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TROMBOZA CEREBRALNIH VENSKIH SINUSA KAO KOMPLIKACIJA MASTOIDITISA - PRIKAZ SLUČAJA SA PREGLEDOM LITERATURE

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Sažetak: Uvod: Mastoiditis je zapaljenje mastoidnog dela temporalne kosti tj. mastoidnih vazdušnih ćelija. Najčešće, mastoiditis nastaje kao komplikacija upale srednjeg uha. Mastoiditis je klinička dijagnoza. Centralno mesto u terapiji mastoiditisa zauzimaju antibiotici. Tromboza cerebralnih venskih sinusa je retka intrakranijalna komplikacija akutnog mastoiditisa. **Prikaz slučaja:** Pacijent starosti 49 godina javio se na pregled zbog zujanja u levom uhu, vrtoglavice praćene mučninom i povraćanjem i ukočenosti leve polovine vrata. Načinjen je opšti klinički i neurološki pregled koji su u tom momentu bili uredni. Otoskopski nalaz oba uha je takođe bio uredan. Pacijent je bio afebrilan. Ordinirana je simptomatska terapija: Analgetici, miorelaksansi, Betahistin uz kompleks vitamina B. Nakon dva dana se ponovo javlja na pregled sa pogoršanjem opisanih tegoba, osećajem punoće i bolom u levom uhu i kao i povremenim curenjem sadržaja iz istog uha. Prisutan je i izrazito jak bol i ukočenost u levoj polovini vrata. Zbog izražene bolnosti klinički pregled je bio ograničen: inspekcijom se uočilo postojanje otoka retroaurikularno u predelu levog mastoida i leve polovine vrata te je pacijent hitno upućen na konsultativni pregled otorinolaringologu i neurologu u regionalnoj bolnici koji indikuju hitan nativni CT endokranijuma kao i laboratorijske analize. Indikovano je CT endokranijuma sa kontrastom koji je potvrdio postojanje tromboze venskih sinusa uz postojanje zapaljenja mastoidinih šupljina levostrano. Indikovana je i urađena radikalna trepanacija temporalne kosti/mastoidektomija levo. U toku hospitalizacije je ordinirana parenteralna antibiotska, antikoagulantna i suportivna terapija. Na primenjenu terapiju pacijent se subjektivno bolje osećao, a kontrolni klinički, laboratorijski i CT nalazi su ukazivali na regresiju inflamatornog procesa. **Zaključak:** Kod pacijenata sa bolom u uhu, kao najčešćim znakom upale srednjeg ili spoljašnjeg uha, važno je da se prilikom pregleda uoči i postojanje tipičnih znakova retroaurikularne inflamacije (otok, crvenilo i retroaurikularna osetljivost) kao odraz postojanja mastoiditisa zbog činjenice da je mastoiditis druga najčešća komplikacija akutnog otitisa srednjeg uha. Pravovremena dijagnoza i adekvatan tretman mastoiditisa smanjuje rizik za nastanak njegove komplikacije kao što je tromboza cerebralnih venskih sinusa.

Ključne reči: otitis media, cerebralne vene, otalgija.

UVOD

Mastoiditis je zapaljenje mastoidnog dela temporalne kosti tj. mastoidnih vazdušnih ćelija. Kako su deca podložnija infekcijama srednjeg uha, oni su pod povećanim rizikom od razvoja akutnog mastoiditisa u poređenju sa odraslima. Najčešće, *akutni mastoiditis* je komplikacija akutne upale srednjeg uha. Subakutne infekcije srednjeg uha uzrokuju *subakutni mastoiditis*. Iako retki, drugi uzroci mastoiditisa dovode do infekcije samo mastoidnih vazdušnih ćelija, koja se naziva *početni mastoiditis*.

Mastoiditis se dakle može podeliti u tri kategorije na osnovu mehanizma infekcije:

- **Početni mastoiditis:** podrazumeva infekciju samo mastoidnih vazdušnih ćelija bez širenja u šupljinu srednjeg uva.
- **Akutni mastoiditis** (najčešća forma): infekcija epitelnih sluznica sa erozijom kroz koštane septacije mastoidnih vazdušnih ćelija. Ova erozija može napredovati do formiranja intrakavitnog apscesa, koji se može proširiti dalje na susedne strukture.
- **Subakutni mastoiditis:** nastaje nakon perzistentne infekcije srednjeg uha ili ponavljajućih epizoda akutne upale srednjeg uha sa neadekvatnom

