The Journal of Laryngology and Otology
September 1996, Vol. **110**, pp. 878–880

Papilloedema, an unusual complication of mastoidectomy

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Abstract
We report a very unusual case of a patient with a previously undiagnosed congenital absence of the left dural venous drainage system and a prominent system on the right. Due to its prominence it was at risk during a cortical mastoidectomy performed as part of an endolymphatic sac decompression procedure. Manipulation of the lateral venous sinus resulted in partial occlusion of the already compromised venous drainage. The result was a rise in intra-cranial pressure and papilloedema, from which the patient recovered. The abnormality was only detected on post-operative imaging.

Key words: Venous sinus, lateral; Abnormalities, congenital; Papilloedema; Radiology

Introduction

Normal anatomical variations of the dural venous sinuses are not rare. In a paper casting doubt on the reliable use of jugular foramen asymmetry for estimating handedness, Glassman and Dana (1992) identified jugular foramen asymmetry in 67 per cent of 54 post-mortem specimens.

Tomura *et al.* (1995), using the very precise criteria defined by Di Chiro *et al.* (1964) for measuring the jugular foramen, reported severe asymmetry in four per cent of 325 patients investigated by high resolution computerized tomographic scans (CT). (Although glomus jugulare tumours and cranial neuromas were largely excluded by exclusing widening with bone erosion, vascular malformations causing enlargement were not necessarily excluded). Total occlusion of the transverse sinus was reported in two per cent on the left and 0.5 per cent on the right in a study of 189 subjects evaluated by carotid angiograms (Durgan *et al.*, 1993). Only 38 per cent showed equal drainage to both sides. From this it was concluded that cerebral venous drainage dominance should be considered before radical neck dissection and other procedures on the internal jugular vein. In the light of our experience, we would include procedures where compression of the lateral dural sinus is a possibility during radical mastoid bowl surgery.

The neuro-ophthalmic manifestations of impaired cranial venous outflow include headache, papilloedema and diplopia secondary to a sixth cranial nerve palsy. In extreme cases encephalopathy, seizures and hemispheric deficits can occur (Purvin *et al.*, 1995). Distinguishing compromised venous drainage from the more common but symptomatically similar idiopathic intracranial hypertension (pseudotumour cerebri) has become easier with non-invasive magnetic resonance imaging (MRI).

Case report

Case history

A 52-year-old female was admitted for a right endolymphatic sac decompression. She had experienced seven years of episodic vertigo and tinnitus and although the hearing loss was initially fluctuant, she eventually developed a permanent sensorineural loss of 80 dB in the right ear. She was treated symptomatically for her presumed endolymphatic hydrops but when the attacks became more frequent she elected to undergo a saccus decompression procedure.

A cortical mastoidectomy was performed and the lateral dural sinus was found to be very superficial, enlarged, protruding through the cortical bone and almost filling the cavity. Unable to delineate the sac, the surgeon performed no further procedure and the cavity was not packed. Post-operative recovery was slow and she was still dizzy on discharge four days later.

Two weeks post-mastoidectomy the patient was readmitted complaining of vertigo, severe headache and diplopia. Bilateral papilloedema was noted and an unenhanced CT scan demonstrated that the left jugular foramen was very small (Figure 1). An incidental finding was a high density lesion within the left frontal lobe

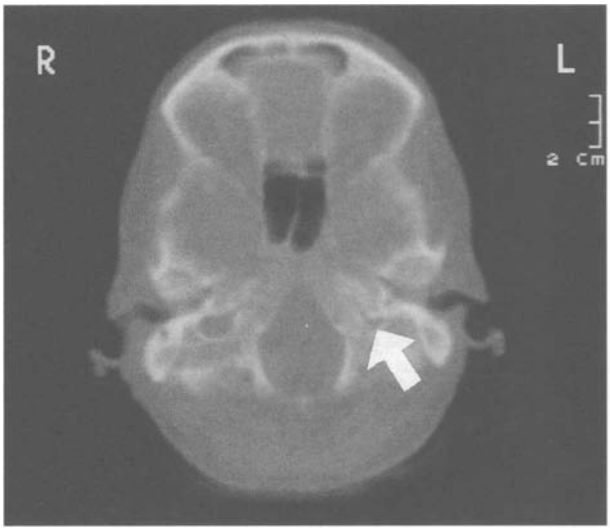

FIG. 1
CT scan demonstrating very small left jugular foramen.

