

New onset strabismus in association with ear pain

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Contributor statement

SG and MDL conceived the idea. SG provided the initial draft of the manuscript and all authors contributed in arriving at the final version. ML provided expertise in the selection of the image.

Competing interests statement

The authors have no competing interests to declare

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CASE HISTORY

A 7 year old previously well boy presented to the Emergency Department (ED) complaining of diplopia and pain in his right eye for 2 days. The previous week, while on holiday abroad, he developed right ear pain and vomiting. He was seen by the local physician, diagnosed with right otitis media and was treated with ear drops. On returning to the UK his GP commenced oral amoxicillin, but his parents brought him to the ED due to worsening symptoms. There was no history of trauma, headache, vomiting or fever. He was fully immunised, was not on any regular medications, and had no known allergies.

On examination he was distressed due to photophobia in his right eye and diplopia. There was crusted discharge in his right ear canal with a perforated tympanic membrane. Cranial nerve examination revealed a loss of abduction of the right eye, but the rest of the neurological and systemic examination was normal.

QUESTIONS:

1. What abnormalities are seen in the brain MRI? (*figure 1*)
2. What is the likely diagnosis?
3. Based on the clinical presentation, what other important differential diagnoses should be considered?

Answer 1

There is fluid in the right middle ear cavity and mastoid air cells, and an area of high T2 signal in the right petrous apex which represents petrous apicitis or a petrous apex abscess. Enhancement of the adjacent dura and the right trigeminal nerve can also be seen.

Answer 2

The clinical and MRI findings are in keeping with Gradenigo's syndrome - a triad of (i) suppurative otitis media, (ii) paralysis of the external rectus muscle, and (iii) pain in the ipsilateral orbit^{1,2}. Symptoms develop as the infection spreads to the petrous apex of the temporal bone, where the abducens nerve and trigeminal ganglion are in close proximity, separated only by the dura mater. The abducens nerve is affected by surrounding inflammation as it passes through Dorello's canal, the anatomical region between petrous apex and petrosphenoidal ligament (*figure 2*)³.

MRI is the optimal imaging modality - acute petrous apicitis with abscess formation is appreciated as a hyperintense lesion on T2 and low intensity lesion on T1 weighted images that may enhance post gadolinium.

Most cases are due to aerobic organisms but anaerobic infections have been reported, warranting anaerobic antibiotic cover⁴. Intravenous antibiotics are recommended for at least 2–3 weeks, although patients with an associated osteomyelitis may require up to 6 weeks of medical treatment.

Surgery is only required in those who do not respond to antibiotic therapy, or who have an abscess in the petrous apex, surrounding dura or brain tissue. Debridement or myringotomy is a less invasive procedure in patients with a bulging tympanic membrane who fail to respond to antibiotics⁵.

Answer 3

a. Intracranial abscess

A brain abscess usually presents with an indolent and protracted prodrome of nonspecific symptoms including low-grade fever, headache, mental state changes and lethargy. As the associated inflammation and cerebral oedema progress, they usually manifest with symptoms of a space-occupying lesion including vomiting, severe headache, seizures, papilloedema, focal neurology and coma¹.

b. Meningitis

Whilst otitis media can be complicated by meningitis, presenting features tend to include headache, general photophobia, pyrexia and meningeal irritation which may progress rapidly. Our patient had an isolated 6th nerve palsy and right sided photophobia with no other features of meningitis.

c. Sinus venous thrombosis

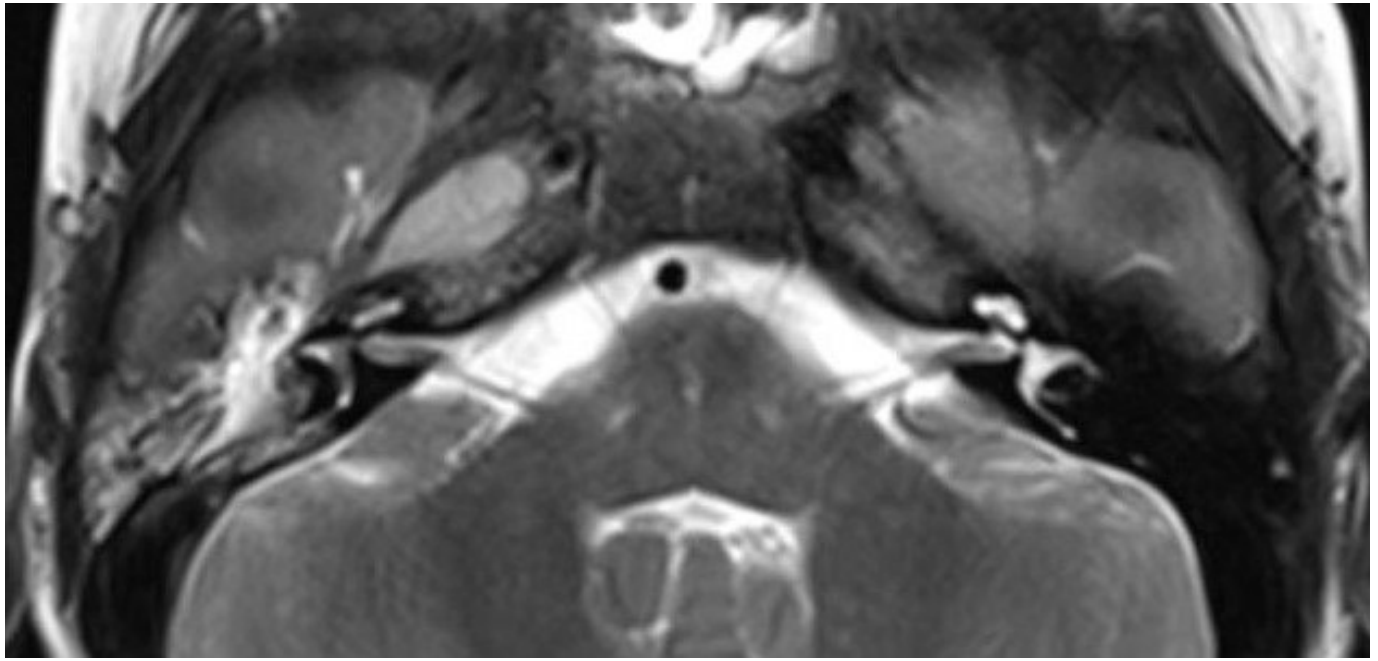
Lateral sinus venous thrombosis is a rare but potentially fatal intracranial complication of acute otitis media. Patients present with headache, fever, otorrhoea, and signs of increased intracranial pressure which result from occlusion of the sinus lumen and the consequent interruption of cortical venous circulation. Tenderness and oedema over the mastoid (the Griesinger sign) are often present.

