Septic Arthritis of the Temporomandibular Joint in a 6-year-old Boy: A Case Report

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Abstract

Septic arthritis of the temporomandibular joint (TMJ) is an uncommon condition, particularly in pediatric patients. We present a case of a previously healthy 6-year-old boy who presented with septic arthritis of the TMJ with extra-articular involvement, which responded well to an extended course of intravenous antibiotic therapy, leading to complete resolution on follow-up imaging.

Keywords: *Septic arthritis, temporomandibular joint, pediatric, ultrasound, CT, MRI.*

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Introduction

Septic arthritis of the temporomandibular joint (TMJ) is a rare but serious condition, particularly in pediatric patients, caused by microbial pathogens (most commonly Staphylococcus aureus and Streptococcus species) through hematogenous spread, local spread from head and neck infections, or iatrogenic infection. It usually presents with preauricular pain, swelling, trismus, and fever. Ultrasound, CT and MRI play a pivotal role in the early diagnosis and management of TMJ septic arthritis, which is crucial to prevent complications such as joint destruction and ankylosis. (1)

Our goal is to illustrate the main imaging characteristics in a case of TMJ septic arthritis in a previously healthy child, managed with an extended course of intravenous antibiotic therapy and supportive care.

Case Presentation

A previously healthy 6-year-old boy presented with fever (39°C), right-sided preauricular swelling and ear pain. He also complained of throat and right cheek pain with reduced appetite, but no other symptoms. He was fully vaccinated, and family history was unremarkable.

Physical examination revealed swelling and tenderness around the right ear, while the remainder of the examination was normal. Otoscopic and otorhinolaryngological (ORL) evaluations were normal, and a dental cause was ruled out. The respiratory panel was negative.

Initial laboratory findings showed leukocytosis (23.1 ×109/L), neutrophilia (85.1%), and an elevated C-reactive protein (CRP) of 105.6 mg/L. Empiric intravenous ceftriaxone was initiated, but on the second day his condition worsened, with fever spiking to 40°C, chills, trismus (limiting jaw opening to about two finger-widths), and right-sided torticollis. Laboratory values showed an increasing CRP of 233.4 mg/L. Blood cultures obtained during the temperature spike were negative. Due to clinical deterioration, he was admitted, and antibiotic therapy was switched to intravenous cefazolin and clindamycin, along with antipyretics and intravenous hydration.

Ultrasound (US) of the affected region was performed, revealing significant right preauricular tenderness with an enlarged TMJ intra-articular space (0.23 cm), and a hypoechoic triangular inhomogeneous zone adjacent to the mandibular condyle consistent with an extra-articular collection ***(Figure 1).*** Mild reactive parotid inflammation was observed, without parotid duct dilation or calculi, along with a reactive intraparotid lymph node. Masseter involvement and soft tissue cellulitis were noted. Given these findings, a contrast-enhanced CT scan of the head and neck was recommended to further evaluate inflammatory changes in the right TMJ and confirm suspected septic arthritis.

