Pott’s puffy tumor: A rare complication of sinusitis. A case report

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ABSTRACT

A rare complication of frontal sinusitis includes Pott’s puffy tumor. It manifests as a swelling of the forehead due to the presence of a subperiosteal abscess secondary to osteomyelitis of the frontal bone. A timely diagnosis allows for an early, intensive medical and surgical treatment, which is critical to prevent serious intracranial complications.

Here we describe the case of a 12-year-old boy with Pott’s puffy tumor as a complication of pansinusitis. This case was a diagnostic challenge; however, a timely treatment allowed for a favorable clinical course.

Keywords: Pott’s puffy tumor; frontal sinusitis; frontal bone; osteomyelitis; pediatrics.

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INTRODUCTION

In 1775, Sir Percivall Pott first described a subperiosteal abscess of the frontal bone with osteomyelitis, manifested as a localized lump on the forehead.\(^1\) Although initially described as a consequence of trauma, Pott’s puffy tumor (PPT) is a rare complication of frontal sinusitis, characterized by swelling and edema of the forehead.\(^2\) A late diagnosis and treatment of this condition may result in intracranial complications.\(^3\) For an adequate recovery, intravenous antibiotic therapy accompanied by surgical treatment is required.\(^4\)

Here, we describe the case of a male adolescent with Pott’s puffy tumor.

CASE REPORT

A previously healthy 12-year-old boy consulted due to headache associated with swelling in the frontal region. When the initial case history was taken, no history of travel, trauma, or recent infections was noted. Based on the described data, at first, a soft tissue ultrasound was done, which showed frontal cellulitis; an empirical antibiotic therapy with cephalexin was started. During the course of his condition, he had fever episodes with worsening of the lesion. A history of purulent nasal discharge of long duration was noted during the subsequent directed history taking.

On physical examination, the boy was in good general condition; his neurological examination was normal; he had a frontal tumor that measured 5 × 5 cm with signs of inflammation, and no evidence of abrasion of the surrounding skin (Figure 1). Given the possibility of complicated sinusitis, a computed tomography (CT) scan of the brain and facial bones was performed, which revealed pansinusitis, frontal subperiosteal inflammation with bubbles and bone erosions in the anterior and posterior walls of the frontal sinus (Figures 2 and 3). The patient was hospitalized due to suspected Pott’s puffy tumor as a complication of frontal sinusitis.

An additional study was a magnetic resonance imaging (MRI) of the central nervous system, which showed the presence of a frontal subcutaneous abscess and signs compatible with osteomyelitis in association with ethmoiditis; no involvement of the dura mater was observed (Figure 4). A neurosurgery was done by bicoronal incision with surgical debridement and skeletonization of the frontal sinus. Likewise, a bilateral maxillary antrostomy was done by endoscopic approach. During the surgery, a tissue sample was collected for pathological examination. Chronic osteomyelitis secondary to sinusitis in the frontal bone was confirmed. An empirical antibiotic therapy with ceftriaxone, vancomycin, and metronidazole was initiated. \textit{Streptococcus constellatus} and \textit{Staphylococcus epidermidis} developed in the culture of maxillary sinus material; therefore, the medication was adapted to the sensitivity of the microorganisms. The therapy with clindamycin was continued until completing 10 days of intravenous antibiotic therapy. Upon hospital discharge, therapy with amoxicillin-clavulanic acid and trimethoprim-sulfamethoxazole was continued for 4 months.
Due to the severity of the condition, the patient’s immune status was assessed and was normal. Once the infectious condition resolved, the Department of Ear, Nose, and Throat (ENT) performed a functional endoscopic sinus surgery (FESS) to open the ostium and thus prevent recurrence. The boy had a favorable clinical and imaging course.

**DISCUSSION**

Pott’s puffy tumor is a rare complication of frontal sinusitis, characterized by swelling of the forehead resulting from a subperiosteal abscess secondary to frontal bone osteomyelitis. Complications in sinusitis are as high as 1 in 10 000 cases. It occurs at all ages, predominantly during adolescence. This is due to the anatomical characteristics associated with this stage of life. Firstly, pneumatization of the frontal sinuses, which begins around 6 years of age and is completed between 12 and 15 years of age. In addition, the flow of diploic veins, which drain the mucosa of the frontal sinuses and facilitate hematogenous spread of infection to the bone and brain, increases in this period.
It is more prevalent among males, and this may be related to the higher frequency of trauma in this group. The most frequent causes include frontal sinusitis and a history of frontal trauma. Less frequent etiologies include insect bites, malignant tumors, acupuncture, and intranasal use of cocaine.

