocandins are recommended as first-line therapy for most patients with invasive candidiasis, whereas voriconazole and isavuconazole represent the standard of care for invasive aspergillosis. Liposomal amphotericin B remains the cornerstone of mucormycosis treatment and is also indispensable in selected severe or refractory invasive mycoses. Furthermore, the development of novel antifungal agents, including ibrexafungerp, olorofim, and fosmanogepix, offers promising therapeutic options for infections caused by multidrug-resistant fungal pathogens.

Optimizing antifungal dosing remains particularly challenging in critically ill patients because of substantial pharmacokinetic variability, organ dysfunction, extracorporeal support modalities, and numerous clinically significant drug–drug interactions with immunosuppressive, antineoplastic, and other concomitant medications.

Therapeutic drug monitoring (TDM) of azole antifungals has become an essential component of individualized patient management, enabling optimization of drug exposure, improved therapeutic efficacy, and reduced risk of toxicity. Contemporary management of IFIs increasingly emphasizes personalized antifungal therapy based on pharmacokinetic/pharmacodynamic (PK/PD) principles, antifungal stewardship, and multidisciplinary collaboration, all of which are fundamental to improving clinical outcomes in this highly vulnerable patient population.

**POSTER PREZENTACIJE
POSTERI I**

KRIPTOKOKNI MENINGOENCEFALITIS KOD PACIJENTICE S TRANSPLANTIRANOM JETROM

Edina Šuvalić¹, Petrović Jasminka¹, Rahima Jahić¹, Ammar Brkić¹

¹Univerzitetski klinički centar Tuzla, Tuzla, Bosna i Hercegovina

Uvod: Kriptokokni meningoencefalitis predstavlja rijetku, ali životno ugrožavajuću oportunističku infekciju kod bolesnika na imunosupresivnoj terapiji nakon transplantacije solidnih organa. Pravovremeno postavljanje dijagnoze i rano započinjanje antifungalnog liječenja od presudnog su značaja za povoljan ishod.

Cilj rada: Prikazati rijedak slučaj kriptokoknog meningoencefalitisa kod pacijentice nakon transplantacije jetre te naglasiti važnost visokog stepena kliničke sumnje, rane dijagnostike i pravovremenog započinjanja optimalne antifungalne terapije u poboljšanju ishoda liječenja.

Materijal i metode: U radu je korištena retrospektivna analiza podataka iz historije bolesti pacijentice koja je bila hospitalizirana u Klinici za interne bolesti.

Prikaz slučaja: Pedesetpetogodišnja pacijentica s transplantiranom jetrom na dugotrajnoj imunosupresivnoj terapiji hospitalizirana je zbog opšte slabosti, malaksalosti, febrilnosti i bola ispod lijevog rebarnog luka u Kliniku za interne bolesti.

Tokom hospitalizacije razvija se intenzivna glavobolja te se osmog dana bolničkog liječenja učini MRI mozga. Tokom hospitalizacije praćena je od strane neurologa i infektologa. U toku hospitalizacije razvija i COVID-19 sa pratećom pneumonijom. Četrnaestog dana hospitalizacije dolazi do pogoršanja neurološkog statusa uz psihomotornu agitaciju i konfuziju te se učini lumbalna punkcija. Analiza likvora je pokazala pleocitozu, povišenu koncentraciju proteina i hipoglikorahiju dok je iz kulture likvora izoliran *Cryptococcus* spp.. U terapiju su uvedeni liposomalni Amfotericin B i intravenski Flukonazol. Zbog pogoršanja stanja pacijentica je premještena u jedinicu intenzivne njege. Antibiotogramom je potvrđena rezistencija izoliranog kriptokoka na Flukonazol. Zbog nedostupnosti Flucitozina razmatrano je upućivanje bolesnice na liječenje u inostranstvo, međutim došlo je do daljeg pogoršanja kliničkog stanja i letalnog ishoda.

Zaključak: Kriptokokni meningoencefalitis predstavlja rijetku, ali po život opasnu oportunističku infekciju kod bolesnika nakon transplantacije solidnih organa. Ovaj prikaz slučaja naglašava važnost visokog stepena kliničke sumnje, pravovremenog uključivanja infektologa, rane dijagnostike i brzog započinjanja odgovarajuće antifungalne terapije. Slučaj dodatno ukazuje na značaj dostupnosti Flucitozina kao standardne komponente indukcijske terapije kriptokoknog meningoencefalitisa.

Ključne riječi: meningoencefalitis, antifungalna terapija, transplantacija jetre

CRYPTOCOCCAL MENINGOENCEPHALITIS IN A LIVER TRANSPLANT RECIPIENT

Edina Šuvalić¹, Jasminka Petrović¹, Rahima Jahić¹, Ammar Brkić¹

¹ University Clinical Center Tuzla, Tuzla, Bosnia and Herzegovina

Introduction: Cryptococcal meningoencephalitis is a rare but life-threatening opportunistic infection in patients receiving immunosuppressive therapy following solid organ transplantation. Timely diagnosis and early initiation of antifungal treatment are crucial for a favorable outcome.

Aim: To present a rare case of cryptococcal meningoencephalitis in a liver transplant recipient and to emphasize the importance of a high index of clinical suspicion, early diagnosis, and timely initiation of optimal antifungal therapy in improving treatment outcomes.

Material and methods: A retrospective analysis of data from the medical records of a patient hospitalized at the Department of Internal Medicine was performed.

Case report: A 55-year-old female liver transplant recipient receiving long-term immunosuppressive therapy was hospitalized due to general weakness, malaise, fever, and pain in the left upper quadrant.

During hospitalization, she developed severe headache, and brain magnetic resonance imaging was performed on the eighth day of hospital stay. Throughout hospitalization, she was evaluated by neurologists and infectious disease specialists. She subsequently developed COVID-19 with associated pneumonia. On the fourteenth day of hospitalization, her neurological status deteriorated, with psychomotor agitation and confusion, prompting a lumbar puncture.

Cerebrospinal fluid analysis revealed pleocytosis, elevated protein concentration, and hypoglycorrhachia, while *Cryptococcus* spp. was isolated from the CSF culture. Treatment with liposomal amphotericin B and intravenous fluconazole was initiated. Due to clinical deterioration, the patient was transferred to the intensive care unit. Antifungal susceptibility testing confirmed resistance of the isolated *Cryptococcus* strain to fluconazole. Due to the unavailability of flucytosine, transfer of the patient abroad for further treatment was considered, however, her clinical condition continued to deteriorate, resulting in a fatal outcome.

Conclusion: Cryptococcal meningoencephalitis is a rare but life-threatening opportunistic infection in solid organ transplant recipients. This case highlights the importance of a high index of clinical suspicion, timely involvement of an infectious disease specialist, early diagnosis, and prompt initiation of appropriate antifungal therapy. The case also emphasizes the importance of access to flucytosine as a standard component of induction therapy for cryptococcal meningoencephalitis.

Keywords: meningoencephalitis, antifungal therapy, liver transplantation

TUBERKULOZNI MENINGOENCEFALITIS U SKLOPU DISEMINOVANE MILIJARNE TUBERKULOZE -PRIKAZ SLUČAJA

TUBERCULOUS MENINGOENCEPHALOMYELITIS IN THE SETTING OF DISSEMINATED MILIARY TUBERCULOSIS: A CASE REPORT

*Tanja Macanović Kostić, Milan Petrović, Tatjana Roganović, Snezana Ritan, Vanja Momić,
Klinika za infektivne bolesti, Univerzitetski klinički centar Republike Srpske (UKC RS)
Medicinski fakultet, Univerzitet u Banjoj Luci*

Uvod: Tuberkulozni meningoencefalitis predstavlja najteži oblik infekcije centralnog nervnog sistema (CNS) uzrokovane bakterijom *Mycobacterium tuberculosis*. Uprkos savremenim dijagnostičkim metodama i dostupnoj antituberkuloznoj terapiji, bolest je i dalje povezana sa visokom smrtnošću i rizikom od trajnih neuroloških posljedica. Rana dijagnoza i pravovremeno započinjanje liječenja od presudnog su značaja za ishod bolesti.

Cilj rada

Prikazati slučaj mladog bolesnika sa teškim oblikom tuberkuloznog meningoencefalomijelitisa u sklopu diseminovane milijarne tuberkuloze, sa višestrukim zahvatanjem CNS, uključujući meninge, moždani parenhim i kičmenu moždinu. Poseban cilj je ukazati na značaj pravovremene dijagnostike, uloge analize cerebrospinalnog likvora i molekularnih metoda u potvrdi dijagnoze, kao i važnost multidisciplinarnog pristupa u liječenju kompleksnih oblika neurotuberkuloze.

Materijal i metode

Podaci su prikupljeni retrospektivnom analizom medicinske dokumentacije tokom hospitalizacije u Klinici za infektivne bolesti UKCRS od 08.12.2025. Analizirani su anamnestički podaci, klinički tok bolesti, laboratorijski nalazi, mikrobiološka obrada, analiza cerebrospinalnog likvora, radiološke metode (kompjuterizovana tomografija i magnetna rezonanca centralnog nervnog sistema i kičmenog stuba), konsultativni pregledi drugih specijalista, primijenjena terapija i ishod liječenja. Dijagnoza je postavljena na osnovu karakterističnog nalaza cerebrospinalnog likvora, pozitivne molekularne detekcije *Mycobacterium tuberculosis* metodom Real-Time PCR, kao i izolacije *Mycobacterium tuberculosis* iz kulture likvora uz određivanje osjetljivosti na antituberkulostatike.

Rezultati i diskusija

Prikazan je slučaj pacijenta sa teškom kliničkom formom tuberkuloznog meningoencefalitisa. Tokom hospitalizacije sprovedena je dijagnostička obrada koja je uključivala laboratorijske analize, neuroradiološku dijagnostiku i analizu cerebrospinalnog likvora. Nalazi likvora ukazivali su na zapaljenski proces karakterističan za tuberkulozni meningitis, dok je PCR metodom potvrđeno prisustvo *Mycobacterium tuberculosis*. Liječenje je sprovedeno kombinovanom antituberkuloznom terapijom uz suportivnu terapiju.

Zaključak: Tuberkulozni meningoencefalitis može imati nespecifičnu kliničku prezentaciju i imitirati druga inflamatorna oboljenja, što odlaže postavljanje dijagnoze. Molekularna dijagnostika i mikrobiološka potvrda iz likvora imaju ključnu ulogu u ranom postavljanju dijagnoze. Pravovremeno započinjanje antituberkulozne terapije i multidisciplinarni pristup liječenju mogu značajno poboljšati ishod čak i kod bolesnika sa opsežnom diseminovanom bolešću.

PRIKAZ SLUČAJA MENINGITISA UZROKOVANOG BETA HEMOLITIČKIM STREPTOKOKOM GRUPE A

Sanja Tadić¹, Antonija Verhaz^{1,2}, Snezana Ritan¹, Ljiljana Pašić Grubišić¹, Bojana Arambašić¹, Branka Antešević¹

¹. Klinika za infektivne bolesti, Univerzitetski klinički centar Republike Srpske

². Medicinski fakultet, Univerzitet u Banja Luci

Uvod

Akutni bakterijski meningitis uzrokovan beta hemolitičkim streptokokom grupe A je rijetka, ali potencijalno životno ugrožavajuća infekcija koja čini približno 0,2-1,2 % bakterijskih meningitisa kod odraslih (1,2).

Cilj rada

Prikazati rijedak slučaj akutnog purulentnog meningitisa uzrokovanog beta hemolitičkim streptokokom grupe A kod odrasle pacijentice sa kongenitalnom encefalomeningokelom, uz osvrt na moguće predisponirajuće faktore, poput angine lacunaris i prethodna tri neurohirurška zahvata, a čiji je tok bolesti dodatno komplikovan i razvojem virusne respiratorne infekcije uzrokovane influencom A.

Metode i rezultati

Retrospektivno je analizirana medicinska dokumentacija tokom bolničkog liječenja i ambulantnog praćenja 26-godišnje pacijentice koja je liječena u Klinici za infektivne bolesti UKC RS.

Diskusija

Meningitis uzrokovan *Streptococcus pyogenes* predstavlja rijetku manifestaciju invazivne streptokokne infekcije. Kongenitalne anomalije baze lobanje, uključujući meningoencefalokelu, predstavljaju značajan predisponirajući faktor za nastanak bakterijskog meningitisa ukoliko postoji komunikacija između intrakranijalnog prostora i struktura gornjih disajnih puteva. Takva komunikacija može omogućiti prodor mikroorganizma iz područja nosa, paranazalnih sinusa ili ždrijela u subarahnoidalni prostor (3). Neurohirurški zahvati mogu biti isto povezani sa promijenjenim anatomskim odnosima između intrakranijalnih struktura i područja gornjih disajnih puteva. Takođe, vremenska povezanost između angine lacunaris i razvoja meningitisa dodatno je interesantna jer mogući mehanizmi nastanka uključuju hematogeno širenje bakterije iz primarnog žarišta. Istovremena pojava influence A i bakterijske infekcije centralnog nervnog sistema mogla je dodatno doprinijeti težini kliničke slike i predstavlja još jedan važan aspekt ovog slučaja.

