

# Puffy Frontal Edema: A Serious Life-Threatening Finding of Pott's Puffy Tumor: Case Report

## Frontal Kaba Şişlikli Ödem: Hayati Tehlike Arz Eden Bulgularıyla Pott'un Şişkin Tümörü

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**ABSTRACT** Osteomyelitis of the frontal bone, otherwise known as Pott's puffy tumour, is a rare complication of frontal sinusitis or direct injury to the frontal bone in adolescent age group. Pott's Puffy tumor can be complicated with cortical vein thrombosis, epidural abscess, subdural empyema, and brain abscess. Venous drainage of the frontal sinus flowing through diploic veins, which have communication with the dural venous plexus is the cause of venous thrombosis. Through this venous system septic thrombi can potentially evolve and propagate from foci within the frontal sinus. We aimed to emphasize in this case report that Pott's puffy tumour should be considered in the differential diagnosis in a patient with swelling on the forehead, due to its high mortality rate of about 17%.

**Key Words:** Frontal sinusitis; osteomyelitis; Pott's puffy tumor

**ÖZET** Pott'un şişkin tümörü olarak da bilinen frontal kemiğin osteomyeliti, adolesan çağıdaki frontal sinüzitin veya frontal kemiğin doğrudan hasarının nadir bir komplikasyonudur. Pott'un şişkin tümörü, kortikal ven trombozu, epidural apse, subdural ampiyem ve beyin apsisi ile komplike olabilmektedir. Frontal sinüsün dural venöz pleksuslarla bağlantılı olan diploik venlere olan venöz drenajı, venöz trombozun sebebidir. Bu venöz sistem boyunca ilerleyen odaklardan, frontal sinüs içinde yer alan septik trombüsler gelişebilmektedir. Bu olgu sunumunda, kafa ön bölgesinde şişlik olan bir hastada, mortalitesinin takriben %17 olması nedeniyle, Pott'un şişkin tümörünün ayırıcı tanıda değerlendirilmesinin yararlı olabileceğini vurgulamayı amaçladık.

**Anahtar Kelimeler:** Frontal sinüzit; osteomyelit; Pott'un şişkin tümörü

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Pott's puffy tumor was first described in 1760 by Percivall Pott (1714–1788), a surgeon at St. Bartholomew's Hospital in London, as "... if the symptoms of pressure such as stupidity, loss of sense, voluntary motion, etc. appear some few days after the head has suffered injury from external mischief, they do most probably imply an effusion of a fluid somewhere; in the substance of the brain, in its ventricles, between its membranes, or on the surface of the dura mater; but the inflammation of the dura mater, and the formation of matter between it and the skull, in consequence of contusion, is generally indicated and preceded by one [sign] which I have hardly ever known to fail; I mean a puffy, circumscribed, indolent tumor of the scalp, and a spontaneous separation of the pericranium,

from the skull under such a tumor in the observation of the nature course of head trauma.”<sup>1</sup> Currently, it is defined as a forehead-localized swelling with overlying subperiosteal abscess and osteomyelitis of the frontal bone.<sup>2-5</sup> In this case report we presented a 13-year old male patient with Pott’s puffy tumour to emphasize the importance of early diagnosis and early initiation of therapy in the development of morbidity and mortality.

## CASE REPORT

A 13-year old male patient was referred to our clinic with a one-week history of headache, fever and painful swelling on the forehead with an antibiotic and an antipyretic prescribed in a cottage hospital with the diagnosis of sinusitis. There was no trauma prior to this swelling. On physical examination, fever was 38°C, there was a fluctuant, tender swelling (2x2 cm) on the right part of the forehead and purulent postnasal discharge (Figure 1). There was no focal neurological deficit. Laboratory findings included white cell count 14.9



**FIGURE 1:** Appearance of Pott’s puffy tumour on the right side of the forehead (See for colored form <http://tipbilimleri.turkiyeklinikleri.com/>)

x10<sup>9</sup>/L, erythrocyte sedimentation rate 74 mm/hour and C-reactive protein 14.8 mg/dl (0-0.8 mg/dl). Cranial computed tomography scan showed inflammatory changes in the frontal sinuses and soft tissue swelling on the right side of the frontal bone. Intravenous cefotaxime and vancomycin was administered for 14 days. As frontal abscess recovered with antibiotic therapy, no surgical intervention was implemented. No microorganism was recovered from the blood culture. He was discharged after 6 weeks of antibiotic therapy and he remained well during one and half years of follow-up.

