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Pott's Puffy Tumor: A Case of Successful Conservative Treatment

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Abstract

Introduction: *Pott's puffy tumor (PPT) is a rare complication of bacterial frontal sinusitis, characterized by subperiosteal abscess due to associated frontal osteomyelitis. It is more commonly seen in young adolescents.*

Case Report: *We present the case of a 116-year-oldboy, with no recent trauma, who was admitted for mucopurulent nasal discharge and frontal headache associated with painful frontal swelling. The diagnosis of PPT was made based on clinical and imaging findings. The patient was treated with triple intravenous antibiotic therapy for two weeks and with double oral antibiotic therapy for another two weeks, with a satisfactory recovery.*

Discussion: *Prompt diagnosis and treatment of this condition is imperative for optimal outcomes and reduction of risk of complications.*

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Introduction

Sinusitis is a common pediatric illness caused, in most instances, by viral infection; however, approximately 0.5–2% of these patients can develop bacterial sinusitis. Although most cases of bacterial sinusitis will resolve without antibiotics, significant complications can arise if it is left untreated [1].

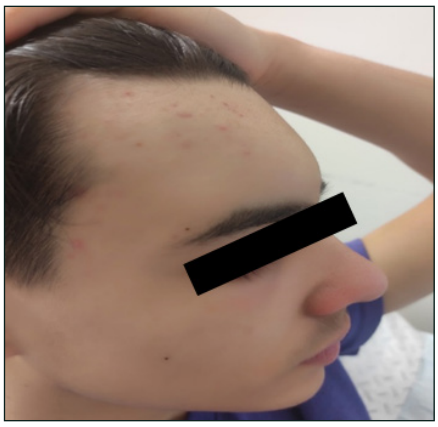
Pott's puffy tumor (PTT) is a rare entity characterized by osteomyelitis of the frontal bone associated with subperiosteal abscess. It is a rare complication of frontal sinusitis or forehead trauma, primarily occurring in the pediatric and young adolescent population. The most common presentation is a combination of

forehead tender swelling, headache, fever, and rhinorrhea [2].

This condition has become rarer with the advent of modern antibiotic therapy; however, in pediatric patients, the diagnosis can be delayed as presenting symptoms and signs can be non-specific, by which time intracranial complications may develop [3]. Therefore, early diagnosis and treatment are crucial to prevent further intracranial complications [1].
We report the case of a 16-year-old boy who presented with PPT following fronto-ethmoid-maxillary sinusitis.

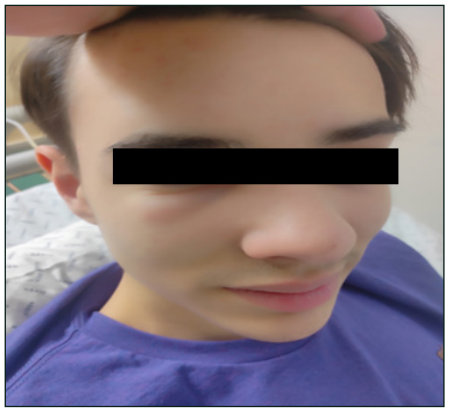
Case Report

A 16-year-old boy with no significant past medical or surgical history presented to the pediatric emergency department with a one-day history of painful frontal swelling, without any history of trauma. Additionally, he also mentioned mucopurulent discharge, frontal headache, and frequent episodes of epistaxis in the previous two weeks. The patient's parents denied fever during this time. The vital signs were normal, with no signs of distress. On physical examination, a swelling on the right forehead, associated with periorbital and nasal bridge edema, was observed, soft and painful to the touch (Figures 1A and 1B). There were no focal neurological findings. The laboratory workup showed a white blood cell count of 13760/uL (normal level: 4000-11500/uL), and a C-reactive protein level of 3.13 mg/dL (normal level <0,5 mg/dL).



1A

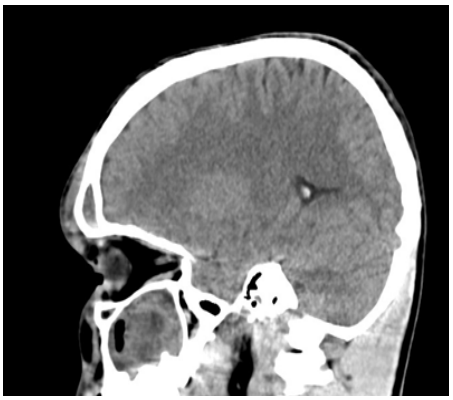
Figure 1A: Photograph of the patient showing right forehead swelling.



