

# Quantitative MRA is Correlated with Intravascular Pressures Before and After Venous Sinus Stenting: Implications for Treatment and Monitoring

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## Introduction

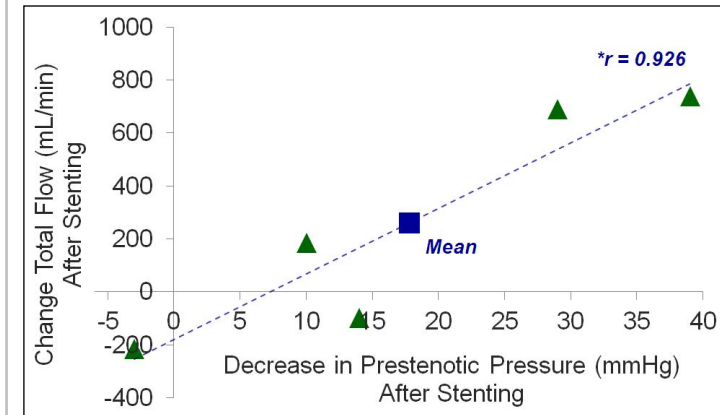
- Cerebral venous sinus stenosis is a significant cause of intracranial hypertension
- Endovascular stenting is an effective treatment available for venous sinus stenosis
- Which patients benefit the most from stenting is currently unknown
- Current literature suggests that patients with the most severe stenosis and highest pressure gradients benefit most
- Beyond angiography, noninvasive monitoring is poor; Magnetic Resonance Venography (MRV) is limited due to stent artifact and signal loss due to turbulent flow
- **Quantitative MRA** is a novel imaging modality that quantifies blood flow through a vessel using MR imaging
- In this study, we review venous qMRA flow in patients before and after venous stenting and correlate these results with intravenous pressure and clinical outcomes

## Methods

- Five patients underwent cerebral venous stenting (2009-2013) at a single institution
- Preoperatively patients were examined, their cerebral venous flow was determined using qMRA, and intravenous pressure measured during angiography
- After stenting, pressure, qMRA flow, clinical outcomes were repeated and compared

## Results

- The mean prestenotic intravenous pressure was 45mmHg prior to stenting and decreased to 27mmHg after (paired t-test **p=0.036**)
- The mean pressure gradient dropped by 20.4 mmHg after stenting (paired t-test **p=0.022**)
- Flow on qMRA increased by 305ml/min at the ipsilateral internal jugular vein after stenting
- When both jugular veins were considered, the total cerebral venous outflow increased by 260ml/min after stenting

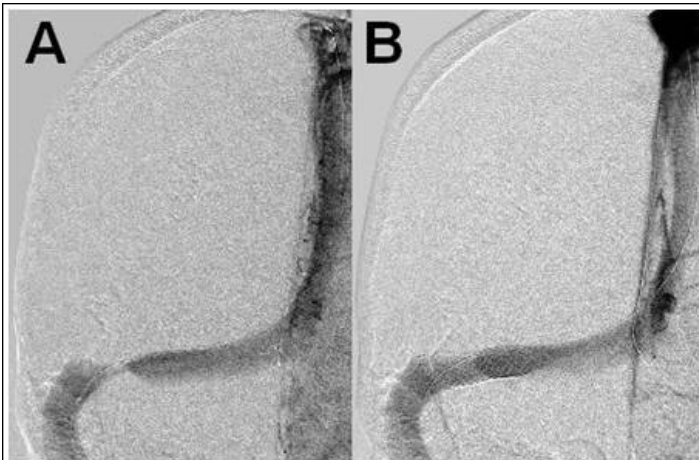


## Conclusions

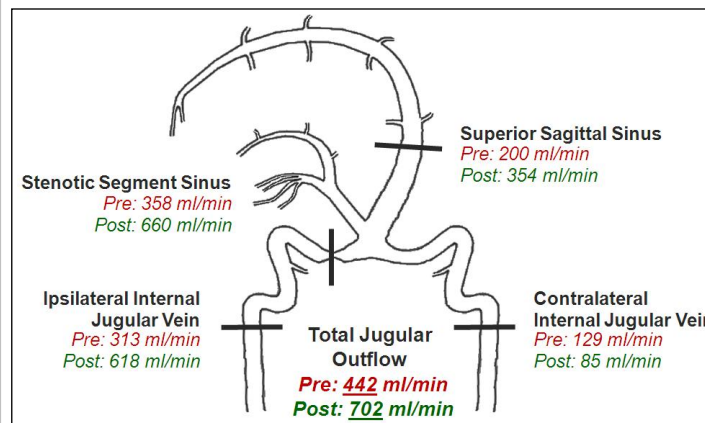
- Venous flow by qMRA increases after cerebral venous sinus stenting
- There is a **strong, linear relationship** between changes in **intravenous pressure and venous outflow** after stenting
- Visual improvement was seen in all patients after stenting

## Potential Applications for qMRA

- As an adjunct to quantify improvement in venous outflow after sinus stenting
- Noninvasive **monitoring of stent patency** in the outpatient setting
- As a **screening tool** to identify patients with poor flow (associated with high pressure) and thus **good candidates for intervention**



Case Example: Right transverse sinus stenosis. Before stenting (A) high pressure (55mmHg) was measured proximal to the site of stenosis with low flow (194ml/min). After (B) the pressure (16mmHg) and flow (727ml/min) improved proportionally.



- The decrease in intravenous pressure proximal to the stenosis and change in qMRA flow were found to have a strong, linear relationship (Pearson's correlation **r=0.926**)
- Visual improvement was seen in at least one eye in every patient