Causative microorganisms are the same as in acute bacterial rhinosinusitis, mainly *Staphylococcus aureus*, *Staphylococcus epidermidis*, and anaerobic bacteria. In the case reported here, a mixed flora of *Streptococcus constellatus* and *Staphylococcus epidermidis* was isolated.

Symptoms include headache, periorbital swelling, frontal swelling, skin fistula, fever, and purulent nasal discharge. Fever, seizures, headache, lethargy, vomiting, and focal neurological deficits suggest intracranial involvement. The rate of intracranial infection may be as high as 60% to 100%. Dissemination may occur in 2 ways: directly, through the posterior bone table, which occurs due to the local inflammatory process; or through septic emboli through the diploic veins, which do not have valves that prevent hematogenous spread to the dural sinuses. Intracranial complications include subdural empyema, brain abscess, orbital cellulitis, intraorbital abscess, venous thrombosis, and epidural abscess.

Diagnosis requires a directed case history, a complete clinical examination, and imaging studies of the affected area, which also allow to assess the presence of potential complications. The recommended imaging study is a CT of the brain and bones with contrast, which helps to detect sinusitis, bone erosion, subperiosteal collection, and intracranial involvement. An MRI provides superior soft tissue resolution, facilitating the detection of intracranial conditions, dural sinus thrombosis, and bone edema. However, an MRI is more time consuming, requires anesthesia in young children, and is usually less available. In summary, the most effective and commonly used imaging study is a CT. However, when intracranial involvement is suspected, an MRI is considered the gold standard.

Differential diagnoses include infected sebaceous cyst, dermoid cyst, lipoma, lipoblastoma, frontal sinus mucocele, superficial temporal artery pseudoaneurysm, and malignant tumors.

The patient described in this article had no clinical manifestations compatible with intracranial compromise, so a CT scan was initially performed, which showed involvement of the anterior and posterior wall of the frontal sinus. Given this finding, an MRI was done to rule out any intracranial lesion.

Pott’s puffy tumor requires an early and rapid management to prevent its progression to life-threatening complications. A multidisciplinary approach is necessary, with the participation of clinicians, ENT specialists, neurosurgeons, ophthalmologists, and infectious disease specialists.

Surgery and prolonged antibiotic therapy are the mainstays of treatment. Since the infection is
usually polymicrobial, the use of broad-spectrum intravenous antibiotics with penetration through the blood-brain barrier is recommended. A triple antibiotic regimen is suggested to cover gram-positive and anaerobic bacteria for 5 to 8 weeks; a potential initial empirical therapy includes vancomycin, third generation cephalosporin, and metronidazole. The drainage of purulent material decreases the mass effect, improves antibiotic penetration, and allows to identify causative microorganisms. The prognosis of Pott’s puffy tumor is usually favorable. In the antibiotic era, mortality reduced from 60% to 3.7%.

In our case, a timely multidisciplinary approach with neurosurgical debridement, that allowed to adjust the antibiotic therapy to the isolated microorganism, and a functional endoscopic sinus surgery prevented recurrence. The surgery may be done through an external approach, an intranasal endoscopy, or combining both approaches. Surgeons who opt for an endoscopic approach must be prepared to perform an external approach, if needed. The external surgical drainage is fast and effective. It allows to see the sinus directly, drain the abscess, remove necrotic bone tissue, and perform an eventual craniotomy. The endoscopic approach is a less invasive option with less morbidity and better esthetic results. It is not recommended in the presence of large subperiosteal collections and sinus secretions or loculated intracranial involvement; its main limitation is the increased risk of mucosal bleeding and tissue edema. The combined approach allows access to other compromised sinuses.

To conclude, it is worth emphasizing that Pott’s puffy tumor requires a high rate of suspicion, as it usually presents with nonspecific symptoms and accounts for an unusual complication of a frequent condition. The vast majority of people with this condition, if properly treated, recover without complications or long-term neurological sequelae.

REFERENCES