

## POTT'S PUFFY TUMOR: CT AND MRI FINDINGS

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**Pott's puffy tumor, a subperiosteal abscess of the frontal bone with cranial osteomyelitis, is a rare complication of frontal sinusitis. In this report, we describe the radiological findings of a 24-year-old man, presenting with swelling of the right upper eyelid. Correct and early diagnosis of this infrequent, but potentially life-threatening condition is of utmost importance.**

**Key-word:** Sinusitis.

Pott's puffy tumor is defined as a subperiosteal abscess of the frontal bone associated with frontal osteomyelitis. It is traditionally considered a complication of frontal sinusitis, but is also occasionally described after head trauma. Spreading of the infection occurs through the venous drainage of the frontal sinus or by direct extension through the bone.

In this report, we describe the radiological findings in a patient with frontal sinusitis spreading through the anterior and inferior bony margins of the frontal sinus.

### Case report

A 24-year-old male patient presented to the emergency department with a recent-onset swelling of the right upper eyelid. The patient complained of headache, but no vision disturbances or fever were present.

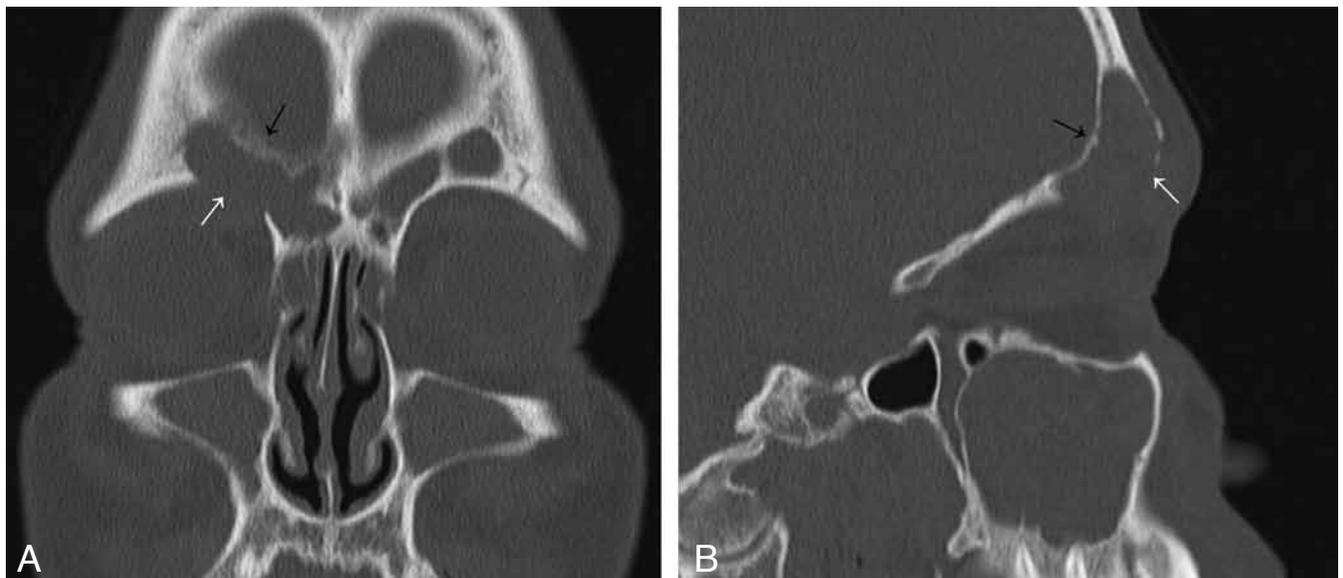


*Fig. 1.* — This photograph of the patient shows swelling of the right periorbital region (black arrow).

Endoscopic examination revealed signs of sinusitis, so the patient was treated with antibiotics, and corticosteroids in a tapering schedule. His complaints disappeared, but after two months he consulted because of

a relapse of the same symptoms. The right periorbital and frontal region was edematous and seemed inflammatory (Fig. 1).

