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Case Report

Delayed Diagnosis of Pott's Puffy Tumor in a Young Adult: A Rare Complication of Neglected Frontal Sinusitis

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ABSTRACT

Background: Pott's puffy tumor (PPT) is an uncommon but potentially life-threatening complication of frontal sinusitis, characterized by frontal bone osteomyelitis with a subperiosteal abscess. Despite its rarity in the antibiotic era, it persists in young adults with inadequately treated sinus infections. Intracranial complications such as epidural or subdural empyema may occur through posterior wall erosion, demanding prompt diagnosis and multidisciplinary management.

Case presentation: A 19-year-old male immigrant from Guinea, residing in Morocco, presented with a two-month history of painful frontal swelling and severe headaches following ten months of purulent rhinorrhea. CT imaging revealed complete opacification of the right frontal sinus with erosion of both anterior and posterior walls, a large subperiosteal abscess (59 × 28 × 57 mm), and a small intracranial empyema contiguous with the sinus. The patient underwent combined surgical management in our department: a functional endoscopic sinus surgery (FESS) with a Draf IIb procedure, achieving wide frontal sinus drainage, complemented by a left supraciliary approach for external debridement of the subperiosteal abscess. Cultures yielded Streptococcus constellatus and Fusobacterium nucleatum. Post-operative treatment included intravenous ceftriaxone and metronidazole for three weeks, followed by oral amoxicillin-clavulanic acid. Clinical and radiological recovery was complete, with no recurrence at three-month follow-up.

Conclusion: This case highlights the importance of early imaging and aggressive combined surgical management for complicated PPT. The Draf IIb approach, supplemented by an external supraciliary drainage, offers safe and effective control of both sinus and extracranial components. A multidisciplinary strategy and long-term follow-up are crucial to prevent recurrence and intracranial sequelae.

Keywords: Pott's puffy tumor; frontal sinusitis; frontal bone osteomyelitis; Draf IIb; supraciliary approach; intracranial empyema; case report

Introduction

Pott's puffy tumor (PPT) is an uncommon but potentially life-threatening complication of frontal sinusitis, characterized by a subperiosteal abscess and underlying frontal bone osteomyelitis[1]. First described by Percivall Pott in 1760, it was originally associated with skull trauma but is now more frequently related to sinus infections[2].

Although rare in the antibiotic era, PPT continues to appear, particularly in adolescents and young adults with neglected or chronic sinusitis[3]. Infection may spread through the diploic veins of the frontal bone, leading to bone necrosis and subperiosteal pus collection[4].

Clinically, the disease presents as a painful, fluctuant swelling of the forehead, often accompanied by headache, fever, and purulent rhinorrhea. Delay in diagnosis increases the risk of intracranial complications such as meningitis, epidural abscess, or dural sinus thrombosis[1,5].

Prompt imaging and combined surgical and antibiotic therapy are crucial for preventing these severe outcomes.

Here, we report the case of a 19-year-old male who developed a Pott's puffy tumor after a prolonged period of untreated sinus infection, highlighting the diagnostic challenges in atypical presentations.

Case Presentation

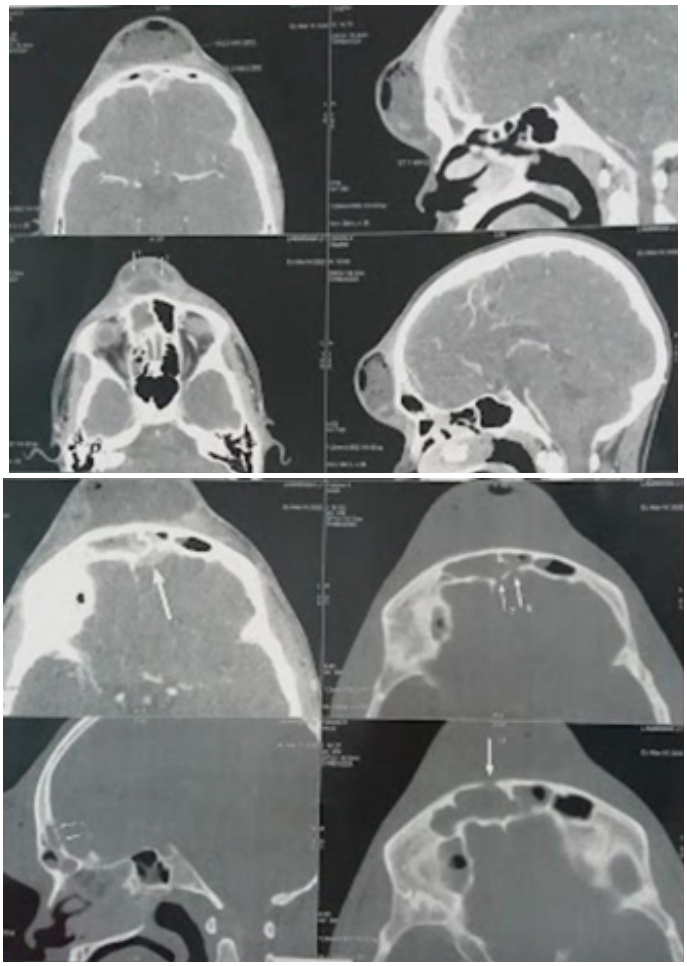
A 19-year-old male immigrant from Guinea, living in Morocco for two years, presented to our ENT emergency department with a two-month history of a progressively enlarging, painful swelling over the frontal region associated with severe throbbing headache. These symptoms were preceded by a ten-month history of persistent rhinorrhea, initially watery and later purulent, accompanied by cacosmia and dull facial pain. There was no history of nasal obstruction, epistaxis, trauma, or previous sinonasal surgery. The patient denied seizures or visual disturbances but reported nausea, vomiting, and fatigue during the previous days. His medical history was unremarkable, and he admitted to regular cannabis use for four years.

