

Frontal osteomyelitis: a serious complication of sinusitis

Peter Walshe, Rory McConn Walsh, Michael Walsh

INTRODUCTION

The complications of sinusitis can be divided into local (e.g. orbital cellulitis) and distant (e.g. septicaemia and laryngitis) complications. Sometimes a subtle swelling of the forehead may be seen. This can indicate the extent of the disease process in the sinuses. It can also herald a rapid deterioration in the patient's health.

DISCUSSION

The complications of sinusitis are many and varied. One of the rarest is osteomyelitis of the frontal bone with subperiosteal abscess formation. This gives a curious swelling of the forehead. The swelling of the forehead in such cases is called 'Pott's puffy tumour', named after Sir Percival Pott.

Initially, the pain experienced in such cases is usually mild, leading to a delay in the diagnosis (Blackshaw and Thomson, 1990). The diagnosis may be further delayed as the white cell count is normal in over 50% of cases (Blackshaw and Thomson, 1990).

The term Pott's puffy tumour is defined as a subperiosteal abscess of

the frontal bone associated with frontal osteomyelitis, and is derived from an observation made by Pott during the 18th century (Pott, 1760). He described the appearance of the forehead in a case of trauma-induced pericranial abscess. 'The part struck swells and becomes puffy' he noted. The term 'puffy' stuck, albeit as a description of a different aetiology to the subperiosteal abscess.

The condition is rare in childhood because the frontal sinuses only begin to develop at the age of 2 years (Hore et al, 2000), and complete their development at puberty. The condition can occur at any age thereafter. When it occurs, it means that pus has escaped from the frontal sinus to the subperiosteal space.

The blood supply of the frontal sinus is derived from three separate sources: the inner table is supplied by vessels from the dura; the outer table from the frontal bone periosteum; and the floor from the periorbital periosteum (Wenig et al, 1983). The venous drainage communicates with and is continuous with the diploe and dura (Thomas and Nel, 1997).

Any condition that predisposes to infection of the sinuses can predispose the patient to developing a subperiosteal abscess. This includes previous trauma such as surgery, nasal polyps and all other causes of chronic rhinosinusitis.

Infection spreads from the mucosa of the frontal sinus to the adjacent bones of the frontal sinus by expansion of venous thrombi, or simply by direct extension from the mucosa (Marshall and Jones, 2000).

The incidence of Pott's puffy tumour is difficult to determine. It has become progressively rare in the post-antibiotic era. A recent study reported an incidence of three cases in a retrospective survey of 649 patients admitted with acute or acute on chronic sinusitis over a 13-year period (0.5%) (Clayman et al, 1998). However, in the pre-antibiotic era the incidence was significantly higher (Marshall and Jones, 2000).

The pus formation is usually as a result of *Staphylococcus aureus* infection, although *Streptococcus milleri*, *Haemophilus influenzae*, *Strep. pneumoniae* and even *Escherichia coli* have been cultured (Marshall and Jones, 2000; Schlosser et al, 2001).

There is a high complication rate in Pott's puffy tumour (Pott, 1760). Serious specific complications include orbital cellulitis (Figure 4), either as a result of infection of the ethmoid sinuses, septic thrombus propagation or direct spread of infection. Further propagation of venous thrombi can then lead to cavernous sinus thrombosis. As mentioned earlier, the venous drainage of the frontal sinus is in continuity with the venous drainage of the diploe and dura. Therefore, any infected thrombus

CASE REPORT

A 12-year-old girl presented with a 6-day history of swelling of the forehead (Figure 1). She had complained of frontal headaches for the previous 2 weeks, but was otherwise well. She denied any history of trauma. The headaches were of a dull boring nature, and the pain extended to the mid-facial region. She complained of a loss of smell and nasal congestion. Neurological examination was normal, as was a subsequent skull X-ray. Computed tomography (CT) of the skull was performed, and indicated osteomyelitis of the frontal bone (Figure 2). There was also evidence of pus in the paranasal sinuses.

Within 30 minutes of admission to the hospital the patient's condition deteriorated rapidly. She lost consciousness and showed signs of increased intracranial pressure. It was thought that the suppuration present in the sinuses had spread to the subdural space, and superficial fine-needle aspiration of the swelling over the forehead was performed in an effort to decompress the area. This yielded 15 ml of pus (Figure 3).

Subsequent magnetic resonance imaging of the brain confirmed a subdural abscess. The patient underwent an emergency craniotomy via a bicoronal flap, and 10 ml of pus was removed from the intracranial cavity. Bilateral frontal sinus trephines with drain insertion, bilateral maxillary sinus washout and bilateral intranasal uncinctomies were then performed. The patient was commenced on high-dose intravenous antibiotics and made a slow but steady recovery over 1 month.

