Publication Brief

The Utility of Intraoperative Blood Flow Measurement during Aneurysm Surgery Using an Ultrasonic Perivascular Flow Probe

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OBJECTIVE
To assess the utility of quantitative intraoperative flow measurements using the Transonic ultrasonic flow probe during aneurysm surgery since inadvertent vessel compromise is a major cause of unfavorable outcome from aneurysm surgery and existing strategies for intraoperative assessment of this complication have potential limitations and disadvantages.

METHODS
Intraoperative flow measurements were analyzed from 103 patients with 106 aneurysms treated surgically at University of Illinois at Chicago from 1998 to 2003. Analysis included:

- The frequency of flow compromise (flow reduction of >25% from baseline) after aneurysm clipping.
- The frequency of clip repositioning assessed and correlated with postoperative angiography and stroke.
- The frequency with which blood flow measurement averted the need for clip repositioning, when vessel compromise was suspected and assessed.
- Aneurysm features most associated with vessel compromise.
- Complications related to use of the flow probe.

Post-operatively: Postoperative angiography of vessel patency was correlated with intraoperative assessment. Evidence of stroke due to large vessel occlusion and incidence of unexpected residual aneurysms seen on postoperative angiography were assessed.

RESULTS
- 33 (31.1%) of cases demonstrated a significant flow reduction after aneurysm clipping;
- Clips were repositioned in 27 (25.5%) of cases, with return to baseline flow except for two cases with vessel thrombosis/dissection.
- In six cases, flow reduction was attributed to spasm and was resolved with papaverine (n = 3) or retractor repositioning (n = 3).
- In six (5.7%) cases, unnecessary clip repositioning was avoided (n = 3) or safe occlusion of the parent vessel for trapping of the aneurysm was allowed by confirming adequate distal flow (n = 3).
- Basilar, middle cerebral, anterior communicating, or carotid terminus aneurysms were more likely to be associated with flow compromise (odds ratio, 4.3; P = 0.03).
- Postoperative angiography corroborated vessel patency in all cases.

STUDY’S CONCLUSIONS
“Use of the ultrasonic flow probe provides real-time immediate feedback concerning vessel patency. Vessel compromise is easier to interpret than with Doppler, and faster/less invasive than intraoperative angiography. Intraoperative flow measurement is a valuable adjunct for enhancing the safety of aneurysm surgery.”

REFERENCES