CEREBRAL VENOUS SINUS THROMBOSIS AS A COMPLICATION OF MASTOIDITIS – A CASE REPORT WITH LITERATURE REVIEW

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Abstract: Introduction: Mastoiditis is the inflammation of the mastoid part of the temporal bone, specifically the mastoid air cells. It most commonly occurs as a complication of middle ear infection. Mastoiditis is a clinical diagnosis, and antibiotics play a central role in its treatment. Cerebral venous sinus thrombosis is a rare intracranial complication of acute mastoiditis. Case Presentation: A 49-year-old patient presented with tinnitus in the left ear, vertigo accompanied by nausea and vomiting, and stiffness on the left side of the neck. A general clinical and neurological examination was performed, which was normal at that time. Otoscopic examination of both ears was also normal. The patient was afebrile. Symptomatic treatment was prescribed, including analgesics, muscle relaxants, Betahistine, and a B-complex vitamin. Two days later, the patient returned with worsened symptoms, including a feeling of fullness and pain in the left ear, occasional discharge from the same ear, and severe pain and stiffness in the left side of the neck. Due to significant pain, the clinical examination was limited. Inspection revealed retroauricular swelling in the area of the left mastoid and the left side of the neck. The patient was urgently referred for consultation with an otorhinolaryngologist and neurologist at a regional hospital, who indicated an urgent non-contrast CT of the endocranium and laboratory tests. A contrast-enhanced CT of the endocranium confirmed the presence of venous sinus thrombosis along with inflammation of the left mastoid air cells. Radical trepanation of the temporal bone/mastoidectomy on the left side was performed. During hospitalization, parenteral antibiotic, anticoagulant, and supportive therapy were administered. The patient reported subjective improvement with the treatment, and follow-up clinical, laboratory, and CT findings indicated regression of the inflammatory process. Conclusion: In patients with ear pain, the most common symptom of middle or outer ear infection, it is important during the examination to identify typical signs of retroauricular inflammation (swelling, redness, and tenderness) as an indication of mastoiditis. Mastoiditis is the second most common complication of acute otitis media. Timely diagnosis and appropriate treatment of mastoiditis reduce the risk of complications, such as cerebral venous sinus thrombosis.

Keywords: otitis media, cerebral veins, otalgia

UVOD

Mastoiditis is an inflammation of the mastoid part of the temporal bone, specifically the mastoid air cells. Since children are more susceptible to middle ear infections, they are at an increased risk of developing acute mastoiditis compared to adults. Most commonly, acute mastoiditis is a complication of acute otitis media (middle ear infection). Subacute middle ear infections cause subacute mastoiditis. Although rare, other causes of mastoiditis lead to an infection of only the mastoid air cells, which is called early mastoiditis.

Mastoiditis can be divided into three categories based on the mechanism of infection:

- Early Mastoiditis: Involves infection of only the mastoid air cells without spreading into the middle ear cavity.
- Acute Mastoiditis (the most common form): Infection of the epithelial mucosa with erosion through the bony septations of the mastoid air cells. This erosion can progress to the formation of an intracavitary abscess, which may further spread to adjacent structures.
- Subacute Mastoiditis: Occurs after a persistent middle ear infection or repeated episodes of acute otitis media with inadequate antimicrobial therapy, leading to a persistent infection and

antimikrobnom terapijom što dovodi do uporne infekcije i erozije koštanih septacija između mastoidnih vazdušnih ćelija [1].

Sa pojavom antibiotika, razvoj akutnog mastoiditisa i progresija do opasnih posledica je malo verovatan. Međutim, ako se ne leči, mastoiditis može dovesti do po život opasnih posledica, uključujući meningitis, intrakranijalni apsces i trombozu venskog sinusa [2].

Najčešći patogen u mastoiditisu je *Streptococcus pneumoniae*. Drugi uobičajeni patogeni uključuju *Staphylococcus aureus*, *Streptococcus piogenes* i *Haemophilus influenzae*. Faktori rizika za mastoiditis su starost mlađa od dve godine, imunokompromitovano stanje, rekurentni akutni otitis srednjeg uha ili nepotpuna pneumatizacija mastoidnog procesa [3].

Kod odraslih, najčešći simptomi mastoiditisa su otalgija, otoreja i gubitak sluha, a obično su prisutni i tipični retoaurikularni znaci mastoiditisa (tj. otok, eritem, osetljivost retroaurikularne regije).

Otoskopskim pregledom će se otkriti ispušćenje zadnjeg gornjeg zida spoljašnjeg slušnog kanala i ispušćenje i gnoj iza bubne opne. Često bubna opna može biti perforirana sa drenažom purulentnog sadržaja. Normalna bubna opna obično, ali ne uvek, isključuje akutni mastoiditis [4].

Mastoiditis je klinička dijagnoza. Laboratorija i radiološke imidžing metode se koriste kao dodatak kada nismo sigurni u dijagnozu ili kada se razmatraju komplikacije akutnog mastoiditisa. Laboratorijske analize koje treba raditi uključuju KKS sa leukocitarnom formulom, sedimentaciju eritrocita i CRP. Najčešće će se videti povećan broj leukocita i povišeni markeri inflamacije (SE, CRP). Radiološka procena akutnog mastoiditisa koristi CT i MR snimanje [5].

Centralno mesto u terapiji mastoiditisa zauzimaju antibiotici. Dodatne invazivne terapijske mere koje uključuju miringotomiju, timpanostomiju i mastoidektomiju, mogu biti indikovane u zavisnosti od težine infekcije [5].

Komplikacije mastoiditisa nastaju širenjem infekcije put spolja prema periferiji ili put unutra prema mozgu. U zavisnosti od toga, javljaju se **ekstrakranijalne komplikacije** koje uključuju subperiostalni apsces, paraliza facijalnog nerva, labirintitis, petrozni apicitis i Bezold-ov apsces i **intrakranijalne**

komplikacije u vidu meningitisa, intrakranijalnih apscesa i tromboze cerebralnih venskih sinusa [6,7]. Ovi pacijenti će često imati klinički nalaz u vidu napada, nihalne rigidnosti, glavobolje i izmenjenog mentalnog statusa.

