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## A tumor that is not a tumor but it sure can kill!

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### Summary

**Background:**

Pott's puffy tumor is a life threatening complication of infectious sinusitis which is the osteomyelitis of the frontal bone with associated subperiosteal abscess causing swelling and edema over the forehead and scalp.

**Case Report:**

Here we present a case a 38 year old male with a rare infectious complication of untreated or inadequately treated sinusitis called Pott's puffy tumor which was diagnosed due to high clinical suspicion and confirmed with CT imaging and biopsy.

**Conclusions:**

This case highlights the need to recognize and easily prevent this fatal complication of a seemingly benign infection like bacterial sinusitis. Unfortunately, if it does occur, clinicians can avoid missing the diagnosis by upholding a high clinical suspicion in the setting of known risk factors and must look for underlying causes both medical and psychosocial.

**key words:**

**Pott's puffy tumor • bacterial sinusitis • complications of bacterial sinusitis**

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## BACKGROUND

Pott's puffy tumor is a life threatening complication of infectious sinusitis which is the osteomyelitis of the frontal bone with associated subperiosteal abscess causing swelling and edema over the forehead and scalp [1,2]. The incidence was higher in the pre-antibiotic era. In the post-antibiotic era few cases have been reported thus far in the pediatric population, mostly in adolescents [1] and an even smaller number being reported in the adult population in the English literature [1,4]. This case highlights the need to recognize and easily prevent this fatal complication of a seemingly benign infection like bacterial sinusitis.

## CASE REPORT

A 38 year old male with a history of sinusitis presented with complaints of a severe frontal headache and a progressive swelling in the center of his forehead. Reportedly patient was well until seven weeks prior to presentation when he had the onset of nasal and sinus congestion associated with an intermittent nocturnal cough. Six weeks prior to presentation he went to an ambulatory clinic where a diagnosis of viral sinusitis was made, and he was given decongestants. Four weeks prior to presentation he returned to the clinic reporting ongoing sinus congestion, a mild headache and yellow nasal secretions; he was given a course of azithromycin and instructed to return if his symptoms did not improve. Over the subsequent weeks, the patient noted a post-nasal drip producing a foul taste in his mouth, intermittent blood-tinged nasal secretions, a progressive headache, and the appearance of a tender, mid-forehead nodule that progressed to the size of "a walnut," which he treated with decongestants and NSAIDs.

His review of systems was of note for an altered sense of smell, a low-grade fever, occasional night sweats, and a 15–20 pound weight loss.

His past history was significant for bipolar disorder and drug abuse, including cocaine and marijuana. He reported recurrent right otitis media as a child for which he underwent myringotomies and a right antrectomy; he also reported recurrent sinus infections as an adult. He denied high-risk sexual behavior or intravenous drug abuse. His only medication on admission was Seroquel.

On physical examination, the patient appeared acutely distressed due to pain and mild photophobia. His vital signs were normal. Bilateral maxillary and frontal sinus tenderness was detected. A 4x5 cm exquisitely tender, fluctuant, warm mass was present over the middle of his forehead. The white blood cell (WBC) count was 12,900/ul with a normal differential and the ESR, 26 mm/hr. CT scan of the brain and face without contrast demonstrated opacification of the right maxillary, ethmoid and frontal sinuses with bony erosion of anterior wall of right frontal bone. MRI of the head did not reveal evidence of erosion into the posterior wall of the frontal bone or findings of an intracranial abscess.

A diagnosis of Pott's puffy tumor was made and empiric antimicrobial therapy with vancomycin, ceftazidime and metronidazole was initiated. On the third hospital day, endoscopic sinus surgery was performed; bilateral maxillary

antrostomies and ethmoidectomies were performed, and the frontal sinuses were explored and debrided, and the abscess was drained. Cultures revealed a Eubacterium species and coagulase-negative Staphylococci. The empiric antimicrobial regimen was discontinued and intravenous clindamycin was started. An immunologic evaluation demonstrated normal serum immunoglobulin concentrations, and HIV serologies were negative.

Although the patient initially experienced a marked improvement in his symptoms, two weeks into his course severe frontal headache recurred. A repeat CT scan demonstrated a persistent opacification of the right frontal sinus, and a right endoscopic debridement of the frontal sinus was performed. Cultures of bone and inflammatory tissue demonstrated rare colonies of coagulase-negative Staphylococcus only. A follow up CT scan of the facial bones revealed postsurgical changes and generalized sinus mucosal thickening. The patient was treated with clindamycin for a total of six weeks in hospital with a resolution of his symptoms and a normalization of his ESR. He has failed to keep follow-up appointments and attempts to contact him have been fruitless.

## DISCUSSION

Pott's Puffy tumor, first described by Dr. Percival Pott is osteomyelitis of the frontal bone with associated subperiosteal abscess causing swelling and edema over the forehead and scalp [1,2]. It is well-circumscribed because the abscess is situated in the periosteum which also gives it the description of being "puffy" [3].