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Accepted for publication: 18 June 1996.

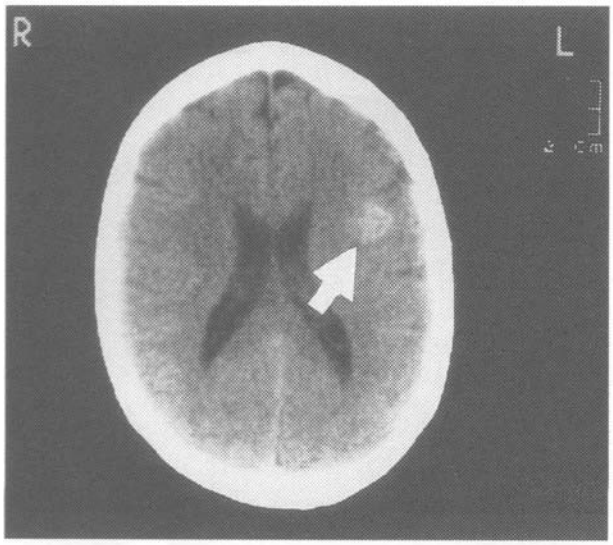

FIG. 2
CT scan. Cavernous haemangioma in left frontal lobe.

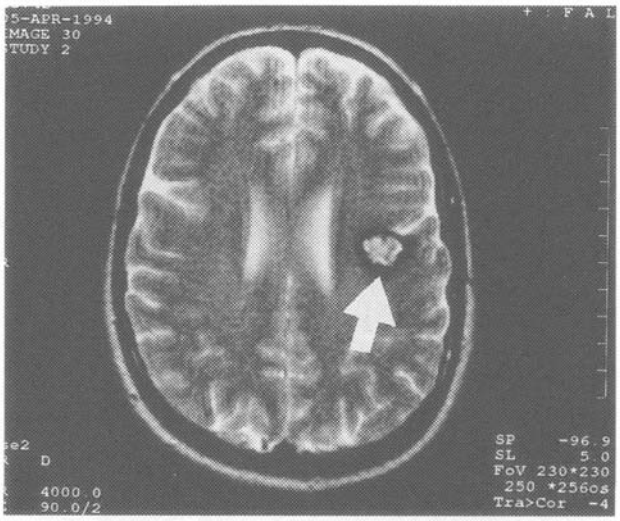

FIG. 4
MRI. Haemangioma demonstrated in Figure 2.

(Figure 2). Admission to a neurosurgical unit was arranged where papilloedema and bilateral VI nerve palsies were confirmed.

A further CT scan showed that on the left side there was an absent lateral sinus, sigmoid sinus and jugular vein (Figure 3). On the right, although the lateral sinus was normal, there was evidence of occlusion, compression or thrombosis of the sigmoid sinus.

Magnetic resonance imaging (MRI) of the frontal lesion showed mixed areas of resonance characteristic of the small haemorrhages within a cavernous haemangioma (decreased signal representing the haemosiderin of old haemorrhages and increased signal representing the met-haemoglobin of more recent haemorrhages) (Figure 4).

Bilateral carotid angiography confirmed that the dural drainage system on the left was either absent or very meagre. It also demonstrated without doubt that the right sigmoid sinus was compressed and not thrombosed (Figure 5). After five days, during which her visual accuities remained stable, she was discharged.

