

## OSTEOMYELITIS OF THE FRONTAL BONE

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### SUMMARY

Osteomyelitis of the skull is a rare clinical presentation. It usually occurs as a complication of trauma or sinusitis. Its complications can be life threatening though the initial symptoms and signs are subtle. Early diagnosis and appropriate management to prevent CNS complications reduce morbidity and mortality significantly. Intracranial complications of sinusitis, focal infections and meningitis remain a great challenge. Mortality from complications is 20-40%. The prevalence of skull osteomyelitis is about 1.5% of all osteomyelitis.

**Keywords:** Skull osteomyelitis, brain abscess, subperiosteal abscess.

### INTRODUCTION

Osteomyelitis can affect any bone. The common sites are the long bones especially the tibia and fibula. Osteomyelitis of the bones of the head is uncommon particularly in children. It can affect the calvarium or the base of the skull. In children trauma is the commonest predisposing factor followed by sinusitis. The spread of infection is either by direct extension from paranasal sinuses or by retrograde thrombophlebitis. Brain abscess is the commonest complication of skull osteomyelitis. This is usually associated with subperiosteal abscess. Frontal lobe abscess present as subtle personality changes.

Radiological features vary with the duration of the infection. Early features are seen as islands of normal bone with increased or diminished density. Advanced features are seen as lytic lesions.

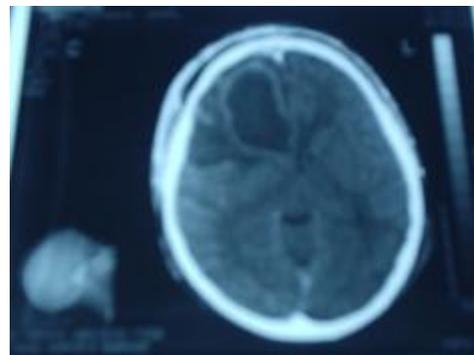
### CASE REPORT

A 10 year old Ghanaian girl presented to the Children's Department of Korle-Bu Teaching Hospital, Accra in March, 2004 with a four week history of frontal headaches, fever, two episodes of convulsion, frequent episodes of weakness, a

week's history of swelling on forehead and drowsiness.

On examination, she looked very ill with a tense warm and tender swelling on her forehead and the anterior half of her scalp. She had bilateral periorbital oedema and opened her eyes with great difficulty. She was conscious and well oriented but not interested in her surroundings with occasional inappropriate smiles. She had slight left facial (upper motor neuron) palsy and a weak left lateral rectus muscle. Her neck was stiff and Kernig's sign was positive. Respiratory and cardiovascular systems were normal.

There were no abnormal abdominal findings. Fundoscopy showed a normal optic disc but dilated veins. Plain x-ray of the skull showed lytic lesions in the frontal bones. Findings of CT scan of the head are shown in Figure 1.



**Figure 1** CT scan showing a large brain abscess in the right frontal lobe and a large subgaleal abscess.

She was managed with IV ceftriaxone, flucloxacillin, and metronidazole. The neurosurgeons were invited for surgical intervention. In theatre seven hundred milliliters of pus was drained from the subgaleal abscess and one hundred milliliters from the frontal abscess. Sequestrectomy of the mid-frontal bone was done. Cultures done on the pus isolated no organisms.

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Our patient was discharged after twenty-five days in hospital with no residual neurological problems. The patient has not reported for follow up to date. Her mother was however seen after two months and she said the girl has gone back to school and is doing well.

## DISCUSSION

The history and clinical presentation suggested late osteomyelitis of the skull with subgaleal abscess and intracranial brain abscess. X-rays and CT scan confirmed these. In our patient, frontal sinusitis was the most likely cause of the osteomyelitis (Pott's puffy tumour). There was no history of cellulitis or trauma to the face prior to presentation. Majority of reported cases in post antibiotic era involve adolescents but this patient was a 10 year old well nourished girl.

The bone separating the frontal sinus from the anterior cranial fossa and the orbit are often quite thin and the interrelated venous drainage system of these areas form the anatomic basis of serious orbital and intracranial complications<sup>1</sup>. Most cases of skull osteomyelitis are related to trauma and spread from adjacent sites especially the frontal sinus. There are occasional reports of haematogenous origin of infection<sup>2</sup>. Epidural empyemas are usually associated with osteomyelitis of the skull. Epidural extension of skull infection separates the dura mater from the inner table of the skull thus interfering with the major blood supply to the inner table of the skull and predisposing the bones to widespread infection. The dura is initially resistant to infection but later yields with resultant meningitis and abscess. The Central Nervous System (CNS) is vulnerable to destruction by infectious processes and is incapable of mounting a significant immune defense itself<sup>4</sup>. A gliotic zone develops around the site of infection but does little to limit spread of infection<sup>3</sup>.

In acute osteomyelitis, the patient is toxic with tender swelling over the bone involved, called Pott's puffy tumour. Chronic osteomyelitis often presents as a lump on the head. Brain abscess may mimic any other intracranial space-occupying lesion with its features of seizures, focal deficits and other features of raised intracranial pressure such as headaches, and vomiting. The patient may present with a low-grade fever, leucocytosis, and raised ESR and C-reactive protein. CT scan shows contrast-enhancing rim with a non-enhancing hypodense center. CSF examination is contraindicated in patients with suspected suppurative intra-

cranial space occupying lesion and the results are non-specific.

The majority of brain abscesses occur in the first two decades of life because of the predisposition of this age group to sinus and middle ear infections. Sinusitis has surpassed middle ear and mastoid disease as the most common source of infection in patients with brain abscesses. The frontal sinus is the most common followed by ethmoid, sphenoid and maxillary sinuses.

Despite advances in neuroradiological imaging techniques and antimicrobial chemotherapy<sup>4</sup> the incidence of cerebral abscesses may be increasing with a growing number of opportunistic infections in immunocompromised patients<sup>4,5</sup>.

The diagnosing of intracranial complications of sinusitis requires a high index of suspicion, imaging of brain and paranasal sinuses and aggressive intervention<sup>6</sup>.

Intracranial complications should be suspected in any patient aged more than seven years with pre-septal or orbital cellulites associated with orbital subperiosteal abscess<sup>7</sup>. Urgent surgical evacuation of any intracranial collection is required. Surgical management of associated sinusitis remains controversial<sup>8</sup>. The source of the infection must be eradicated. Delay in surgical intervention has been associated with prolonged hospitalization<sup>9</sup>. Broad-spectrum antibiotics are strongly recommended because the sites of primary infections vary and many different organisms can be the cause of the abscess formation. Long-term morbidity includes hemiparesis, chronic seizure disorder, decreased cognitive function and residual cranial nerve defects.

## CONCLUSION

Despite improvements in antibiotic therapies and surgical techniques, sinusitis still carries a risk of serious and potentially fatal complications<sup>10</sup>. Prompt appropriate intervention can reduce morbidity and avert death.

## ACKNOWLEDGEMENT

We wish to acknowledge the neurosurgical team of Korle-Bu Teaching Hospital, whose prompt response helped save the girl.

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