

A quartet of lateral sinus thrombosis, extradural abscess, subdural abscess and occipital abscess: complications of acute mastoiditis in a pre-adolescent child

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Abstract

Neurological complications of acute mastoiditis are rare but can be life threatening. Their presentation may be masked by the use of antibiotics. We present a unique case of acute otitis media progressing to occipital, extradural and subdural abscess formation and lateral sinus thrombosis in a child. The clinical course and management of a pre-adolescent male is presented and discussed. We review the incidence, presentation and treatment of occipital abscesses and lateral sinus thrombosis with acute mastoiditis. Following extended cortical mastoidectomy, neck exploration and broad spectrum intravenous antibiotics, the patient made a full recovery. This is the first reported case of acute mastoiditis associated with occipital abscess in a child. Early, aggressive treatment is required for a successful outcome. The rarity of neurological complications, in addition to the insidious onset and subtle symptoms associated with antibiotic therapy, can make diagnosis extremely difficult. Patients with acute otitis media who fail to respond fully to treatment should be referred early for a specialist otology opinion.

Key words: Child; Abscess, Intracranial, Extradural; Abscess, Intracranial, Subdural; Lateral Sinus Thrombosis; Mastoiditis

Introduction

The widespread use of antibiotics in the treatment of acute otitis media in the developed world has led to a marked reduction in the incidence of acute mastoiditis, down from 50 per cent in 1910¹ to 0.004 per cent in 1985.² Although neurological complications are a rare event, they are life threatening. Their presentation may frequently be masked by the use of antibiotics.³

We present a case of acute otitis media in a child which progressed to acute mastoiditis, complicated by a quartet of lateral sinus thrombosis, subdural and extradural abscess, and (previously undescribed) occipital abscess.

Case

A nine-year-old boy presented with a 24-hour history of a painful swelling behind his left ear. This had followed left-sided otalgia over the previous two weeks. His general practitioner had prescribed two separate courses of oral antibiotics, with improvement of his symptoms between treatments.

On examination, he was afebrile. There was a tender swelling over his left occiput. Otoscopy revealed a red, bulging left tympanic membrane. He had no focal neurological signs. Inflammatory markers were elevated, his white cell count was $13.9 \times 10^9/l$ with a neutrophilia and his C-reactive protein concentration was 30 mg/l. A pure tone audiogram showed normal hearing thresholds in the right ear and a conductive loss of 30–40 dB in the left ear. A diagnosis of acute otitis media with mastoiditis

was made and the patient was commenced on intravenous co-amoxiclav 900 mg thrice daily (tds).

On the third day, the patient clinically deteriorated. He became pyrexial and the tender swelling over the left occipital region increased in size. Contrast-enhanced computed tomography (CT) revealed several abnormalities. There was a free communication between a fluid-filled left mastoid cavity and the subdural space beneath the lateral sinus, abnormal material was seen in the extradural space tracking inferiorly into the inferior aspect of the left posterior fossa, and the bone of the left occiput was thinned and demineralized, with evidence of full thickness bone destruction (Figure 1). Extracranially, there was an abnormal swelling in the muscle groups inferior to the left occiput, with abscess formation (Figure 2). There was no radiological evidence of sigmoid sinus thrombosis.

After discussion with the neurosurgical team, it was decided to proceed with a cortical mastoidectomy and drainage of the extradural and occipital abscesses. Operative findings showed a mastoid system filled with granulation tissue, and a representative sample was sent for histological analysis to exclude histiocytosis X. There was a large area of exposed sigmoid sinus and posterior fossa dura. Pus drained through a small area of granulation on the posterior fossa, followed by a leak of cerebrospinal fluid (CSF). Pressure applied to the occipital abscess cavity caused pus to empty into the cortical mastoid cavity. This confirmed direct continuity between the occipital abscess and the extradural abscess through a defect in the occipital bone. A temporalis muscle graft

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Accepted for publication: 14 February 2006.

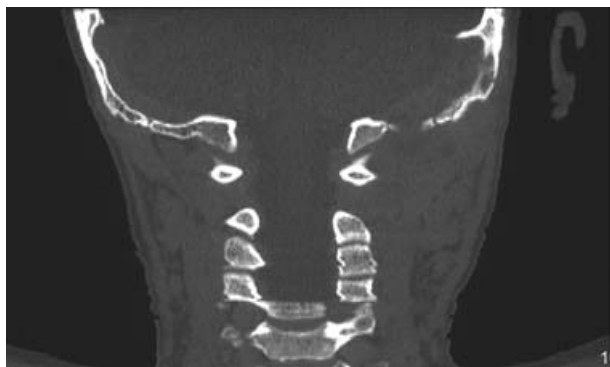


FIG. 1

Pre-operative computed tomography of the head with contrast, showing full thickness bone destruction of the occiput.

was used to plug the CSF leak from the posterior fossa dura after formal drainage of the occipital abscess and extended cortical mastoidectomy.

Post-operatively, the patient was treated with intravenous cefotaxime 1 g tds and metronidazole 215 mg tds for two weeks, followed by four weeks of oral cefalexin and metronidazole. Histological analysis showed only evidence of active chronic inflammation with granulation tissue formation. No organisms were cultured from a pus sample or pre-operative blood cultures. Inflammatory markers returned to normal within five days. Sequential magnetic resonance imaging with contrast was performed post-operatively for three weeks and showed a left lateral sinus thrombosis but no evidence of residual abscess. The patient was discharged three weeks following his operation. He made a full recovery, with no neurological sequelae. He developed a well healed scar and his hearing returned to normal.