Twelve days after discharge the patient was re-admitted with headache, nausea, vomiting, photophobia and fluctuating visual acuity. A repeat CT scan was unchanged and a lumbar puncture was performed. The opening pressure was 27 cm (normal range up to 15 cm) but the CSF was clear and sterile. The poor visual acuity (6/12 right eye and 6/18 left eye) was considered to be due to hypermetropia secondary to the papilloedema. A diuretic was commenced and daily lumbar punctures performed initially to reduce the intra-cranial pressure.

A month later the CSF opening pressure was 15 cm, the diplopia had resolved and there had been a marked improvement in the papilloedema and visual acuity. Ten months after the cortical mastoidectomy the patient had a follow-up magnetic resonance angiogram (MRA) of the venous sinuses (Figure 6). This again confirmed an absent jugular vein on the left (arrows). On the right the narrowing of the sigmoid sinus was less than before. She still complains of severe vertigo and is undergoing labyrinthine testing as a prelude to vestibular neurectomy.

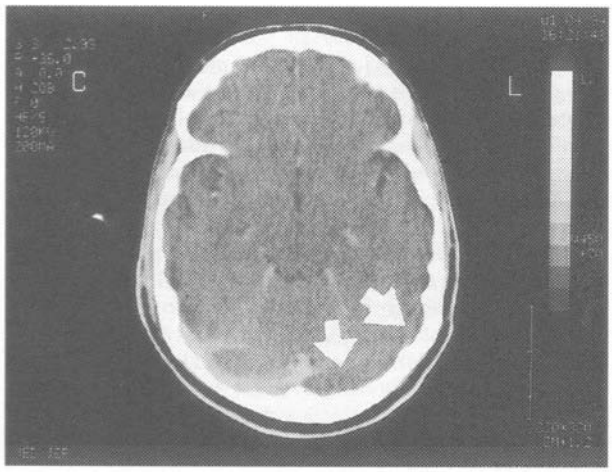

FIG. 3
CT scan. Absent left dural venous drainage system.

Discussion

Reported is a case where the sigmoid sinus was compressed and the dural venous drainage compromised following an operation to decompress the endolymphatic

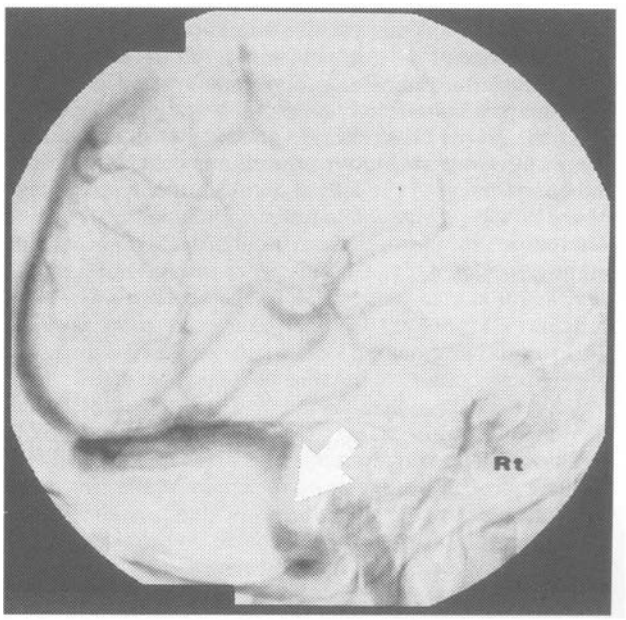

FIG. 5
Carotid angiogram. Compression of right sigmoid sinus.

https://doi.org/10.1017/S0022215100135224 Published online by Cambridge University Press