Tromboza cerebralnih venskih sinusa (TCVS) je retka komplikacija akutnog mastoiditisa sa opadanjem incidencije u postantibiotskoj eri [8]. Sastoji se od delimične ili potpune okluzije sinusa ili cerebralne vene. Najraniji opis datira iz prve polovine 19. veka. Od tada postaje sve više priznata zbog široko rasprostranjene dostupnosti naprednih tehnika snimanja, kao što su CT venografija, MR venografija i digitalna subtrakciona angiografija [9]. Najčešća mesta okluzije su transversalni sinusi (44-73%), gornji sagitalni sinus (39-62%), sigmoidni sinus (40-47%), duboki venski sistem (10,9%) i kortikalne vene (3,7-17,1%) [10]. Klinička prezentacija TCVS-a je promenljiva. Glavobolja je obično najčešći simptom (88,8%), a slede napadi (39,3%) i pareza (37,2%). Takođe se može pojaviti sa drugim fokalnim neurološkim deficitima ili izmenjenim mentalnim statusom. Intrakranijalno krvarenje se javlja kod 30-40% pacijenata [11].

PRIKAZ SLUČAJA

Pacijent starosti 49 godina javio se na pregled u ambulantu opšte prakse zbog zujanja u levom uhu unazad 7 dana, vrtoglavice praćene mučninom i povraćanjem u jednom navratu kao i ukočenosti leve polovine vrata. Uvidom u zdravstveni karton dolazi se do podatka da je u više navrata lečio upalu levog srednjeg uha u poslednjih godinu dana. Boluje od arterijske hipertenzije koju dobro kontroliše redovnom antihipertenzivnom terapijom. Ne boluje od drugih bolesti.

Načinjen je opšti klinički i neurološki pregled koji su u tom momentu bili uredni. Otoskopski nalaz oba uha je takođe bio uredan. Pacijent je bio afebrilan. Ordinirana je simptomatska terapija: Analgetici, miorelaksansi, Betahistin uz kompleks vitamina B.

Nakon dva dana se ponovo javlja na pregled sa pogoršanjem opisanih tegoba, osećajem punoće i bolom u levom uhu i kao i povremenim curenjem sadržaja iz istog uha. Prisutan je i izrazito jak bol i ukočenost u levoj polovini vrata. Zbog izražene bolnosti i nesaradnje pacijenta klinički pregled je bio ograničen (inspekcijom se uočilo postojanje otoka u predelu levog mastoida i leve polovine

erosion of the bony septations between the mastoid air cells. [1].

With the advent of antibiotics, the development of acute mastoiditis and progression to dangerous complications is unlikely. However, if left untreated, mastoiditis can lead to life-threatening complications, including meningitis, intracranial abscess, and venous sinus thrombosis [2].

The most common pathogen in mastoiditis is *Streptococcus pneumoniae*. Other common pathogens include *Staphylococcus aureus*, *Streptococcus pyogenes*, and *Haemophilus influenzae*. Risk factors for mastoiditis include age under two years, immunocompromised conditions, recurrent acute otitis media, or incomplete pneumatization of the mastoid process [3].

In adults, the most common symptoms of mastoiditis are otalgia (ear pain), otorrhea (ear discharge), and hearing loss, with typical retroauricular signs of mastoiditis usually present (i.e., swelling, erythema, tenderness in the retroauricular area).

Otoscopy will reveal bulging of the posterior superior wall of the external auditory canal and bulging with pus behind the tympanic membrane. The tympanic membrane is often perforated, with drainage of purulent material. A normal tympanic membrane generally, but not always, rules out acute mastoiditis [4].

Mastoiditis is a clinical diagnosis. Laboratory tests and radiological imaging methods are used as adjuncts when the diagnosis is uncertain or when complications of acute mastoiditis are being considered. Laboratory analyses include a complete blood count (CBC) with leukocyte formula, erythrocyte sedimentation rate (ESR), and C-reactive protein (CRP). Typically, an elevated white blood cell count and increased inflammatory markers (ESR, CRP) are observed. Radiological assessment of acute mastoiditis involves CT and MRI imaging [5].

Antibiotics play a central role in the treatment of mastoiditis. Additional invasive therapeutic measures, including myringotomy, tympanostomy, and mastoidectomy, may be indicated depending on the severity of the infection [5].

Complications of mastoiditis occur when the infection spreads outward toward the periphery or inward toward the brain. Depending on the direction, extracranial

complications may include subperiosteal abscess, facial nerve paralysis, labyrinthitis, petrositis, and Bezold's abscess, while intracranial complications include meningitis, intracranial abscesses, and cerebral venous sinus thrombosis [6,7]. These patients often present clinically with seizures, neck stiffness, headache, and altered mental status.

Cerebral Venous Sinus Thrombosis (CVST) is a rare complication of acute mastoiditis, with a declining incidence in the post-antibiotic era [8]. It involves partial or complete occlusion of a sinus or cerebral vein. The earliest description dates back to the first half of the 19th century. Since then, it has become increasingly recognized due to the widespread availability of advanced imaging techniques, such as CT venography, MR venography, and digital subtraction angiography [9].

The most common sites of occlusion are the transverse sinuses (44–73%), superior sagittal sinus (39–62%), sigmoid sinus (40–47%), deep venous system (10.9%), and cortical veins (3.7–17.1%) [10].