Zaključak

Prikazani slučaj naglašava važnost detaljne anamneze i prepoznavanja kongenitalnih anatomskih anomalija kod pacijenta sa meningitisom, te ne samo pravovremenu mikrobiološku dijagnostiku i adekvatno antimikrobno liječenje, već i multidisciplinarni pristup.

Literatura

1. Kastenbauer S, Pfister HW. Epidemiology, diagnosis and antimicrobial treatment of acute bacterial meningitis. *Clinical Microbiology Reviews*. 2010;23(2): 467-492.
2. Van de Beek D, de Gans J, Spanjaard L, Sela S, Vermeulen M, Dankert J. Group A streptococcal meningitis in adults: report of 41 cases and a review of the literature. *Clinical Infectious Diseases* 2002;34(9):e32-e36
3. Qui T, Lei Q, He D. Recurrent bacterial meningitis caused by transethmoidal encephalocele. *Neurology*, 2022;99(23):1049-1050

CASE REPORT OF MENINGITIS CAUSED BY GROUP A BETA HEMOLYTIC STREPTOCOCCUS

Sanja Tadić¹, Antonija Verhaz^{1,2}, Snezana Ritan¹, Ljiljana Pašić Grubišić¹, Bojana Arambašić¹, Branka Antešević¹

¹. Clinic for Infectious Diseases, University Clinical Centre of the Republic of Srpska

². Faculty of Medicine, University of Banja Luka

Introduction

Acute bacterial meningitis caused by group A beta hemolytic streptococcus is a rare but potentially life-threatening infection that accounts for approximately 0.2-1.2% of bacterial meningitis in adults (1,2).

The aim of the work

To present a rare case of acute purulent meningitis caused by group A beta hemolytic streptococcus in an adult patient with congenital encephalomingocele, with reference to possible predisposing factors, such as angina lacunar and three previous neurosurgical procedures, whose course of the disease was additionally complicated by the development of a viral respiratory infection caused by influenza A. Methods and results

Medical documentation during hospital treatment and outpatient follow-up of a 26-year-old female patient who was treated at the Infectious Diseases Clinic of the UKC RS was retrospectively analyzed.

Discussion

Meningitis caused by *Streptococcus pyogenes* is a rare manifestation of invasive streptococcal infection. Congenital anomalies of the skull base, including meningoencephalocele, represent a significant predisposing factor for the development of bacterial meningitis if there is communication between the intracranial space and the structures of the upper respiratory tract. Such communication can enable the penetration of microorganisms from the area of the nose, paranasal sinuses or pharynx into the subarachnoid space (3). Non-surgical interventions may also be associated with altered anatomical relationships between intracranial structures and the area of the upper respiratory tract. Also, the temporal connection between angina lacunar and the development of meningitis is additionally interesting because possible mechanisms of occurrence include hematogenous spread of bacteria from the primary focus. The simultaneous occurrence of influenza A and bacterial infection of the central nervous system could have additionally contributed to the severity of the clinical picture and represents another important aspect of this case.

Conclusion

The presented case emphasizes the importance of a detailed anamnesis and recognition of congenital anatomical anomalies in a patient with meningitis, and not only timely microbiological diagnosis and adequate antimicrobial treatment, but also a multidisciplinary approach.

References

1. Kastenbauer S, Pfister HW. Epidemiology, diagnosis and antimicrobial treatment of acute bacterial meningitis. *Clinical Microbiology Reviews*. 2010;23(2): 467-492.
2. Van de Beek D, de Gans J, Spanjaard L, Sela S, Vermeulen M, Dankert J. Group A streptococcal meningitis in adults: report of 41 cases and a review of the literature. *Clinical Infectious Diseases* 2002;34(9):e32-e36
3. Qui T, Lei Q, He D. Recurrent bacterial meningitis caused by transethmoidal encephalocele. *Neurology*, 2022;99(23):1049-1050

TUBERKULOZNI MENINGOENCEFALITIS REZISTENTAN NA IZONIAZID, ETAMBUTOL I STREPTOMICIN UZ OSJETLJIVOST NA RIFAMPICIN: DIJAGNOSTIČKI I TERAPIJSKI IZAZOV – PRIKAZ SLUČAJA

Senad Hadžipašić, Igor Hadžimulić, Mirela Zirić, Mirela Topić, Ismir Kukić, Enisa Šabotić, Velida Gaković, Mejra Durmišević
Kantonalna bolnica „Dr. Irfan Ljubijankić“, Odjel za infektivne bolesti, Bihać, Bosna i Hercegovina

Uvod: Tuberkulozni meningoencefalitis predstavlja tešku manifestaciju tuberkuloze centralnog nervnog sistema. Dijagnoza može biti otežana zbog nespecifične kliničke prezentacije, dok rezistencija na antituberkulotike dodatno komplikuje liječenje i zahtijeva pravovremenu mikrobiološku potvrdu i ispitivanje osjetljivosti uzročnika.

Cilj: Prikazati slučaj mladog bolesnika s teškom kliničkom prezentacijom tuberkuloznog meningoencefalitisa i ukazati na dijagnostičke i terapijske izazove povezane s rezistentnom tuberkulozom.

Metode: Provedena je retrospektivna analiza kliničke slike, dijagnostičkih postupaka, liječenja i toka bolesti. Bolesnik je liječen na Odjelu za infektivne bolesti u periodu od 16.12.2025. do 31.03.2026. godine. Podaci su prikupljeni iz dostupne medicinske dokumentacije.

Prikaz slučaja: Bolesnik V. DŽ., star 23 godine, iz Cazina, primljen je petog dana bolesti zbog povraćanja i povišene tjelesne temperature. Neposredno prije prijema došlo je do neurološkog pogoršanja, uz otežan i nerazumljiv govor te dezorijentisanost. CT mozga nije pokazao patološke morfološke promjene. Lumbalnom punkcijom dobijen je bistar likvor sa 242 ćelije/ μ L, proteinima 3,3 g/L i laktatima 6,8 mmol/L. Glukoza u likvoru iznosila je 1,4 mmol/L, uz istovremenu vrijednost glukoze u serumu od 5,7 mmol/L. Radiografija pluća pokazala je obostrana hiloapikalna zasjenjenja, izraženija desno, suspekt na specifičnu etiologiju. Kontrolnom lumbalnom punkcijom registrovano je 362 ćelije/ μ L, proteini 2,50 g/L, laktati 7,1 mmol/L i glukoza u likvoru 0,9 mmol/L, uz serumsku glukozu 5,3 mmol/L. PCR likvora potvrdio je prisustvo *Mycobacterium tuberculosis*. Mikroskopski pregled sputuma bio je pozitivan na acidorezistentne bacile, a kulture sputuma pozitivne u tri uzorka. Test osjetljivosti pokazao je rezistenciju na izoniazid, etambutol i streptomycin, uz osjetljivost na rifampicin.

Liječenje i zaključak: Inicijalno je uvedena antituberkulozna terapija izoniazidom, rifampicinom, pirazinamidom i etambutolom. Nakon dobijanja rezultata testa osjetljivosti, izoniazid i etambutol su obustavljeni, a u terapiju je uključen levofloksacin. Deksametazon je primjenjivan tokom pet sedmica. Dugotrajna pleocitoza likvora pobudila je sumnju na rezistentni soj *Mycobacterium tuberculosis*.

ISONIAZID-, ETHAMBUTOL- AND STREPTOMYCIN-RESISTANT TUBERCULOUS MENINGOENCEPHALITIS WITH RIFAMPICIN SUSCEPTIBILITY: A DIAGNOSTIC AND THERAPEUTIC CHALLENGE – A CASE REPORT

Senad Hadžipašić, Igor Hadžimulić, Mirela Zirić, Mirela Topić, Ismir Kukić, Enisa Šabotić, Velida Gaković, Mejra Durmišević
Cantonal Hospital "Dr. Irfan Ljubijankić", Department of Infectious Diseases, Bihać, Bosnia and Herzegovina

Background: Tuberculous meningoencephalitis is a severe manifestation of tuberculosis of the central nervous system, associated with significant morbidity and mortality. Diagnosis may be challenging because of nonspecific clinical presentation, and drug resistance further complicates treatment and requires timely microbiological confirmation and susceptibility testing.

Aim: To present the case of a young patient with severe clinical presentation of tuberculous meningoencephalitis and to highlight the diagnostic and therapeutic challenges associated with drug-resistant tuberculosis.

Methods: A retrospective analysis of the patient's clinical presentation, diagnostic procedures, treatment, and disease course was performed. The patient was treated at the Department of Infectious Diseases from December 16, 2025, to March 31, 2026. Data were obtained from the available medical records.

Case Presentation: A 23-year-old male patient from Cazin was admitted on the fifth day of illness with vomiting and fever. Shortly before admission, neurological deterioration developed, characterized by impaired, incomprehensible speech and disorientation. Brain computed tomography showed no pathological morphological changes. Lumbar puncture revealed clear CSF with 242 cells/ μ L, protein 3.3 g/L, and lactate 6.8 mmol/L. CSF glucose was 1.4 mmol/L, with simultaneous serum glucose of 5.7 mmol/L. Chest radiography demonstrated bilateral hilar and apical opacities, more pronounced on the right, suspicious for specific etiology. Repeat lumbar puncture showed 362 cells/ μ L, protein 2.50 g/L, lactate 7.1 mmol/L, and CSF glucose 0.9 mmol/L, with serum glucose of 5.3 mmol/L.

Microbiological Findings: CSF PCR confirmed *Mycobacterium tuberculosis*. Sputum smear microscopy was positive for acid-fast bacilli, and cultures were positive in three samples, as like CSF. Drug susceptibility testing demonstrated resistance to isoniazid, ethambutol, and streptomycin, with susceptibility to rifampicin.

Treatment and Conclusion: Initial antituberculosis therapy consisted of isoniazid, rifampicin, pyrazinamide, and ethambutol susceptibility results, levofloxacin was incorporated into the treatment regimen. Dexamethasone was administered for five weeks. Persistent CSF pleocytosis prompted consideration of a drug-resistant strain of *Mycobacterium tuberculosis*. Molecular and culture-based methods are essential for confirming the diagnosis and determining the resistance profile.

VZV MENINGITIS BEZ OSIPA KOD IMUNOKOMPETENTNOG, MLADOG PACIJENTA- PRIKAZ SLUČAJA

Ivana Milanović, dr Milan Petrović, doc. dr Tatjana Roganović, prof. dr sc. med. Antonija Verhaz, Sandra Toprek, Jelena Milovanović
Univerzitetski Klinički centar Republike Srpske, Banja Luka, Republika Srpska, Bosna i Hercegovina

Uvod: Meningitis uzrokovan virusom varičela-zoster (VZV) predstavlja rijetku komplikaciju VZV infekcije, koja se češće opisuje kod starijih i imunokompromitovanih osoba. Neurološke manifestacije VZV infekcije najčešće su praćene karakterističnim herpes zoster osipom, međutim, rijetko se mogu javiti i bez kožnih manifestacija, što može predstavljati dijagnostički izazov. (1)

Cilj rada: Ukazati na mogućnost VZV meningitisa bez osipa kod mladih, prethodno zdravih osoba, te naglasiti značaj molekularne dijagnostike u etiološkoj evaluaciji aseptičnog meningitisa.

Materija i metode: Prikazan je slučaj 22-godišnjeg, prethodno zdravog pacijenta, sa anamnezom preležanih varičela. Pacijent se prezentovao febrilnošću, fotofobijom i glavoboljom, bez pozitivnih meningealnih znakova, urednog neurološkog nalaza. Likvor dobijen lumbalnom punkcijom odgovarao je seroznom meningitisu, PCR analizom detektovan je VZV. Na NMR mozga opisana je cistična promjena, desno subtentorijalno, na konveksitetu hemisfere malog mozga. U cilju procjene mogućeg poremećaja imunskog sistema sprovedena je dodatna laboratorijska i serološka obrada, kao i CT pregled grudnog koša, abdomena i male karlice.