A multislice helical computed tomography (CT) scan with axial,



*Fig. 2.* — The coronal (A) and parasagittal (B) CT images with bone window setting show osteomyelitis of the frontal bone with bony blurring (black arrow), and with bone erosion of the supraorbital margin (white arrow).

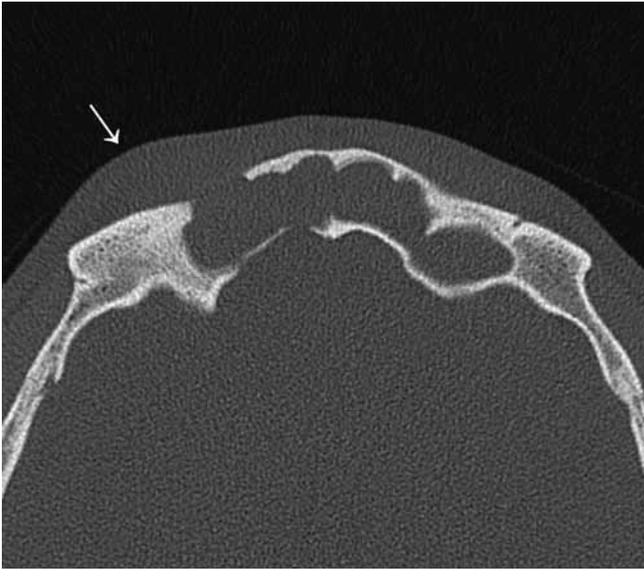


Fig. 3. — Axial CT scan with bone window shows that a soft tissue swelling is present over the right frontal bone (white arrow).

coronal and sagittal reconstructions was performed, and showed bilateral extensive opacification of the frontal and maxillary sinuses, and the anterior ethmoid sinus cells. Bony erosion of the supraorbital margin of the right frontal sinus was present (Fig. 2), as well as soft tissue swelling (Fig. 3).

The patient subsequently underwent magnetic resonance imaging (MRI, 1.5 Tesla) with axial T1- and T2-weighted images. After intravenous injection of gadolinium axial and coronal fat-suppressed T1-weighted images were performed. The examination confirmed the presence of sinusitis and osteomyelitis of the

right frontal bone, and also showed opacification of the subcutaneous fat of the right forehead and upper eyelid. The fat plane surrounding the right superior rectus muscle and levator palpebrae superioris muscle also enhanced (Fig. 4 and 5). Meningeal involvement was however not present.

The imaging findings led to the final diagnosis of Pott's puffy tumor, and a surgical intervention with an appropriate antibiotic treatment was proposed.

### Discussion

Percivall Pott, an 18th century neurosurgeon, wrote a book about head injuries by means of examples (1). He observed phenomena such as intracranial haemorrhage and infected epidural collections, and treated them with trepanation (2, 3). In 1775, he described a case of frontal sinus infection with a puffy swelling of the forehead. Exploration showed osteomyelitis of the frontal bone, associated with formation of a subperiosteal abscess. The entity became known as Pott's puffy tumor (4, 5). This condition mostly arises because of the expansion of frontal sinusitis through valveless diploic veins into the marrow cavity of the anterior bony

