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Reporte de Caso

Osteomyelitis of the Maxilla Secondary to Periorbital Cellulitis in a Neonate: A Case Report

Osteomielitis del maxilar secundaria a celulitis periorbitaria en un neonato: reporte de un caso

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RESUMEN

La osteomielitis es la infección del tejido y médula ósea, causado principalmente por bacterias, microorganismos que pueden diseminarse por tres vías: hematógena, por contigüidad o directa. En la etapa neonatal es una entidad grave y poco frecuente, que puede causar secuelas osteoarticulares permanentes, presentándose en esta etapa de la vida con características etiopatogénicas e histológicas diferentes a las presentaciones en otros grupos etarios. Su presentación en el macizo facial es poco y puede ser secundaria a infecciones de tejidos blandos de la cara. Se presenta el caso de un neonato femenino de 20 días de vida que desencadenó osteomielitis del maxilar superior secundaria a celulitis facial y periorbitaria, con determinación de Staphylococus aureus en hemocultivos y secreción ocular, manejado con cobertura antibiótica de amplio espectro y manejo quirúrgico expectante, con evolución clínica favorable, en seguimiento actual por ambulatorio.

Palabras clave: Celulitis periorbitaria, osteomielitis, neonatal, infección bacteriana, celulitis.

ABSTRACT

Osteomyelitis is an infection of bone tissue and bone marrow, primarily caused by bacteria, which may spread through three main routes: hematogenous dissemination, contiguous spread, or direct inoculation. In the neo-

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natal period, it represents a rare but severe condition with the potential to cause permanent osteoarticular sequelae. During this stage of life, osteomyelitis exhibits etiopathogenic and histological features that differ from those observed in other age groups. Involvement of the facial skeleton is uncommon and is usually secondary to contiguous soft tissue infections of the face. We report the case of a 20-day-old female neonate who developed osteomyelitis of the maxilla secondary to facial and periorbital cellulitis, with Staphylococcus aureus isolated from blood cultures and ocular discharge. The patient was treated with broad-spectrum antibiotic therapy and conservative surgical management, showing favorable clinical evolution and currently remaining under outpatient follow-up.

Keywords: Periorbital cellulitis; osteomyelitis; neonatal period; bacterial infection; cellulitis.

Introducción

Osteomyelitis (OM) is an infection of bone tissue and bone marrow, primarily caused by bacteria, which may spread through three main routes: hematogenous dissemination, contiguous spread, or direct inoculation[1]. In the neonatal period, hematogenous spread represents the predominant mechanism of infection. During the early phase of the disease, increased bone vascularity occurs as a result of the inflammatory response, whereas reduced vascularity is observed in chronic cases[2,5].

Identified risk factors include prematurity and prolonged stays in critical care units, often associated with catheter-related infections. In neonates, OM presents with etiopathogenic and histological characteristics that differ from those observed in older patients[3].

Maxillary osteomyelitis predominantly affects infants and young children and may arise from hematogenous dissemination or as a complication of adjacent staphylococcal skin infections[4]. The most commonly reported etiologic agents include Staphylococcus aureus, Bacteroides spp., and Streptococcus spp[5]. Clinical presentation is usually nonspecific and includes prolonged fever, irritability, edema, erythema, pain, and functional impairment[6].

The diagnosis of maxillary osteomyelitis relies on clinical evaluation, imaging studies, biopsy, and microbiological cultures[7], with blood cultures considered the gold standard for etiologic identification. Treatment is primarily based on broad-spectrum antibiotic therapy[8], with surgical intervention reserved for selected cases.

Case Presentation

A 20-day-old female neonate, born to a 23-year-old mother, fifth pregnancy, delivered via uncomplicated vaginal delivery at 39 weeks of gestation, was admitted with a 48-hour history of fever up to 38 °C, immediate postprandial vomiting, abdominal distension, right-sided periorbital edema, and greenish discharge from the upper right gingival region.

On admission, the patient was irritable, febrile, and tachycardic. Physical examination revealed edema and erythema of the right eyelid, induration of the right cheek, yellowish discharge from the right nostril, and a violaceous mass approximately 0.5 cm in diameter in the upper right gingiva, associated with greenish discharge and whitish spots on the mucosa.

Given the presentation of a febrile neonate, an initial diagnostic approach for late-onset neonatal sepsis and periorbital cellulitis was initiated. Blood and site cultures were obtained. Chest radiography showed right perihilar reinforcement, while abdominal radiography revealed poor air distribution and mild interloop edema. Transfontanellar ultrasound was normal, whereas abdominal ultrasound demonstrated hepatomegaly and splenomegaly.

Laboratory evaluation showed leukocytosis with neutrophilia (absolute neutrophil count of 15,200), reactive thrombocytosis, elevated acute-phase reactants, and indirect hyperbilirubinemia. Immunoglobulin and complement levels were normal for age, as were organ function tests. Urine and cerebrospinal fluid cultures were negative, and echocardiography was unremarkable.