1B

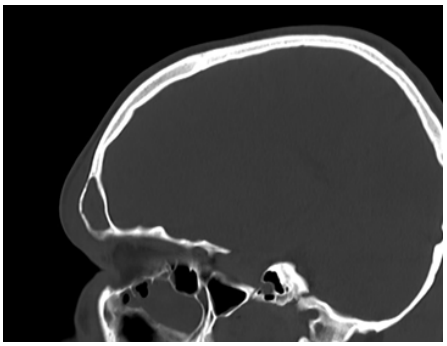
Figure 1B: Photograph of the patient showing right periorbital and nasal bridge edema.

A head computed tomography (CT) with contrast revealed signs of right fronto-etmoido-maxillary sinusopathy associated with thickening of epicranial soft tissues and densification in the frontal-polar/periorbital region and the dorsum of the nose ipsilaterally, also with some continuity solutions/areas of focal demineralization of frontal sinus anterior wall (Figures 2A, 2B and 2C). Bacteriologic testing of the nasopharyngeal exudate revealed Streptococcus pyogenes, resistant to levofloxacin. Based on the clinical and imaging findings, the primary diagnosis of Pott's puffy tumor was made.



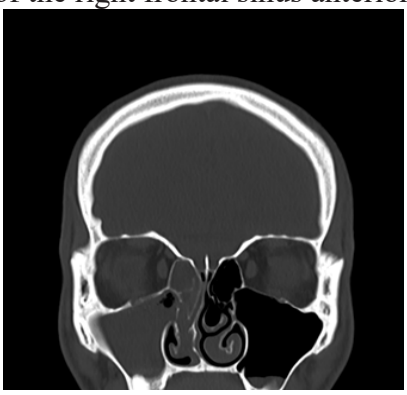
2A

Figure 2A: Sagittal CT scan showing opacification of the right frontal sinus and thickening of the epicranial soft tissue.



2B

Figure 2B: Sagittal CT scan showing focal demineralization of the right frontal sinus anterior wall.

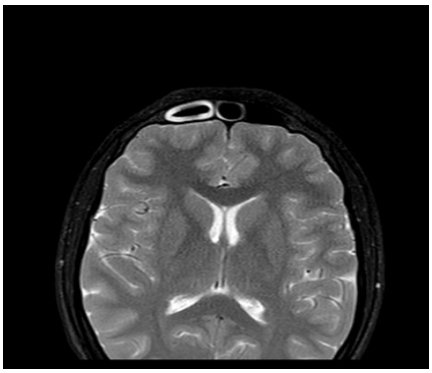


2C

Figure 2C: Coronal CT scan showing signs of ethmoidal-maxillary sinusopathy.

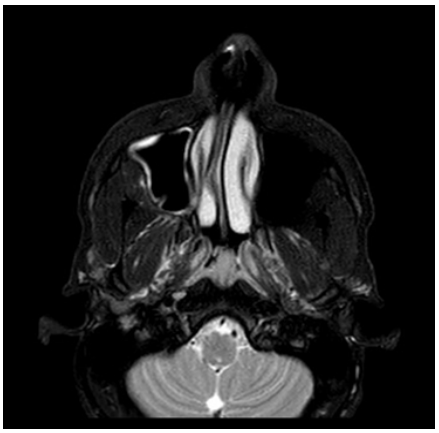
The patient started empirical antibiotic therapy with intravenous amoxicillin and clavulanic acid, 2200 mg every eight hours for one day. After consultation with the Pediatric Infectious Diseases and Otorhinolaryngology departments, the therapy was switched to intravenous ceftriaxone 2750 mg once daily, vancomycin 600 mg very six hours, and metronidazole 800 mg every eight hours, for two weeks. Topical nasal decongestants were applied daily as adjunctive therapy. He showed clinical improvement and was discharged with oral antibiotics (linezolid 600 mg every twelve hours, and metronidazole 250 mg every six hours) for an additional two weeks, as he did not experience complications.

Four weeks after treatment initiation, a follow-up brain magnetic resonance imaging (MRI) was performed to assess response to antibiotic therapy. The MRI revealed marked improvement of the sinusitis, with almost total recanalization of all paranasal sinuses (Figure 3A, 3B). The patient was subsequently referred to Pediatrics and Otorhinolaryngology appointments to ensure continued follow-up.



3A

Figure 3A: Axial MRI showing improvement of the frontal sinus opacification.