Rezultat i diskusija: U prikazanom slučaju odsustvo karakterističnog kožnog osipa, kao i pozitivnih meningealnih znakova uz uredan neurološki nalaz predstavljalo je značajan dijagnostički izazov i otežavalo inicijalno postavljanje sumnje na VZV infekciju. Ipak, analiza likvora i detekcija VZV DNK PCR metodom omogućile su etiološku dijagnozu VZV meningitisa. Sprovedena je dodatna obrada u cilju isključivanja eventualnog poremećaja imunskog sistema, uključujući laboratorijske i serološke analize, kao i CT pregled grudnog koša, abdomena i male karlice. Pacijent je liječen antivirusnom terapijom, uz dobar klinički odgovor i postepeno povlačenje simptoma. (1,2)

Zaključak: VZV meningitis potrebno je razmotriti i kod pacijenata bez karakterističnog herpes zoster osipa. Odsustvo kožnih manifestacija i meningealnih znakova ne isključuje VZV infekciju centralnog nervnog sistema. PCR analiza cerebrospinalnog likvora predstavlja važan dijagnostički alat u etiološkoj evaluaciji aseptičnog meningitisa i omogućava brzu i specifičnu identifikaciju VZV kao uzročnika. Pravovremeno prepoznavanje atipičnih oblika VZV infekcije od značaja je za rano započinjanje odgovarajuće antivirusne terapije. (2,3)

1. Pasedag T, Weissenborn K, Wurster U, Ganzenmueller T, Stangel M, Skripuletz T. Varicella zoster virus meningitis in a young immunocompetent adult without rash: a misleading clinical presentation. *Case Rep Neurol Med.* 2014;2014:686218. doi:10.1155/2014/686218.
2. Baddal B, Bostancı A, Süer K. Two cases of Varicella Zoster Virus meningitis without fever and rash: an unexpected clinical presentation. *J Biotechnol Strateg Health Res.* 2023;7(3):220-225. doi:10.34084/bshr.1344740.
3. Gilden D, Cohrs RJ, Mahalingam R, Nagel MA. Neurological disease produced by Varicella Zoster Virus reactivation without rash. In: Abendroth A, Arvin A, Moffat J, editors. *Varicella-zoster Virus. Current Topics in Microbiology and Immunology.* Vol. 342. Berlin, Heidelberg: Springer; 2010. p.243-253. doi:10.1007/82_2009_3.

POSTERI II

MORBILI BEZ OSIPA SA PNEUMONIJOM- PRIKAZ SLUČAJA

MEASLES WITHOUT RASH WITH PNEUMONIA - CASE REPORT

Olja Čuković, Tatjana Roganović, Antonija Verhaz, Tanja Macanović Kostić

Klinika za infektivne bolesti, Univerzitetski Klinički Centar Republike Srpske, Medicinski fakultet Univerzitet u Banjoj Luci

Morbili su veoma zarazna bolest uzrokovana virusom Mumps. Bolest je visokog kontagioznog potencijala i lako se širi kapljičnim putem, kašljanjem i kihanjem zaražene osobe. Može uzrokovati teške oblike bolesti, komplikacije, pa čak i smrt. Simptomi bolesti uključuju visoku temperaturu, kašalj, curenje nosa i osip po cijelom tijelu. Vakcinacija je najbolji način za sprječavanje obolijevanja od morbila ili njihovo širenje u populaciji.

Cilj: Prikazati pacijenticu sa morbilima bez osipa, komplikovanim pneumonijom, te dijagnostičke i terapijske dileme.

Metode: Retrospektivna analiza dijagnostike, kliničke slike i toka bolesti. Dijagnoza se temeljila na serološkoj potvrdi morbila, a sumnja je postavljena na osnovu epidemiološke anamneze. Rezultati. Analiziranim anamnestičkim i epidemiološkim podacima, kliničkom slikom, rezultatima laboratorijskih, mikrobioloških i radioloških nalaza, kod pacijentice smo dijagnostikovali morbile sa pneumonijom, ali bez osipa. Od prvih simptoma do početka hospitalnog liječenja proteklo je 10 dana. Klinička slika je bila atipična za morbile, a klinički oporavak je uslijedio brzo, dok se osip nije ni razvio, vjerovatno zato što je pacijentica već imala određeni imunitet protiv virusa malih boginja stečen vakcinacijom.

Zaključak: Morbili bez osipa su veoma rijetki, ali na njih treba misliti kako u toku epidemijskih perioda bolesti tako i kod imunokompromitovanih i prethodno vakcinisanih imunokompetentnih pacijenata.

Cljučne riječi: Morbili, osip, pneumonija

SEPTIČKI ŠOK UZROKOVAN PAENICLOSTRIDIUM SORDELLII – PRIKAZ SLUČAJA

Ana Bubanja Merdović

Klinika za infektivne bolesti, Klinički centar Crne Gore, Podgorica, Crna Gora

UVOD: Paeniclostridium sordellii je rijedak, ali izrazito virulentan anaerobni uzročnik povezan sa toksičnim šokom i visokom smrtnošću. Infekciju karakteriše brz razvoj multiorganske disfunkcije, često bez jasno definisanog infektivnog fokusa i bez tipične febrilne reakcije.

CILJ: Ukazati na dijagnostičke izazove septičkog šoka uzrokovanog Paeniclostridium sordellii kroz prikaz slučaja sa atipičnom kliničkom prezentacijom i brzim smrtnim ishodom.

MATERIJAL I METODE: Prikaz bolesnice starosti 84 godine hospitalizovane u jedinici intenzivnog liječenja zbog septičkog šoka. Analizirani su klinički, laboratorijski i mikrobiološki podaci.

REZULTATI I DISKUSIJA: Pri prijemu bolesnica je bila hipotenzivna, dispnoična, dezorijentisana i afebrilna. Registrovan je difuzni, brzo progresivni edem mekih tkiva uz tenziju, zategnutu kožu sa hemoragijskim bulama i diskoloracijama, najizraženijim na donjim ekstremitetima. Eritem je bio minimalan, dok je sistemska klinička slika bila izrazito teška i nesrazmjerna lokalnom nalazu, što je pobuđivalo sumnju na fulminantnu nekrotizujuću infekciju mekih tkiva. Radiološkom obradom nije identifikovan fokus infekcije. Laboratorijski nalazi pokazali su leukocitozu $33 \times 10^9/L$, CRP 364 mg/L, prokalcitonin 28 ng/mL, kreatinin 405 $\mu\text{mol/L}$, AST 1141 U/L i LDH 5647 U/L, uz koagulopatiju. Započeta je empirijska antibiotska terapija širokog spektra uz vazopresorsku potporu i mehaničku ventilaciju. Uprkos terapiji došlo je do progresije refraktornog šoka, a smrtni ishod nastupio je unutar 48 sati od prijema. Hemokultura uzeta za života, čiji je nalaz pristigao posthumno, izolovala je Paeniclostridium sordellii. Prikazani slučaj ukazuje da afebrilna prezentacija i odsustvo jasno definisanog infektivnog fokusa mogu odložiti postavljanje dijagnoze uprkos izrazito teškoj sistemskoj kliničkoj slici.

ZAKLJUČAK: Infekcija uzrokovana Paeniclostridium sordellii ima fulminantan tok i visoku smrtnost. Rana sumnja na anaerobne uzročnike kod afebrilnog septičkog šoka bez jasno definisanog infektivnog fokusa, naročito uz hemoragijske kožne manifestacije, može biti ključna za pravovremeno postavljanje dijagnoze i započinjanje odgovarajućeg liječenja.

KLJUČNE RIJEČI: Paeniclostridium sordellii; septički šok; nekrotizujuća infekcija mekih tkiva; hemoragijske bule; anaerobne infekcije

LITERATURA:

1. Singer M, Deutschman CS, Seymour CW, Shankar-Hari M, Annane D, Bauer M, et al. The Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3). JAMA. 2016;315(8):801-10.
2. Aldape MJ, Bryant AE, Stevens DL. Clostridium sordellii infection: epidemiology, clinical findings, and current perspectives on diagnosis and treatment. Clin Infect Dis. 2006;43(11):1436-46.

SEPTIC SHOCK CAUSED BY PAENICLOSTRIDIUM SORDELLII – A CASE REPORT

Ana Bubanja Merdović

Clinic for Infectious Diseases, Clinical Center of Montenegro, Podgorica, Montenegro

INTRODUCTION: Paeniclostridium sordellii is a rare but highly virulent anaerobic pathogen associated with toxic shock syndrome and high mortality. Infection is characterised by rapid development of multiorgan dysfunction, often without an identifiable infectious focus and without the typical febrile response.

OBJECTIVE: To highlight the diagnostic challenges of septic shock caused by Paeniclostridium sordellii by presenting a case with an atypical clinical presentation and a rapidly fatal outcome.

MATERIALS AND METHODS: Case report of an 84-year-old woman admitted to the intensive care unit with septic shock. Clinical, laboratory, and microbiological data were analysed.

RESULTS AND DISCUSSION: On admission, the patient was hypotensive, dyspnoeic, disoriented, and afebrile. Diffuse, rapidly progressive soft tissue oedema with tense skin, haemorrhagic bullae, and skin discolouration, most prominent on the lower extremities, was observed. Erythema was minimal, whereas the systemic clinical presentation was extremely severe and disproportionate to the local findings, raising suspicion of a fulminant necrotising soft tissue infection. Radiological evaluation failed to identify an infectious focus. Laboratory findings revealed a leukocyte count of $33 \times 10^9/L$, C-reactive protein of 364 mg/L, procalcitonin of 28 ng/mL, serum creatinine of 405 $\mu\text{mol/L}$, AST of 1141 U/L, and LDH of 5647 U/L, accompanied by coagulopathy. Empirical broad-spectrum antibiotic therapy, vasopressor support, and mechanical ventilation were initiated. Despite treatment, refractory shock progressed, and the patient died within 48 hours of admission. Blood cultures obtained during life, the results of which became available posthumously, yielded Paeniclostridium sordellii. This case indicates that an afebrile presentation and the absence of a clearly identifiable infectious focus may delay diagnosis despite an extremely severe systemic clinical presentation.

CONCLUSION: Paeniclostridium sordellii infection follows a fulminant course and is associated with high mortality. Early suspicion of anaerobic pathogens in afebrile patients with septic shock without a clearly identifiable infectious focus, particularly in the presence of haemorrhagic skin manifestations, may be crucial for timely diagnosis and initiation of appropriate treatment.

KEYWORDS: Paeniclostridium sordellii; septic shock; necrotising soft tissue infection; haemorrhagic bullae; anaerobic infections

REFERENCES:

1. Singer M, Deutschman CS, Seymour CW, Shankar-Hari M, Annane D, Bauer M, et al. The Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3). JAMA. 2016;315(8):801–810.
2. Aldape MJ, Bryant AE, Stevens DL. Clostridium sordellii infection: epidemiology, clinical findings, and current perspectives on diagnosis and treatment. Clinical Infectious Diseases. 2006;43(11):1436–1446.

EPIDEMIOLOŠKE KARAKTERISTIKE LEPTOSPIROZE NA PODRUČJU TUZLANSKOG KANTONA U PERIODU OD 2009.-2025. GODINE

Selma Palavrić, Amela Mujanović, Jasmina Brkić Džambić

Uvod: Leptospiroza je akutna bakterijska zoonoza rasprostranjena širom svijeta, posebno u područjima s toplom i vlažnom klimom. Zbog nespecifične kliničke slike često ostaje nedovoljno prepoznata, dok klimatske promjene, poplave i intenzivniji kontakt ljudi sa životinjskim rezervoarima doprinose njenom ponovnom porastu.

Cilj: Analizirati epidemiološke karakteristike leptospiroze na području Tuzlanskog kantona u periodu 2009.–2025. godine.

Materijal i metode: Provedena je retrospektivna analitička studija korištenjem podataka Zavoda za javno zdravstvo Tuzlanskog kantona prikupljenih iz zakonom propisanih evidencija. Obrada podataka izvršena je primjenom deskriptivne statistike u programu Microsoft Excel.

Rezultati: U analiziranom periodu registrovano je 276 slučajeva leptospiroze. Najveća incidenca zabilježena je 2014. godine (15,19/100.000 stanovnika), što se može povezati s poplavama koje su pogodile područje Tuzlanskog kantona. Bolest pokazuje izražen sezonski obrazac, pri čemu je 45,65 % svih slučajeva registrovano u periodu od augusta do oktobra. Najviše oboljelih bilo je u dobnim skupinama 25–49 i 50–64 godine, dok je 75,36 % svih oboljelih zabilježeno kod osoba muškog spola. Najveći broj slučajeva evidentiran je u opštinama Živinice (15,94%) i Srebrenik (18,11%).

Zaključak: Leptospiroza na području Tuzlanskog kantona pokazuje izražen sezonski obrazac i najveće opterećenje među radno aktivnim muškarcima. Povećanje broja oboljelih nakon poplava potvrđuje značaj okolišnih faktora u epidemiologiji bolesti. Jačanje epidemiološkog nadzora, međusektorska saradnja u okviru pristupa „One Health“, kontrola rezervoara infekcije i pravovremene preventivne mjere ključni su za smanjenje incidencije i ublažavanje javnozdravstvenog tereta leptospiroze.

Literatura:

1. Obradović Z, Širak M. Zoonoze. Sarajevo: Medicinski fakultet Univerziteta u Sarajevu; 2014. p. 107-112.
2. World Health Organization, International Leptospirosis Society. Human leptospirosis: guidance for diagnosis, surveillance and control. Geneva: World Health Organization; 2003. p. 1-2. ISBN: 9241545895.
3. European Centre for Disease Prevention and Control. Annual epidemiological report for 2016 – Leptospirosis. Stockholm: ECDC; 2017.
4. Centers for Disease Control and Prevention. Leptospirosis: Information for healthcare workers. Atlanta: CDC; 2024.

