

# Golden age of cerebral venous and CSF disorders

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## SEVERAL NEW VENOUS PROCEDURES HAVE BEEN SUCCESSFULLY DEVELOPED AND RAPIDLY ADOPTED

Neurointerventional focus on cerebral venous outflow disorders (CVD) has been rapidly increasing over the last decade.<sup>1,2</sup> While the field has traditionally viewed venous sinus thrombosis and dural arteriovenous fistulas (DAVFs) as the mainstays of cerebral venous disorders, venous sinus stenting (VSS) for idiopathic intracranial hypertension (IIH) has emerged as a more widely accepted first-line intervention for those who require surgical management.<sup>3</sup> With more than 1066 published cases of VSS to treat IIH,<sup>3</sup> VSS is the most highly researched surgical intervention for this disease with an equivalent level of evidence as is available for shunting and optic nerve sheath fenestration for the same indication.<sup>4</sup> Cumulatively, the published data report 89% improvement in papilledema, 88% alleviation of diplopia or visual disturbance, 79% reduction in headaches, and 95% improvement in pulsatile tinnitus when treated with VSS.<sup>3</sup> Major morbidity/complications associated with this intervention are rare, with <1% chance of subdural and subarachnoid hemorrhage reported.<sup>3,5</sup> Optic nerve sheath fenestration, which can lead to a temporary vision improvement, results in half of patients with persistent vision loss at long-term follow-up and it does not relieve the other symptoms of IIH like headache or pulsatile tinnitus.<sup>6</sup> VSS is also at least as effective as shunting procedures for treating papilledema and vision symptoms but outperforms shunts for treating the symptoms of pulsatile tinnitus or headaches. The reported VP shunt revisions rates of up to 42% far exceed the <10% expected revision rate of VSS.<sup>4</sup> While the level of evidence for VSS remains below that of acetazolamide in treating mild IIH,<sup>7</sup> it has emerged as the preferable surgical therapy.

In addition to VSS for IIH, neurointervention has seen significant growth in other neuro-venous disorders, including identifying and treating venous causes of pulsatile tinnitus,<sup>8,9</sup> development of novel transvenous approaches to treat DAVFs and brain AVMs<sup>10,11</sup> a new system for characterizing shunting lesions of the spine that incorporates 'high risk' venous drainage as a marker of natural history akin to the so-called Borden and Cognard classifications of DAVFs,<sup>12</sup> transvenous embolization of CSF to venous fistulas to treat SIH,<sup>13</sup> transvenous placement of CSF shunts,<sup>14</sup> and the emergence of brain-computer interfaces that were previously only in the realm of science fiction.<sup>15-17</sup> A quick search of PubMed for vein or venous and JNIS finds 165 articles printed in this journal since 2019, and the annual number of venous publications in this journal also increases every year.<sup>2</sup>

## AN INVITATION TO THE SNIS CEREBRAL VENOUS AND CSF DISORDERS SUMMIT

Thanks to these recent advances, patients have access to safe and minimally invasive procedures that treat more and more complex diseases that are both within and outside the traditional boundaries of neurointervention. To facilitate this endeavor, the Society of Neurointerventional Surgery (SNIS) formed the Cerebral Venous (CV) and Cerebral Spinal Fluid (CSF) Disorders Committee in 2022. Critical to the responsible growth of the field is the encouragement of discourse and quality research. The CV and CSF Disorders Committee recently established an Annual Summit for this purpose. The Summit is an open meeting that brings together physicians (both academic and private practice) of various specialties (including neurointervention, vascular surgery, neurology, neuroophthalmology, neurotology and head and neck surgery, spine and skull base neurological surgery, and many others), industry partners (including strategics and emerging startups), research scientists with varying backgrounds, and biomedical engineers. This meeting has quickly evolved into an opportunity for collaboration and

discussion both in the conference room as well as in side meetings.

To that end, we invite *everyone* to attend the third annual SNIS CV and CSF Disorders Summit to be held in Honolulu, Hawaii, USA, on March 19–21, 2025.

## A CHALLENGE TO IMPROVE THE LEVEL OF EVIDENCE

While neurointerventional physicians have made tremendous gains in the venous space, the acceptance of these procedures by other specialties pales in comparison to stroke interventions, where there is a lesson to be learned. Considering the juxtaposition of stroke care from 2013 to 2015 and beyond is remarkable and likely secondary to the hard work of countless physicians, clinical researchers, industry partners, and patients and their families. Between 2012 and 2015, the rate of EVT among eligible patients in hospitals participating in the Get With the Guidelines-Stroke (GWTG-Stroke) registry was dismal at 5%. By the end of 2016, the rate had tripled to 15% and then expanded again to 25% by the end of 2019. The clear inflection point in 2015 coincided with the publication of several randomized controlled trials (RCTs) that established EVT as standard of care for ELVO.<sup>18</sup> Similarly, a second inflection point in EVT occurred in 2018 with the publication of RCTs showing the efficacy in patients with ELVO presenting later than 6 hours from onset of their strokes.<sup>19</sup> Although the current evidence for venous interventions, particularly in IIH and venous causes of pulsatile tinnitus is encouraging, further progress is needed to replicate the level of success seen in EVT. For venous interventions to become standard of care like EVT for ELVO, clear and reproducible clinical pathways that are based on higher levels of clinical evidence need to be established. This can only happen with further progress in venous research, collaboration with our clinical colleagues from neurosurgery, neurology, and ophthalmology, and both industry and multi-institutional partnerships.

The SNIS CV and CSF Disorders Committee is presently working on two fronts to improve patient access and care. First, the committee is in the process of developing two multicenter prospective registries of VSS to treat IIH to further validate and improve the current level of evidence. These may be more realistic alternatives to trials comparing surgical options for IIH directly, which have been slow to enroll possibly due to a perception that VSS is not in equipoise with the other

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surgical interventions.<sup>20</sup> Summit participation will help expand the efforts to improve the breadth and level of evidence of the venous procedures currently being performed to ensure we are doing right by our patients, and to increase acceptance of venous interventions by the broader scientific community. The committee is also working with the Center for Disease Control (CDC) to implement a unique taxonomy of venous disorders in the 10<sup>th</sup> revision of the International Classification of Diseases (ICD-10) that will more accurately capture and classify the various CVD.

Neuroendovascular surgery is a rapidly evolving specialty with neuro-venous intervention likely to be at the forefront of its advance in the coming years. As the field continues to forge forward with the development of safer and more effective options to manage complex diseases, it is incumbent on us as a group of specialists to develop and participate in rigorous high-level research projects. The CV and CSF Venous Disorders Summit was created to help in this endeavor, and we hope to see you there in 2025.

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