The clinical presentation of CVST is variable. Headache is typically the most common symptom (88.8%), followed by seizures (39.3%) and paresis (37.2%). It may also present with other focal neurological deficits or altered mental status. Intracranial hemorrhage occurs in 30–40% of patients [11].

CASE REPOST

A 49-year-old patient presented to a general practice clinic complaining of tinnitus in the left ear for the past 7 days, vertigo accompanied by nausea and a single episode of vomiting, as well as stiffness in the left side of the neck. Upon reviewing the patient's medical records, it was noted that he had been treated for left middle ear infection on several occasions over the past year. He has arterial hypertension, which is well-controlled with regular antihypertensive therapy. He has no other known medical conditions.

A general clinical and neurological examination was performed, both of which were unremarkable at that time. Otoscopy of both ears was also normal. The patient was afebrile. Symptomatic treatment was prescribed, including analgesics, muscle relaxants, betahistine, and a vitamin B complex.

vrata), te je pacijent hitno upućen na konsultativni pregled otorinolaringologu i neurologu u regionalnoj bolnici koji indikuju hitan nativni CT endokranijuma kao i laboratorijske analize (CRP 224,5, Leukociti 15, Trombociti 41, Eritrociti 3,6, Hemoglobin 120 g/l, Hematokrit 0,33 L/L). Na CT nalazu se opisuju inkluzije gasa koje se prate u predelu jugularnog kanala i lumena jugularne vene levo što ukazuje na trombozu venskog sinusa. Sa iste strane mastoidne ćelije i unutrašnje uho su ispunjeni hipodenznim, najverovatnije inflamatornim sadržajem kod mastoiditisa.

Pacijent je istog dana transportovan u Urgentni centar UKCV gde su ponovljene laboratorijske analize (CRP 231,6 mg/l, PCT 135,58 ng/ml, Leukociti 9,47, Eritrociti 3,7, Hemoglobin 119 g/l, Hematokrit 0,34 L/L, Trombociti 42) i ponovo urađen CT endokranijuma sa kontrastom. Uočava se kompletna opacifikacija mastoidnih šupljina sa leve strane, u prvom redu zapaljenske etiologije. Postkontrastno se na odloženim studijama sigmoidni sinus uz pomenute koštane strukture ne opacifikuje za razliku od kontralateralnog, sa vidnim gasnim partikulama unutar istog-tromboza levog venskog sinusa. U kontinuitetu sa levom sigmoidnim sinusom uočava se i parcijalno tromboziran i levi transversalni sinus sa vidnim gasnim partikulama.

Indikovano je hitan prijem na Kliniku za ORL i hirurgiju glave i vrata. Kliničkim pregledom prilikom prijema se konstatuje da je mastoid levo, manje otečen i bolan na palpaciju. Otomikroskopski levo spoljašnji ušni kanal je bio ispunjen većom količinom purulentnog sadržaja koji se ispira, koža zvukovoda bez promena. Pretimpanalno prisutne beličaste naslage. Bubna opna sa naglašenom vaskularizacijom, razlivenog svetlosnog refleksa. Načinjena je i paracenteza gde se dobija oskudan purulentni sadržaj. Indikovana je i urađena radikalna trepanacija temporalne kosti/mastoidektomija levo, a odstranjeni operativni materijal je poslat na patohistološku verifikaciju sa nalazom: *Inflammatio phlegmonosopurulenta acuta mucosae*. U pregledanom materijalu se nalazio i holesteatomski debrisi. Intraoperativno je uzet i bris purulentnog sadržaja gde je izolovan *Actinomyces* spp. U toku hospitalizacije ordinirana parenteralna antibiotska, antikoagulantna (LMWH) i suportivna terapija. Redovno su praćeni laboratorijski parametri i ponavljani nalazi CT endokranijuma nativno i sa

kontrastom. Na primenjenu terapiju pacijent se subjektivno bolje osećao, a kontrolni klinički, laboratorijski i CT nalazi su ukazivali na regresiju inflamatornog procesa te je po završenoj hospitalizaciji savetovana dalja terapija oralnim antibioticima i primena LMWH sa prevođenjem – preklapanjem sa oralnim antikoagulantima (Acenokumarol) oko 5 dana da se postigne PT/in rod 2,0 do 3,0 uz kontrolnu INR u terapijskom opsegu. Na kontrolnim pregledima u narednih 6 meseci od hospitalizacije pacijent se osećao dobro uz uredne kliničke i laboratorijske nalaze.

DISKUSIJA

S obzirom da se pacijenti sa bolom u uhu kao najčešćim znakom upale srednjeg ili spoljašnjeg uha vrlo često prvo jave na pregled kod izabranog lekara opšte prakse ili kod dežurnog lekara u službi hitne pomoći, važno je da se prilikom pregleda uoči i postojanje tipičnih znakova retroaurikularne inflamacije (otok, crvenilo i retroaurikularna osetljivost) kao odraz postojanja mastoiditisa.

Ovo je važno zbog činjenice da je mastoiditis druga najčešća komplikacija akutnog otitisa srednjeg uha posle perforacije membrane bubne opne, a pravovremena dijagnoza i adekvatan tretman mastoiditisa smanjuje rizik za nastanak njegovih komplikacija koje mogu biti fatalne.