On admission, the patient was conscious, afebrile (37.8 °C), and hemodynamically stable. Physical examination revealed a tender, fluctuant swelling measuring approximately 6 × 5 cm over the right paramedian and midline frontal region, with overlying erythema and warmth **(Figures 1 and 2)**. The lesion was non-pulsatile and mildly fluctuant at the center, without cutaneous necrosis or fistula. There was no periorbital edema or proptosis. Nasal endoscopy showed thick, purulent secretions in the right middle meatus and edematous mucosa narrowing the frontal recess. Neurological examination revealed no focal neurological deficit.

Figures 1 and 2: Frontal and lateral views shwing a swelling of the frontal region.

Laboratory investigations revealed leukocytosis (14 800/µL, 82 % neutrophils) and elevated C-reactive protein (112 mg/L).

A craniofacial CT scan with contrast showed complete opacification of the right frontal sinus with erosion of both anterior and posterior sinus walls. A large soft-tissue abscess measuring 59 × 28 × 57 mm was identified in the overlying frontal soft tissues, containing air bubbles and internal septations, and communicating with the sinus through the anterior bony defect. Posteriorly, a small intracranial empyema was noted adjacent to the posterior wall defect, consistent with early subdural extension. The left frontal sinus showed partial opacification with posterior wall thinning. Bilateral fronto-ethmoido-maxillary sinusitis and a left septal deviation with concha bullosa were also noted **(Figures 3 and 4)**.



Figures 3 and 4: Opacification of the right frontal sinus with erosion of both anterior and posterior sinus walls.

Given the diagnosis of Pott's puffy tumor complicated by a limited intracranial empyema, the patient underwent combined surgical management under general anesthesia in our department.

A functional endoscopic sinus surgery (FESS) with Draf IIb procedure was performed to create a wide frontal sinusotomy extending medially to the nasal septum, ensuring optimal drainage and long-term patency of the frontal outflow tract. Thick purulent material and necrotic mucosa were removed from the frontal sinus cavity, and irrigation was performed with sterile saline until clear fluid returned.

To achieve complete evacuation of the subperiosteal collection, a left supraciliary external approach was added, allowing direct access for debridement of the infected soft tissues

and curettage of necrotic bone around the anterior sinus wall. Approximately 20 mL of thick purulent material was drained. A small silicone drain was left in place for 48 hours.

Microbiological culture of the aspirated pus grew Streptococcus constellatus and Fusobacterium nucleatum, both sensitive to ceftriaxone and metronidazole. Postoperatively, the patient received intravenous ceftriaxone (2 g/day) and metronidazole (1.5 g/day) for three weeks, followed by oral amoxicillin–clavulanic acid for an additional four weeks. Analgesics and nasal saline irrigations were prescribed.

The postoperative course was favorable, with rapid regression of pain and swelling within ten days. The patient was discharged on postoperative day 7.

A control CT scan at six weeks confirmed complete resolution of both the frontal subperiosteal abscess and the small intracranial empyema, with re-aeration of the frontal sinus and no residual bone defect. At three-month follow-up, the patient remained asymptomatic, without aesthetic deformity or neurological sequelae. He was advised on nasal hygiene, smoking and cannabis cessation, and scheduled for routine follow-up imaging at six and twelve months.

