Pott’s puffy tumor: the forgotten entity

Case report

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Pott’s puffy tumor has become an historical vignette. In 1775, Sir Percivall Pott described a case of frontal sinus infection causing an indolent, puffy, circumscribed swelling of the forehead. Surgical exploration of this lesion revealed a subperiosteal abscess and osteomyelitis of the frontal bone. This entity became known as Pott’s puffy tumor. Since the introduction of antibiotic medications, only 11 cases have been reported in the literature. In this communication, we describe a young man who developed Pott’s puffy tumor following frontal sinusitis.

**KEY WORDS** • abscess • Percivall Pott • puffy tumor • sinusitis

No tenderness over the paranasal sinuses was elicited. The neurological examination was completely nonfocal. Laboratory blood values were significant for a white blood cell count of 7800/mm³ (normal range 4.5–13.2 mm³). Erythrocyte sedimentation rate was 30 mm per hour (normal range 0–10 mm/hr).

Axial computerized tomography (CT) with and without gadolinium contrast revealed an enhancing subgaleal mass in the frontal region; CT with bone windows showed

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This 20-year-old right-handed man was transferred to our institution with a gradually enlarging mass on his forehead. His medical history was significant for pain and swelling around the root of the nose 2 months prior to this admission. A diagnosis of frontal sinusitis was made at that time, and he was treated with antibiotic medications. He had no history of head trauma. He was asymptomatic until 2 weeks prior to this admission when he noticed increasing swelling on the forehead not associated with pain or fever. He had no history of intravenous or intranasal drug abuse.

**Examination.** Physical examination revealed a well-nourished, well-developed man. He was afibrile and had normal vital signs. A soft fluctuant, nontender swelling on the forehead crossing the midline was noted (Fig. 1). There was no surrounding cellulitis or active inflammation noted, and there was no drainage from this lesion.

FIG. 1. Preoperative photograph showing the well-defined subcutaneous swelling of Pott’s puffy tumor on the forehead.
underlying destruction of the frontal bone (Fig. 2 left). There was an associated epidural collection of modest size, and no abnormalities in the underlying brain parenchyma. This lesion was not in continuity with the frontal sinus radiographically. Examination using magnetic resonance (MR) imaging confirmed the findings of the CT scan (Fig. 2 center and right). A preoperative diagnosis of Pott’s puffy tumor was made and the patient was taken to surgery.

Operation. A bifrontal craniotomy was performed via a standard bicoronal skin incision. As the scalp was reflected, a significant amount of purulent drainage was noted. This fluid was collected for culturing and Gram staining. The scalp in the subgaleal plane was adherent to the underlying bone secondary to massive amounts of granulation tissue, which formed the “puffy tumor.” This granulation tissue was scraped and removed for histopathological examination. The frontal bone underlying this tissue was noted to be centrally eroded with a pinpoint defect actively discharging pus. After removal of the bone, the underlying dura was noted to have a moderate amount of granulation tissue adherent to the surface with no apparent dural defect. This tissue was carefully scraped away, taking care not to injure the dura. Prior to repositioning the craniotomy flap, abnormal-appearing bone was removed using a high-speed air drill. The wound was copiously irrigated with antibiotic solution and the scalp was closed in layers.

Postoperatively, the patient remained neurologically intact and had an uneventful recovery.

Histopathological Examination. Gram staining of specimens collected intraoperatively revealed many leukocytes and few Gram-positive cocci in pairs and chains. Cultures from the tissue grew *Streptococcus viridans*. No anaerobes were seen. Histological examination of epidural tissue revealed an abscess wall and masses of chronic inflammatory cells (Fig. 3).

The patient received a 6-week course of intravenously administered penicillin. The posttreatment CT scan revealed complete resolution of abscess with minimal enhancement (Fig. 4).
Discussion

In 1768, Percivall Pott described Pott’s puffy tumor as local necrosis and suppuration of the frontal bone with intact overlying scalp. Originally describing it as resulting from trauma, in 1775 Pott reported another case of “puffy tumor” that resulted from sinusitis. In 1879 (as stated by Thomas and Nel) it was confirmed that a subperiosteal abscess manifested as a puffy swelling of the forehead or scalp resulted from frontal sinusitis spreading to the frontal bone.

A number of cases have been reported since the original description of the disease but fewer since the introduction of antibiotic drugs. This lesion is known to result from trauma and frontal sinusitis but has also been reported as a complication of intranasal cocaine abuse.

The current definition of Pott’s puffy tumor is a subperiosteal abscess of the frontal bone associated with frontal osteomyelitis. An epidural collection may occur with complete erosion of the frontal bone. Pott’s theory about the occurrence of infected epidural collections was used to explain the occurrence and significance of the puffy tumor. It was used as a sign of “matter,” the poorly defined concept of an infected collection occurring some time after head injury. It was thus considered an indication for operative intervention. Osteomyelitis and a subperiosteal abscess presenting as a puffy tumor of the forehead occurred less frequently as a complication of frontal sinusitis.

The most common complication of sinus infection occurs within the orbit. Orbital cellulitis usually arises from infection in the ethmoid sinuses but can occur from frontal sinus infection. Intracranial extension, although not as common as orbital involvement, is a well-recognized complication of sinusitis. Infection may spread from the frontal sinus through the diploic veins to involve the marrow space of the frontal bone. As a result, epidural spread may occur, causing epidural abscess. If the epidural veins are involved, a subdural empyema may result. Other complications include meningitis, cavernous sinus thrombosis, and brain abscess.

Both adults and children may be affected. Presenting complaints include headache, photophobia, and fever. Signs of inflammation or swelling may be absent. A CT scan with contrast enhancement and bone windows provides adequate information. However, MR imaging with gadolinium enhancement may give better details of the extent of the disease and of the underlying subdural space and brain.

The cultures from patients with Pott’s puffy tumor frequently reveal polymicrobial involvement. Alpha- and β-hemolytic streptococci, bacteroides species, and, less frequently, staphylococci and enterococci are the predominant organisms. In frontal sinusitis associated with intracranial complications, anaerobes such as fusobacterium, bacteroides species, and anaerobe streptococci are the predominant pathogens, but S. viridans is also recovered.

Surgical intervention is the treatment of choice. Drainage of the abscess to obtain material for Gram stain and culture and removal of the osteomyelitic bone are the goals. It is very important to be circumspect in removing the densely adherent granulation tissue from the dura, lest it tear and cause the spread of infection into the subarachnoid and subdural space. Thorough removal of osteomyelitic bone up to the margins of normal bone is essential. Although the extent of disease can be assessed with CT scan and bone scan preoperatively, accurate assessment of involved bone is best made at the time of surgery. If the patient has associated sinusitis, that needs to be addressed at the same time. Postoperatively, the patient should be given appropriate antibiotic medications for a period of 6 to 8 weeks.

Conclusions

Pott’s puffy tumor is a rare complication in this postantibiotic era; however, partially treated frontal sinusitis may result in this potentially dangerous complication. Early diagnosis and appropriate treatment will improve outcome in these patients.

References


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