Palma (Palma) i dr. su u retrospektivnoj studiji na 62 pacijenta sa mastoiditisom izneli podatke da je od ukupnog broja pacijenata, kod 48,4% bilo tipičnih retroaurikularnih znakova inflamacije kao i ispupčenje zadnje-gornjeg zida spoljašnjeg slušnog kanala. Kod 51,6% pacijenata nisu uočeni znaci retroaurikularne zapaljenja, pa je dijagnoza zasnovana na CT nalazima. Tipični znaci retro-aurikularne inflamacije su uočeni u 53,4% slučajeva kod mastoiditisa nastalog u sklopu akutne upale srednjeg uha, a u 36,8% slučajeva mastoiditisa kod subakutne upale srednjeg uha. Od ukupnog broja pacijenata, 50% je imalo temperaturu na prijemu, a 21% je imalo temperaturu 38 °C [12]. Ova studija govori u prilog tome da se kod značajnog broja pacijenata i pored pažljivog kliničkog pregleda, može vrlo lako prevideti mastoiditis.

Ako pacijent ima kliničke znake i simptome akutnog mastoiditisa, trebalo bi da se uputi na hitan konsultativni pregled otorinolaringologu, jer će ovaj pacijent

Two days later, the patient returned with worsening of the described symptoms, including a feeling of fullness and pain in the left ear, as well as intermittent discharge from the same ear. There was also severe pain and stiffness in the left side of the neck. Due to the patient's intense pain and poor cooperation, the clinical examination was limited. Inspection revealed swelling in the area of the left mastoid and left side of the neck. The patient was urgently referred for consultation with an otorhinolaryngologist (ENT specialist) and a neurologist at the regional hospital. They recommended an urgent non-contrast CT of the endocranium and laboratory tests, which showed: CRP: 224.5 mg/L; Leukocytes: $15 \times 10^9/L$; Platelets: $41 \times 10^9/L$; Erythrocytes: $3.6 \times 10^{12}/L$; Hemoglobin: 120 g/L; Hematocrit: 0.33 L/L. The CT scan revealed the presence of gas inclusions tracking in the region of the jugular canal and the lumen of the left jugular vein, indicating venous sinus thrombosis. The left mastoid air cells and inner ear were filled with hypodense material, most likely inflammatory in nature, consistent with mastoiditis.

The patient was transported on the same day to the Emergency Center of UKCV, where laboratory tests were repeated: CRP: 231.6 mg/L; PCT: 135.58 ng/mL; Leukocytes: $9.47 \times 10^9/L$; Erythrocytes: $3.7 \times 10^{12}/L$; Hemoglobin: 119 g/L; Hematocrit: 0.34 L/L; Platelets: $42 \times 10^9/L$. A contrast-enhanced CT of the endocranium was also repeated. The scan showed complete opacification of the left mastoid air cells, primarily of inflammatory etiology. Post-contrast delayed studies revealed that the sigmoid sinus, along with the adjacent bony structures, did not opacify, unlike the contralateral side, with visible gas particles within the sinus—indicative of left venous sinus thrombosis. Additionally, in continuity with the left sigmoid sinus, the left transverse sinus was observed to be partially thrombosed with visible gas particles.

An urgent admission to the ENT Clinic and Head and Neck Surgery was indicated. Upon clinical examination at admission, it was noted that the left mastoid was slightly swollen and painful on palpation. Otomicroscopic examination of the left external auditory canal revealed it to be filled with a large amount of purulent material, which was irrigated. The skin of the ear canal showed no changes. Whitish

deposits were present pre-tympanically, and the tympanic membrane displayed pronounced vascularization with a diffuse light reflex. A paracentesis was performed, yielding a small amount of purulent material. An urgent radical mastoidectomy (trepanation of the temporal bone) was performed on the left side, and the surgical material was sent for pathohistological verification. The findings were: Inflammatio phlegmonosopurulenta acuta mucosae (acute phlegmonous-purulent inflammation of the mucosa). Additionally, cholesteatomatous debris was found in the examined material. Intraoperatively, a swab of the purulent material was taken, and *Actinomyces* spp. was isolated. During hospitalization, the patient received parenteral antibiotic therapy, anticoagulant therapy (LMWH), and supportive care. Laboratory parameters and CT scans of the endocranium (native and with contrast) were regularly monitored. The patient reported subjective improvement with the applied therapy, and follow-up clinical, laboratory, and CT findings indicated regression of the inflammatory process. Upon completion of hospitalization, the patient was advised to continue treatment with oral antibiotics and LMWH, with a transition to oral anticoagulants (Acenocoumarol). The LMWH was overlapped with Acenocoumarol for about five days to achieve a PT/INR ratio of 2.0–3.0, with INR monitored in the therapeutic range. On follow-up visits over the next six months after hospitalization, the patient reported feeling well, with normal clinical and laboratory findings.