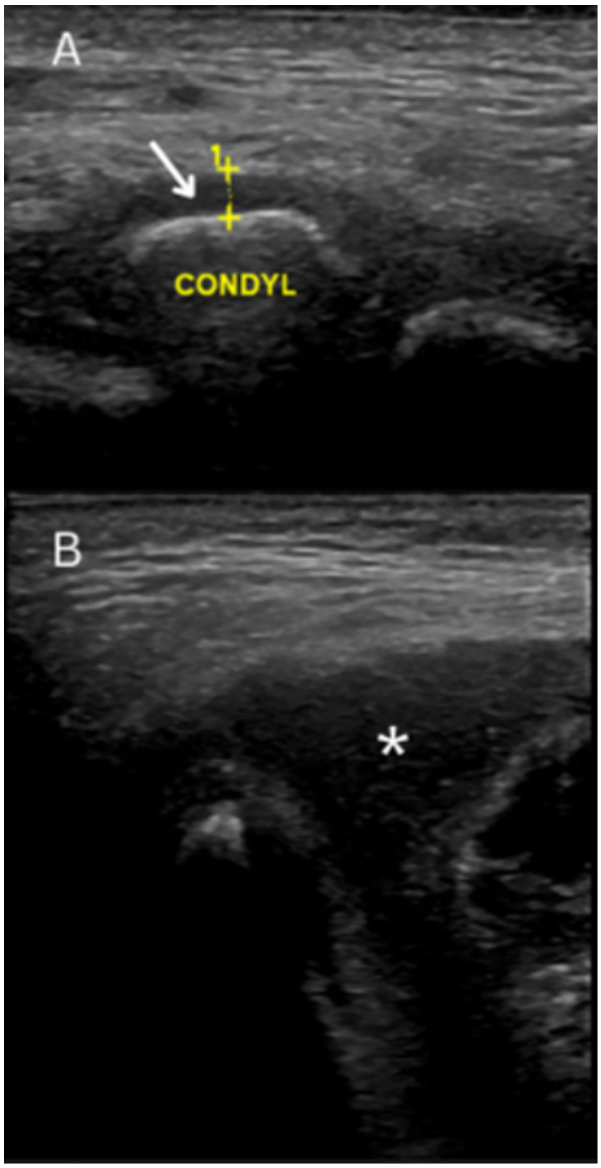

Figure 1: *Ultrasound of the right TMJ (A) shows distended intra-articular space with effusion (white arrow), continuous with a hypoechoic triangular collection (asterisk) in the surrounding masticator space soft tissue (B).*

Contrast-enhanced computed tomography (CT) of the head and neck revealed widened intra-articular space of the right TMJ compared to the left, suggestive of a joint effusion, without evidence of bony destruction. The condylar head was positioned more anteriorly, with thickened and edematous periarticular soft tissues. An irregular fluid collection with peripheral enhancement was identified in the right masticator space, measuring 28 × 17 × 17 mm, extending from the right temporomandibular joint (TMJ). The right masseter muscle appeared enlarged with surrounding fat stranding. Mild blurring of the ipsilateral parapharyngeal fat was also noted. The parotid glands appeared morphologically normal. The right mastoid air cells and middle ear were opacified, consistent with middle ear effusion, as well as some retained secretion in the left mastoid cells ***(Figure 2, 3***).

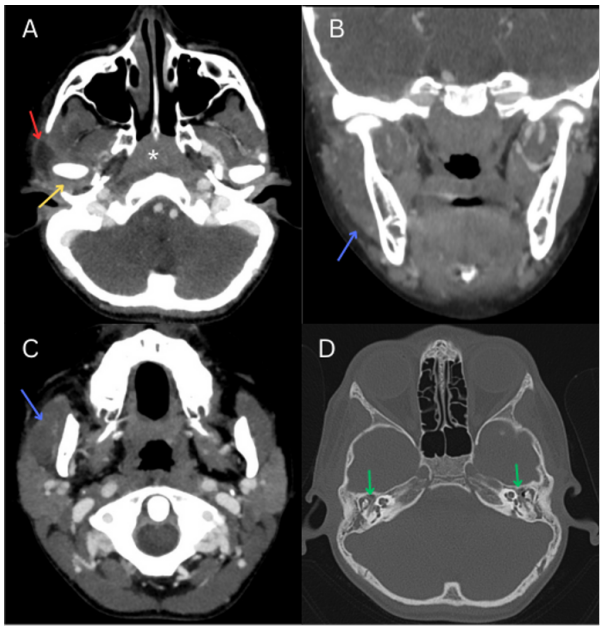

Figure 2: *Contrast-enhanced CT images. Axial images at the TMJ level (A) demonstrate right TMJ space distension with synovial thickening and effusion (yellow arrow), anterior displacement of the condylar head, and a pericondylar triangular inflammatory collection with peripheral enhancement (red arrow). Note the enlarged adenoid tonsils (asterisk). Coronal (B) and more caudal axial images (C) illustrate edema of the right masseter muscle with associated fat stranding (blue arrows), indicative of cellulitis. Bone window reconstructions at the level of the temporal bones (D) reveal bilateral mastoid air cell and middle ear opacification, more pronounced on the right side (green arrow).*