Discussion

Pott's puffy tumor (PPT) is a rare complication of frontal sinusitis, characterized by frontal bone osteomyelitis associated to a subperiosteal abscess[1]. First described by Percivall Pott in 1760 after skull trauma, the pathology is now most frequently associated with bacterial sinusitis[2]. Although rare in the antibiotic era, several recent studies report a rising incidence, particularly among adolescents and young adults with untreated or chronic sinus infections[3,4].

The pathogenesis involves spread of infection through the diploic veins of the frontal bone, leading to osteomyelitis and accumulation of pus beneath the periosteum[1,5]. When the posterior wall of the frontal sinus is breached, the infection may extend intracranially, potentially leading to serious complications such as epidural or subdural abscess, meningitis, or cerebral empyema, which considerably increase morbidity and mortality[6]. Such complications occur in approximately 40-60% of reported cases[7].

Clinically, patients typically present with forehead swelling, headache, and fever, although the classical triad is not always complete[3]. Neurological symptoms-such as nausea, vomiting, photophobia, or altered mental status-suggest intracranial involvement[7,8]. In our case, the patient presented with prolonged purulent rhinorrhoea and progressive frontal swelling associated with severe headaches, suggesting advanced frontal sinus infection with early intracranial extension.

Radiological evaluation plays a key role in both diagnosis and treatment planning. Contrast-enhanced CT remains the imaging modality of choice to evaluate bony destruction and sinus opacification, while MRI is superior for delineating soft-tissue and intracranial involvement[4,9]. In the present case, CT findings of anterior and posterior wall erosion, subperiosteal abscess, and limited subdural empyema were sufficient for diagnosis. These imaging findings are characteristic of PPT and help differentiate it from other frontal soft-tissue infections[8,10].

Management of PPT requires combination of medical and surgical management. Broad-spectrum intravenous antibiotics covering both aerobic and anaerobic organisms should be started promptly and adjusted according to culture results[1,5,9]. Surgical treatment remains a fundamental component of management, aiming to remove necrotic bone, drain abscesses, and restore sinus drainage and ventilation[4,5]. The endoscopic endonasal approach is preferred for isolated sinus disease because of its lower morbidity and better postoperative outcomes[3]. However, when there is osteomyelitis with anterior wall destruction or intracranial extension, a combined endoscopic and external approach provides the most effective drainage[6,7].

In our patient, a functional endoscopic sinus surgery (FESS) with a Draf IIb procedure was performed to achieve wide frontal sinusotomy and adequate drainage. This was complemented by a supraciliary external approach to remove necrotic bone and evacuate the subperiosteal abscess. This combined strategy aligns with recommendations from recent series involving combined routes in cases with both anterior and posterior wall erosion[9,10]. Microbiological analysis revealed Streptococcus constellatus and Fusobacterium nucleatum, organisms frequently isolated in polymicrobial infections of PPT[3,8]. The patient experienced favorable recovery after surgery and six weeks of antibiotic therapy emphasizes the importance of early recognition and comprehensive management.

Early diagnosis remains critical to prevent life-threatening complications. Delayed management can result in intracranial sepsis, meningitis, or cerebral abscess with mortality rates up to 13% in historical series[6]. Therefore, prompt imaging, appropriate antibiotic coverage, and combined surgical drainage remain the mainstays of treatment. Long-term follow-up with radiological assessment is recommended to ensure sinus patency and detect potential recurrence.

Conclusion

Pott's puffy tumor remains a rare but serious complication of frontal sinusitis, with the potential for rapid progression to intracranial involvement if not promptly diagnosed. This case illustrates the importance of early recognition and imaging in patients presenting with frontal swelling and sinus symptoms, even in the absence of systemic signs of infection.

The combined surgical approach-endoscopic frontal sinusotomy (Draf IIb) complemented by a supraciliary drainage-proved to be an effective and safe strategy for achieving complete evacuation of both subperiosteal and intracranial abscesses. The identification of Streptococcus constellatus and Fusobacterium nucleatum underscores the polymicrobial nature of this condition and supports the use of broad-spectrum antibiotics covering both aerobic and anaerobic organisms.

A multidisciplinary approach involving otolaryngology, radiology, neurosurgery, and infectious disease specialists is essential to optimize outcomes. Long-term follow-up with endoscopic evaluation and imaging is crucial to ensure sinus ventilation, prevent recurrence, and monitor for potential late complications.

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