DISCUSSION

Since ear pain is the most common sign of middle or external ear inflammation, patients often first present to their primary care physician or the on-duty doctor at the emergency service. It is crucial that during the examination, the presence of typical signs of retroauricular inflammation (swelling, redness, and retroauricular tenderness) is recognized, as these may indicate the presence of mastoiditis. This is important because mastoiditis is the second most common complication of acute otitis media, after tympanic membrane perforation. Timely diagnosis and appropriate treatment of mastoiditis reduce the risk of developing potentially fatal complications. Palma et al., in a retrospective study of 62 patients with mastoiditis, reported that out of

verovatno biti primljen u bolnicu zbog ordiniranja parenteralnih antibiotika, miringotomije, postavljanja cevi za timpanostomiju i moguće mastoidektomije. Za pacijente koji se javljaju zbog čestih epizoda akutnog otitisa ili hroničnog otitisa srednjeg uha koji su inače stabilni i nemaju znake za mastoiditis, preporučuje se ambulantni pregled otorinolaringologa radi konsultacija u vezi sa rizikom i prevencijom od mastoiditisa [13].

Većina pacijenata sa nekomplikovanim akutnim mastoiditisom rešava simptome konzervativnim merama, uključujući antibiotike, kortikosteroide i miringotomiju (incizija bubne opne, paracenteza), bez potrebe za mastoidektomijom. Ključno je pratiti pacijente koji se leče zbog akutnog mastoiditisa, posebno u prvih 48 sati. U slučajevima kada se klinički status pacijenta ne promeni ili pogorša od prijema, tada je indikovana mastoidektomija [14].

Česte debate među lekarima u vezi sa lečenjem upale srednjeg uha su primena antibiotika kao i posledice nelečenih infekcija. Kao što je pomenuto, otitis srednjeg uha može napredovati u mastoiditis, koji može imati fatalne komplikacije. Mnogi slučajevi upale srednjeg uha su virusni, međutim pacijentima se ordiniraju antibiotici. Iz perspektive lekara, izuzetno je teško reći na osnovu fizičkog pregleda da li je infekcija pacijenta bakterijska ili virusna. Istorija pacijenta može pomoći u dijagnozi, ali je i dalje to veliki izazov. Ovo može dovesti do preteranog propisivanja antibiotika i zloupotrebe, što može dovesti do otpornih infekcija. Sa druge strane, lekar mora uzeti u obzir posledice infekcije ako se ne leči. Na kraju, da bi se poboljšao ishod pacijenata, lekar mora da uzme detaljnu anamnezu, adekvatan fizikalni pregled, konsultuje ORL specijalistu u nejasnim slučajevima, jer nešto tako jednostavno kao što je infekcija uha može na kraju dovesti do letalnog ishoda. Konačno, da bi se poboljšali rezultati zdravstvenog sistema u celini, trebalo bi da se sprovedu dalje studije i da se dodatno razmotri ambulantno lečenje nekomplikovanog akutnog mastoiditisa. Izbegavanje prijema u bolnicu sprečava jatrogene komplikacije, povećava zadovoljstvo pacijenata i smanjuje troškove zdravstvene zaštite [13].

TCVS je redak oblik venske tromboembolije (VTE) u odrasloj populaciji, sa incidencom od 3-4/1.000.000 i većom dominacijom kod žena sa odnosom 3:1 u

poređenju sa muškarcima [15]. Akutni otitis i mastoiditis su glavni faktori rizika za TCVS zbog širenja infekcije iz malih venula koje dreniraju mastoidnu šupljinu u sigmoidni sinus i izazivaju direktno širenje inflamatornog procesa. Ovo dalje dovodi do okluzije cerebralnih vena i duralnih venskih sinusa, što uzrokuje kašnjenje u apsorpciji cerebrospinalne tečnosti, što zauzvrat izaziva povišen venski pritisak čime se povećava intrakranijalni pritisak poznat i kao intrakranijalna hipertenzija [16]. Ostali faktori rizika koje treba imati na umu uključuju oralne kontraceptive, puerperijum i povrede glave ili direktne povrede tokom neurohirurških procedura. Žene na oralnim kontraceptivima i pacijenti sa aktivnim karcinomom su u protrombotičnom stanju, što dodatno povećava rizik od tromboze cerebralnog sinusa [17].

Kliničke manifestacije TCVS mogu varirati, pri čemu 30% može da se pojavi akutno u roku od 48 sati od blokade, 50% prisutno na subakutni način u roku od 48 sati do 30 dana, a 20% može da se pojavi bilo kada od 30 dana do šest meseci [15]. Ipsilateralna glavobolja je bila prisutna kod skoro 90% odraslih pacijenata za koje je utvrđeno da imaju TCVS [15,17]. Osim glavobolje, oni sa TCVS mogu imati edem i osetljivost na mastoidnom procesu poznatom kao Griesingerov znak, mučninu, povraćanje, izmenjen mentalni status, napade, fokalni motorni deficit, diplopiju i otalgiju [15-17]. Postoje izveštaji u kojima 13,2% pacijenata ima vizuelni deficit verovatno zbog edema papile usled povećanog intrakranijalnog pritiska [15,16,18]. Oftalmoplegija se takođe može javiti usled paralize okulomotornih, abducenskih ili trohlearnih nerava sa udruženom osetljivošću oka [15-17]. Ako se ne leči, povećana intrakranijalna hipertenzija može dovesti do komplikacija opasnih po život, kao što su trajno slepilo, epileptični status, koma i smrt od cerebralne hernije [17].

