Publication Brief

Intra-operative Transit Time Flowmetry Reduces the Risk of Ischemic Neurological Deficits in Neurosurgery.

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OBJECTIVE
To assess intraoperative transit time flowmetry in terms of its indications, ease of implementation and interpretation, safety and reliability.

STUDY
• Twenty-eight patients (17 females, 11 males, average age 53) undergoing 30 craniotomies participated, including 21 aneurysm clipping or explorations, 2 AVM excisions, 2 dural AV fistula disconnections, 2 EC-IC bypass and 3 tumor resections.
• Transit-time ultrasound flowmetry was recorded from at-risk vessels before and after surgical intervention.
• Any episodes of flow compromise or change in surgical procedure were correlated with post-operative neurological deficits and imaging.

RESULTS
• Transit-time ultrasound flowmetry led to adjustments in 27% of the surgeries (8 of the 30 cases).
  • ANEURYSMS: inadvertent vessel occlusion, identified in 3 cases, led to immediate repositioning of the aneurysm clips. One aneurysm patient awoke with a stroke presumably from an undetected embolism.
  • AVMs: markedly reduced draining vein flow rates in 2 AVM surgeries were confirmed quantitatively immediately before final surgical excision was performed.
  • AV FISTULAE: reduced draining vein flow rates in 2 AV fistulae surgeries were confirmed quantitatively immediately before final surgical disconnection was carried out.
  • In 1 EC-IC bypass patient, the measurement suggested graft vasospasm which was then successfully treated with papaverine.

STUDY’S CONCLUSIONS
• Transit-time ultrasound flowmetry provides immediate feedback regarding vessel patency and clip-related arterial compromise and local vasospasm. An embolic event may escape detection.
• Transit-time ultrasound flowmetry was found to have a broad utility in intra-cranial surgery including AVMs, fistulae disconnections and tumor excisions. Demonstrating dramatically reduced flow in the draining veins aided confidence in surgical disconnection of the AVM or DAVF. During excision of complex tumors surrounding vascular structures, TTF was invaluable in confirming that vessel compromise was not occurring secondary to brain retraction.
• Transit-time ultrasound flowmetry was found to be was safe, rapidly performed, easy to interpret and generally reliable. Its use contributes significantly to the safety of patients.

TRANSONIC COMMENT
This landmark study is the first documentation of the benefits of intraoperative flow measurements during surgical AVM, dural fistula and tumor management.

REFERENCE