EPIDEMIOLOGICAL CHARACTERISTICS OF LEPTOSPIROSIS IN TUZLA CANTON DURING THE PERIOD 2009–2025

Selma Palavrić, Amela Mujanović, Jasmina Brkić Džambić

Introduction: Leptospirosis is an acute bacterial zoonotic disease distributed worldwide, particularly in regions with warm and humid climates. Due to its nonspecific clinical presentation, it is frequently underdiagnosed, while climate change, flooding, and increased human exposure to animal reservoirs have contributed to its re-emergence as a significant public health concern.

Objective: To analyze the epidemiological characteristics of leptospirosis in Tuzla Canton during the period from 2009 to 2025.

Materials and Methods: A retrospective analytical study was conducted using surveillance data obtained from the Institute of Public Health of Tuzla Canton, collected through legally mandated communicable disease reporting records. Data were analyzed using descriptive statistical methods in Microsoft Excel.

Results: During the study period, a total of 276 cases of leptospirosis were reported. The highest incidence was recorded in 2014 (15.19 cases per 100,000 population), which may be associated with the severe floods that affected Tuzla Canton that year. The disease demonstrated a pronounced seasonal pattern, with 45.65% of all cases occurring between August and October. The highest number of cases was observed among individuals aged 25–49 and 50–64 years, while males accounted for 75.36% of all reported cases. The largest proportions of cases were recorded in the municipalities of Živinice (15.94%) and Srebrenik (18.11%).

Conclusion: Leptospirosis in Tuzla Canton demonstrates a marked seasonal distribution and predominantly affects working-age men. The increased incidence following flooding highlights the important role of environmental factors in the epidemiology of the disease. Strengthening epidemiological surveillance, enhancing intersectoral collaboration through the „One Health“ approach, implementing effective reservoir control measures, and ensuring timely preventive interventions are essential for reducing the incidence of leptospirosis and mitigating its public health burden.

References

1. Obradović Z, Širak M. Zoonoses. Sarajevo: Faculty of Medicine, University of Sarajevo; 2014. p. 107–112.
2. World Health Organization, International Leptospirosis Society. Human leptospirosis: Guidance for diagnosis, surveillance and control. Geneva: World Health Organization; 2003. p. 1–2.
3. European Centre for Disease Prevention and Control. Annual epidemiological report for 2016 – Leptospirosis. Stockholm: ECDC; 2017.
4. Centers for Disease Control and Prevention. Leptospirosis: Information for Healthcare Workers. Atlanta: CDC; 2024.

PRVA ISKUSTVA U LIJEČENJU HIV INFEKCIJE NA ODJELU ZA INFEKTIVNE BOLESTI KANTONALNE BOLNICE ZENICA

Zahirović Nadira, Hadžić Eldira

Odjel za infektivne bolesti, Kantonalna bolnica Zenica

Uvod: Na području Zeničko-dobojskog kantona (ZDK) evidentirane su 33 osobe koje žive s HIV infekcijom i koje su na kontinuiranoj antiretrovirusnoj terapiji. Od januara do juna 2026.godine registrirana su četiri nova slučaja HIV infekcije, od toga jedan smrtni ishod. Početkom tekuće godine na nivou sekundarne zdravstvene zaštite ZDK započeta je implementacija antiretrovirusnog liječenja i praćenja osoba koje žive s HIV infekcijom, čime je započet proces decentralizacije HIV zbrinjavanja.

Cilj: Cilj ovog rada je prikazati početna iskustva u liječenju pacijenata s HIV infekcijom na sekundarnom nivou zdravstvene zaštite u ZDK, s posebnim osvrtom na kliničke karakteristike, dijagnostičko-terapijski pristup i ishode liječenja, kao i procjenu izvodljivosti decentralizacije HIV zbrinjavanja.

Metode: Prikazana je serija od pet slučajeva pacijenata s HIV infekcijom koji se liječe na Odjelu za infektivne bolesti u Kantonalnoj bolnici Zenica. Podaci su prikupljeni retrospektivno iz medicinske dokumentacije i obuhvataju kliničku prezentaciju, dijagnostički algoritam, terapijski pristup i ishode liječenja.

Rezultati i diskusija: Kod dva pacijenta dijagnosticirane su oportunističke infekcije u trenutku postavljanja dijagnoze HIV infekcije. Jedan pacijent imao je dokazanu cerebralnu toksoplazmozu, uz povoljan terapijski odgovor i potpun klinički oporavak. Drugi pacijent je liječen zbog sumnje na cerebralni tuberkulom, konkomitantne infekcije sifilisom, a potom i Kapošijevog sarkoma, sa smrtnim ishodom. 23-godišnja žena sa novootkrivenom HIV infekcijom bila je klinički asimptomatska, uz prisutnu sekundarnu amenoreju kao posljedicu hipogonadotropnog hipogonadizma, koji se može dovesti u vezu sa HIV infekcijom kroz njeno djelovanje na hipotalamo-hipofiznu osovinu. Nakon uvođenja antiretrovirusne terapije postignut je dobar virološki i imunološki odgovor, uz normalizaciju menstrualnog ciklusa pod kontraceptivnom terapijom i redovno ginekološko praćenje. Preostala dva pacijenta su ranije dijagnosticirani i već su na dugotrajnoj antiretrovirusnoj terapiji sa kontinuiranom virološkom supresijom i stabilnim brojem CD4 limfocita.

Zaključak: Početna iskustva Odjela za infektivne bolesti Kantonalne bolnice Zenica ukazuju da je decentralizacija zbrinjavanja osoba koje žive s HIV infekcijom na sekundarni nivo zdravstvene zaštite medicinski izvodljiva i psiho-sociološki opravdana. Ovakav model može doprinijeti boljoj dostupnosti terapije, smanjenju opterećenja tercijarnog nivoa zdravstvenog sistema, smanjenju indirektnih troškova za pacijente te smanjenju stigmatizacije kroz približavanje zdravstvene zaštite lokalnoj zajednici.

Literatura:

1. World Health Organization. Consolidated guidelines on HIV prevention, testing, treatment, service delivery and monitoring: recommendations for a public health approach. Geneva: World Health Organization; 2021.
2. Ambrosioni J, Levi L, Nasi M, et al. Major revision version 12.0 of the European AIDS Clinical Society guidelines 2023. HIV Med. 2023;24(10):1055-1063. doi:10.1111/hiv.13542.
3. National Institutes of Health; HIV Medicine Association of the Infectious Diseases Society of America. Guidelines for the Prevention and Treatment of Opportunistic Infections in Adults and Adolescents With HIV [Internet]. Rockville (MD): US Department of Health and Human Services; 2026 [cited 2026 Jun 18]. Available from: ClinicalInfo.HIV.gov

Cljučne riječi: HIV infekcija, antiretrovirusna terapija, sekundarni nivo zdravstvene zaštite, decentralizacija liječenja HIV-a

FIRST EXPERIENCES IN THE TREATMENT OF HIV INFECTION AT THE DEPARTMENT OF INFECTIOUS DISEASES, CANTONAL HOSPITAL ZENICA

Zahirović Nadira, Hadžić Eldira

Department of Infectious Diseases, Cantonal Hospital Zenica

Introduction: In the Zenica-Doboj Canton (ZDC), 33 persons living with HIV infection have been registered and are currently on continuous antiretroviral therapy. In the period from January to June 2026, four new cases of HIV infection were recorded, including one fatal outcome. At the beginning of the current year, implementation of antiretroviral treatment and follow-up of persons living with HIV infection was initiated at the secondary level of healthcare in ZDC, marking the beginning of the decentralization process of HIV care.

Aim: The aim of this study is to present initial experiences in the treatment of patients with HIV infection at the secondary level of healthcare in ZDC, with a focus on clinical characteristics, diagnostic and therapeutic approach, treatment outcomes, and assessment of the feasibility of decentralizing HIV care.

Methods: A case series of five patients with HIV infection treated at the Department of Infectious Diseases of the Cantonal Hospital Zenica is presented. Data were collected retrospectively from medical records and include clinical presentation, diagnostic algorithm, therapeutic approach, and treatment outcomes.

Results and discussion: Opportunistic infections were diagnosed in two patients at the time of HIV diagnosis. One patient had confirmed cerebral toxoplasmosis with a favorable therapeutic response and complete clinical recovery. The second patient was treated for suspected cerebral tuberculoma, concomitant syphilis infection, and development of Kaposi's sarcoma, with a fatal outcome.

A 23-year-old woman with newly diagnosed HIV infection was almost asymptomatic, with secondary amenorrhea due to hypogonadotropic hypogonadism, potentially related to HIV infection through its effect on the hypothalamic–pituitary axis. After initiation of antiretroviral therapy, a good virological and immunological response was achieved, with normalization of the menstrual cycle under contraceptive therapy and regular gynecological follow-up. The remaining two patients were previously diagnosed and are already on long-term antiretroviral therapy with sustained virological suppression and stable CD4 cell counts.

Conclusion: Initial experiences from the Department of Infectious Diseases, Cantonal Hospital Zenica indicate that decentralization of care for persons living with HIV infection to the secondary level of healthcare is feasible and clinically justified. This model may improve access to therapy, reduce the burden on tertiary healthcare institutions, decrease indirect patient costs, and reduce stigma by bringing healthcare services closer to the local community.

References:

1. World Health Organization. Consolidated guidelines on HIV prevention, testing, treatment, service delivery and monitoring: recommendations for a public health approach. Geneva: World Health Organization; 2021.
2. Ambrosioni J, Levi L, Nasi M, et al. Major revision version 12.0 of the European AIDS Clinical Society guidelines 2023. *HIV Med.* 2023;24(10):1055-1063. doi:10.1111/hiv.13542.
3. National Institutes of Health; HIV Medicine Association of the Infectious Diseases Society of America. Guidelines for the Prevention and Treatment of Opportunistic Infections in Adults and Adolescents With HIV [Internet]. Rockville (MD): US Department of Health and Human Services; 2026 [cited 2026 Jun 18]. Available from: [ClinicalInfo.HIV.gov](https://clinicalinfo.hiv.gov)

Keywords: HIV infection, antiretroviral therapy, secondary healthcare level, decentralization of HIV care

ISTOVREMENA DIJAGNOZA HIV INFEKCIJE I MAJUMUNSKIH BOGINJA (MPOX): PRVI DOKUMENTOVANI SLUČAJ U REPUBLICI SRPSKOJ

Ljiljana Pašić Grubišić^{1,2}, Andrej Trubajčić¹, Antonija Verhaz^{1,2}, Zvezdana Vuković¹, Maja Milinković Đukić¹, Jelena Milovanović¹

¹. Univerzitetski klinički centar Republike Srpske, Klinika za infektivne bolesti, Banja Luka, Bosna i Hercegovina

². Medicinski fakultet Univeziteta u Banjoj Luci, , Banja Luka, Bosna i Hercegovina

Uvod: Virus majmunskih boginja (Mpox), ranije ograničen uglavnom na endemska područja Afrike, od epidemije 2022. godine predstavlja značajan javnozdravstveni problem, posebno među muškarcima koji imaju seksualne odnose sa muškarcima (MSM) (1,2). Mpox može predstavljati prvu manifestaciju prethodno nedijagnostikovane HIV infekcije (1-6).

Cilj rada: Prikazati prvi laboratorijski potvrđen slučaj Mpox infekcije u Republici Srpskoj.

Materijal i metode: Retrospektivna analiza medicinske dokumentacije jednog hospitalizovanog pacijenta liječenog na Klinici za infektivne bolesti Univerzitetskog kliničkog centra Republike Srpske.

Rezultati: Pacijent star 31 godinu, pripadnik MSM populacije, sa psorijazom i psorijatičnim artritisom liječenim metotreksatom, hospitalizovan je zbog febrilnog stanja, eksudativnog tonzilitisa, generalizovanog polimorfnog osipa i limfadenopatije. Laboratorijskom obradom potvrđena je novootkrivena HIV infekcija (HIV RNA 14.733 IU/mL; CD4+ 600 ćelija/μL), dok je PCR analizom uzoraka kožnih lezija potvrđena Mpox infekcija, bez dokazanih koinfekcija I oportunističkih infekcija. Epidemiološkim ispitivanjem utvrđeno je da je infekcija vjerovatno importovana iz Austrije, bliski kontakt kao put prenosa. Tokom hospitalizacije razvijen je sekundarni bakterijski celulitis desne natkoljenice, zbog čega je primijenjena antibiotska terapija, uz započinjanje antiretrovirusne terapije (TDF/FTC/RPV). U narednih mjesec dana došlo je do rezolucije osipa, dok je HIV -1 RNK 3,968 c/ml, te oporavka.

