

## IMAGE OF THE MOMENT

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# Meningitis associated with sphenoid sinus encephalocoele

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A 50-year-old woman presented with headache, fever, lethargy and confusion. She had been taking amoxicillin for several days prior to presentation for worsening headache and presumed sinusitis. Her background history included hypertension, poorly controlled type 2 diabetes and a pineal tumour for which she was followed with regular brain imaging. In the emergency department, lumbar puncture showed a raised opening pressure of 52 cm H<sub>2</sub>O, white blood cell count of 1200/mm<sup>3</sup> and protein 600 mg/dl. Gram stain revealed gram positive cocci in chains and culture subsequently grew *Streptococcus pneumoniae*.

Shortly after the diagnosis of meningitis was established, the patient provided additional history of a road traffic accident with head trauma two decades earlier. Seventeen years after the road traffic accident—that is, 3 years before her presentation with meningitis—she had started to experience frequent clear nasal discharge.

CT of her head showed a complex mass in the left sphenoid sinus with a defect in the sphenoid bone (figure 1), initially felt to be consistent with infective sinusitis. However, endoscopic evaluation and biopsy of the mass yielded inflamed brain tissue, leading to the diagnosis of an encephalocoele (figure 2). The patient underwent a left sphenoidotomy, removal of the encephalocoele and repair of the sphenoid defect with fibrin glue, gel foam and an abdominal fat pad. She was treated with intravenous vancomycin and ceftriaxone, and discharged without any neurological deficit.

In outpatient follow-up, she initially reported a small amount of ongoing nasal discharge which has since resolved. Review of the brain MRI done 2 years earlier (figure 3) showed brain herniation although at the time this appearance had been attributed to a retention cyst.

In this patient, the diagnosis of meningitis with the additional history of recurrent rhinorrhoea prompted closer scrutiny of the opacified left sphenoid sinus and the overlying bone. Bone windows on CT displayed evidence of bone dehiscence overlying the mass, and an ear, nose and throat evaluation was helpful in excluding osteomyelitis or a destructive neoplastic lesion as the underlying cause for the meningitis.

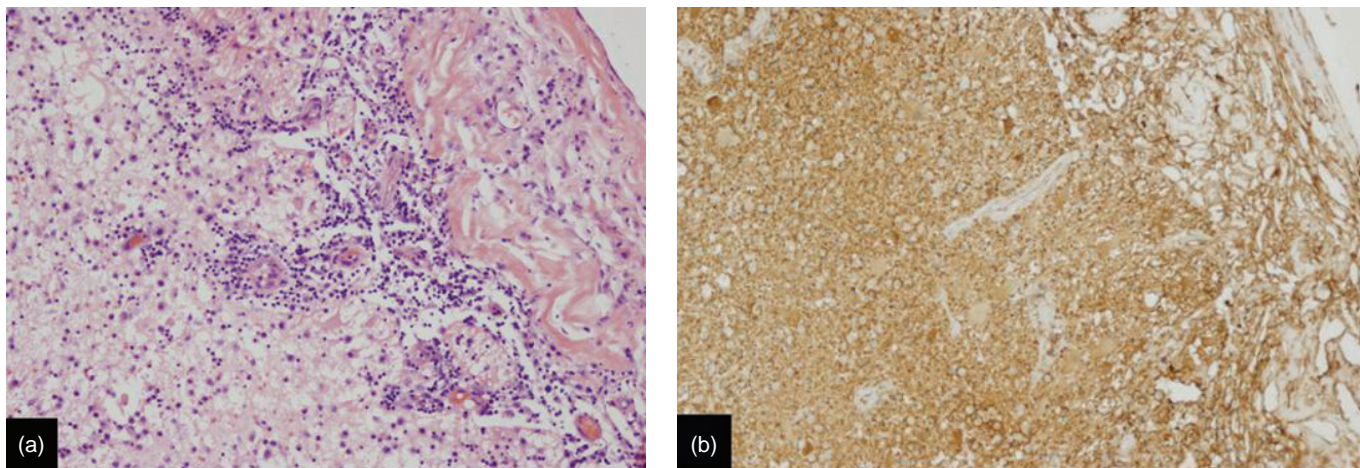
An encephalocoele is an abnormal herniation of parenchymal brain tissue across a congenital or acquired defect of the skull. Most



**Figure 1** Non-contrast axial brain CT demonstrating almost complete opacification of the left sphenoid sinus and significant erosion of bony structures forming the lateral septum of the sinus (arrow).

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**Figure 2**  
Histology of the surgical specimen from the left sphenoid sinus. (A) An haematoxylin–eosin stain demonstrates neural parenchyma with neutrophilic and lymphocytic infiltration suggestive of acute and chronic inflammation. (B) Immunostaining for glial fibrillary acidic protein confirms the presence of astrocyte rich neural tissue.



**Figure 3**  
T1 weighted axial MRI 2 years prior to presentation demonstrates partial opacification of the left sphenoid sinus (arrow).

are congenital, with the majority arising from the occipital lobe and herniating posteriorly and inferiorly. In a series of 103 anterior congenital encephalocoeles, the majority were fronto-ethmoidal and patients had congenital swelling over the nose and inner canthus with hypertelorism; rhinorrhoea was infrequent.<sup>1</sup> Rarely encephalocoeles arise after trauma or a

destructive process of bone, when they present with rhinorrhoea, often mistaken for sinusitis. In extreme cases, they might even present with recurrent bouts of meningitis.<sup>2</sup> Intractable temporal lobe epilepsy should similarly prompt a search for an encephalocoele.<sup>3</sup>

Treatment is usually aimed at surgically repairing the underlying defect, removing or moving the herniated brain back into place and treating any intercurrent infection. Close follow-up is required to assess for recurrent rhinorrhoea which would indicate inadequate closure of the defect and increased risk of recurrent meningitis. Without symptoms, there does not appear to be any need for routine follow-up neuroimaging.

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