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Case Reports

Pott's Puffy Tumor: A Rare Complication of Frontal Sinusitis

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Abstract

Pott's puffy tumor (PPT) is a rare complication of frontal sinusitis, characterized by subperiosteal abscess formation and frontal bone osteomyelitis, with potential for severe intracranial spread. An 18-year-old male presented with forehead swelling and periorbital edema following recent sinusitis. Imaging revealed bilateral frontal epidural abscesses, osteomyelitis, and pachymeningitis. Surgical intervention included bicoronal craniotomy, frontal sinus cranialization, and abscess debridement. The presence of bilateral epidural abscesses and pachymeningitis represented an unusually severe presentation of PPT. In contrast to typical cases, systemic signs were absent, resulting in delayed diagnosis. Imaging findings and surgical management aligned with current literature and support these approaches in complex cases. Clinicians should suspect PPT in adolescents presenting with forehead swelling in the setting of sinusitis. Early imaging, prompt surgical management, and prolonged antibiotic therapy are essential to prevent life-threatening complications.

BACKGROUND

Pott's puffy tumor (PPT) is a rare but serious complication of frontal sinusitis, characterized by a subperiosteal abscess with underlying frontal bone osteomyelitis.[1] Although first described by Sir Percivall Pott in 1760, PPT remains clinically relevant, particularly among adolescents.[2] Without prompt diagnosis and treatment, PPT can lead to life-threatening complications, including epidural abscess, subdural empyema, meningitis, and cavernous sinus thrombosis.[3]

Clinical presentation may be subtle, with symptoms such as forehead swelling, headache, fever, or periorbital edema. A low threshold for suspicion is warranted, especially in young patients with forehead or upper facial swelling in the setting of recent or ongoing sinusitis.[2,4] Computed tomography (CT) is typically the first-line imaging modality for evaluating bony erosion and sinus disease, while magnetic resonance imaging (MRI) offers superior detail regarding intracranial involvement.[1] Management of PPT requires a multidisciplinary approach, combining broad-spectrum intravenous antibiotics with early surgical intervention. Procedures such as sinus cranialization, abscess drainage, and frontal sinus debridement are often necessary. This report describes an adolescent male with extensive complications of PPT, emphasizing the importance of early recognition, coordinated specialist care, and tailored antimicrobial therapy in achieving a favorable outcome.

CASE PRESENTATION

An 18-year-old previously healthy male presented to the emergency department with progressive forehead swelling and bilateral periorbital edema. Three weeks earlier, he had been evaluated at an outside hospital for frontal sinusitis and was prescribed a 10-day course of cefdinir and a 5-day course of prednisone. Although his symptoms initially improved, they recurred shortly after completing antibiotics, with worsening forehead and periorbital swelling. On re-presentation, he denied fever, chills, headache, visual changes, nausea, or vomiting. Vital signs were normal. Physical examination revealed circumferential swelling of the left forehead with tenderness to palpation, bilateral maxillary sinus tenderness, and intact extraocular movements without pain. The neurologic examination was non-focal, with intact cranial nerves and full strength throughout. There was no nystagmus, nor was ophthalmoplegia present as the patient had full visual fields without gaze deviation. Mental status exam was unremarkable, and the patient's language fluency, comprehension, and repetition were intact. Laboratory testing showed a mildly elevated white blood cell count of 11.0 $\times 10^9$/L. Contrast-enhanced CT of the facial bones revealed findings consistent with PPT, including frontal sinus opacification, erosion of the anterior and posterior sinus walls, bifrontal epidural abscesses (~3 cm each), and enhancement of the interhemispheric falx concerning for pachymeningitis. Blood cultures were drawn,

and empiric intravenous vancomycin and ampicillin-sulbactam were initiated.