Diskusija: Mpox može predstavljati prvu manifestaciju prethodno nedijagnostikovane HIV infekcije kod MSM populacije(1-6). Uprkos izraženim mukokutanim promjenama i razvoju sekundarnog bakterijskog celulitisa, očuvan imunološki status vjerovatno je doprinio povoljnom kliničkom ishodu bez razvoja težih sistemskih komplikacija(6). Za razliku od većine objavljenih serija, u kojima su bolesnici već bili na antiretrovirusnoj terapiji, kod našeg pacijenta Mpox infekcija dovela je do postavljanja dijagnoze HIV infekcije(1).

Zaključak: Kod pacijenata sa febrilnim egzantemom i karakterističnim mukokutanim lezijama, naročito u MSM populaciji, potrebno je istovremeno razmatrati Mpox i HIV infekciju. Ovaj prikaz predstavlja prvi laboratorijski potvrđen slučaj Mpox infekcije u Republici Srpskoj i naglašava značaj aktivnog testiranja na HIV kod oboljelih od Mpox, te započinjanja antiretrovirusne terapije.

CONCURRENT HIV DIAGNOSIS AND MPOX IN AN MSM PATIENT: FIRST DOCUMENTED CASE IN THE REPUBLIC OF SRPSKA

Ljiljana Pašić Grubišić^{1,2}, Andrej Trubajčić¹, Antonija Verhaz^{1,2}, Zvezdana Vuković¹, Maja Milinković Đukić¹, Jelena Milovanović¹

¹. University Clinical Centre of the Republic of Srpska, Clinic for Infectious Diseases, Banja Luka, Bosnia and Herzegovina

². Faculty of Medicine, University of Banja Luka, Banja Luka, Bosnia and Herzegovina

Introduction: Mpox (formerly known as monkeypox), previously confined mainly to endemic regions of Africa, has become a major public health concern since the 2022 global outbreak, particularly among men who have sex with men (MSM). In some cases, Mpox may represent the first clinical manifestation of previously undiagnosed HIV infection.

Objective: To present the first laboratory-confirmed case of Mpox infection in the Republic of Srpska.

Materials and Methods: A retrospective analysis of the medical records of a hospitalized patient treated at the Clinic for Infectious Diseases, University Clinical Centre of the Republic of Srpska.

Results: A 31-year-old MSM patient with psoriasis and psoriatic arthritis receiving methotrexate was admitted with fever, exudative tonsillitis, generalized polymorphic rash, and lymphadenopathy. Diagnostic evaluation confirmed newly diagnosed HIV infection (HIV-1 RNA 14,733 copies/mL; CD4+ T-cell count 600 cells/μL), while Mpox virus infection was confirmed by PCR testing of skin lesion samples. No concomitant opportunistic or sexually transmitted infections were identified. Epidemiological investigation suggested that the infection was imported from Austria and acquired through close physical contact. During hospitalization, the patient developed secondary bacterial cellulitis of the right thigh, which was successfully treated with antibiotics. Antiretroviral therapy (tenofovir disoproxil fumarate/emtricitabine plus rilpivirine) was initiated. Within one month, the skin lesions completely resolved, the patient achieved an excellent clinical recovery, and HIV-1 RNA declined to 3,968 copies/mL.

Discussion: This case illustrates that Mpox may be the initial presentation of previously undiagnosed HIV infection in MSM individuals(1-6). Despite extensive mucocutaneous involvement and secondary bacterial cellulitis, the preserved immune status likely contributed to the favorable clinical outcome without severe systemic complications(6). Unlike most published cases, in which patients were already receiving antiretroviral therapy, Mpox infection in our patient led directly to the diagnosis of HIV infection(1).

Conclusion: In patients presenting with febrile exanthema and characteristic mucocutaneous lesions, particularly among MSM, both Mpox and HIV infection should be considered simultaneously. Early laboratory confirmation, prompt initiation of antiretroviral therapy, and a multidisciplinary approach are essential for achieving favorable clinical outcomes. This report describes the first laboratory-confirmed case of Mpox infection in the Republic of Srpska and highlights the importance of routine HIV testing in all patients diagnosed with Mpox.

Literatura:

1. Our World in Data [Internet]. [cited 2026 Jul 15]. Mpox Data Explorer. Available from: https://ourworldindata.org/explorers/monkeypox?time=2022-06-09&facet=none&country=~OWID_WRL&hideControls=true&Metric=Confirmed+cases&Frequency=7-day+average&Relative+to+population=false
2. Ortiz-Saavedra B, Montes-Madariaga ES, Cabanillas-Ramirez C, Alva N, Ricardo-Martínez A, León-Figueroa DA, et al. Epidemiologic Situation of HIV and Monkeypox Coinfection: A Systematic Review. *Vaccines*. 2023 Jan 22;11(2):246. doi:10.3390/vaccines11020246 PubMed PMID: 36851124; PubMed Central PMCID: PMC9965118.
3. Liu BM, Rakhmanina NY, Yang Z, Bukrinsky MI. Mpox (Monkeypox) Virus and Its Co-Infection with HIV, Sexually Transmitted Infections, or Bacterial Superinfections: Double Whammy or a New Prime Culprit? *Viruses*. 2024 May 15;16(5):784. doi:10.3390/v16050784 PubMed PMID: 38793665; PubMed Central PMCID: PMC11125633.
4. Rao AK. Interim Clinical Treatment Considerations for Severe Manifestations of Mpox — United States, February 2023. *MMWR Morb Mortal Wkly Rep*. 2023;72. doi:10.15585/mmwr.mm7209a4
5. Liu Q, Fu L, Wang B, Sun Y, Wu X, Peng X, et al. Clinical Characteristics of Human Mpox (Monkeypox) in 2022: A Systematic Review and Meta-Analysis. *Pathogens*. 2023 Jan 15;12(1):146. doi:10.3390/pathogens12010146 PubMed PMID: 36678494; PubMed Central PMCID: PMC9861547.
6. Mpox Mortality 27% if CD4s Below 100 With HIV Infection [Internet]. [cited 2026 Jul 15]. Available from: https://www.natap.org/2023/CROI/croi_68.htm

HBV REAKTIVACIJA KOD BOLESNIKA SA REUMATOIDNIM ARTRITISOM LIJEČENIM RITUKSIMABOM – PRIKAZ SLUČAJA

HBV REACTIVATION IN A PATIENT WITH RHEUMATOID ARTHRITIS TREATED WITH RITUXIMAB: A CASE REPORT

dr Snežana Ostojić¹, prof. dr sc. med. Antonija Verhaz^{1,2}, dr Milan Petrović¹, dr Snežana Ritan¹, dr Branka Antešević¹, dr Svetlana Milinković¹

¹ *Klinika za infektivne bolesti, Univerzitetski klinički centar Republike Srpske (UKC RS)*

² *Medicinski fakultet, Univerzitet u Banjoj Luci*

Uvod: Reaktivacija hepatitis B virusa (HBV), predstavlja ozbiljnu ali preventabilnu komplikaciju kod bolesnika koji primaju imunosupresivnu terapiju, uključujući biološke lijekove. Pravovremen skrining, pravilna interpretacija HBV seroloških markera i multidisciplinarni pristup su od ključnog značaja u prevenciji komplikacija.

Cilj rada: Prikazati težak klinički tok HBV reaktivacije kod bolesnika sa reumatoidnim artitisom liječenog rituksimabom i ukazati na značaj procijene HBV statusa prije i tokom imunosupresivne terapije.

Materijal i metode: Retrospektivno su analizirani podaci iz medicinske dokumentacije, laboratorijski i radiološki nalazi bolesnika hospitalizovanog u Klinici za infektivne bolesti od 09.07 do 05.08.2026 godine.

Rezultati i diskusija: Muškarac, starosti 66 godina, koji boluje od reumatoidnog artritisa od 2010 godine, liječen je rituksimabom od 2022 godine, posljednja doza je primjenjena u novembru 2025 godine. U 2023 godini HBsAg je bio nereaktivan, uz reaktivan anti-Hbc. U aprilu 2026 godine registrovana je HBsAg reaktivnost, nakon čega je uveden lamivudin. U julu 2026 godine HBsAg i anti-Hbc su bili reaktivni uz negativan anti-Hbc IgM, HBeAg i anti-HBs, te HBV DNK 16.494.006 IU/mL, uz izraženu konjugovanu hiperbilirubinemiju. Po prijemu je imao izražen ikterus, opštu slabost i bolove pod desnim rebarnim lukom. Ultrazvuk abdomena, KT abdomena i MRCP nisu pokazali opstrukciju žučnih puteva. Terapija je izmjenjena na tenofovir uz intenzivno suportivno liječenje. Biološka terapija je obustavljena. Zbog teškog kliničkog stanja bolesnik je upućen u tercijarni centar u Republici Srbiji na nastavak liječenja. Poseban značaj ima činjenica da je prethodni anti-Hbc status bio poznat, što potvrđuje potrebu za kontinuiranom procijenom rizika kod bolesnika koji primaju B ćelijsku deplecionu terapiju.

Zaključak: Ovaj slučaj ukazuje na značaj obaveznog skrininga na HBV prije primjene biološke terapije i potrebu za adekvatnim tumačenjem izolovanog anti-Hbc pozitivnog nalaza. Pravovremeno uključivanje infektologa u procijenu rizika omogućava izbor odgovarajuće strategije u vidu antivirusne profilakse ili intenzivnog virusološkog praćenja, koja može spriječiti razvoj teških oblika HBV reaktivacije. Pravovremena saradnja infektologa i reumatologa omogućava individualizovan izbor antivirusne strategije i vođenje imunosupresivne terapije.

Ključne riječi: HBV reaktivacija, reumatoidni artritis, rituksimab, skrining na virusne hepatitise

AKUTNA Q-GROZNICA - PRIKAZ SLUČAJA

*Bojana Nježić Nedić, Antonija Verhaz, Vesna Pavlović, Sanja Tadić, Branka Antešević, Željka Petrušić
Klinika za infektivne bolesti, Univerzitetski klinički centar Republike Srpske, Banjaluka, Bosna i
Hercegovina*

Q-groznica je sistemska zoonoza uzrokovana unutarćelijskom bakterijom *Coxiella burnetii*, koja se najčešće manifestuje kao akutna febrilna bolest, atipična pneumonija ili hepatitis. Cilj rada je prikaz bolesnika sa srednje teškim kliničkim oblikom bolesti, koja se prezentovala kao prolongirano febrilno stanje uz zahvatanje jetre i rijetke vaskularne komplikacije. Epidemiološka anamneza ukazivala je na profesionalnu izloženost poljoprivrednom i ruralnom okruženju. Laboratorijski nalazi pri prijemu pokazali su izražen sistemski inflamatorni odgovor sa trombocitopenijom, hepatocelularnim oštećenjem i značajno povišenim D-dimerom. RTG pluća bio je uredan, dok su na multislajsnom CT-u abdomena uočeni blaga hepatomegalija, uvećan hilusni limfni čvor jetre (18mm) i dva klinasta infarkta slezine. Transtoraksnom ehokardiografijom nisu viđene vegetacije koje bi odgovarale infektivnom endokarditisu. Serološkim ispitivanjem potvrđena je akutna Q groznica sa pozitivnim anti-*Coxiella burnetii* Phase II IgM i IgG antitijelima uz negativna antitijela na Phase I antigene. U diferencijalno-dijagnostičkoj obradi isključena su hematološka ili sistemska autoimuna oboljenja. Nakon potvrde dijagnoze uveden je doksiciklin u trajanju od 14 dana, uz postepeno kliničko i biohemijsko poboljšanje, ali je na kontrolnom pregledu perzistirao post-Q-groznica sindrom umora. Ovaj slučaj ukazuje da akutnu Q groznicu treba razmotriti u diferencijalnoj dijagnozi prolongiranih febrilnih stanja nejasne etiologije, posebno kod pacijenata sa epidemiološkim rizikom i zahvatanjem jetre. Infarkti slezine predstavljaju rijetku komplikaciju koja može otežati postavljanje dijagnoze bolesti, dok su pravovremena serološka ispitivanja, rano uvođenje doksiciklina i praćenje pacijenata zbog mogućeg razvoja hronične Q-groznice i post-Q-groznica sindroma umora od ključnog značaja.