Kada je klinička sumnja velika, konačna dijagnoza je neophodna neuroimidžingom. MRI mozga u kombinaciji sa MR venografijom (MRV) je najosetljiviji i najbolji modalitet za [17,19]. Kompjuterska tomografska venografija (CTV) i MRV imaju osetljivost od 95% [15].

Zanimljivo je da postoji studija u literaturi koja opisuje upotrebu ultrazvuka u identifikaciji komplikacija mastoiditisa. U populaciji pacijenata od 10, ultrazvuk je mogao da identifikuje komplikacije u 9 slučajeva. Trenutno, CT skeniranje je standard nege;

the total number of patients, 48.4% exhibited typical retroauricular signs of inflammation and bulging of the posterior-superior wall of the external auditory canal. In 51.6% of patients, signs of retroauricular inflammation were not observed, and the diagnosis was based on CT findings.

Typical signs of retroauricular inflammation were observed in 53.4% of cases where mastoiditis developed as part of acute otitis media, and in 36.8% of cases where mastoiditis occurred with subacute otitis media. Of the total number of patients, 50% had a fever upon admission, and 21% had a temperature of 38°C [12]. This study supports the notion that in a significant number of patients, mastoiditis can be easily overlooked, even with a careful clinical examination.

If a patient presents with clinical signs and symptoms of acute mastoiditis, they should be referred for an urgent ENT consultation, as the patient will likely require hospital admission for parenteral antibiotics, myringotomy, tympanostomy tube placement, and possibly mastoidectomy. For patients who present with frequent episodes of acute otitis or chronic otitis media who are otherwise stable and show no signs of mastoiditis, an outpatient ENT consultation is recommended to discuss the risk and prevention of mastoiditis [13].

Most patients with uncomplicated acute mastoiditis resolve their symptoms with conservative measures, including antibiotics, corticosteroids, and myringotomy (tympanic membrane incision, paracentesis), without the need for mastoidectomy. It is crucial to monitor patients closely, especially in the first 48 hours of treatment. If the patient's clinical status does not improve or worsens after admission, mastoidectomy is indicated [14]. There is ongoing debate among physicians regarding the treatment of otitis media, specifically the use of antibiotics and the consequences of untreated infections. As mentioned, otitis media can progress to mastoiditis, which may lead to fatal complications.

Many cases of otitis media are viral, yet patients are often prescribed antibiotics. From a physician's perspective, it is extremely difficult to determine whether a patient's infection is bacterial or viral based on physical examination alone. Patient history can aid in diagnosis, but it remains a significant challenge. This uncertainty may lead to the overprescription of antibiotics

and subsequent antibiotic misuse, contributing to the development of antibiotic-resistant infections. On the other hand, physicians must consider the consequences of untreated infections. Ultimately, to improve patient outcomes, physicians must:

Take a detailed medical history,

Perform an adequate physical examination,

Consult an ENT specialist in unclear cases, as even a seemingly simple ear infection can result in a fatal outcome.

To enhance the overall healthcare system's performance, further studies should investigate the outpatient management of uncomplicated acute mastoiditis. Avoiding hospital admission can prevent iatrogenic complications, improve patient satisfaction, and reduce healthcare costs [13].

Cerebral venous sinus thrombosis (CVST) is a rare form of venous thromboembolism (VTE) in the adult population, with an incidence of 3–4 per 1,000,000, and it is more common in women, with a 3:1 ratio compared to men [15].

Acute otitis and mastoiditis are significant risk factors for CVST due to the spread of infection from small venules draining the mastoid air cells into the sigmoid sinus, leading to the direct spread of inflammation. This process can cause occlusion of cerebral veins and dural venous sinuses, delaying cerebrospinal fluid (CSF) absorption, which in turn increases venous pressure, resulting in elevated intracranial pressure, also known as intracranial hypertension [16].

Other risk factors include: Oral contraceptive use, Puerperium, Head trauma, Direct injury during neurosurgical procedures. Women on oral contraceptives and patients with active cancer are in a prothrombotic state, further increasing the risk of cerebral sinus thrombosis [17].

Clinical manifestations of CVST vary: 30% present acutely within 48 hours of blockage, 50% present subacutely (between 48 hours and 30 days), 20% may present anytime between 30 days and six months [15]. Ipsilateral headache is present in nearly 90% of adult patients diagnosed with CVST [15,17]. In addition to headache, CVST patients may exhibit: Edema and tenderness over the mastoid process (Griesinger's sign), Nausea and vomiting, Altered mental status, Seizures, Focal motor deficit, Diplopia, Otalgia [15–17].

međutim, imajući u vidu obećavajuće rezultate ove studije, treba razmotriti dalje istraživačke napore usmerene na korišćenje ultrazvuka za identifikaciju komplikacija mastoiditisa; ovo je posebno važno za pedijatrijsku populaciju jer može sprečiti nepotrebno izlaganje zračenju CT skeniranja. Čak i ako ultrazvuk služi samo kao dodatak skriningu pacijenata koji će na kraju dobiti CT skeniranje, korist je ogromna za pedijatrijsku populaciju i ukupne troškove zdravstvene zaštite [20].