## DISCUSSION

Pott’s puffy tumor is a frontal osteomyelitis accompanied by a subperiosteal abscess of the frontal bone. This “puffy” lesion arises when infection breaks through the outer edge of the frontal bone forming an abscess between the bone and the periosteum. It remains “circumscribed” because of tight adherence between the periosteum and the bone.

Pott’s puffy tumor is often associated with antecedent sinusitis and less commonly with trauma.<sup>6</sup> Pott’s puffy tumor and its complications are a result of the unique configuration of the frontal sinuses and their vascular structures. The diploic veins drain into the frontal sinuses. These thin-walled, valveless vessels facilitate the hematogenous spread of the sinus infection to the bone and the brain.<sup>7,8</sup> The usual route for infection spread is from the frontal sinus to the frontal bone. The infection may further erode through the bony cortex, leading to the subperiosteal collection of pus described by Pott, or erode inward causing meningitis, epidural or subdural empyema, frontal lobe abscess, or cavernous sinus thrombosis. If the inferior wall of the frontal sinus is involved, infection may spread toward the orbit-leading to intraorbital abscess or orbital cellulitis. Pott’s puffy tumor also can occur due to trauma (from insect bites to wrestling injuries) to the forehead of any patient with frontal sinusitis.<sup>9,10</sup> Rarer risk factors for Pott’s puffy tumor include osteocartilaginous necrosis secondary to chronic intranasal cocaine abuse, den-

tal sepsis, or delayed complications of neurosurgery.<sup>11,12</sup> In our case no prior trauma was present, frontal sinusitis might have led to Pott's puffy tumor.

Laboratory investigations are not usually helpful with an equivocal white cell count and normal erythrocyte sedimentation rate, which is presented in over 50% of the cases.<sup>13</sup> The most common microorganisms in osteomyelitis of the skull are *Streptococcus milleri* or *Staphylococcus aureus*.<sup>14</sup> Culture is required to identify the organism and appropriate antibiotic therapy should be started even if culture does not yield any microorganism.<sup>15</sup> Although culture did not yield any microorganism in our case, antibiotic therapy is initiated immediately.

Tsai and his colleagues examined 6 Pott's puffy tumour patients and found the male-to-female ratio 5:1. The mean age at the time of diagnosis was 13.3 years. The risk factors were acute sinusitis in two (33%) cases, chronic sinusitis in two (33%), recent head trauma in two (33%), and acupuncture therapy on skull in one (17%). The most common presenting symptoms were fever, headache, forehead tenderness, vomiting and fatigue/malaise (100%) in those patients. They diagnosed Pott's puffy tumor on average the seventh day after effervescence, and half of them had intracranial involvement at diagnosis. Intracranial involvement was in the form of intracranial infection, most of which were subdural empyema. The frontal sinus was involved in all cases (100%). The frontal lobe was the most common area of involvement in intracranial infections (100%); two thirds of those were polymicrobial from two or more sites. The average time of the initial operation was 5.8 days after

the diagnosis. Half of the patients were reoperated. The mortality rate was 17% in that study.<sup>16</sup>

The incidence has decreased significantly in the post-antibiotic era but it may rise due to sub-optimal treatment of frontal sinusitis. Although articles about Pott's puffy tumor are rare, many clinicians speculate that it is more common than cited in the literature.<sup>5</sup> Pott's puffy tumor is more common in adolescents and young adults because adolescence corresponds with a peak in the vascularity of the diploic system and growth of the frontal sinus.<sup>17,18</sup> Despite antimicrobial therapy, the mortality rate is 5-17%.<sup>8,16</sup> Symptoms including headache and little or no fever are often indolent. Increasing symptoms suggest complications.

Early diagnosis is critical to prevent complications.<sup>19</sup> Imaging with computed axial tomography scan or magnetic resonance defines the extent of the infection.<sup>20</sup> In our case cranial computed tomography scan showed inflammatory changes in the frontal sinuses and soft tissue swelling on the right side of the frontal bone. A combined approach is suggested with 6 weeks of antimicrobials and surgery. Our patient received treatment for 6 weeks and he had no symptom during the 1.5 years of follow-up. Antimicrobial therapy should be tailored to the organisms isolated from surgical specimens.<sup>19</sup> Surgery is indicated for abscess drainage, bony debridement, and trephination of the frontal sinus.<sup>21</sup>

We aimed to emphasize in this case report that Pott's puffy tumour should be considered when a patient presents with a swelling on the forehead since mortality rate might be as high as 17%.<sup>16</sup>

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