ACUTE Q FEVER: A CASE REPORT

*Bojana Nježić Nedić, Antonija Verhaz, Vesna Pavlović, Sanja Tadić, Branka Antešević, Željka Petrušić
Clinic for Infectious Diseases, University Clinical Centre of the Republic of Srpska, Banjaluka, Bosnia
and Herzegovina*

Q fever is a systemic zoonosis caused by the intracellular bacterium *Coxiella burnetii*, most commonly manifesting as an acute febrile illness, atypical pneumonia, or hepatitis. This paper presents a patient with a moderately severe clinical form of the disease, characterized by a prolonged febrile state involving the liver and rare vascular complications. Epidemiological history indicated occupational exposure to an agricultural and rural environment. Admission laboratory findings revealed a pronounced systemic inflammatory response with thrombocytopenia, hepatocellular injury, and significantly elevated D-dimer levels. A chest X-ray was unremarkable, whereas a multislice CT scan of the abdomen showed mild hepatomegaly, an enlarged hepatic hilar lymph node (18 mm) and splenic infarcts. Transthoracic echocardiography showed no vegetations suggestive of infective endocarditis. Serological testing confirmed acute Q fever, showing positive anti-*Coxiella burnetii* Phase II IgM and IgG antibodies alongside negative antibodies against Phase I antigens. Hematological and systemic autoimmune diseases were ruled out during the differential diagnostic workup. Following confirmation of the diagnosis, a 14-day course of doxycycline was initiated, resulting in gradual clinical and biochemical improvement; however, post-Q fever fatigue syndrome persisted at the follow-up examination. This case indicates that acute Q fever should be considered in the differential diagnosis of prolonged febrile illnesses of unclear etiology, particularly in patients with epidemiological risk factors and hepatic involvement. Splenic infarction is a rare complication that can complicate the diagnosis, while timely serological testing, early initiation of doxycycline, and patient monitoring for the potential development of chronic Q fever and post-Q fever fatigue syndrome are of crucial importance.

Literatura:

1. Eldin C, Mélenotte C, Mediannikov O, Ghigo E, Million M, Edouard S, et al. From Q Fever to *Coxiella burnetii* Infection: A Paradigm Change. *Clin Microbiol Rev.* 2017;30(1):115–190.
2. Maurin M, Raoult D. Q Fever. *Clin Microbiol Rev.* 1999;12(4):518–553.
3. Anderson A, Bijlmer H, Fournier PE, Graves S, Hartzell J, Kersh GJ, et al. Diagnosis and Management of Q Fever—United States, 2013: Recommendations from CDC and the Q Fever Working Group. *MMWR Recomm Rep.* 2013;62(RR-03):1–30.

HOLESTAZNI HEPATITIS A, MOGUĆNOSTI LEČENJA – PRIKAZ SLUČAJA

Ivana Raković^{1,2}, Nemanja Đorđević^{1,2}, Biljana Popovska Jovičić^{1,2}, Jagoda Gavrilović^{1,2}, Sara Petrović^{1,2}, Sofija Sekulić Marković^{1,2}, Ivana Lešnjak^{1,2}, Andrijana Krstić^{1,2}, Željko Mijailović^{1,2}

¹ Univerzitet u Kragujevcu, Fakultet medicinskih nauka, Katedra za infektivne bolesti, Kragujevac, Srbija

² Univerzitetski klinički centar Kragujevac, Klinika za infektivne bolesti, Kragujevac, Srbija

Uvod: Holestatski hepatitis A predstavlja retku formu akutne infekcije virusom hepatitisa A, koju karakterišu produžena hiperbilirubinemija, izražena žutica i intenzivan pruritus. Lečenje bolesnika kod kojih standardna terapija ne dovede do poboljšanja predstavlja značajan klinički izazov.

Cilj rada: Prikazati klinički tok i ishod kombinovane primene sistema za recirkulaciju molekularnih adsorbenata (MARS) i kortikosteroida kod bolesnice sa holestatskim hepatitisom A i refraktarnim pruritusom.

Materijal i metode: Retrospektivno su analizirani klinički, laboratorijski i terapijski podaci bolesnice lečene zbog holestatskog hepatitisa A u Klinici za infektivne bolesti Univerzitetskog kliničkog centra Kragujevac.

Rezultati i diskusija: Bolesnica stara 36 godina javila se po povratku sa Zanzibara sa kliničkom slikom akutnog hepatitisa, praćenom febrilnošću, gastrointestinalnim tegobama i ikterusom. Dijagnoza akutnog hepatitisa A potvrđena je nalazom anti-HAV IgM antitela i HAV RNK-a u krvi. Tok bolesti komplikovan je progresivnom holestazom i intenzivnim pruritusom praćenim nesanicom, koji se održavao uprkos primeni ursodeoksiholne kiseline, holestiramina i simptomatske terapije. Zbog pogoršanja kliničkih i biohemijskih pokazatelja bolesnica je hospitalizovana, a vrednost ukupnog bilirubina na prijemu iznosila je 391,3 µmol/L. Dijagnostičkim ispitivanjem isključeni su: mehanička opstrukcija bilijarnog sistema, druge virusne infekcije jetre, autoimunski hepatitis i Wilsonova bolest. Zbog refraktarnog pruritusa sprovedena su dva osmočasovna ciklusa MARS terapije, nakon čega je primenjen kratkotrajni režim prednizona u postepeno smanjivanim dozama. Primenjeno lečenje bilo je praćeno postepenim smanjenjem intenziteta pruritusa, kao i poboljšanjem biohemijskih pokazatelja hepatocelularnog oštećenja i holestaze. Tokom daljeg praćenja, pruritus se potpuno povukao i nije se više pojavio, uz potpunu normalizaciju laboratorijskih parametara.

Zaključak: Kombinovana primena MARS terapije i kratkotrajnog režima kortikosteroida bila je praćena povlačenjem refraktarnog pruritusa i povoljnim kliničkim ishodom. Ovaj terapijski pristup može se razmotriti kod pažljivo odabranih bolesnika sa teškim holestatskim hepatitisom A koji ne odgovaraju na standardnu terapiju.

Ključne reči: hepatitis A, holestaza, refraktarni pruritus, MARS, kortikosteroidi.

CHOLESTATIC HEPATITIS A: TREATMENT OPTIONS – A CASE REPORT

Ivana Raković^{1,2}, Nemanja Đorđević^{1,2}, Biljana Popovska Jovičić^{1,2}, Jagoda Gavrilović^{1,2}, Sara Petrović^{1,2}, Sofija Sekulić Marković^{1,2}, Ivana Lešnjak^{1,2}, Andrijana Krstić^{1,2}, Željko Mijailović^{1,2}

¹University of Kragujevac, Faculty of Medical Sciences, Department of Infectious diseases, Kragujevac, Serbia

²University Clinical Centre Kragujevac, Clinic for Infectious Diseases, Kragujevac, Serbia

Introduction: Cholestatic hepatitis A is a rare form of acute hepatitis A virus infection characterized by prolonged hyperbilirubinemia, pronounced jaundice, and severe pruritus. The treatment of patients who fail to improve with standard therapy represents a significant clinical challenge.

Objective: To describe the clinical course and outcome of combined treatment with the Molecular Adsorbent Recirculating System (MARS) and corticosteroids in a female patient with cholestatic hepatitis A and refractory pruritus.

Materials and Methods: The clinical, laboratory, and treatment data of a patient treated for cholestatic hepatitis A at the Clinic for Infectious Diseases of the University Clinical Centre Kragujevac were retrospectively analyzed.

Results and Discussion: After returning from Zanzibar, a 36-year-old woman presented with clinical manifestations of acute hepatitis, including fever, gastrointestinal symptoms, and jaundice. The diagnosis of acute hepatitis A was confirmed by the detection of anti-HAV IgM antibodies and HAV RNA in the blood. The disease course was complicated by progressive cholestasis and severe pruritus accompanied by insomnia, which persisted despite treatment with ursodeoxycholic acid, cholestyramine, and symptomatic therapy. Due to worsening clinical and biochemical parameters, the patient was hospitalized. Her total bilirubin level on admission was 391.3 µmol/L. Diagnostic evaluation excluded: mechanical obstruction of the biliary system, other viral liver infections, autoimmune hepatitis, and Wilson's disease. Owing to refractory pruritus, two eight-hour sessions of MARS therapy were performed, followed by a short course of prednisone administered in gradually tapering doses. The treatment was associated with a gradual reduction in pruritus intensity and improvement in biochemical markers of hepatocellular injury and cholestasis. During follow-up, the pruritus completely resolved without recurrence, accompanied by complete normalization of laboratory parameters.

Conclusion: Combined MARS therapy and a short course of corticosteroids were associated with the resolution of refractory pruritus and a favourable clinical outcome. This therapeutic approach may be considered in carefully selected patients with severe cholestatic hepatitis A who do not respond to standard therapy.

Keywords: hepatitis A, cholestasis, refractory pruritus, MARS, corticosteroids.

References:

1. Jeong SH, Lee HS. Hepatitis A: clinical manifestations and management. *Intervirology*. 2010;53(1):15–19. doi:10.1159/000252779.
2. Daghighan D, Rez MS, Soltany A, Alsaleh A. Two case reports of corticosteroid administration—prolonged and pulsed therapy—in treatment of pruritus in cholestatic hepatitis A patients. *Oxf Med Case Reports*. 2019;2019(8):omz080. doi:10.1093/omcr/omz080.
3. Đorđević N, Čanović P, Petrović D, Minić N, Mijailović Ž. Cholestatic viral hepatitis A with refractory pruritus successfully treated with a combination of Molecular Adsorbent Recirculating System and corticosteroids: a case report. *Acta Fac Med Naiss*. 2023;40(4):497–504. doi:10.5937/afmna40-41106.
4. Lisboa LF, Asthana S, Kremer A, et al. Blood cytokine, chemokine and gene expression in cholestasis patients with intractable pruritus treated with a molecular adsorbent recirculating system: a case series. *Can J Gastroenterol*. 2012;26(11):799–805. doi:10.1155/2012/623862.
5. Acevedo Ribó M, Moreno Planas JM, Sanz Moreno C, Rubio González EE, Rubio González E, Boullosa Graña E, Sanchez-Turrión V, Sanz Guajardo V, Cuervas-Mons V. Therapy of intractable pruritus with MARS. *Transplant Proc*. 2005;37(3):1480–1481. doi:10.1016/j.transproceed.2005.02.002

POSTERI III

EKONOMSKI ASPEKT LIJEČENJA INFEKCIJA UZROKOVANIH CLOSTRIDIODES DIFFICILE BAKTERIJOM U SKB MOSTAR

Linda Soldo^{1 2}, Svjetlana Grgić^{1 2 3}, Nives Vasilj^{1 2 3}, Matea Kokić¹, Helien Bebek Ivanković¹

¹ Sveučilišna klinička bolnica Mostar, 88 000 Mostar, Bosna i Hercegovina

² Medicinski fakultet Sveučilišta u Mostaru, 88 000, Mostar, Bosna i Hercegovina

³ Fakultet zdravstvenih studija Sveučilište u Mostaru, 88 000 Mostar Bosna i Hercegovina

Cilj: Ispitati utjecaj novih pristupa liječenja CDI, na ekonomske izdatke liječenja, te ishode liječenja bolesnika u Klinici za infektivne bolesti SKB Mostar u vremenskom razdoblju 01.01.2018.g. do 31.05.2023.g., a obuhvata razdoblje prije pandemije SARS-COV-2, tijekom pandemije SARS- COV-2, kao i razdoblje nakon pandemije SARS- COV-2 virusom

Postupci: U istraživanje uključeni su svi bolesnici sa potvrđenom dijagnozom CDI, njih 208 liječeni u Klinici za infektivne bolesti Sveučilišne kliničke bolnice u Mostaru u razdoblju od 01.01.2018. g. do 31.05.2023. g. Analizirani su demografski podatci (dob, spol) i epidemiološki podatci - prva epizoda bolesti, ponavljajuće epizode bolesti (CDI), broj dana boravka u bolnici, vrsta prijema u Kliniku (prijem iz kućnih uvjeta, premještaj iz drugih klinika, odjela, bolnica) prijemi iz stacionarnih ustanova, prethodni boravak u bolničkoj ustanovi unatrag četiri mjeseca, primjenjivana antibiotska terapija, ukupan novčani iznos liječenja. Svi podatci su prikupljeni iz medicinske dokumentacije, bolničkog informacijskog sustava i podataka iz Jedinice za fakturiranje SKB Mostar i Službe za informatiku SKB Mostar, unošenja dobivenih podataka u računalo, statističke obrade podataka, tabelarnom prikazu i tumačenju dobivenih podataka.

Rezultati: Većina pacijenata (50,5%) prezentirala se sa srednje teškim oblikom bolesti, 35,1% s lakim oblikom, a 14,4% s teškim oblikom CDI. Poboljšanje je zabilježeno kod 83,2% pacijenata, smrtni ishod kod 15,9%, a pogoršanje kod 1,0% pacijenata. Najbolji klinički ishod zabilježen je kod pacijenata liječenih monoterapijom vankomicinom (89,3% poboljšanja).

