Publication Brief

Intraoperative Flow Measurement by Microflow Probe During Surgery for Brain Arteriovenous Malformations

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OBJECTIVE
To test intraoperative quantitative flow measurement (FAST - Flow assisted surgical technique) with a microvascular ultrasonic flow probe in brain arteriovenous malformation (AVM) surgery.

METHOD
• Retrospective analysis of data from 25 patients with brain AVMs who consecutively underwent microsurgical resection with the assistance of flow measurement by a microflow probe.
• Flow measurements were performed 203 times on 92 vessels including arterial feeders, potential transit arteries, and venous drainages of AVMs during different phases of AVM resection.

RESULTS
Pre-resection:
• Flow data helped understand the AVM architecture and guided surgical planning and AVM resection.
• Flow data completely agreed with ICG-VA on AVM angioarchitecture.
• In seven cases, flow measurements clarified ICG-VA data for planning the surgical approach.

During resection:
• Flowmetry discriminated between deep small arterial feeders and venous drainages (76% of cases, 19/25) both superficially and deeply located, by defining the direction of flow in AVM vessels.
• Flow measurements identified transit arteries in 12% of cases (3/25) by detecting a major flow drop between 2 points of the same vessel during AVM dissection. Further dissection revealed a deep afferent artery to the nidus arising from a transit artery between the points of the two previous measurements.
• At the final stage of resection, a residual nidus was detected in 20% of patients (5/25) when the flow value of venous drainage was greater than 4 mL/min.

After resection:
• No microflow probe-induced AVM vessel injury was reported.
• Complete AVM resection was achieved in all cases with low morbidity.

CONCLUSIONS
• Intraoperative flow measurements proved to be a feasible, safe, repeatable, and reliable methodology to assist surgery in different phases of AVM resection.
• Intraoperative data changes surgical planning in 32% of cases: 12% sparing a transit artery and 20% of further final dissection of the AVM nidus before sectioning the main venous drainage.

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<th>Micro-Flowprobe Advantages and Limitations</th>
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<tr>
<td><strong>Advantages</strong></td>
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<tr>
<td>Flow measurement can be repeated when needed</td>
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<td>Flow measurement identifies direction of flow</td>
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<td>Flow measurement identifies flow in deep vessels not completely exposed in the surgical field</td>
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REFERENCES

Della Puppa(NS-10288AH-pb)RevA2014USltr