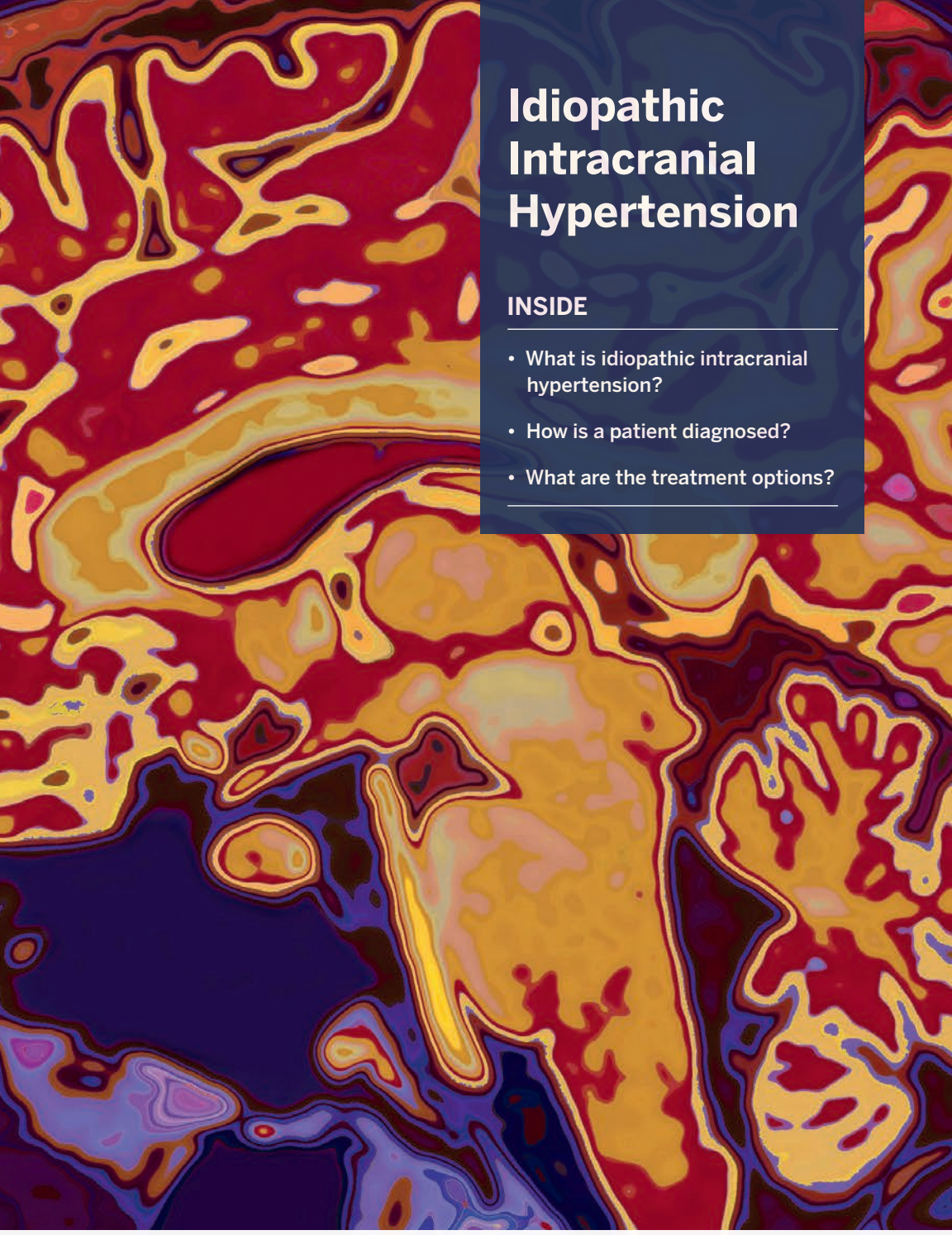

Idiopathic Intracranial Hypertension

INSIDE

- What is idiopathic intracranial hypertension?
- How is a patient diagnosed?
- What are the treatment options?