Additional findings included enlarged adenoid and palatine tonsils, with normal morphology of the oral cavity, pharynx and larynx. Cervical vasculature was patent. Reactive lymph nodes were present in levels I and II on the right.
Magnetic resonance imaging (MRI) of the temporomandibular joints, performed with contrast,

depict right TMJ intra-articular effusion with extra-articular soft tissue inflammatory spread. An

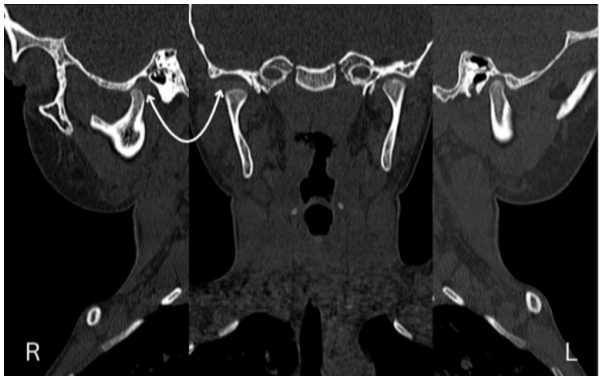

Figure 3: *Sagittal and coronal bone window reconstructions from the same CT images as Figure 2, clearly depicting right (R) TMJ intra-articular distension with an anteriorly displaced mandibular condyle (curved double arrow) and no evidence of bone destruction.*

extra-articular collection was noted in the masticator space, extending lamellarly to the temporal muscle. These findings were consistent with US and CT images and confirmed the diagnosis of septic arthritis of the right TMJ with extra-articular involvement. Additionally, fluid was present in the mastoid cells and tympanic cavity bilaterally, more pronounced on the right. Hypertrophic adenoid vegetation was observed in the epipharynx, along with reactive lymphadenopathy in the right neck region ***(Figure 4)***.

Joint aspiration was performed, and Streptococcus pyogenes (β-hemolytic) was detected via PCR analysis. A comprehensive immunological assessment revealed no underlying immunodeficiency; only findings of an appropriate reactive immune response to the infection were noted. The patient underwent a six-week course of intravenous clindamycin therapy, complemented by supportive care. This regimen led to clinical improvement, as evidenced by the resolution of fever and a significant decrease in C-reactive protein (CRP) levels. At discharge, ultrasonography demonstrated regression of joint distension and effusion, as well as resolution of the extra-articular collection. Follow-up magnetic resonance imaging (MRI) performed several months later confirmed complete resolution of the inflammatory process ***(Figure 5)***. The patient regained normal mandibular function without any complications.

Discussion

Septic arthritis of the temporomandibular joint (TMJ) is a rare condition, particularly in children, with limited cases reported in the literature. Its nonspecific clinical presentation can lead to diagnostic challenges, potentially resulting in delayed treatment and increased risk of complications such as chronic pain and joint dysfunction due to bone destruction and ankylosis (2).

It is usually caused by an infection that spreads hematogenously or via local contiguous spread from head and neck infections, iatrogenic procedures, or even trauma (3). TMJ is particularly susceptible to hematogenous spread due to the high vascularity of the synovium, combined with the absence of a basement membrane. Less frequently, direct spread of infection can be the cause in patients with concurrent otologic or odontogenic infections (2).

Although rare, septic TMJ arthritis may develop secondary to acute otitis media or mastoiditis, with infection potentially spreading through the bony partitions between the middle ear and the glenoid fossa, particularly in preschool children, where incomplete ossification of these thin plates can facilitate spread (4). However, in many cases, the original infectious sites were often occult (3).

In our case, CT and MRI scans revealed bilateral middle ear and mastoid air cell effusions, more pronounced on the side of septic TMJ arthritis. However, given the absence of any prior history or clinical signs of middle ear infection, a definitive diagnosis of acute otitis media or mastoiditis —and thus its role as the infection source—could not be established.

Additionally, given this rare presentation and the fact that our patient presented without any known underlying infection, a thorough immunological evaluation was conducted to rule out immunodeficiency, since immunocompromised individuals are at higher risk for septic arthritis (5).