Kada se postavi dijagnoza TCVS, imperativ je započeti antikoagulaciju (AC) heparinom. U meta-analizi je pokazano da je početak heparina povezan sa apsolutnim smanjenjem mortaliteta od 13% [15,17]. Najčešće se koriste nefrakcionisani heparin (UFH) ili heparin niske molekularne težine (LMWH); međutim, zbog praktičnih prednosti, LMWH se preporučuje u odnosu na UFH [15]. Nema dovoljno dokaza o upotrebi novijih antikoagulanasa. Kod osoba sa prolaznim faktorima rizika kao što su infekcija, trauma ili trudnoća, trajanje AC može biti tri meseca ili tri do šest meseci [15]. Kod onih sa predisponirajućim protrombotičkim stanjima kao što je aktivni kancer, trajanje je duže, oko šest do 12 meseci [15]. Endovaskularna tromboliza za brzu rekanalizaciju i dekompresivnu kraniotomiju mogu se primeniti u teškim slučajevima opasnim po život koji ne

reaguju na medicinsku antikoagulansnu terapiju [15].

Istorijski se smatralo da TCVS ima visoku stopu mortaliteta zbog komplikacija opasnih po život. Međutim, sa novim tehnološkim napretkom u neuroimadžingu i ranom lečenju, stope mortaliteta su postale manje od 3% [16]. Prognoza kod TCVS-a je prilično povoljna.

Preter (Preter) i dr. retrospektivno je pogledao dugoročne ishode kod 77 pacijenata kojima je dijagnostikovao TCVS. On izveštava da 85% pacijenata koji su patili od TCVS nije imalo dugotrajne neurološke posledice tokom praćenja nakon 77,8 meseci. Takođe je otkrio da je 14,5% onih koji su imali neurološka oštećenja patilo od napadaja, kognitivnih i fokalnih neuroloških deficita [21].

ZAKLJUČAK

Kod pacijenata sa bolom u uhu, kao najčešćim znakom upale srednjeg ili spoljašnjeg uha, važno je da se prilikom pregleda uoči i postojanje tipičnih znakova retroaurikularne inflamacije (otok, crvenilo i retroaurikularna osetljivost) kao odraz postojanja mastoiditisa zbog činjenice da je mastoiditis druga najčešća komplikacija akutnog otitisa srednjeg uha. Pravovremena dijagnoza i adekvatan tretman mastoiditisa smanjuje rizik za nastanak njegove komplikacije kao što je tromboza cerebralnih venskih sinusa.

Reports indicate that 13.2% of patients may experience visual deficits, likely due to papilledema from increased intracranial pressure [15,16,18]. Ophthalmoplegia may also occur due to paralysis of the oculomotor, abducens, or trochlear nerves, often associated with eye pain [15–17]. If untreated, elevated intracranial pressure can lead to life-threatening complications, including: Permanent blindness, Status epilepticus, Coma, Death from cerebral herniation [17].

When clinical suspicion is high, a definitive diagnosis requires neuroimaging. Brain MRI combined with MR venography (MRV) is the most sensitive and best modality for diagnosis [17,19]. Computed Tomography Venography (CTV) and MRV both have a sensitivity of 95% [15]. Interestingly, a study in the literature describes the use of ultrasound in identifying complications of mastoiditis. In a population of 10 patients, ultrasound identified complications in 9 cases. Currently, CT scanning is the standard of care; however, given the promising results of this study, further research into using ultrasound to identify mastoiditis complications should be considered.

This is especially important for the pediatric population, as it may prevent unnecessary radiation exposure from CT scans. Even if ultrasound serves only as an adjunct for screening patients who eventually undergo CT scanning, the benefit is significant for both the pediatric population and overall healthcare costs [20]. When a diagnosis of cerebral venous sinus thrombosis (CVST) is made, it is imperative to initiate anticoagulation (AC) with heparin. A meta-analysis showed that starting heparin is associated with an absolute reduction in mortality of 13% [15,17].

The most commonly used anticoagulants are unfractionated heparin (UFH) or low molecular weight heparin (LMWH). Due to practical advantages, LMWH is recommended over UFH [15]. There is insufficient evidence regarding the use of new anticoagulants.

For individuals with transient risk factors, such as infection, trauma, or pregnancy, the duration of anticoagulation therapy is typically three months, or three to six months [15]. For those with predisposing prothrombotic conditions, such as active cancer, the duration is longer—approximately six to twelve months [15].

Endovascular thrombolysis for rapid recanalization and decompressive craniotomy may be considered in life-threatening cases that do not respond to anticoagulant therapy [15].

Historically, CVST was associated with a high mortality rate due to life-threatening complications. However, with advances in neuroimaging and early treatment, mortality rates have decreased to less than 3% [16]. The prognosis for CVST is generally favorable.

Preter et al. conducted a retrospective study examining the long-term outcomes in 77 patients diagnosed with CVST. The study reports that 85% of patients did not experience long-term neurological sequelae during a 77.8-month follow-up. Additionally, the study found that 14.5% of patients with neurological impairment suffered from seizures, cognitive deficits, and focal neurological deficits [21].

CONCLUSION

In patients presenting with ear pain, the most common symptom of middle or outer ear infection, it is crucial during examination to identify the presence of typical signs of retroauricular inflammation (swelling, redness, and tenderness behind the ear) as an indication of mastoiditis. This is important because mastoiditis is the second most common complication of acute otitis media.

Timely diagnosis and appropriate treatment of mastoiditis significantly reduce the risk of complications, such as cerebral venous sinus thrombosis (CVST).

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