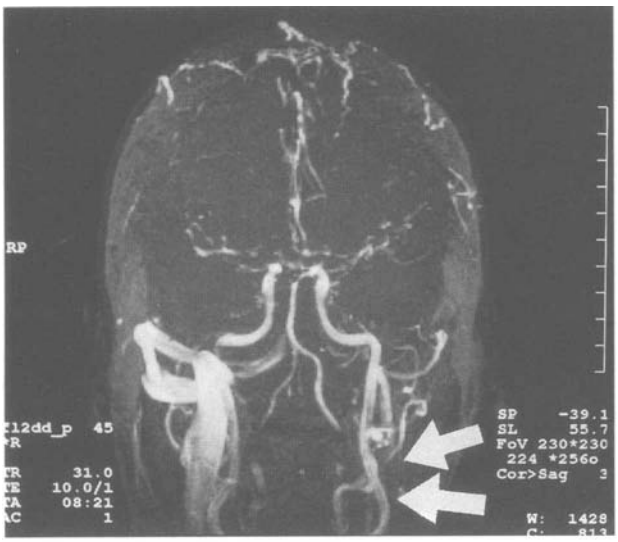

FIG. 6
Magnetic resonance angiogram of venous sinuses confirming absent left jugular vein (arrows).

sac. Unfortunately, it was not known pre-operatively that there was a congenital absence of the venous system on the contralateral side. The result was a temporary rise in intracranial pressure, papilloedema and partial loss of vision.

A CT scan was unable to differentiate between thrombosis and external compression of the sigmoid sinus and anti-coagulation therapy was considered. However, an incidental finding on CT of a lesion within the frontal lobe was subsequently demonstrated by an MRI scan to be a cavernous haemangioma, the presence of which is a relative contra-indication to anticoagulation due to the significant danger of cerebral haemorrhage. A carotid angiogram refuted the diagnosis of thrombosis, instead suggesting extrinsic compression.

It is unlikely that these complications would have occurred if the contralateral dural drainage was not absent. A plain 20 degrees submento-vertical (SMV) X-ray (Figure 7), taken later, clearly shows the abnormality; a very small left jugular foramen (lacking the bony spur which normally separates the jugular vein from the 11th, 10th and ninth cranial nerves).

A variation in the relative sizes of the two dural drainage systems is not uncommon, as is a dehiscent dural sinus after radical mastoid bowl surgery. In view of this it may be considered that a pre-operative SMV X-ray is a cheap investigation to assess the likelihood of complications arising after procedures where exposure and compression of the lateral dural sinus is a possibility.

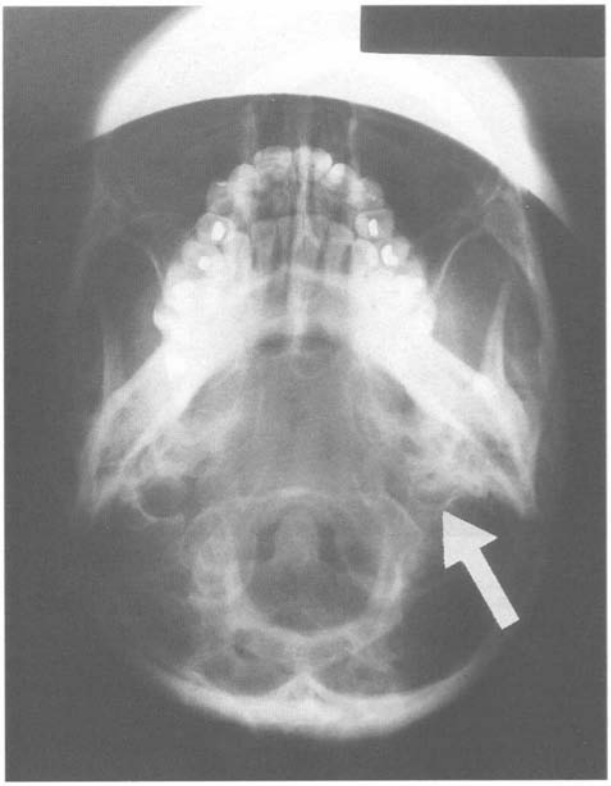

FIG. 7
Plain X-ray demonstrating very small left jugular foramen.

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