The most common causative pathogen in both adults and children is Staphylococcus aureus, with Streptococcus species being somewhat predominant in pediatric cases, particularly among preschool-aged children—as seen in our case (1, 2, 3, 6, 7).

Clinical manifestations often include preauricular pain, tenderness, swelling and erythema, with trismus and fever. Because these symptoms are non-specific, overlap with ear and dental infections, and can resemble other TMJ disorders, diagnosis becomes challenging and necessitates a thorough patient history, physical examination, laboratory evaluations, and imaging to confirm (3, 8).

Laboratory findings are not specific but are useful for confirming infection, elevated inflammatory markers such as C-reactive protein (CRP), white cell count, and neutrophils may be observed (3).

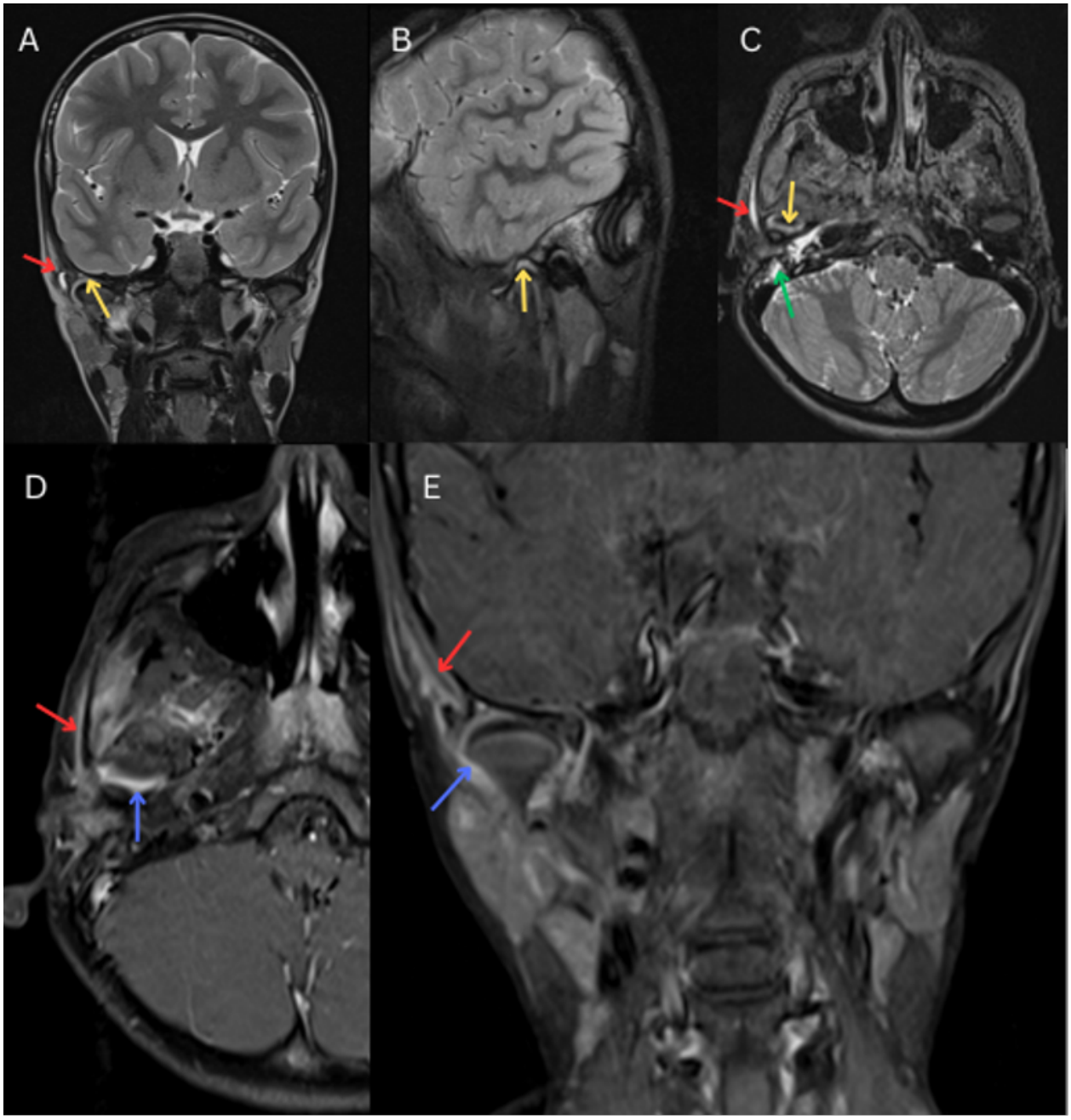

Figure 4: *MRI of TM joints with contrast. Coronal (A), sagittal (B) and axial (C) T2 images with fat suppression show right TMJ effusion (yellow arrows) and a masticator space fluid collection (red arrows). There is extensive right mastoid cells and middle ear effusion (green arrow). Post-contrast axial (D) and coronal (E) T1 images with fat suppression depict synovial enhancement (blue arrows) and enhancement of the fluid collection and surrounding soft tissue phlegmon (red arrows).*

In our case, an ultrasound scan of the affected region was initially performed as a quick and easily accessible imaging method, revealing TMJ space distension and surrounding fluid collection, which raised the suspicion of septic arthritis. These findings prompted further evaluation with more advanced imaging techniques, specifically contrast enhanced CT and MRI of the head and neck.

CT is valuable for assessing TMJ joint space morphology, condylar head misplacement due to distension, and soft tissue changes with abscess formation, particularly excelling at detecting bone destruction—which was absent in our case—and chronic complications like osteoarthritis or ankylosis.

MRI, on the other hand, is considered the gold standard because it offers higher sensitivity for early detection of infection, providing detailed visualization of joint effusions, synovial enhancement, and adjacent soft tissue involvement, as well as evaluating signs of potential osteomyelitis (3, 7, 8).