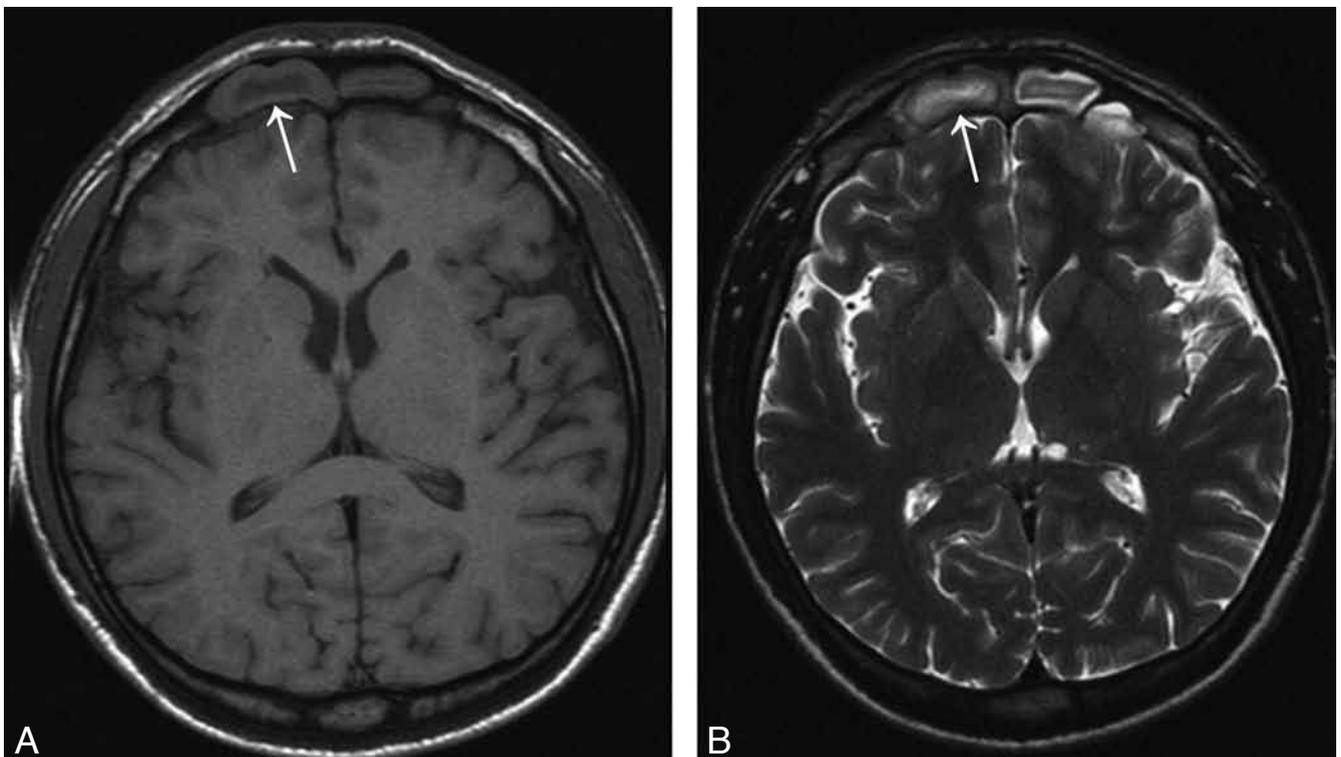


Fig. 4. — The T1-weighted (A) and T2-weighted (B) axial MRI images show bilateral frontal sinusitis and frontal bone osteomyelitis on the right side, with bone thinning (white arrow).