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eye Insights

Dear Colleagues,

In this issue of *eye Insights,* we take a close look at idiopathic intracranial hypertension (IIH). Inside, you'll find key information about how IIH is diagnosed and treated as well as further reading.

IIH is becoming more prevalent due to increasing rates of obesity in the United States. Undiagnosed patients are at risk for visual loss, but treatment is widely available and effective. Neuro-ophthalmologists have the expertise to diagnose and treat IIH, but effective treatment requires coordinated management with additional specialists, including internists, nutritionists, and neurosurgeons.

There are about 200 full-time neuro-ophthalmologists nationwide. For a list of doctors who specialize in neuro-ophthalmology, please visit the website for the North American Neuro-Ophthalmology Society.

We hope you find this issue of *eye Insights* useful in your practice. Back issues are available online at masseyeandear.org. If you have questions or comments, please email us at eyeinsights@meei.harvard.edu.

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What is Idiopathic Intracranial Hypertension (IIH)?

IIH (also known as pseudotumor cerebri) is a disorder of idiopathic raised intracranial pressure primarily affecting overweight women of childbearing age, with an incidence of 3-4 per 100,000.

Patients typically present with headaches (90%) that have nonspecific features of migraine or tension-type headache, and a minority (20%) experience symptomatic visual loss. Other common symptoms include pulse synchronous tinnitus (60%) or transient visual obscurations (10%), which are unilateral or bilateral blackouts of vision lasting for seconds.

Infrequently, patients are asymptomatic, with papilledema identified during a routine fundus examination. Papilledema due to raised intracranial pressure is the hallmark clinical feature and is present in over 90% of patients. The risk of permanent visual loss correlates with papilledema severity, and a subset of patients have a fulminant presentation with severe papilledema requiring aggressive management, including surgical interventions.

While the exact pathophysiology remains elusive, 90% of patients are overweight or obese. The incidence of IIH has increased since the early 1990s in parallel with the rise in obesity. Hormonal changes related to obesity may play a role, and changes in cerebral venous outflow due to the development of transverse venous sinus stenosis may also potentiate raised intracranial pressure.

Did You Know?

90%

of patients with IIH are overweight or obese

20%

of patients with IIH experience symptomatic visual loss

6-10%

reduction in body weight can reduce the symptoms of patients with IIH

How is a Patient Diagnosed?

ASK THE EXPERT

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A recent update to the modified Dandy Criteria for IIH is used for diagnosis.

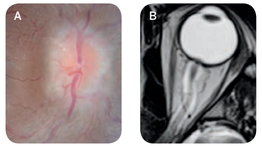
Diagnosis relies on accurately identifying papilledema and excluding secondary forms of intracranial hypertension with neuroimaging. A lumbar puncture to ensure normal cerebrospinal fluid (CSF) constituents and confirm an elevated opening pressure is also needed.

A diagnosis of definite IIH is reached if the patient has:

- Either papilledema or a sixth nerve palsy
- Normal MRI/MRV imaging of the head
- And a lumbar puncture showing an elevated opening pressure (>25 cm H2O in adults or >28 cm H2O in sedated children) with normal spinal fluid constituents

A minority (5-10%) of patients with IIH may have no papilledema. However, IIH without papilledema is frequently *overdiagnosed* in patients with chronic primary headache disorders who undergo a lumbar puncture because an elevated lumbar puncture opening pressure is present in 10% of normal patients. It is important to remember that chronic migraine and chronic tension-type headaches each have a prevalence of up to 3% in the general population (and each are a thousandfold more common than IIH without papilledema).

The presence of multiple MRI features of raised intracranial pressure can assist in making an accurate diagnosis of IIH in those patients without evidence of papilledema or a sixth nerve palsy.