In the above case, there are a number of reasons why our patient developed such a life threatening complication of acute bacterial sinusitis in the era of easy availability of a wide range of antimicrobials. In our patient in spite of no symptomatic improvement, the antimicrobials were not re-addressed. It is important to know when to switch antimicrobials or add broader coverage for patients in whom an adequate course of commonly used antimicrobials like macrolides are not causing symptomatic relief of acute bacterial sinusitis. Follow-up to see the resolution of symptoms or the development of complications is needed. Our patient was not only non-compliant with his medications but also had a high risk of being lost to follow-up. This patient had a delayed diagnosis and hence a delay in appropriate interventions because Pott's puffy tumor had not been included in his differentials by the physicians he encountered earlier, perhaps; because this entity is so rare; and this only emphasizes the need for high clinical suspicion to diagnose Pott's puffy tumor.

## Incidence

Pott's puffy tumor was more common in the pre-antibiotic era. The exact incidence however, is not known. In the post-antibiotic era few cases have been reported thus far in the pediatric population, mostly in adolescents [1] and an even smaller number being reported in the adult population in English literature [4]. The incidence is higher in developing countries but because of under-reporting an exact estimate cannot be made. Retrospective studies from South Africa have shown that spread of infection from the paranasal sinuses leading to Pott's puffy tumor in about one-third

of patients (32.4%). Because of under-reporting of cases [5] and missed diagnoses [2], it is difficult to comment on any increasing trend in the incidence of Pott's puffy tumor in recent years but due to increasing anti-microbial resistance differential diagnoses should include this diagnosis in the settings of swelling over the forehead following seemingly treatment resistant acute bacterial sinusitis.

### Precipitating factors

Trauma was the earliest precipitating factor described for Pott's puffy tumor. Undiagnosed or partially treated frontal and ethmoidal sinusitis may lead to this serious complication [5]. Motor vehicle accidents, sport injuries, and the use of orthopedic hardware to manage trauma have contributed to the apparent increase in prevalence of posttraumatic osteomyelitis [6]. Rarer precipitating factors like insect bite [1], dental origin frontal sinusitis-related complication, post-acupuncture, latent mastoiditis and pansinusitis have also been reported.

### Etiological agents

The abscess contents tend to be polymicrobial, hence the empiric antibiotic coverage should be broad [7] and must include Gram positive and anaerobic coverage. In previously reported cases, most of the cultured organisms consisted of microaerophilic streptococci, including alpha-hemolytic streptococcus, staphylococcus, peptostreptococcus, bacteroides species and other anaerobes such as fusobacterium. These organisms may be more common in this setting, compared to other otorhinologic infections, because of the relatively lower oxygen concentration in the frontal sinus caused by compromised ostial patency [1].

### Pathophysiology

The exact pathophysiology is unclear. However, because the mucosal venous drainage of the frontal sinus occurs through diploic veins, which communicate with the dural venous plexus, septic thrombi can potentially evolve from foci within the frontal sinus and propagate through this venous system. Thus, intracranial involvement is possible with or without direct erosion of the frontal bone [1].

### Typical and atypical clinical presentations

In a patient with pre-disposing factors, Pott's Puffy tumor usually presents as a well-circumscribed, fluctuant, tender swelling over the forehead. Infrequently, it may extend from the forehead onto the vertex and form an extensive subgaleal empyema [2]. Due to its indolent course, it may be accompanied with low grade fever and weight loss. A sino-cutaneous fistula is a rarer presentation [8].

### Differential diagnoses

Pott's pseudotumor, metastatic bronchogenic carcinoma, primary squamous cell carcinoma of frontal sinus, Langerhan's histiocytosis of frontal sinus have been confused with Pott's puffy tumor in the past. Unfortunately, a large number of patients presenting with 'Pott's puffy tumor' are still misdiagnosed as having scalp abscess, undergo incision and drainage and are discharged from hospital [2].

### Complications

There is a high risk of severe neurological complications, such as epidural abscess, subdural empyema, and secondary septic thrombosis of the dural sinuses [9]. Intracranial suppuration can complicate both acute and chronic frontal sinusitis [10] but in our case although we did see frontal bone erosion, our patient did not develop a frontal lobe abscess.

### Early diagnosis

Besides, a characteristic clinical presentation, leukocytosis and elevated markers of inflammation like ESR and CRP, radiological imaging clinches the diagnosis. CT scan is diagnostic for associated complications and underlying pathology [11]. When imaging the orbits and sinuses in such patients, the brain should be included to rule out intraparenchymal involvement [7].

### Timely treatment

Pott's puffy tumor can be life threatening because of the high frequency of intracranial complications, hence a prompt diagnosis and combined treatment; surgery and long term antibiotic therapy (not less than 8 weeks), is necessary to cure the disease [12]. Combined endonasal and percutaneous endoscopic surgery is a good approach which can be carried out for the treatment of frontal sinus diseases and its complications [11].

### CONCLUSIONS

This is a very serious complication which can be easily prevented by adequate and appropriate treatment of acute bacterial sinusitis in this day and age. Unfortunately, if it does occur, clinicians can avoid missing the diagnosis by upholding a high clinical suspicion in the setting of known risk factors and must look for underlying causes both medical to psychosocial.

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