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CLINICAL VIGNETTE

A Case of Pott's Puffy Tumor

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Case Presentation

A 58-year-old male with mild cognitive impairment presented to the Emergency Department (ED) for left head trauma. One week ago, patient was struck in the face by a cane while he was sleeping. He self-medicated with acetaminophen and aspirin, but developed swelling over his left eye and a throbbing headache. In the ED, patient denied any blurry vision, weakness, and numbness or fever and chills.

Upon initial interview, patient was alert and oriented to name, place and year. He was disheveled in appearance and in mild distress due to left eye pain. Vital signs included temperature of 98.2°F, HR 100, BP 122/79 and oximetry of 98% on room air. Pupils were equally round and reactive to light and accommodation. Extraocular muscles were intact. Left eye was swollen with inability to fully open his eye. A 3x3cm erythematous swollen area in the left lateral supratarsal region was severely tender to palpation, with fluctuance without open wound or drainage. Visual acuity was 20/40 OS and 20/50 OD. There was no evidence of ocular hemorrhage or hyphema, and negative Siedel sign on Wood's lamp exam. There was no increased ocular pressure as with a Tono-Pen. Cranial nerves were intact and cardiovascular, pulmonary, abdominal and neurological exam were unremarkable.

CT sinus with contrast (Figure 1A) revealed complete left ostiomeatal complex sinus obstruction with post-obstructive opacification of the left maxillary, anterior ethmoid, and frontal sinuses. There was bony dehiscence of the left lateral frontal sinus, resulting in an open connection into the epidural space (Figure 1B). There was also swelling in the region of the left periorbital soft tissue and left frontal skull. There were no signs of new maxillofacial fractures. MRI brain showed no intracranial extension of the infection or mass effect on the left frontal lobe. Head and Neck surgery (ENT) and Neurosurgery were consulted in the Emergency Department.

Based on imaging and prior history, the patient was diagnosed with Pott's Puffy Tumor. ENT advised parenteral ampicillin-sulbactam and dexamethasone. The patient was admitted to the inpatient medicine service for further management and a referral was placed to the Infectious Disease (ID) specialists. The following day, ENT drained frank pus from the left periorbital abscess. The abscess pocket was packed with iodoform gauze coated with polysporin ointment with continued parenteral ampicillin-sulbactam. The periorbital swelling, tenderness, and erythema improved significantly with IV ampicillin-sulbactam

and daily iodoform packing changes. The wound gradually closed. Cultures grew normal oral flora.

After two week of treatment, ENT performed endoscopic left sinus surgery to drain the infectious sources and open up the left sinuses. Intraoperatively, the left ostiomeatal complex obstruction was noted to be due to inflammatory and polypoid mucosa extending from the maxillary sinus into the middle meatus up towards the common drainage pathway of the frontal sinus and anterior ethmoids. There was no pathology visualized in the right nasal cavity and paranasal sinuses. Subsequently, a left maxillary anastomosis, left anterior ethmoidectomy, left Draf IIb frontal sinusotomy, and left inferior turbinate outfracture was performed, with placement of steroid-eluting stents in the left ethmoid cavity sinus and left frontal sinus to maintain patent passageways. Tissue and bone were sent for culture and pathologic analysis. At 2 weeks post-operative follow up there was complete resolution of the left periorbital abscess and improved sinus disease.

Discussion

Pott's puffy tumor is a subperiosteal abscess with associated osteomyelitis of the frontal bone, related to acute or chronic frontal sinusitis. It was first described by English surgeon, Sir Percival Pott in the late 18th century as a consequence of frontal head trauma. However, Pott later identified it as a rare complication more commonly associated with frontal sinusitis rather than head trauma.¹⁻³ A systematic review has identified less than 150 cases over a 60-year period.³ Case reports of this disease have mainly been identified in the adolescent population, but it can occur in individuals of all ages. Though Pott's puffy tumor is often associated with head trauma and sinusitis, it can also occur in the setting of surgery, dental infections, and insect bites. These subperiosteal abscesses are most often polymicrobial in nature – with streptococci, staphylococci and anaerobic bacteria being the most commonly involved organisms.¹

To understand why sinusitis and trauma can lead to subperiosteal abscesses and osteomyelitis, it is important to understand the anatomy of the involved structures. Pneumatization of the frontal sinuses often occurs by age 2. One route of disease is direct spread through bone, leading to osteomyelitis and subperiosteal abscess.⁴ The other route is through retrograde thrombophlebitis; the frontal sinuses are drained through valve-

less diplopic veins that communicate with the dural venous sinuses.^{4,5} Thus, in patients with untreated Pott's puffy tumor, septic embolic can travel through this venous network to seed the bone and brain causing osteomyelitis, bony necrosis, cerebral abscess, edema, meningitis, encephalitis and thrombosis. In our patient there was dehiscence of the left lateral frontal sinus bone which could have allowed purulent material to drain into the epidural space, although luckily no intracranial spread of disease had yet occurred at the time of presentation.

Patients with Pott's puffy tumor should be started on 4 to 8 weeks of IV antibiotics that cover aerobic and anaerobic organisms with good bone and blood-brain barrier penetration. Subsequent surgical decompression of the frontal sinus may be needed.^{1,6} Historically, an external drainage approach was advocated including craniotomy with debridement of infected bone, complex reconstruction, and external drain placement.⁷ However, these methods are invasive with complications including sino-cutaneous fistula. Recent advances in endoscopic sinus surgery (ESS), along with long-term antibiotics, have obviated the need for more aggressive, open measures for treatment of uncomplicated Pott's Puffy Tumor.⁷ ESS involves opening the frontal sinus drainage pathway with a Draf frontal sinusotomy procedure; this has been shown to result in minimal complications.⁷

There are case reports of patients with Pott's Puffy Tumor presenting with non-specific symptoms similar to our patient; the most common being headache, purulent rhinorrhea and fever. Other symptoms include periorbital swelling, emesis and encephalitis.^{5,6} Due to these non-specific symptoms and its overall rarity, many cases of Pott's Puffy Tumor are misdiagnosed on initial presentation. Delays in diagnosis can result in severe complications such as intracranial abscess or meningitis.⁸ Symptoms of intracranial involvement include: nausea, vomiting, altered mental status, and seizures. In patients with recent head trauma or recurrent sinusitis who present with the characteristic "puffy" swelling of the head, there should be a low threshold for additional imaging and a high index of suspicion for Pott's puffy tumor. Patients who have already been prescribed antibiotics, may have symptoms masked until late in their course. Because of sensitivity for air-bone interfaces, CT scan is useful for delineating whether there is sinusitis, bone destruction, and extracranial abscess formation. MRI, however, is superior at examining soft tissue, and should be used to visualize cerebral abscess formation and intracranial involvement, as well as bone edema.^{1,6}

Conclusion

Pott's puffy tumor is a rare medical emergency and early recognition and treatment is important. Once Pott's puffy tumor is suspected, diagnosis and treatment requires interdisciplinary teamwork with ED, medicine, ID, ENT and neurosurgery specialists.



Figure 1A. Pre-operative CT sinus showing left ostiomeatal complex sinus obstruction with post-obstructive opacification of the left maxillary, anterior ethmoid, and frontal sinuses. There are no signs of any new maxillofacial fractures.



Figure 1B. Pre-operative CT sinus showing an area of bony dehiscence of the left lateral frontal sinus, resulting in an open connection into the epidural space. There is also evidence of soft tissue swelling in the region of the left periorbital soft tissue and left frontal skull.

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