Zaključak: Peroralno liječenje CDI vankomicinom je bolja terapijska opcija zbog boljeg ishoda liječenja bez recidiva bolesti, a rezultira kraćim hospitalizacijama i manjim troškovima sestrinske njege i bolničkog smještaja

Reference:

1. Joffrey van Prehn, Elena Reigadas, Erik H. Vogelzang i sur : The guideline committee of the European Study Group on Clostridioides difficile, European Society of Clinical Microbiology and Infectious Diseases, 2021 27 Suppl 2:S1-S21. doi: 10.1016/j.cmi.2021.09.038.
2. Bainum TB, Reveles KR, Hall RG 2nd, Cornell K, Alvarez CA. Controversies in the Prevention and Treatment of Clostridioides difficile Infection in Adults: A Narrative Review. Microorganisms.2023; 3;11:3 doi: 10.3390/microorganisms11020387.
3. Reveles KR, Yang M, Garcia-Horton V, Edwards ML, Guo A, Lodise T, Bochan M, Tillotson G, Dubberke ER. Economic Impact of Recurrent Clostridioides difficile Infection in the USA: A Systematic Literature Review and Cost Synthesis. Adv Ther. 2023. doi: 10.1007/s12325-023-02498-x.
4. Depestel DD, Aronoff DM. Epidemiology of Clostridium difficile infection. J Pharm Pract. 2013, 464-75. doi: 10.1177/0897190013499521
5. Madoff SE, Urquiaga M, Alonso CD, Kelly CP. Prevention of recurrent Clostridioides difficile infection: A systematic review of randomized controlled trials. Anaerobe. 2020; 61:102098. doi: 10.1016/j.anaerobe.2019.102098

ECONOMIC ASPECTS OF TREATMENT AND MANAGEMENT OF CLOSTRIDOIDES DIFFICILE INFECTIONS IN UNIVERSITY CLINICAL HOSPITAL MOSTAR

Authors: Linda Soldo^{1 2}, Svjetlana Grgić^{1 2 3}, Nives Vasilj^{1 2 3}, Matea Kokić¹, Helien Bebek Ivanković¹

¹ *University Clinical Hospital Mostar, 88 000 Mostar, Bosnia and Herzegovina*

² *School of Medicine, University of Mostar, 88 000 Mostar, Bosnia and Herzegovina*

³ *Faculty of Health Studies, University of Mostar, 88 000 Mostar, Bosnia and Herzegovina*

Aim: To examine the impact of new CDI treatment approaches on economic treatment expenditures and patient treatment outcomes at the Clinic for Infectious Diseases of University Clinical Hospital Mostar in the time period from January 1, 2018 to May 31, 2023, which encompasses the period before the SARS-CoV-2 pandemic, during the SARS-CoV-2 pandemic, as well as the period after the SARS-CoV-2 virus pandemic."

Methods: The study included all patients with confirmed CDI diagnosis, 208 of them treated at the Clinic for Infectious Diseases of the University Clinical Hospital in Mostar in the period from January 1, 2018 to May 31, 2023. Demographic data (age, gender) and epidemiological data were analyzed - first episode of disease, recurrent episodes of disease (CDI), number of days of hospital stay, type of admission to the Clinic (admission from home conditions, transfer from other clinics, departments, hospitals), admissions from residential institutions, previous hospital stay within the past four months, applied antibiotic therapy, total monetary amount of treatment. All data were collected from medical documentation, hospital information system and data from the Billing Unit of UKB Mostar and the IT Service of UKB Mostar, entering the obtained data into computer, statistical data processing, tabular presentation and interpretation of the obtained data.

Results: The majority of patients (50.5%) presented with moderate disease, 35.1% with mild disease, and 14.4% with severe CDI. Improvement was recorded in 83.2% of patients, fatal outcome in 15.9%, and deterioration in 1.0% of patients. The best clinical outcome was recorded in patients treated with vancomycin monotherapy (89.3% improvement).

Conclusion: Oral treatment of CDI with vancomycin is a better therapeutic option due to better treatment outcomes without disease recurrence, and results in shorter hospitalizations and lower costs of nursing care and hospital accommodation.

References:

1. Joffrey van Prehn, Elena Reigadas, Erik H. Vogelzang i sur : The guideline committee of the European Study Group on Clostridioides difficile, European Society of Clinical Microbiology and Infectious Diseases, 2021 27 Suppl 2:S1-S21. doi: 10.1016/j.cmi.2021.09.038.
2. Bainum TB, Reveles KR, Hall RG 2nd, Cornell K, Alvarez CA. Controversies in the Prevention and Treatment of Clostridioides difficile Infection in Adults: A Narrative Review. Microorganisms.2023; 3;11:3 doi: 10.3390/microorganisms11020387.
3. Reveles KR, Yang M, Garcia-Horton V, Edwards ML, Guo A, Lodise T, Bochan M, Tillotson G, Dubberke ER. Economic Impact of Recurrent Clostridioides difficile Infection in the USA: A Systematic Literature Review and Cost Synthesis. Adv Ther. 2023. doi: 10.1007/s12325-023-02498-x.
4. Depestel DD, Aronoff DM. Epidemiology of Clostridium difficile infection. J Pharm Pract. 2013, 464-75. doi: 10.1177/0897190013499521
5. Madoff SE, Urquiaga M, Alonso CD, Kelly CP. Prevention of recurrent Clostridioides difficile infection: A systematic review of randomized controlled trials. Anaerobe. 2020; 61:102098. doi: 10.1016/j.anaerobe.2019.102098

VARIČELA KOD HOSPITALIZIRANIH PACIJENATA NA ODJELU ZA INFEKTIVNE BOLESTI KB ZENICA: KLINIČKE KARAKTERISTIKE, KOMPLIKACIJE I ISHODI LIJEČENJA U PERIODU 2024–2026.

Meliha Šehić Arslan

Odjel za Infektivne bolesti KB Zenica

Uvod: Varičela je najčešće samoograničavajuća virusna infekcija, ali može imati težak klinički tok i dovesti do ozbiljnih komplikacija pa čak i letalnog ishoda (1). Cilj rada bio je analizirati kliničke karakteristike, terapijske pristupe, komplikacije i ishode liječenja hospitaliziranih pacijenata s varičelom na Odjelu za infektivne bolesti KB Zenica u periodu od dvije i po godine.

Metode: Provedena je retrospektivna analiza 28 pacijenata hospitaliziranih na Odjelu za infektivne bolesti u periodu od januara 2024. do juna 2026. godine. Analizirani su dob, spol, trajanje bolesti prije prijema, primijenjena terapija, trajanje hospitalizacije, komplikacije, potreba za premještajem i ishod liječenja.

Rezultati i diskusija: Hospitalizirano je 7 pacijenata tokom 2024., 11 tokom 2025. i 10 u prvih šest mjeseci 2026. godine. Žene su činile 64,3%, a medijan dobi iznosio je 15,5 godina. Komplikacije su zabilježene kod 20 (71,4%) pacijenata, najčešće respiratorne: pneumonija/pneumonitis kod 12 (42,9%), dok su neurološke komplikacije zabilježene kod 4 (14,3%) pacijenta, uključujući dva meningoencefalitisa i dva serozna meningitisa. Ostale komplikacije uključivale su sekundarnu bakterijsku infekciju kože, trombocitopeniju i hepatitis. Rezultati većih evropskih studija pokazuju udio komplikacija od 64,6–76% kod hospitaliziranih pacijenata, pri čemu se respiratorne i neurološke komplikacije navode kao značajni uzroci hospitalizacije (2,3). U prvih šest mjeseci 2026. godine komplikacije su zabilježene kod 9/10 (90,0%) pacijenata. Antivirusnu terapiju primilo je 12 (42,9%), antibiotsku 15 (53,6%), a simptomatsku 16 (57,1%) pacijenata. Prosječno trajanje hospitalizacije iznosilo je 6,3 dana, a dva pacijenta zahtijevala su liječenje u jedinici intenzivnog liječenja.

Zaključak: U analiziranom uzorku zabilježen je visok udio komplikovanih oblika varičele, posebno respiratornih i neuroloških komplikacija, uz visok udio komplikacija u prvoj polovini 2026. godine. Nalazi dodatno naglašavaju značaj preventivnih strategija i uvođenja vakcinacije protiv varičele u nacionalni program imunizacije.

Reference:

1. Begovac J, Baršić B, Kuzman I, Lisić M, Tambić Andrašević A, Visković K, editors. Infektologija. Zagreb: Profil; 2014.
2. Maresová V, Maly M, Kyncl J, et al. Varicella and its complications: a five-year retrospective analysis of hospitalized patients. Med Mal Infect. 2006;36(8):?–?. doi:10.1016/S1294-5501(06)70812-3.
3. Hagemann C, Krämer A, Grote V, Liese JG, Streng A. Specific Varicella-Related Complications and Their Decrease in Hospitalized Children after the Introduction of General Varicella Vaccination: Results from a Multicenter Pediatric Hospital Surveillance Study in Bavaria (Germany). Infect Dis Ther. 2019;8:597–611. doi:10.1007/s40121-019-00273-6.

VARICELLA IN HOSPITALIZED PATIENTS AT THE DEPARTMENT OF INFECTIOUS DISEASES, CANTONAL HOSPITAL ZENICA: CLINICAL CHARACTERISTICS, COMPLICATIONS, AND TREATMENT OUTCOMES IN THE PERIOD 2024–2026

Meliha Šehić Arslan

Department of Infectious Diseases, Cantonal Hospital Zenica

Introduction: Varicella is usually a self-limiting viral infection; however, it may have a severe clinical course and lead to serious complications, including fatal outcomes (1). The aim of this study was to analyze the clinical characteristics, treatment approaches, complications, and treatment outcomes of hospitalized patients with varicella at the Department of Infectious Diseases, Cantonal Hospital Zenica, over a two-and-a-half-year period.

Methods: A retrospective analysis was conducted of 28 patients hospitalized at the Department of Infectious Diseases from January 2024 to June 2026. Data on age, sex, duration of illness prior to admission, treatment administered, length of hospitalization, complications, need for transfer, and treatment outcome were analyzed.

Results and Discussion: Seven patients were hospitalized in 2024, 11 in 2025, and 10 during the first six months of 2026. Females accounted for 64.3% of patients, and the median age was 15.5 years. Complications were recorded in 20 (71.4%) patients, most commonly respiratory complications, with pneumonia/pneumonitis occurring in 12 (42.9%) patients. Neurological complications occurred in 4 (14.3%) patients, including two cases of meningoencephalitis and two of aseptic meningitis. Other complications included secondary bacterial skin infection, thrombocytopenia, and hepatitis. Large European studies of hospitalized patients have reported complication rates of 64.6–76%, with respiratory and neurological complications also representing important causes of hospitalization (2,3). During the first six months of 2026, complications were recorded in 9/10 (90.0%) patients. Antiviral therapy was administered to 12 (42.9%), antibiotic therapy to 15 (53.6%), and symptomatic treatment to 16 (57.1%) patients. The mean length of hospitalization was 6.3 days, and two patients required treatment in the intensive care unit.

Conclusion: A high proportion of complicated varicella cases was observed in our study population, particularly respiratory and neurological complications, with a high proportion of complications during the first half of 2026. These findings further emphasize the importance of preventive strategies and the introduction of varicella vaccination into the national immunization program

VODIČ ZA NAJBOLJE PRAKSE I SIGURNOST IMUNIZACIJE: STANDARDIZACIJA POSTUPAKA I NADZORA NAD NEŽELJENIM POJAVAMA U FEDERACIJI BOSNE I HERCEGOVINE

Rozalija Nedić¹, Sanjin Musa^{1,2}, Mia Blažević¹, Siniša Skočibušić^{1,3}

¹ Zavod za javno zdravstvo Federacije Bosne i Hercegovine, Sarajevo/Mostar, Bosna i Hercegovina

² Medicinski fakultet Univerziteta Sarajevo School of Science and Technology, Sarajevo, Bosna i Hercegovina

³ Medicinski fakultet Sveučilišta u Mostaru, Mostar, Bosna i Hercegovina

Uvod

Sigurnost imunizacije ne ovisi samo o kakvoći cjepiva nego i o pravilnom odabiru, čuvanju, primjeni, nadzoru i komunikaciji. Neželjena pojava nakon imunizacije vremenski slijedi cijepljenje, ali sama po sebi ne dokazuje uzročnu povezanost, zbog čega je potreban standardiziran i transparentan postupak.

Cilj rada

Predstaviti sadržaj i praktičnu vrijednost Vodiča za najbolje prakse i sigurnost imunizacije u jačanju kvalitete usluge i nadzora nad neželjenim pojavama u Federaciji Bosne i Hercegovine.

Materijal i metode

Provedena je deskriptivna analiza Vodiča objavljenog 2024. godine. Jedanaest poglavlja analizirano je prema slijedu imunizacijske usluge: od rasporeda, kontraindikacija, primjene i hladnoga lanca do sprječavanja neželjenih reakcija, prijavljivanja, istrage, procjene uzročnosti i komunikacije. Razmotrena je usklađenost postupaka s propisima Federacije BiH i izvorima Svjetske zdravstvene organizacije navedenima u Vodiču.