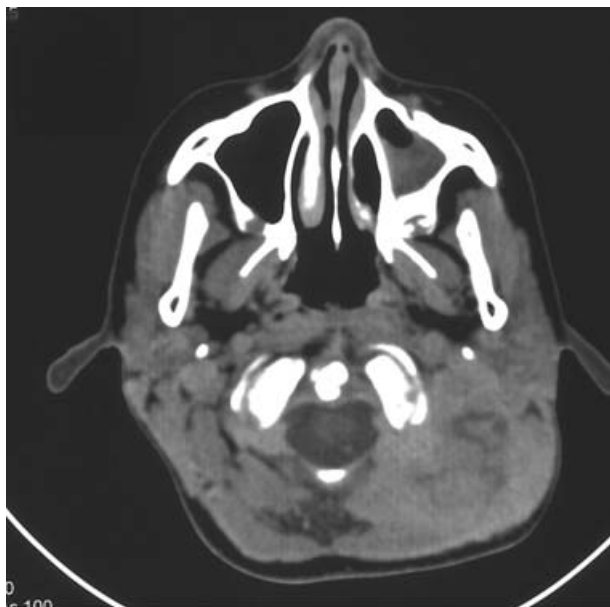


FIG. 2

Pre-operative computed tomography of the head with contrast, showing abnormal swelling in the muscle groups inferior to the left occiput, with abscess formation.

Discussion

Intracranial and extracranial complications of suppurative middle-ear disease are rare. There have been eight cases of lateral sinus thrombosis reported in the UK in the past 25 years^{4–8} and only two cases of mastoiditis associated with scalp abscesses.^{4,9} Of the latter, both occurred in adults.

Lateral sinus thrombosis classically presents with a 'picket-fence' fever, headaches, neck pain and wasting. The transverse and sigmoid sinuses usually become occluded as part of an inflammatory response to an extradural perivenous collection.¹⁰ The pathogenesis of the occipital abscess, however, remains less clear. The formation of a propagated clot in an emissary vein may have provided a route for infective spread, with an ensuing occipital osteomyelitis.⁴ There was no evidence of sinus thrombosis on a pre-operative CT; however, magnetic resonance imaging is a more sensitive modality for demonstrating this.⁵ Alternatively, pus escaping from the mastoid cavity into the subdural space may have tracked posteriorly, causing erosion through the dura. The outcome was osteomyelitis with subsequent demineralization and destruction of the occipital bone, allowing the collection to present as an occipital abscess.

The appearance of the occipital abscess can be likened to that of a Pott's 'puffy tumour'. Originally described by Percival Pott in 1760 as a complication of head trauma,¹¹ it was defined as 'a puffy, circumscribed indolent tumour of the scalp',¹² with separation of the pericranium from the skull, and it is often a sign of underlying osteomyelitis. It is a rare phenomenon, usually associated with frontal sinusitis, but has been described with maxillary sinusitis.¹³

Progression of disease occurred despite two one-week courses of oral antibiotics prior to hospital admission, with partial resolution of symptoms between treatments. In addition, the patient had remained well relative to the severity of the intracranial involvement. The insidious onset and absence of neurological and systemic manifestations of the disease have become a feature of partially treated mastoiditis.³ The effect of anti-microbial therapy was also seen on bacteriology samples, with the absence of positive cultures in both blood and pus specimens. Ideally, treatment should be directed towards specific bacterial sensitivities; however, in this scenario, broad spectrum antibiotics were needed to cover organisms commonly implicated in mastoiditis.¹⁴

- **Neurological complications of acute mastoiditis are rare but can be life threatening. Their presentation may be masked by the use of antibiotics**
- **The rarity of neurological complications, in addition to the insidious onset and subtle symptoms associated with antibiotic therapy, can make diagnosis extremely difficult**
- **This paper describes the first reported case of acute mastoiditis associated with occipital abscess in a child**
- **Patients with acute otitis media who fail to respond fully to treatment should be referred early for a specialist otology opinion**

The mainstay of treatment for such complications, however, remains early surgical exploration and drainage of the mastoid air cells and any associated collections. Computed tomography plays an important role in assessing the extent of disease spread and planning the operative

procedure, and it has a sensitivity as high as 97 per cent in the diagnosis of complicated acute otomastoiditis.¹⁵ Magnetic resonance imaging is better at demonstrating the intracranial complications of mastoiditis but is less readily available than CT.³ In this case, CT was performed because bony complications of mastoiditis were suspected. The natural history of sigmoid sinus thrombosis is usually one of complete resolution and re-canalization over four to six weeks, following definitive surgery.¹⁶ The use of antibiotics, however, is advocated during this period. Monitoring of inflammatory markers and sequential magnetic resonance imaging can be used to confirm disease resolution.

The rarity of intracranial complications of mastoiditis, in addition to the insidious onset and subtle symptoms associated with antibiotic treatment, can make diagnosis of this condition extremely difficult. Patients with acute otitis media who fail to respond fully to treatment should be referred early for a specialist otology opinion and investigation.³

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Mr S D Charlett takes responsibility for the integrity of the content of the paper.

Competing interests: None declared