The patient was transferred to Saint Louis University Hospital for neurosurgical evaluation. Repeat imaging confirmed frontal sinus wall destruction with extension into the subgaleal tissues and bilateral epidural spaces. MRI revealed two peripherally enhancing epidural abscesses exerting mild mass effect on the frontal lobes, along with pachymeningeal enhancement (Figure 1). He was admitted to the neurocritical care unit and underwent bicoronal craniotomy with frontal sinus cranialization, epidural and bony debridement, and placement of a vascularized pericranial flap. Subgaleal drains were inserted. Intraoperative cultures were sent for aerobic, anaerobic, and fungal studies. Postoperatively, he remained neurologically stable. Antibiotic therapy was broadened to include cefepime and metronidazole alongside vancomycin. Cultures later grew *Streptococcus intermedius*; blood cultures remained negative. Based on sensitivities, his regimen was narrowed to intravenous ampicillin. By hospital day four, the patient improved clinically and was transferred to the general medicine floor. His JP drain was removed without complication. However, discharge planning was delayed due to insurance barriers preventing home health services for continued IV therapy. To facilitate discharge, infectious disease specialists recommended transitioning to oral linezolid for a planned six-week course. After tolerating two inpatient doses without adverse effects, he was discharged home on oral antibiotics with close outpatient follow-up arranged with neurosurgery, otolaryngology, infectious disease, and primary care. At discharge, he was stable, ambulating independently, and neurologically intact. Follow-up imaging was scheduled to monitor resolution of the epidural and subgaleal collections, along with laboratory monitoring for linezolid-related hematologic side effects.

DISCUSSION

Pott's puffy tumor is a rare yet serious complication of frontal sinusitis, particularly in adolescents due to ongoing sinus development and extensive venous communication between the sinuses and intracranial space.[3] This case demonstrates hallmark features of PPT: initial improvement, rapid deterioration, intracranial extension, and the need for aggressive, multidisciplinary intervention. PPT typically arises from direct extension through eroded sinus walls or via hematogenous spread through valveless diploic veins, leading to both extracranial and intracranial involvement.[3] In this patient, imaging revealed anterior and posterior frontal sinus wall erosion, subgaleal abscess, and bilateral epidural abscesses—an uncommon but recognized complication with high risk for neurologic deterioration.[3,4] Early recognition is essential, yet PPT symptoms often overlap with uncomplicated sinusitis.[5] Forehead swelling, nasal congestion, and headache may be present without systemic signs such as fever, further obscuring diagnosis. CT is highly sensitive for detecting bony erosion, while MRI is superior for evaluating intracranial complications including epidural abscess, subdural empyema, and pachymeningitis.[1,5,6] Both imaging modalities were essential in guiding surgical planning in this case. Effective management requires coordination among otolaryngology, neurosurgery, infectious disease, ophthalmology, and critical care. Surgery remains the cornerstone of treatment, particularly with intracranial extension. Common procedures include abscess drainage, debridement of necrotic bone, and sinus cranialization.[1,7] Cranialization is critical when the posterior sinus wall is eroded, eliminating the sinus cavity and reducing infection risk.[1,8] Empiric antibiotics should broadly cover Streptococcus spp., Staphylococcus aureus (including MRSA), and anaerobes.[9] Viral co-infections, such as SARS-CoV-2, may contribute to complications.[10] Although not present in this case, the literature suggests increased risk in co-infected patients. Cultures in this case grew Streptococcus intermedius, a member of the Streptococcus anginosus group, known for abscess formation. Intravenous ampicillin was appropriate based on sensitivities. Due to logistical challenges with home IV therapy, the patient was transitioned to oral linezolid—a well-absorbed oxazolidinone with good bone penetration. Management of frontal bone osteomyelitis requires at least six weeks of antibiotics.[11] Close outpatient follow-up is essential, including labs for potential myelosuppression and imaging to confirm resolution. Several lessons emerge from this case. First, corticosteroids, as initially prescribed, may transiently mask infection and delay diagnosis. Although systemic corticosteroids can relieve sinus symptoms, they should be used cautiously in severe or atypical cases.[12,13] Second, interdisciplinary collaboration enabled timely diagnosis and management. Third, engaging the patient and family in shared decision-making supports informed consent, treatment adherence, and ongoing care coordination.[14] Lastly, clinicians should include PPT in the differential diagnosis of adolescents with forehead swelling and sinusitis symptoms. Early imaging, surgical intervention, and appropriate antibiotics remain the cornerstones of treatment.

CONCLUSION

Pott's puffy tumor remains a potentially life-threatening complication of frontal sinusitis. This case highlights the importance of early clinical suspicion in adolescents with forehead swelling and recent sinus infection, even in the absence of systemic symptoms. Prompt imaging, multidisciplinary collaboration, surgical intervention, and prolonged antimicrobial therapy were essential to achieving a favorable outcome.

Disclosures/Conflicts of Interest

The authors have no conflicts of interest to disclose.

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