A: Frisen grade 3 papilledema in a patient with IIH

B: MRI showing flattening of the posterior globe and optic nerve sheath distension

The presence of three of four MRI features of intracranial hypertension is highly specific for IIH:

- Empty sella
- Optic nerve sheath distension
- Posterior globe flattening
- Transverse venous sinus stenosis

Testing/Imaging

- MRI of the brain with and without contrast and MRV of the head should be obtained urgently to exclude an intracranial mass lesion, hydrocephalus, or cerebral venous sinus thrombosis.
- Lumbar puncture should be performed after neuroimaging in order to confirm normal spinal fluid constituents (cell counts, protein, and glucose) and elevated opening pressure.
- In patients with severe papilledema, frequent visual acuity and visual field testing (usually 24-2 or 30-2 standard automated perimetry protocols) are important to assess for response to medical therapy and need for surgical intervention. For patients with improving papilledema and vision, visual fields are monitored approximately every three months.
- Ocular imaging modalities, including photography and optical coherence tomography (OCT), are invaluable for documenting the degree of papilledema and monitoring response to therapy.
- Orbital B-scan ultrasound helps distinguish papilledema from pseudo-papilledema. Buried optic disc drusen may be identified as a hyper-echoic signal at the optic nerve head. Enhanced-depth OCT imaging of the optic nerve head may also identify optic disc drusen as hypo-reflective cores with adjacent hyper-reflective bands. The presence of optic nerve head drusen does not completely exclude the co-occurrence of papilledema. Clinical history and longitudinal follow-up are essential in these difficult cases.

What are the Treatment Options?

Acetazolamide

The first-line medical therapy is acetazolamide, which reduces CSF production by the choroid plexus. In the recent IIH Treatment Trial, acetazolamide, in addition to weight loss, was found to be more effective than weight loss alone in patients with IIH and mild visual loss. The starting dose of 500 mg twice daily can be increased up to 3-4 g daily depending on the severity of the visual loss, papilledema grade, and response to lower doses. Acetazolamide is less effective for the treatment of headaches associated with IIH. Patients with concomitant migraine or tension-type headaches may benefit from treatment by a headache specialist.

Topiramate

Topiramate has a similar effect to acetazolamide on CSF production and is also an effective treatment for migraine headaches, which often co-occur in patients with IIH.

Furosemide

Furosemide may be tried in patients intolerant to acetazolamide or topiramate, but it has less effect on CSF production.

Weight Loss

Weight loss is important in reversing the underlying pathophysiology of IIH. Loss of only 6-10% of body weight is beneficial, and often patients can be tapered off of acetazolamide once this weight loss target is reached. Consultation with a nutritionist or involvement in an intensive weight-loss program may be helpful.

Surgical Treatments

Traditional surgical treatments, such as CSF diversion (ventriculoperitoneal shunt or lumboperitoneal shunt) and optic nerve sheath fenestration, are appropriate for patients with progressive visual loss due to papilledema that is unresponsive to medical therapy or weight loss.

Transverse cerebral venous sinus stenting is an endovascular treatment for medically refractory patients, but it has not been studied in a randomized-controlled clinical trial. Preliminary case series suggest efficacy in select patients with appropriate venous anatomy.

Referral Guidelines

Patients in whom IIH is a concern should be referred to a neuro-ophthalmologist for diagnosis and treatment.

Further Reading

Kilgore KP, Lee MS, Leavitt JA, Mokri B, Hodge DO, Frank RD, et al. Re-evaluating the incidence of idiopathic intracranial hypertension in an era of increasing obesity. *Ophthalmology*. 2017;124:697–700.

NORDIC Idiopathic Intracranial Hypertension Study Group Writing Committee, Wall M, McDermott MP, Kieburtz KD, Corbett JJ, Feldon SE, et al. Effect of acetazolamide on visual function in patients with idiopathic intracranial hypertension and mild visual loss: the idiopathic intracranial hypertension treatment trial. *JAMA*. 2014;311:1641–1651.

Friedman DI, Liu GT, Digre KB. Revised diagnostic criteria for the pseudotumor cerebri syndrome in adults and children. *Neurology*. 2013;81:1159–1165.

Mallery RM, Rehmani OF, Woo JH, Chen YJ, Reddi S, Salzman KL, et al. Utility of magnetic resonance imaging features for improving the diagnosis of idiopathic intracranial hypertension without papilledema. *J Neuroophthalmol.* 2019;39(3):299-307.

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