Rezultati i rasprava

Vodič povezuje kliničku praksu, sigurnost pacijenta, epidemiološki nadzor i komunikaciju. Neželjene pojave razvrstava u reakcije povezane sa sadržajem ili kakvoćom cjepiva, pogreškom pri cijepljenju, anksioznošću odnosno stresnim odgovorom te slučajne događaje. Naglašava prevenciju pogrešaka, provjeru kontraindikacija, pravilnu tehniku, održavanje hladnoga lanca, petnaestominutno promatranje nakon cijepljenja te spremnost za trenutačno prepoznavanje i liječenje anafilaksije. Sama sumnja dovoljna je za prijavu; od prijavitelja se ne očekuje procjena uzročnosti. Ozbiljne pojave prijavljuju se odmah i, prema propisima Federacije BiH, istražuju najkasnije u roku od 48 sati. Procjena uzročnosti temelji se na potpunoj dokumentaciji, valjanoj dijagnozi, vremenskoj povezanosti, alternativnim uzrocima i algoritmu SZO-a, a završava klasifikacijom i preporukama za korektivne mjere. Komunikacija treba biti pravodobna, empatična i transparentna, uz izbjegavanje preuranjenih zaključaka o uzroku.

Zaključak

Vodič pruža jedinstven operativni okvir za sigurnu imunizaciju i postupanje s neželjenim pojavama. Njegova dosljedna primjena, uz redovitu edukaciju, dostupnu opremu za hitna stanja, kvalitetnu dokumentaciju i koordinaciju svih razina sustava, može smanjiti sprječive pogreške, ubrzati odgovor na sigurnosne signale i ojačati povjerenje u imunizaciju.

Literatura

1. Musa S, ur. Vodič za najbolje prakse i sigurnost imunizacije. Sarajevo/Mostar: Zavod za javno zdravstvo Federacije Bosne i Hercegovine; 2024.
2. Pravilnik o načinu provođenja obavezne imunizacije, imunoprofilakse i hemoprofilakse protiv zaraznih bolesti te o osobama koje se podvrgavaju toj obavezi. Službene novine Federacije BiH. 2019;(22).
3. World Health Organization. Global manual on surveillance of adverse events following immunization. Geneva: WHO; 2014, revised March 2016.
4. World Health Organization. Causality assessment of an adverse event following immunization (AEFI): user manual for the revised WHO classification. 2nd ed., 2019 update. Geneva: WHO; 2019.

GUIDE TO IMMUNIZATION BEST PRACTICES AND SAFETY: STANDARDIZING PROCEDURES AND SURVEILLANCE OF ADVERSE EVENTS IN THE FEDERATION OF BOSNIA AND HERZEGOVINA

Rozalija Nedić¹, Sanjin Musa^{1,2}, Mia Blažević¹, Siniša Skočibušić^{1,3}

¹ Institute for Public Health of the Federation of Bosnia and Herzegovina, Sarajevo/Mostar, Bosnia and Herzegovina

² Faculty of Medicine, Sarajevo School of Science and Technology, Sarajevo, Bosnia and Herzegovina

³ Faculty of Medicine, University of Mostar, Mostar, Bosnia and Herzegovina

Introduction

Immunization safety depends not only on vaccine quality but also on selection, storage, administration, surveillance and communication. An adverse event following immunization is temporally associated with vaccination but does not by itself establish causality, requiring a standardized and transparent response.

Objective

To present the Guide's content and practical value for strengthening immunization service quality and adverse-event surveillance in the Federation of Bosnia and Herzegovina.

Materials and methods

A descriptive analysis of the 2024 Guide was conducted. Its eleven chapters were reviewed across the immunization service pathway, from schedules, contraindications, administration and cold-chain management to prevention of adverse reactions, reporting, investigation, causality assessment and communication. Procedures were considered against Federation regulations and World Health Organization sources cited in the Guide.

Results and discussion

The Guide integrates clinical practice, patient safety, epidemiological surveillance and communication. Adverse events are classified as vaccine product-related, vaccine quality defect-related, immunization error-related, immunization stress-related or coincidental. It emphasizes error prevention, screening for contraindications, correct administration technique, cold-chain maintenance, 15-minute observation after vaccination, and readiness to recognize and treat anaphylaxis immediately. Suspicion alone is sufficient for reporting; the reporter is not expected to assess causality. Serious events should be reported immediately and, under Federation regulations, investigated within 48 hours at the latest. Causality assessment requires complete documentation, a valid diagnosis, temporal association, consideration of alternative causes and use of the WHO algorithm, followed by classification and recommendations for corrective action. Communication should be timely, empathetic and transparent, while avoiding premature statements about causation.

Conclusion

The Guide provides a unified operational framework for safe immunization and management of adverse events. Consistent implementation, supported by regular training, emergency equipment, complete documentation and coordination across health-system levels, may reduce preventable errors, accelerate responses to safety signals and strengthen confidence in immunization.

References

1. Musa S, editor. Guide to Immunization Best Practices and Safety. Sarajevo/Mostar: Institute for Public Health of the Federation of Bosnia and Herzegovina; 2024.
2. Rulebook on mandatory immunization, immunoprophylaxis and chemoprophylaxis against infectious diseases. Official Gazette of the Federation of Bosnia and Herzegovina. 2019;(22).
3. World Health Organization. Global manual on surveillance of adverse events following immunization. Geneva: WHO; 2014, revised March 2016.
4. World Health Organization. Causality assessment of an adverse event following immunization (AEFI): user manual for the revised WHO classification. 2nd ed., 2019 update. Geneva: WHO; 2019.

SINUS HISTIOCITOZA SA GENERALIZOVANOM LIMFADENOPATIJOM

Maja Milinković Đukić¹, Ljiljana Pašić Grubišić¹, Antonija Verhaz^{1,2}, Svetlana Milinković¹, Borko Pavlica¹, Branka Antešević¹

¹ Univerzitetski klinički centar Republike Srpske, Klinika za infektivne bolesti, Banja Luka, Bosna i Hercegovina

² Medicinski fakultet Univeziteta u Banjoj Luci, Banja Luka, Bosna i Hercegovina

Uvod: Sinus histiocitoza sa generalizovanom limfadenopatijom, poznata kao Rosai-Dorfman-Destombesova bolest (RDD), rijetka je histiocitna bolest koju karakteriše akumulacija karakterističnih histiocita u zahvaćenim tkivima. Iako se RDD smatra benignim i samoograničavajućim oboljenjem, klinički tok je heterogen i može varirati od spontanih remisija do progresivne ili multifokalne bolesti sa zahvatanjem vitalnih organa.

Cilj rada: Prikazati kliničku prezentaciju, dijagnostiku i terapijski pristup kod pacijenta sa sinus histiocitozom sa generalizovanom limfadenopatijom.

Materijal i metode: Analizirani su podaci iz anamneze, kliničkog pregleda, rezultati laboratorijskih i mikrobioloških analiza, radiološke dijagnostike, patohistološki i imunohistohemijski nalaz biopsije limfnog čvora, te liječenje pacijenta.

Rezultati: Pacijent D.G. u 70. godini života, hospitalizovan je petog dana bolesti zbog povišene tjelesne temperature, bolova u zglobovima šaka, stopala i skočnih zglobova te otežanog hoda. Kliničkim pregledom verifikuju se sitni limfni nodusi na vratu i palpatorna bolnost distalnih zglobova šaka i stopala. Laboratorijski su verifikovane leukocitoza sa neutrofilijom, visoke vrijednosti CRP i SE, uz povišene vrijednosti feritina, fibrinogena i mokraćne kiseline. Radiološki se verifikuje infracentimetarska limfadenopatija vrata, te medijastinalna i paraaortalna limfadenopatija. Ultrazvukom muskuloskeletnog sistema verifikuje se sinovijalna proliferacija u II i III MCP, a u lijevom TC zglobu manja količina tečnosti. Urađena je UVATS ekstirpacija limfnog čvora a patohistološkim pregledom postavljena je dijagnoza sinus histiocitoze. Tokom hospitalizacije liječen je antibiotskom i antigljivičnom terapijom, kortikosteroidom, febuksostatom, IPP, etorikoksibom, te ostalom terapijom.

Diskusija: Za razliku od tipične prezentacije, koju karakterišu izražena cervikalna limfadenopatija i mlađa životna dob, naš pacijent je bio starije životne dobi sa generalizovanom limfadenopatijom(1). Povezanost RDD sa poliartritisom i oligoartritisom opisana je samo u pojedinačnim slučajevima(2,3). Konačna dijagnoza zahtijeva patohistološku verifikaciju limfnog čvora(1).

Zaključak: RDD treba razmotriti u diferencijalnoj dijagnozi nejasnih febrilnih stanja praćenih generalizovanom limfadenopatijom i zglobnim manifestacijama.

Literatura:

1. Abba O, Jacobsen E, Picarsic J, et al. Consensus recommendations for the diagnosis and clinical management of Rosai-Dorfman-Destombes disease. *Blood*. 2018;131(26):2877–2890.
2. Castioni J, Mihaescu A, So AK. Sinus histiocytosis with massive lymphadenopathy (Rosai-Dorfman disease) and oligoarthritis. *Joint Bone Spine*. 2011;78(6):641–643. doi:10.1016/j.jbspin.2011.05.024.
3. Polyarthritits in a child with Rosai-Dorfman disease. PubMed PMID: 17888226.

SINUS HISTIOCYTOSIS WITH MASSIVE LYMPHADENOPATHY

Maja Milinković Đukić¹, Ljiljana Pašić Grubišić¹, Antonija Verhaz^{1, 2}, Svetlana Milinković¹, Borko Pavlica¹, Branka Antešević¹

¹University Clinical Center of the Republic of Srpska, Department of Infectious Diseases, Banja Luka, Bosnia and Herzegovina

²Faculty of Medicine, University of Banja Luka, Banja Luka, Bosnia and Herzegovina

Introduction: Sinus histiocytosis with massive lymphadenopathy, known as Rosai-Dorfman-Destombes disease (RDD), is a rare histiocytic disorder characterized by the accumulation of characteristic histiocytes in affected tissues. Although RDD is generally considered a benign and self-limiting disease, its clinical course is heterogeneous and may range from spontaneous remission to progressive or multifocal disease involving vital organs.

Aim: To present the clinical presentation, diagnostic evaluation, and therapeutic approach in a patient with sinus histiocytosis with massive lymphadenopathy.

Materials and Methods: An analysis was performed of the patient's medical history, clinical examination findings, laboratory and microbiological results, radiological imaging, histopathological and immunohistochemical findings of lymph node biopsy, as well as the treatment administered.

Results: A 70-year-old male patient, D.G., was hospitalized on the fifth day of illness due to fever, pain in the joints of the hands, feet, and ankles, and difficulty walking. Clinical examination revealed small cervical lymph nodes and tenderness of the distal joints of the hands and feet. Laboratory findings showed leukocytosis with neutrophilia, elevated CRP and ESR levels, as well as increased ferritin, fibrinogen, and uric acid levels. Radiological evaluation revealed subcentimeter cervical lymphadenopathy, as well as mediastinal and para-aortic lymphadenopathy. Musculoskeletal ultrasonography demonstrated synovial proliferation in the second and third metacarpophalangeal (MCP) joints and a small amount of fluid in the left tarsocrural (TC) joint. UVAT S-assisted excision of a lymph node was performed, and histopathological examination established the diagnosis of sinus histiocytosis. During hospitalization, the patient was treated with antimicrobial and antifungal therapy, corticosteroids, febuxostat, a proton pump inhibitor, etoricoxib, and other supportive therapy.

Discussion: Unlike the typical presentation, characterized by prominent cervical lymphadenopathy and younger age, our patient was older and presented with generalized lymphadenopathy (1). The association of RDD with polyarthritis and oligoarthritis has been described only in isolated cases (2,3). Definitive diagnosis requires histopathological examination of an affected lymph node (1).

Conclusion: RDD should be considered in the differential diagnosis of unexplained febrile conditions accompanied by generalized lymphadenopathy and articular manifestations.

References:

1. Ablat O, Jacobsen E, Picarsic J, et al. Consensus recommendations for the diagnosis and clinical management of Rosai-Dorfman-Destombes disease. *Blood*. 2018;131(26):2877–2890.
2. Castioni J, Mihaescu A, So AK. Sinus histiocytosis with massive lymphadenopathy (Rosai-Dorfman disease) and oligoarthritis. *Joint Bone Spine*. 2011;78(6):641–643. doi:10.1016/j.jbspin.2011.05.024.
3. Polyarthritis in a child with Rosai-Dorfman disease. PubMed PMID: 17888226.

ZLATNI SPONZOR:

HERCEGOVINALIJEK d.o.o.
MOSTAR

abbvie

SPONZORI:

HIF Hemofarm
STADA GRUPA

+CORAPHARM™

glosarij cd

MSD
INVENTING FOR LIFE

ewo pharma 
since 1959

vitamed®



ABDIIBRAHIM

PharmaS®

ALKALOID
Zdravlje prije svega

Pfizer

BOSNALIJEK



MEDICOPHARMACIA



AbelaPharm



NOBEL



TGT



OKTAL PHARMA

AKOMED

ORGANIZATOR:



ZLATNI SPONZOR:

HERCEGOVINALIJEK d.o.o.
MOSTAR

abbvie