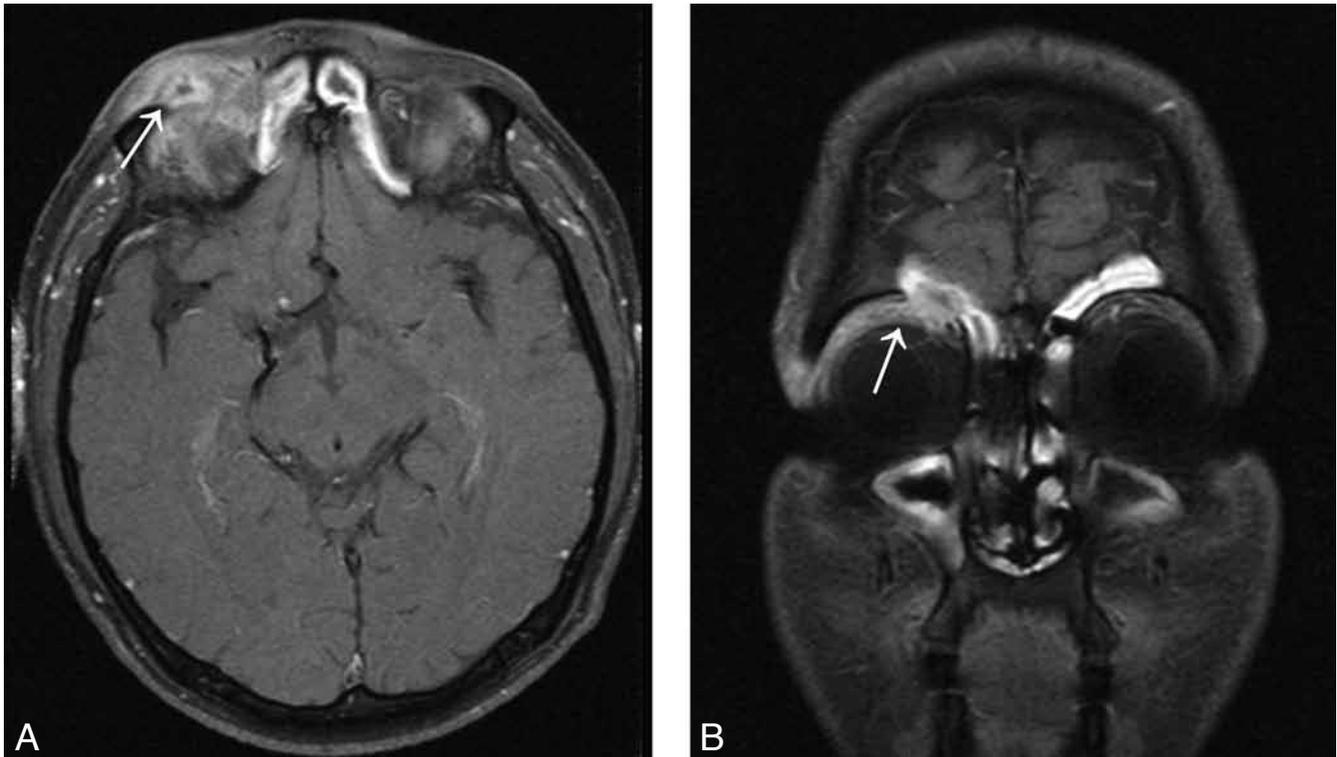


Fig. 5. — Axial (A) and coronal (B) fat-suppressed T1-weighted MRI images performed after intravenous injection of gadolinium contrast show inflammation with enhancement of the subcutaneous fat and of the superior periorbital fat (white arrow).

boundary of the frontal sinus. It results in infection, osteomyelitis, bony erosion and finally subperiosteal abscess formation (6).

Signs of Pott's puffy tumor are a soft and fluctuant swelling over the forehead or scalp, headache, photophobia, fever, and symptoms of an underlying subacute or chronic sinusitis. Erythema, warmth and tenderness usually overlie the swelling but may be absent (7). The majority of the reported cases are adolescent males, but cases of young children are also published (7). After the introduction of appropriate antibiotic therapy, this condition has become rare. However, recently there is an increase in cases described in literature, probably because of intranasal drug use (6), HIV pandemic, misdiagnosis and partial treatment (8). The differential diagnosis includes meningitis, especially when there is a delay in appearance of focal symptoms (8). When swelling of the forehead predominates, skin and soft tissue infection should also be considered.

A CT scan with intravenous contrast enhancement provides adequate information on the intracranial as well as extracranial complications of frontal sinusitis, but is most of all

superior to MRI in visualisation of the bone. However, MRI after intravenous gadolinium injection provides more detail in the description of the extent of the disease, and enables better evaluation of the underlying subdural space and brain (5, 9). Scintigraphic evaluation can be helpful in the diagnosis of osteomyelitis (10). The cultures of patients with Pott's puffy tumor often reveal polymicrobial involvement. Streptococci, staphylococci, and some anaerobic bacteria are most frequently found (3, 5).

In most cases, there is failure to respond to antibiotics and more aggressive treatment options should be preferred. Surgical intervention is the treatment of choice, including drainage of the abscess and removal of the osteomyelitic bone. Associated sinusitis needs to be addressed at the same time. Postoperatively, the patient should be given appropriate antibiotic medication for a period of 6 to 8 weeks (5, 7).

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