

NOVA supports need for re-intervention after angioplasty and stenting of vertebral stenosis

Patient History

- ❖ 65-year-old man
- ❖ Post stroke involving posterior circulation territory
- ❖ High grade left vertebral stenosis just proximal to the vertebrobasilar junction

Baseline NOVA QMRA Study

- ❖ A NOVA study was performed to quantify blood flow in the vertebrobasilar circulation. Basilar artery flow was found to be 80 ml/min and both posterior cerebral arteries were less than 40 ml/min. These flows are below the normal range according to the NOVA VBD algorithm for risk stratification of patients with vertebrobasilar disease.¹

The right vertebral terminates at PICA. The left vertebral is dominant. The distal left vertebral shows severe stenosis extending for approximately 1.1 cm.

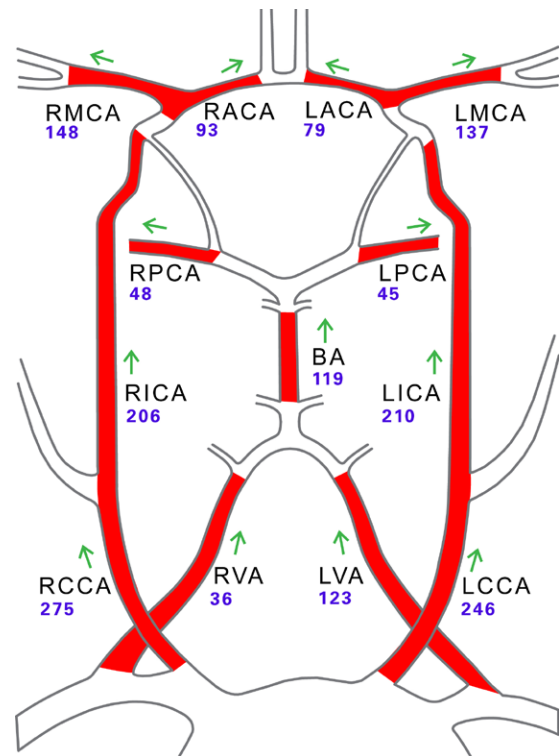


Figure. 1 NOVA Vessel Map

Intervention

- ❖ Angiography confirmed a high-grade left vertebral artery stenosis of 70% just proximal to the basilar artery. The stenosis was noted to be complex and long involving a more proximal site that has around 50% stenosis. There is no evidence of posterior communicating collateral on the angiogram.

The patient underwent angioplasty and stenting of the vertebral lesion utilizing a micro-delivery stent system. The LVA angiogram, status post angioplasty and stenting of the distal LVA/proximal BA showed a minimal residual stenosis of 10% that involves the proximal portion of the angioplasty and stented area. Otherwise there is good revascularization. There were no changes in neurological status.

The NOVA study performed 5 days after intervention documented flow improvement. Basilar artery and posterior cerebral artery blood flow rates are now in the normal range. (Figure 1)

5 Months Post Intervention

- ❖ The patient returned for follow up 5 months later after experiencing symptoms of dizziness. NOVA analysis shows that flow in the basilar artery now measures 58 ml/min whereas previously it measured 119 ml/min. He was subsequently found to have stenosis just proximal to the area of the previously stented segment with the LVA angiogram showing a 70% stenosis of the LVA just proximal to the stented segment.

Fortunately, the patient was eligible to be part of the HDE approval for a self-expanding intracranial stent for symptomatic stenosis greater than 50%. The stent system was applied somewhat overlapping the previous stent but then completely covering the area of new stenosis. The LVA angiogram cervical and intracranial view now reveals good revascularization status post angioplasty and stenting.

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Post Second Intervention MRI/MRA with NOVA Study

- ❖ The time of flight images show normal flow on the post-infusion MR angiogram. The visualized anterior, middle and posterior cerebral arteries appear normal. There is improved flow in the basilar compared to the prior examination. The basilar artery is 99 ml/min (58 on previous exam).

Summary

- ❖ NOVA was used to quantitatively assess blood flow in the vertebrobasilar circulation at initial presentation and throughout the course of the patient's treatment (Table 1). NOVA measured the reduction in flow 5 months after the first stent procedure. Following placement of a second stent across the new area of stenosis, the NOVA study performed 1 month post-intervention shows improvement in basilar artery flow.

Table 1 NOVA Flow Measurements (ml/min)

	Baseline	Post 1st	5 Months	Post 2nd
Basilar Artery	80	119	58	99
Right PCA	38	48	25	--*
Left PCA	29	45	22	38

* not measured

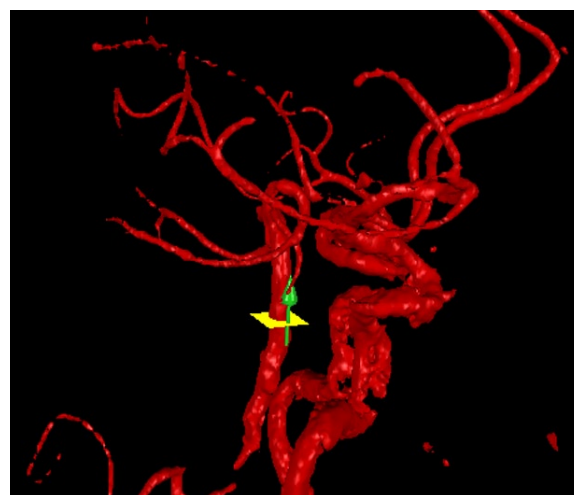


Figure. 2 NOVA 3D surface Rendering of the Circle of Willis showing cut plane for flow measurement in the Basilar Artery at Baseline (top) and 5 months post angioplasty and stenting (bottom).

Conclusions

- ❖ NOVA documented low flow in the vertebrobasilar tree, supporting the need for intervention.
- ❖ NOVA helped guide post-intervention management.
- ❖ NOVA is a useful tool for both the work up and non-invasive follow up of patients with intracranial occlusive disease.

¹ Reference: Amin-Hanjani, S., Du X., Zhao M., Walsh K., Malisch, T., and Charbel FT.

"Use of Quantitative Magnetic Resonance Angiography to Stratify Stroke Risk in Symptomatic Vertebrobasilar Disease," Stroke 2005;36:1140-1145

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