Magnetic resonance venography for idiopathic intracranial hypertension

- Real time intravascular ultrasound evaluation and stent selection for cerebral venous sinus stenosis associated with idiopathic intracranial hypertension
- The clinical characteristics, treatment and prognosis differences between occipital brain tumors with venous flow obstruction and occipital brain tumors without venous flow obstruction
- Papilledema With Intracranial Hypertension and Ectopic Orbital Calcification During Hemodialysis: A Case Report
- Predictors of dural venous sinus pressure gradient in patients with idiopathic intracranial hypertension
- Flow-based simulation in transverse sinus stenosis pre- and post-stenting: pressure prediction accuracy, hemodynamic complexity, and relationship to pulsatile tinnitus
- Antithrombin III deficiency and idiopathic intracranial hypertension: a case report
- Isolated third cranial nerve palsy in benign idiopathic intracranial hypertension
- Study on the correlation between spontaneous cerebrospinal fluid rhinorrhea and increased intracranial pressure

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Traditionally, the primary role of imaging in idiopathic intracranial hypertension diagnosis has been to exclude other conditions that can cause increased intracranial pressure (ICP) and papilledema. Over the years multiple attempts have been made to define objective signs on cross-sectional imaging as well as on cerebral angiography that would identify IIH patients rather than only exclude other underlying conditions. There was also hope that mechanism-derived' imaging techniques such as magnetic resonance venography (MRV) and diffusion weighted imaging would potentially provide insight into the still unknown underlying etiology of this disease. It was shown in a double-blind controlled study that flattening of the posterior aspect of the globe is the only sign on cross-sectional imaging that, if present, strongly suggests the diagnosis of IIH. In addition, the evaluation of extra-luminal and intra-luminal narrowing of the transverse and sigmoid dural sinuses with contrast-enhanced MRV using a simple grading system provides a highly sensitive and specific test for identifying patients with IIH. Unfortunately, none of the imaging-based studies published to date can explain the pathogenesis of IIH whether it be a primary vascular venous disorder causing the increase in ICP or rather the disorder itself secondarily affecting the cerebral veins [1].

With the advent of magnetic resonance venography and increased use of cerebral angiography, there has been recent emphasis on the significant number of patients with idiopathic intracranial hypertension (IIH) found to have associated non-thrombotic dural venous sinus stenosis. This has led to a renewed interest in endovascular stenting and angioplasty as a treatment for IIH in patients non-responsive to medical treatment.

An Magnetic resonance venography is also performed in most cases to exclude the possibility of venous sinus stenosis/obstruction or cerebral venous sinus thrombosis.

A contrast-enhanced MRV (ATECO) scan has a high detection rate for abnormal transverse sinus stenoses.

These stenoses can be more adequately identified and assessed with catheter cerebral venography and manometry.

Buckling of the bilateral optic nerves with increased perineural fluid is also often noted on MRI imaging.

Should Magnetic Resonance Venography be Performed Routinely in all Patients Undergoing Evaluation for Idiopathic Intracranial Hypertension?

The sensitivity and resolution of MRV has increased over the past decade and further advances in neuroimaging should continue to improve the technical aspects of this modality.

Dinkin and Moss have presented compelling arguments both for and against the routine inclusion of MRV in the work up of IIH. All neuro-ophthalmologists should have a low threshold for ordering MRV in patients who have a high risk of CVST. The decision to include MRV in the majority of suspected IIH patients should include factors such as the technical quality of the test at the specific facility, the skill of the interpreting neuroradiologist, the time and cost of the testing, and the degree to which the presence or absence of transverse sinus stenosis influences diagnosis and management [2].

The protocol for idiopathic intracranial hypertension consists of a brain MRI and head magnetic resonance venography (MRV), both performed without and with intravenous gadolinium contrast material to minimize potential pitfalls of noncontrast MRV techniques and obviate ionizing radiation from CT/CT venography. Although low-field-strength MRI scanners may be sufficient to exclude large intracranial pathology, higher field strength (1.5 or 3.0 T) superconducting units are generally preferred to appreciate the imaging findings associated with chronically elevated ICP [3].

Case series

2004

MRVs from 20 patients with idiopathic intracranial hypertension were reviewed, unblinded, by two neuroradiologists, and their appearances rated for focal narrowings and signal gaps. A control group of 40 asymptomatic volunteers, matched for age and sex with the patient group, was recruited prospectively for MRV, and their scans rated in the same way.

The lateral sinuses presented a range of appearances with quite different distributions in the two groups ($p<0.001$). Bilateral lateral sinus flow gaps were seen in 13 of 20 patients with idiopathic intracranial hypertension and in none of 40 controls.

A historical failure to use normal healthy controls to establish the boundaries between imaging artefact, normal anatomical variant, and disease means that the pathological significance of the different appearances of the lateral sinuses on MRV has not so far been appreciated [4].

2002

Twelve patients with clinical and lumbar puncture findings of IIH or SIH and 12 control subjects were examined with MR venography and MR flow quantification studies of the cerebral arteries and veins. Total cerebral, superior sagittal sinus (SSS), and straight sinus blood flows were measured. Pulsatility indices from the arterial and venous flow for all patients were compared using the Student t test.

MR venography confirmed that seven of the 12 patients had venous outflow obstruction, and thus, SIH. The remaining five patients had IIH. All patients showed reduced sinus pulsatility compared with that of the control group; reductions of 42% in the SSS and 32% in the straight sinus were noted (P =.0001 and.005, respectively). In the IIH group, total blood flow was 46% higher than that in the control group (P =.0002), and SSS flow was normal. In the SIH group, total blood flow was normal; however, SSS flow was reduced by 25% (P =.003).

Reduced venous sinus pulsatility is a marker of intracranial hypertension secondary to raised venous sinus pressure. When suspicion of IIH or SIH exists and the MR venogram is difficult to interpret, raised total blood flow indicates IIH, whereas reduced SSS flow indicates SIH [5].

2000

A prospective study to evaluate for the presence or absence of dural sinus thrombosis using MR imaging and MR venography of the brain in 22 consecutive young, female, overweight patients with typical pseudotumor cerebri.

None of the 22 MR imaging and MR venography studies showed venous sinus thrombosis.

Magnetic resonance venography might not add significantly to the evaluation of typical idiopathic pseudotumor cerebri but may be indicated in atypical cases (e.g., male, thin, or elderly patients) [6].

Case reports

2017

Marvin et al. describe a case of progressive headache and visual disturbances attributed to idiopathic intracranial hypertension (IIH), that resulted from subacute superior sagittal sinus (SSS) stenosis by a metastatic tumor.

Venous outflow obstruction often presents with an acute symptomatology including infarcts, hemorrhages, and seizures, but only rarely does it cause the progressive development of raised ICP. The sinister presentation of our patient's pathology stemmed from local mass effect caused by a tumor that has hitherto not been reported to cause intracranial hypertension (IH) and was best elucidated using magnetic resonance venography (MRV) [7].

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