

Venous Sinus Stenting for Idiopathic Intracranial Hypertension: Is It Ready for Prime Time?

A discussion of patient selection, current data, and available tools and techniques.

By Waleed Brinjikji, MD

Over the past decade, there has been growing interest in venous sinus stenting as a primary treatment for idiopathic intracranial hypertension (IIH) refractory to medical therapy. Many centers, including our own, have started to offer venous sinus stenting to a select group of patients as an alternative to shunting, serial lumbar punctures, and optic nerve sheath fenestration.

The big question now is whether or not venous sinus stenting should be accepted as standard of care in the management of IIH. There are a number of compelling reasons why it should be considered as a standard first-line therapy for IIH refractory to medical therapy, but several nuances must be considered.

WHO ARE THE IDEAL PATIENTS?

To diagnose patients with IIH, the two most widely accepted criteria used are the modified Dandy criteria and the criteria put forth by Friedman et al in 2013.¹ At our center, and at many other centers across North America, the Friedman criteria are becoming more accepted because they include a combination of imaging and clinical criteria. It is important to point out that the Friedman criteria allow for a diagnosis of IIH in the absence of papilledema as long as patients meet certain imaging criteria.

To identify ideal patients for IIH stenting, we are careful to primarily select only those who have papill-

edema because (1) papilledema is the most debilitating long-term consequence of IIH, and (2) there is a strong correlation between improvement in papilledema and venographic and manometric findings (ie, is the stent actually doing what it is supposed to do). Some groups have advocated the use of venous sinus stenting as a treatment for IIH with headache but no papilledema; however, rates of headache improvement with venous sinus stenting are hit or miss, especially because many patients with IIH also have a history of migraine, which does not respond to stent therapy. Plus, the stent itself can be a cause of headache given the stretching of the sinus and irritation of the surrounding dura.

The most effective therapy for IIH is weight loss. Obese females have over a 10-fold relative risk for developing IIH, and weight loss almost universally results in reversal of the disease.² However, weight loss is also very difficult for most patients to achieve. Medical therapy with acetazolamide is the mainstay of therapy and is effective in the majority of patients.

In general, patients who are selected for stent therapy have either tried medical therapy (ie, acetazolamide, topiramate) and were unable to tolerate it due to side effects or did not experience improvement in opening pressures and papilledema. In fact, medical therapy alone is effective in more than 80% of patients, so the proportion of patients with IIH who actually go on to receive stent or surgical therapies is approximately 10% to 20%.

WHAT DO THE DATA SHOW?

Overall, the literature has shown that IIH stenting is very effective in improving papilledema. Rates of papilledema improvement as determined by ophthalmologists are > 90% in most observational cohort studies. About 90% of patients who present with pulsatile tinnitus from venous sinus stenosis also have improvement or resolution with venous sinus stenting, and headache improvement is reported in about 80% of patients. However, there have been no large multicenter registries with core lab and standardized longitudinal data collection, and most case series lack standardized assessment of outcomes such as headaches or tinnitus. There have also been few studies examining improvements in quality of life with stenting.

Interventionalists should be cognizant that complications are likely underreported. Hemorrhage from venous perforation occurs in approximately 2% of reported cases and often results in subdural or epidural hematoma. About 50% of these complications require additional surgical intervention, which is complicated by the need for dual antiplatelet therapy in the setting of an intravascular stent. In-stent thrombosis and stenosis seem to be exceedingly rare.

Current data lack long-term follow-up. Dural venous sinus stenting came into favor in the mid-2010s, and 5- to 10-year data do not exist. Follow-up in most series is limited to about 1 year, so we are not 100% sure if stenting results in a long-term cure.

WHAT TOOLS DO WE HAVE?

As with everything in neurointervention, there is a wide range of techniques for venous sinus stenting. First, there are currently no “on-label” devices for venous sinus stenting. Our group has historically used a setup that includes a 6-F guiding sheath and advancing a Carotid Wallstent (Boston Scientific Corporation) over 0.014-inch guidewires to cross the lesion. However, the Wallstent is a relatively stiff system and often has some difficulty making sharper turns, particularly in patients with high-riding jugular bulbs or high-grade stenosis. Plus, the Wallstent does not allow for coverage of the entire transverse sinus given its shorter lengths. More recently, we have shifted to using the Zilver 518 stent (Cook Medical), which comes in diameters up to 9 mm, lengths up to 80 mm, and can be used with 6-F catheters such as the Navien (Medtronic). We have found that it is much easier to deliver this stent than the carotid stents we have tried. The River stent (Serenity Medical, Inc.) is currently being studied for treatment of venous stenosis in IIH. If approved, it would be the first on-label device for IIH stenting. Other devices are in the pipeline.

IS VENOUS SINUS STENTING READY FOR PRIME TIME?

Is venous sinus stenting for IIH ready for prime time? I personally would say yes, absolutely! However, the real answer is that it depends. First, IIH treatment requires a multidisciplinary team including neurologists, neuro-ophthalmologists, and neurointerventionalists. Our primary referrals are from headache neurologists and neuro-ophthalmologists, and an important hurdle is that venous sinus stenting is still not widely accepted in the neurology and neuro-ophthalmology community. IIH has been the subject of rigorous study in these fields, with clinical trials performed to evaluate medical management, weight loss, and surgical interventions such as shunting and optic nerve sheath fenestration. Given the lack of rigorous data collection in the neurointerventional literature, headache neurologists and neuro-ophthalmologists at many centers may dismiss our results on the basis of selection bias and publication bias. Given the widespread eagerness for those in the neurointerventional community to add this treatment to their armamentarium, there is a real concern that patients would be inappropriately selected and that lower-volume centers could run into unexpected, and sometimes devastating, complications.

Furthermore, it is important to remember that IIH can be cured with weight loss and managed medically in the majority of patients. To really move the field forward and have venous sinus stenting accepted as standard of care for patients refractory to medical therapy, we will likely need to study the safety and efficacy in a more rigorous fashion, including prospective registries and clinical trials. ■

1. Friedman DJ, Liu GT, Digre KB. Revised diagnostic criteria for the pseudotumor cerebri syndrome in adults and children. *Neurology*. 2013;81:1159-1165. doi: 10.1212/WNL.0b013e3182a55f17

2. Szewka AJ, Bruce BB, Newman NJ, Biousse V. Idiopathic intracranial hypertension: relation between obesity and visual outcomes. *J Neuroophthalmol*. 2013;33:4-8. doi: 10.1097/WNO.0b013e31823f852

Waleed Brinjikji, MD

Associate Professor of Neurosurgery and
Interventional Neuroradiology

Mayo Clinic

Rochester, Minnesota

brinjikji.waleed@mayo.edu

Disclosures: Chief Medical Officer, Marblehead Medical LLC; stock options in Superior Medical Experts; grant funding from Cerenovus, National Institutes of Health/National Institute of Neurological Disorders and Stroke; consultant to Cerenovus, MicroVention.