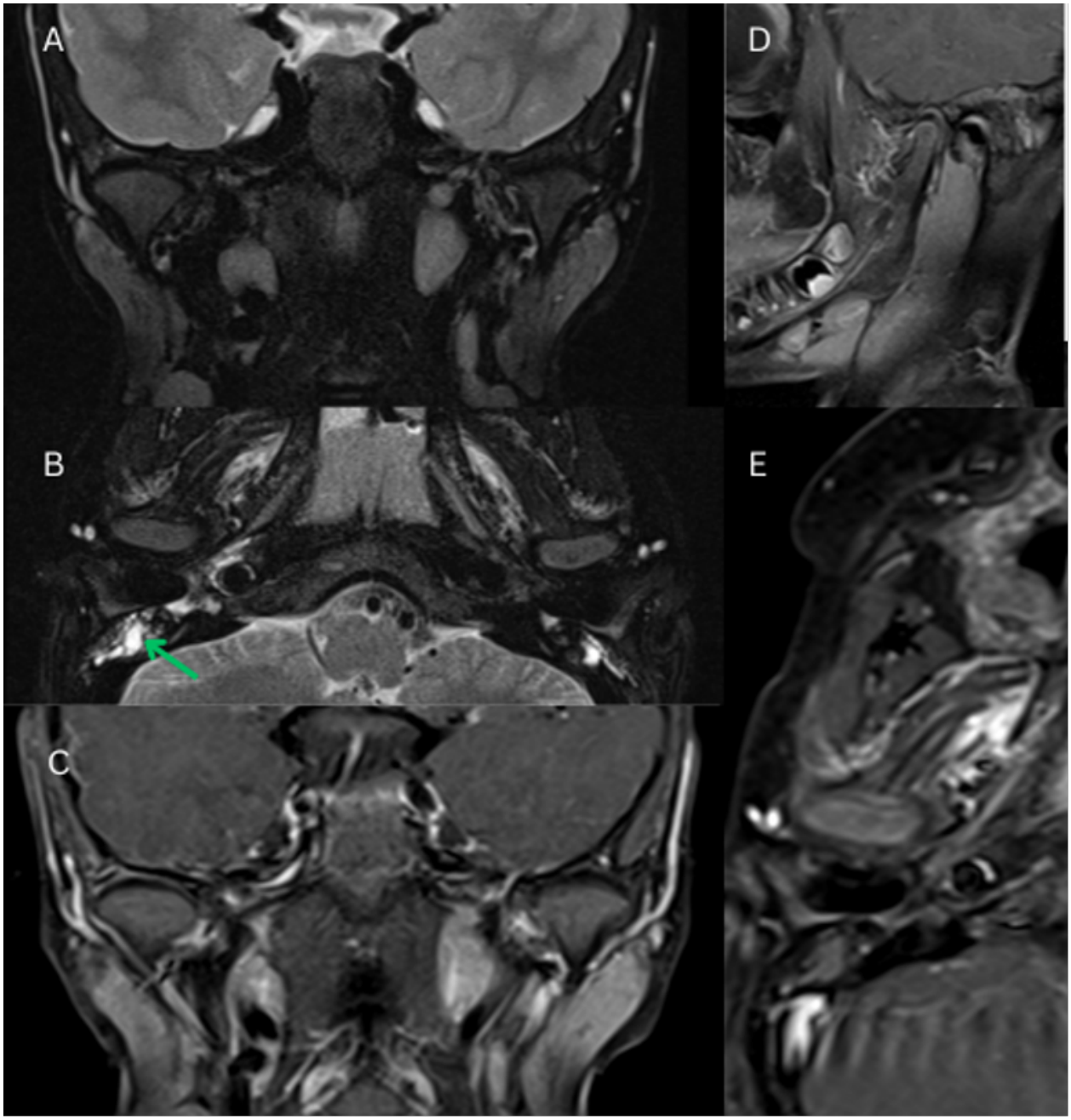

Figure 5: *Follow up MRI performed several months after discharge reveals complete resolution of the inflammatory process within the joint and the surrounding soft tissue on fat-suppressed T2 (A, B) and post-contrast T1 images (C, D, E). Persistent right middle ear and mastoid cell effusion (green arrow on B).*

In cases where septic arthritis is suspected, a broad-spectrum empirical and parenteral antibiotic should be administered immediately, to prevent long term complications. (2, 5) Once the diagnosis is confirmed through advanced imaging methods, joint aspiration should be performed (7), with the causative pathogen best identified by PCR (6), along with culture and sensitivity testing. The antibiotic treatment can then be adjusted accordingly if needed, with a recommended course of four to eight weeks, administered orally or intravenously, depending on the severity of the case (2, 5).

In severe cases, surgical interventions—including arthrocentesis (drainage expedites healing), arthroscopy, or arthrotomy—may be necessary. Significant joint damage may necessitate condylar shaving or condylectomy. Once the acute phase subsides, early physical therapy with controlled jaw exercises is crucial, especially in growing children, to prevent fibrosis and ankylosis (5, 7).

Most patients typically achieve complete resolution of symptoms and signs of infection on follow-up imaging after prolonged antibiotic therapy and regain full TMJ function – as did our patient.

However, as complications may arise more than a year after the initial disease onset, long-term monitoring is advised (5).

Conclusion:

This case underscores the importance of maintaining a high index of suspicion for TMJ septic arthritis in pediatric patients presenting with trismus, preauricular swelling, and fever. Prompt imaging studies, including ultrasound, computed tomography (CT), and magnetic resonance imaging (MRI), are essential for accurate diagnosis. Early and aggressive intravenous antibiotic therapy remains the cornerstone of management, with surgical intervention reserved for cases in which there is no adequate response to medical treatment.

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Declarations

Consent for publication: The author clarifies that written informed consent was obtained and the anonymity of the patient was ensured. This study submitted to Swiss J. Rad. Nucl. Med. has been conducted in accordance with the Declaration of Helsinki and according to requirements of all applicable local and international standards. All authors contributed to the conception and design of the manuscript, participated in drafting and revising the content critically for important intellectual input, and approved the final version for publication. Each author agrees to be accountable for all aspects of the work, ensuring its accuracy and integrity. Written informed consent was obtained from the patient's legal guardians for the publication of this case report and any accompanying images.

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