Mr Peter Walshe is Research Registrar, Mr Rory McConn Walsh is Consultant Surgeon and Professor Michael Walsh is Professor in the Department of Otolaryngology, Beaumont Hospital, Dublin

Correspondence to: Mr P Walshe

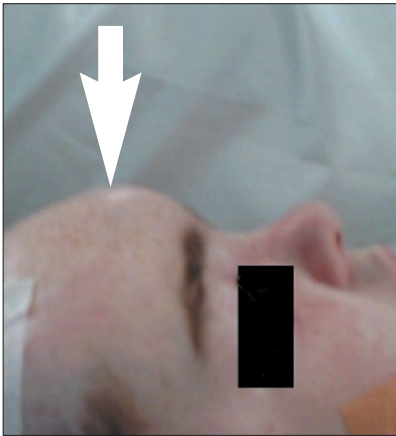


Figure 1. Typical swelling seen over the glabella as a result of subperiosteal pus.

can spread to involve the dura and cause an epidural abscess or pachymeningitis. Indeed, further propagation again can lead to a subdural abscess and even intracerebral abscess. Chronic osteomyelitis of the frontal bone can occur if the disease is inadequately treated (Meshashawar et al, 2001).

Treatment is usually by frontal sinus trephine with drain insertion, bilateral maxillary sinus washout with or without drain insertion, and sometimes intranasal ethmoidectomy. The principle of these treatments is the drainage of pus from the sinuses.

Twice-daily washouts of the sinus drains described above are performed on the ward until the washings are clear.

A specimen of pus is taken for culture and sensitivity during the operation. The patient should be placed on broad-spectrum, intravenous antibiotics such as amoxicillin/clavulanate and metronidazole, until a culture and sensitivity result is obtained, as well as short-term use of a vasoconstrictive nasal spray.

Antibiotics should be continued for 6 weeks or longer (Marshall and Jones, 2000). Shorter courses can allow



Figure 2. Coronal computed tomography scan of the skull showing the typical 'moth-eaten' appearance of the frontal bone as a result of osteomyelitis.



Figure 3. Approximately 15ml of pus was aspirated from the swelling with a fine needle.

chronic osteomyelitis to develop. Long-term administration of antibiotics for many months is sometimes required in these cases. In cases where chronic sinusitis develops, excision of bone should be performed (Marshall and Jones, 2000). Ideally, this should be limited in younger patients to avoid cosmetic deformity. Where cosmetic deformity occurs as a result of excessive removal of bone, stripping of the sinuses and remoulding with hydroxyapatite paste should be considered.



Figure 4. Left-sided orbital cellulitis.

CONCLUSION

Although Pott's puffy tumour is rare, it is imperative that this condition is diagnosed quickly, so appropriate treatment can be instituted before intracranial suppuration can occur. **HM**

- Blackshaw G, Thomson N (1990) Pott's puffy tumour reviewed. *J Laryng Otolology* **104**: 574-7
- Clayman GL, Adams GL, Paugh DR, Koopmann CK (1998) Intracranial complications of paranasal sinusitis; a combined institutional review. *Laryngoscope* **108**: 1635-42
- Hore I, Mitchell RB, Radcliffe G, De Casso Moxo C (2000) Pott's puffy tumour: a rare cause of forehead swelling in a child. *Int J Clin Pract* **54**(4): 267-8
- Marshall AH, Jones NS (2000) Osteomyelitis of the frontal bone secondary to frontal sinusitis. *J Laryng Otolology* **114**: 944-6
- Meshashawar AA, Harris DA, Al Mokhahar N, Evans RA (2001) Pott's puffy tumour. An unusual presentation and management. *J Laryng Otolology* **115**(6): 497-9
- Pott P (1760) *Observations on the Nature and Consequences of Wounds and Contusions of the Head*. C Hitch and L Hawes, London
- Schlosser RJ, London SD, Gwaltney JM, Gross CW (2001) Microbiology of chronic frontal sinusitis. *Laryngoscope* **111**: 1330-2
- Thomas JN, Nel JR (1997) Acute spreading osteomyelitis of the skull complicating frontal sinusitis. *J Laryng Otolology* **91**: 55-62
- Wenig BL, Goldstein MN, Abrahamson AL (1983) Frontal sinusitis and its complications. *Int J Paed Otorhinolaryng* **90**: 1814-24

Correspondence

If you would like to comment on any articles published in *Hospital Medicine*, or any issues relevant to our readers, please write in no more than 250 words to:

Dr Jack Tinker
 Editor-in-Chief, *Hospital Medicine*
 c/o Yvonne Perks
 1 Wimpole Street
 London W1G 0AE