3B

Figure 3B: Axial MRI showing almost full repermeabilization of the ethmoidal and maxillary sinus.

Discussion

First described in 1768, Pott's puffy tumor is a rare clinical entity, characterized as a sequela of frontal bone osteomyelitis with associated subperiosteal abscess [2]. Frontal sinusitis remains the most common cause of PTT, typically secondary to hematogenous spread of infection, although direct spread from traumatic open wounds has also been described [2,3].

Intracranial complications are most frequently encountered in previously healthy adolescent males with frontal sinusitis [4,5]. Although it can occur in all age groups, it is particularly common in children and young adolescents, due to the relatively underdeveloped frontal sinuses [2]. Additionally, structural abnormalities during the pneumatization process, which may not be fully complete until 15 to 18 years of age, can lead to mucosal inflammation and provide a conducive environment for anaerobic bacteria growth. In the majority of cases, this is a polymicrobial infection. Non-enterococci streptococci (47%), anaerobic

oral bacteria (28%), and staphylococci (22%) are the most common microorganisms encountered [2,6].

The most common clinical signs include forehead swelling, headache, fever, and nasal congestion along with presence of either purulent or non-purulent secretions. While soft, erythematous forehead swelling accompanied by fever is typically considered pathognomonic of PPT, there have been reported cases where fever was absent [1,2,7]. Suspicion of increased intracranial pressure may arise if the patient exhibits symptoms such as nausea/vomiting, photophobia, cranial nerve deficits, seizures, altered mental status, lethargy or confusion.

In pediatric patients, an indolent course of nonspecific symptoms can be present. Thus, the presence of a fluctuant, tender swelling on the scalp should trigger the suspicion for PPT. In such cases, prompt imaging is necessary. While brain MRI with contrast remains the gold standard, head CT with contrast serves as an excellent initial study due to its availability and fast diagnostic confirmation. However, MRI is preferred for follow-up, as it avoids radiation exposure, provides superior soft-tissue resolution, and aids in better characterization of the infection [2,7].

The management of PPT is multidisciplinary, involving the combination of medical treatment with systemic antibiotic therapy and surgical intervention [1,2]. Upon suspicion of the diagnosis, empirical treatment with broad-spectrum antibiotics should be promptly initiated. The selection of antibiotics should prioritize those with excellent penetration into intracranial tissue. Vancomycin (to cover for potential infections with methicillin-resistant Staphylococcus aureus or penicillin-resistant Streptococcus pneumoniae) should be used in addition to ceftriaxone, ampicillin-sulbactam or piperacillin-tazobactam. Metronidazole (to cover for infections with anaerobes) should be added to the regimen in cases of intracranial complications of bacterial sinusitis, when prescribing ceftriaxone [2,4,6]. Although the length of treatment can vary, studies indicate four to eight weeks of intravenous antibiotic therapy [2,6]. Small extradural collections may be managed conservatively with these, but an aspiration/biopsy is strongly recommended for culture and antibiotic therapy guidance [2,7].

Surgical intervention becomes necessary in advanced stages, with options including open approaches or minimally invasive techniques like functional endoscopic sinus surgery, which are particularly beneficial in pediatric patients [2,3,8,9].

In this particular case, surgical intervention was not recommended, and we opted for conservative treatment, initiating empiric therapy with antibiotics with good intracerebral and bone penetration and targeting microorganisms responsible for Pott's puffy tumor. The patient responded well, showing reduced inflammatory swelling and excellent clinical recovery after two weeks of intravenous antibiotic therapy. Following multidisciplinary discussion, we deemed it safe to discharge the patient on oral antibiotics.

PTT incidence and its complications have significantly decreased with the administration of appropriate antibiotic treatment [2]. Intracranial complications are the most common, occurring in 60–85% of patients with PPT. For patients exhibiting satisfactory clinical progress, a strategy combining medical treatment with simple drainage of the abscess may be preferable [9]. Nonetheless, early diagnosis is critical to prevent either septic thrombophlebitis or direct extension of the infection to the brain, which can lead to serious meningitis, frontal lobe abscess, cavernous sinus thrombosis, and epidural or subdural abscess [1,2].

Conclusion

Pott's puffy tumor, although rare, poses a potentially lethal threat if left untreated. It should be considered in the differential diagnosis of pediatric patients presenting with suspected sinusitis. Prompt diagnosis of PTT and initiation of adequate antibiotics are crucial for an optimal outcome.

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