Contrast-enhanced computed tomography (CT) of the orbits and facial bones was performed (Figure 1). Ophthalmologic evaluation revealed a normal fundoscopic examination and findings consistent with right periorbital cellulitis, recommending conservative management and ophthalmic antibiotic therapy. In conjunction with neonatology, the infectious diseases team maintained ampicillin and added vancomycin. Maxillofacial surgery recommended gingival cleansing with Dakin's solution and continuation of antibiotic therapy.

Subsequent clinical deterioration included worsening right periorbital edema with inability to open the eye, marked proptosis, and purulent discharge. Blood cultures and ocular secretion cultures yielded methicillin-resistant Staphylococcus aureus. Leukocytosis and elevated inflammatory markers persisted. Following multidisciplinary discussion, conservative management and antibiotic therapy were continued.

After 14 days of antibiotic treatment, clinical improvement of periorbital edema was noted, with improvement in blood counts but persistent elevation of inflammatory markers. Follow-up CT of the face and orbits was performed (Figures 2 and 3), followed by contrast-enhanced magnetic resonance imaging (MRI) of the right orbit (Figure 4). Based on clinical and radiological evidence of osteomyelitis, and considering the patient's age and surgical risks, conservative management with continued vancomycin therapy and close monitoring of inflammatory markers was maintained.

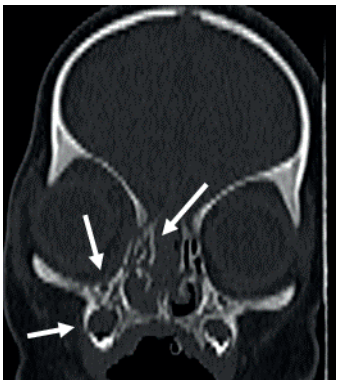


Figure 1. Non-contrast coronal computed tomography demonstrating mucosal thickening of the right maxillary sinus and adjacent osteomeatal complex, associated with irregularity of the medial wall and floor of the ipsilateral orbit, as well as inflammatory changes in the anterior third of the contiguous extraconal fat, consistent with complicated sinusitis with associated osteomyelitis.



Figures 2 and 3. Contrast-enhanced axial computed tomography showing extension of inflammatory changes to the adjacent canthal region (white arrows), mild protrusion of the right globe (interzygomatic line–anterior corneal border distance: 14.3 mm on the right and 11.3 mm on the left), and millimetric bone fragments within the extraconal fat associated with the inflammatory process (yellow arrow).

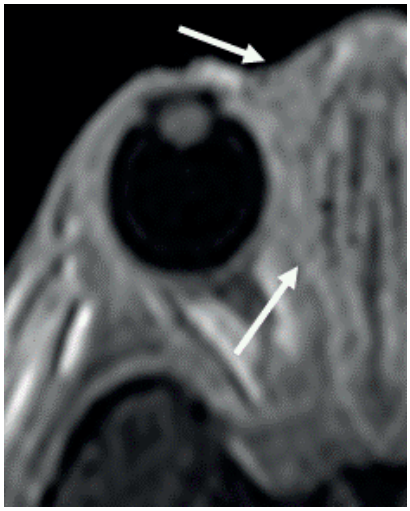


Figure 4. Axial contrast-enhanced T1-weighted magnetic resonance imaging demonstrating inflammatory changes involving the extraconal fat and the medial canthal regions.

In view of the improvement in clinical and laboratory findings, it was decided to complete 30 days of antibiotic therapy with vancomycin, followed by a switch to oral clindamycin to complete a total of six weeks of antimicrobial treatment. After joint reassessment by the neonatology, ophthalmology, maxillofacial surgery, and infectious diseases teams, the patient was discharged with a plan for multidisciplinary outpatient follow-up.

Discussion

Osteomyelitis is an inflammatory process of bone caused by bacterial or fungal infection. Maxillary osteomyelitis in the neonatal period and early infancy is an exceptionally rare condition; the first case was described in 1847 by Jacob and Sagorin[9]. The incidence of acute osteomyelitis (AO) is estimated at 1 to 3 cases per 1,000 children[10]. However, in our country, there are no precise epidemiological data regarding prevalence or incidence, likely due to the rarity of this clinical presentation.

According to etiopathogenic classification, AO is divided into three types: hematogenous osteomyelitis; osteomyelitis secondary to contiguous spread related to trauma, penetrating wounds, surgical procedures, or joint replacement; and osteomyelitis secondary to vascular insufficiency, with the hematogenous route being the most frequent, particularly in neonates[11]. Nevertheless, other predisposing factors have been described in the literature, including genetic conditions such as sickle cell anemia and osteopetrosis, as well as toxic and environmental factors, including birth-related trauma[12,13].

Factors associated with maxillary osteomyelitis include infections of the orofacial region, eyes, nose, paranasal sinuses, and ears, as well as alveolodental infections[14,15]. In the present case, the presence of a rudimentary tooth in the palatal region with subsequent abscess formation represented a significant risk factor for the development of maxillary osteomyelitis.