PATIENT OUTCOME

Our patient was managed conservatively and received antibiotics for a total of 6 weeks. The 6th nerve palsy resolved within a few days and he made a full recovery within 3 weeks. The follow up MRI at 6 weeks showed complete resolution of the petrous apicitis and surrounding inflammation.

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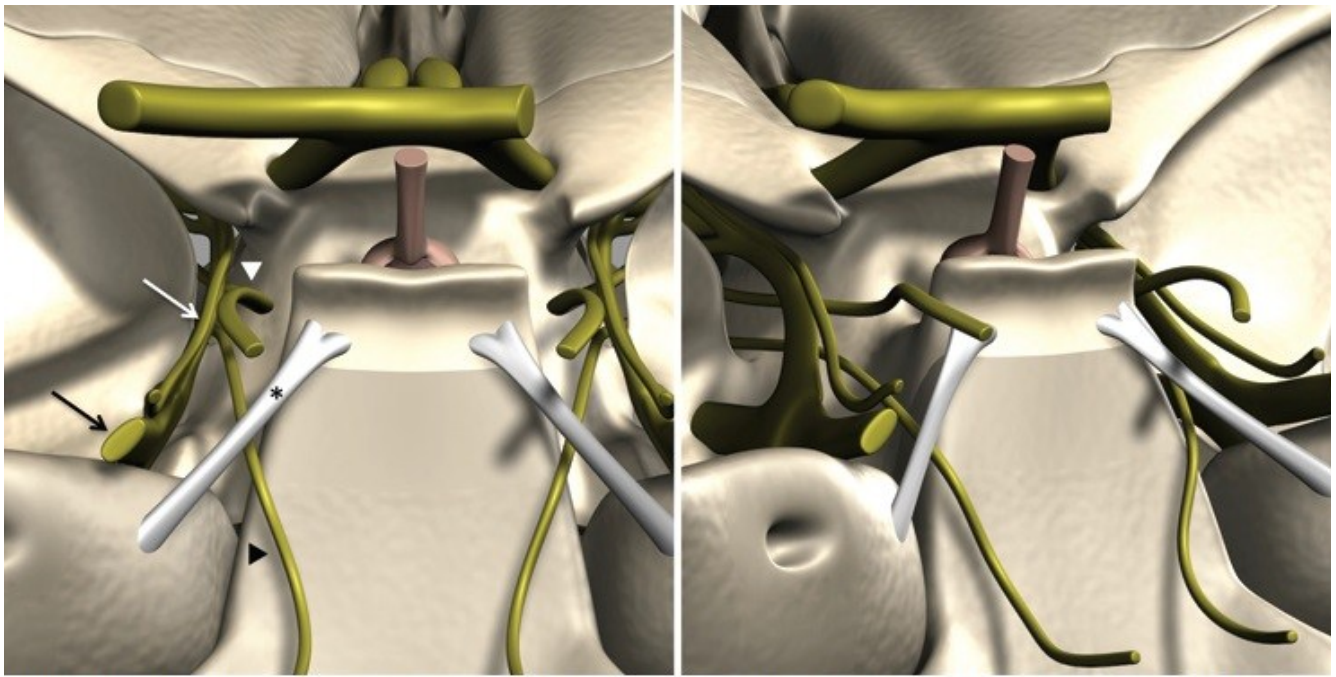


Figure 2. Rotated 3D computer graphic views of the Dorello canal as the space between the petrous apex and superolateral portion of the clivus bounded superiorly by the petrosphenoidal ligament of Gruber (asterisk, left). Also depicted are cranial nerves III (white arrowhead), IV (white arrow), V (black arrow), and VI (black arrowhead).
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