CASE REPORT

Bilateral transverse sinus stenosis causing intracranial hypertension

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SUMMARY

Idiopathic intracranial hypertension (IIH) has been associated with transverse sinus stenosis in a number of cases. Some authors advocate for stent placement when transverse sinus stenosis is responsible for pseudotumor symptoms. A 19-year-old man with IIH, bilateral transverse sinus stenosis was apparent on a CT venography, with reconstitution of the lateral sinus. MRI was then performed, and transverse sinus stenosis was confirmed. An impressive network of dilated collateral veins became apparent on VENCOLD sequences. Treatment options in this case include cerebrospinal fluid (CSF) shunting, optic nerve fenestrations and transverse sinus stenting. A ventriculoperitoneal shunt was placed in this patient, with prompt resolution of pseudotumor symptoms.

BACKGROUND

The most widely accepted pathophysiological mechanism for idiopathic intracranial hypertension (IIH) is obstruction of the intracranial venous drainage.¹ However, there exists debate over whether venous sinus obstruction is the primary mechanism or secondary to intracranial hypertension. Some studies have suggested that the appearance of transverse sinus stenosis may improve after cerebrospinal fluid (CSF) diversion (ie, serial LPs and VP shunts); lending credence to the theory that elevated CSF pressures may cause transverse sinuses to appear stenotic even when they are not. Contrastingly, other studies have suggested that transverse sinus stenosis persisted even after normalisation of ICP.¹ In our patient's case of IIH, the MRI revealed not only transverse sinus stenosis but also a dilated network of venous channels suggesting a long-standing defect in cerebral venous drainage. The finding of dilated venous collaterals supports the notion that this patient has long-standing transverse sinus stenosis, unlikely to be artefactual, that is likely responsible for his intracranial hypertension. This case provides further insight into the debate over the pathophysiology of IIH with regard to transverse sinus stenosis and could contribute in changing the surgical treatment paradigm for this disease process.

CASE PRESENTATION

A 19-year-old man presented with headache and visual disturbance. His funduscopic examination revealed papilloedema, and serial lumbar punctures revealed opening pressures greater than 30 mm of water. The patient's symptoms have responded to CSF drainage from serial lumbar punctures throughout the course of his disease. A CT venogram and an MRI of the brain were acquired to rule out cerebral venous thrombosis, as he did have a smoking history.

Figure 1 Bilateral transverse sinus stenosis (yellow arrows) by the CT venography.

INVESTIGATIONS

A 19-year-old man with IIH, bilateral transverse sinus stenosis was apparent on the CT venography (figure 1), with reconstitution of the transverse sinus. MRI was then performed, and transverse sinus stenosis was confirmed (figure 2). An impressive network of dilated collateral veins became

Figure 2 Transverse sinus stenosis confirmed by three-dimensional reconstruction MR venogram (yellow arrow).

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Figure 3 VENBOLD sequences demonstrating collateral venous plexus (yellow arrows).

apparent on susceptibility-weighted sequences (figure 3).

TREATMENT

Treatment options in this case include CSF shunting, optic nerve fenestrations and transverse sinus stenting. Endovascular therapies for transverse sinus stenosis are emerging as a treatment for pseudotumor symptoms in this setting, and are a popular topic in the literature. We elected to treat the patient with a ventriculoperitoneal shunt placement, as the patient responded well to treatment with CSF drainage from serial lumbar punctures.

OUTCOME AND FOLLOW-UP

The patient tolerated the procedure well and was discharged home on postoperative day 1. He had an immediate improvement in his headache and visual symptoms. He continues to be asymptomatic, now greater than 6 months after surgery.

DISCUSSION

IIH is a well-known disease entity; however, only recently cerebral venous insufficiency has been targeted as a culprit in the pathophysiology of this disease. Fargen *et al*² recently published a case demonstrating a decrease in intracranial pressure following the placement of a transverse sinus stent in a patient with intracranial hypertension secondary to transverse sinus stenosis. Ahmed *et al*³ published a case series of transverse sinus stents placed in 52 patients with rapid improvement of symptoms in all patients (six of the patients' symptoms relapsed, however). The success of these cases in the treatment of IIH through sinus

stenting suggests that sinus stenosis plays a central role in the pathogenesis of IIH, rather than as a sequela of intracranial hypertension.

The presented case supports this mode of thinking about sinus stenosis. In this patient, the presence of extensive collateral venous channels, along with bilateral transverse sinus stenosis and symptoms of IIH, suggest that a defect in sinus venous drainage is primarily responsible for IIH in this patient. Despite evidence of transverse sinus stenosis, the patient was successfully treated with a ventriculoperitoneal shunt. The fact that CSF shunting was successful does not exclude sinus stenosis as the primary aetiology of IIH in this patient. As demonstrated in a case series by McGirt *et al*,⁴ some IIH patients treated with CSF shunting had a relapse of symptoms despite a functional shunt 3 years after shunt placement. If the patient's symptoms were to relapse in the future despite a functional shunt, then he would be a strong candidate for sinus stenting. Although there is certainly promise for endovascular treatment in selected cases of IIH where venous sinus stenosis is responsible, CSF shunting and optic nerve sheath fenestrations remain the mainstays of therapy.

Learning points

- ▶ Idiopathic intracranial hypertension has been associated with transverse sinus stenosis in some cases.
- ▶ Goals of treatment include preservation of vision and control of headache.
- ▶ Treatment options include cerebrospinal fluid (CSF) shunting procedures, optic nerve fenestration and endovascular stenting in selected cases.

Contributors MNW and KDN were responsible for literature review and manuscript preparation. CHA and SDM were responsible for study oversight and review of the manuscript.

Competing interests None.

Patient consent Obtained.

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