Clinical presentation during the neonatal period is highly variable and often nonspecific, and may manifest solely as irritability, fever, or even gastrointestinal symptoms such as diarrhea[16]. Purulent nasal discharge or drainage from the canine fossa may also be observed[17]. In hematogenous acute osteomyelitis, symptom onset typically occurs within less than two weeks[11], consistent with the clinical course observed in our patient.

Once the maxilla is involved, rapid spread to adjacent structures may occur, including the orbital region, dental follicles, nasal cavity, and medial maxillary sinus. Clinically, this results in erythema and edema of the periorbital region, usually involving the medial aspect, as well as cheek and periorbital soft tissue swelling[14,15,17]. In more severe cases, proptosis, chemosis, and ophthalmoplegia may develop[14], findings that were consistent with the clinical deterioration and right-eye proptosis observed in our patient.

The most frequently isolated pathogen across all age groups is Staphylococcus aureus, followed by Streptococcus agalactiae, enteric gram-negative bacteria, and Candida spp., particularly in infants younger than one year[3]. In the present case, S. aureus was isolated, in agreement with global literature. It is important to highlight

the increasing emergence of antimicrobial resistance and methicillin-resistant strains (MRSA). In our patient, the isolated strain was methicillin-susceptible, which represents a favorable prognostic factor.

The diagnosis of maxillary osteomyelitis is primarily clinical and supported by laboratory and imaging studies. Inflammatory markers such as leukocyte count and C-reactive protein (CRP) are useful for monitoring disease progression; CRP values below 20 mg/L have been associated with criteria for discontinuation of antibiotic therapy. However, independent predictors of MRSA infection have been described, including elevated body temperature, low hematocrit, leukocytosis, and increased CRP levels[18].

Computed tomography and magnetic resonance imaging are essential tools for assessing changes in tissue density, lytic lesions, and periosteal involvement associated with maxillary osteomyelitis[19]. In our patient, initial imaging demonstrated increased density of the maxillary and ethmoidal sinuses and hypertrophy of the nasal turbinate mucosa, followed by progression to lytic lesions of the maxillary bone, confirmed on subsequent imaging studies.

The treatment of maxillary osteomyelitis remains controversial, as there is no absolute consensus regarding exclusive conservative management with antibiotics versus the need for surgical intervention. Since the first reported cases, treatment has been guided by microbiological sensitivity; penicillin has historically been used as first-line therapy[14,16]. In our patient, empirical therapy with an aminopenicillin and an aminoglycoside was initiated to cover S. aureus and enteric gram-negative bacteria. However, definitive antimicrobial selection depends on the isolated pathogen, its susceptibility profile, and local resistance patterns; in cases of suspected or confirmed MRSA infection, vancomycin is the treatment of choice[19].

The duration of antibiotic therapy depends on the association with acute bacterial arthritis and the presence of osteomyelitis. In cases without osteomyelitis, a 10–14-day course of antibiotics is recommended[20]. In patients with osteomyelitis and isolation of S. aureus, treatment should be extended to 3–4 weeks, with longer courses required for resistant organisms[13,21]. In the present case, with methicillin-susceptible S. aureus isolated from blood and maxillary secretion cultures, three weeks of vancomycin therapy were completed due to initial concern for MRSA, considering risk factors such as age and extensive involvement of adjacent structures. The patient showed favorable clinical evolution without neurological complications and was discharged on oral lincosamide therapy, in accordance with international guidelines for the management of osteomyelitis[21].

Conclusion

Maxillary osteomyelitis in the neonatal period is an uncommon condition but is associated with significant morbidity and mortality. Early diagnosis is often challenging due to the nonspecific nature of initial clinical manifestations and the rapid progression to orbital and systemic complications. This case highlights the importance of maintaining a high index of suspicion in infants with facial or periorbital cellulitis showing poor response or refractory evolution to initial therapy, as well as the need for a multidisciplinary approach involving neonatology, infectious diseases, and maxillofacial surgery to optimize clinical outcomes. Timely recognition and early initiation of appropriate antibiotic therapy remain critical in preserving function, preventing aesthetic sequelae, and improving overall prognosis.

Author contributions

Armijos Cevallos: Preparation of the original manuscript drafts. Delgado Macías: Conceptualization and manuscript writing. Hernández Cedeño: Critical review and content validation. Villalta Herrera: Resource provision. Chávez Aurora: Study supervision. Mosquera Reyma: Study supervision.

Ethical Statement

This clinical case is presented anonymously, ensuring protection of patient identity and

confidentiality. Informed consent was obtained from the patient's legal representative, and the right to privacy was respected at all times.

Data availability statement

The data are not publicly available due to patient confidentiality considerations. However, data may be made available for academic purposes upon reasonable request to the corresponding author.

Conflict of interest

The authors declare no conflicts of interest.

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