Indocyanine green video angiography for arteriovenous malformation

The role of indocyanine green videoangiography (ICG-VA) in the resection of vascular malformations has been largely described.

Wang et al. evaluated the application of intraoperative ultrasound (IOU) combined with indocyanine green videoangiography for arteriovenous malformation and concluded that it can identify the boundary of AVM, detect deep vessels, and discriminate between feeding arteries and draining veins, reducing operation difficulty, decreasing mortality and disability rate, and increasing the rate of complete excision [1].

Intraarterial injection was feasible and useful to distinguish feeders from normal artery and to observe changes in flow dynamics. Intraarterial injection of ICG had better phase contrast than intra-venous injection of ICG and better spatial resolution than digital subtraction angiography. Therefore, this technique can be helpful in arteriovenous malformation (AVM) surgery [2].

The utility of ICG-VA before dural opening (transdural ICG-VA) proved an efficient tool that allows optimising the exposure of the malformation, performing a safe dural opening and identifying dural vascular connections of the lesion [3].

ICG videoangiography is a quick and safe method of intraoperatively mapping the angioarchitecture of superficial AVMs, but it is less helpful for deep-seated lesions. This modality alone does not improve the identification of residual disease or clinical outcomes. Surgeon experience with extensive study of preoperative vascular imaging is paramount to achieving acceptable clinical outcomes. Formal angiography remains the gold standard for the evaluation of AVM obliteration [4].

It's yield in detecting residual AVM nidus or shunt is low, especially for deep-seated lesions and higher grade AVMs. ICG angiography should not be used as a sole and/or reliable technique. High-resolution postoperative angiography must be performed in brain AVM surgery and remains the best test to confidently confirm complete AVM resection [5].

It plays a role to identify small, posterior fossa arteriovenous malformations mimicking cavernous angiomas [6].

Retrospective cohort studies

In a retrospective cohort study, Yang et al. from The First Affiliated Hospital of Soochow University (Suzhou, Jiangsu) and Beijing Tiantan Hospital, Capital Medical University (Beijing, China), published in World Neurosurgery, evaluated the safety and effectiveness of combining intraoperative indocyanine green video angiography (ICG-VA) with FLOW800 and multimodal fusion neuronavigation in the microsurgical resection of brain arteriovenous malformations (AVMs).

The combined use of ICG-VA, FLOW800, and multimodal neuro-navigation was associated with:

Reduced intraoperative blood loss

Improved functional outcomes

Lower rates of postoperative complications and reoperation

→ Enhancing both the safety and efficacy of AVM microsurgery.

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A flashy mix of fluorescence imaging, hemodynamic mapping, and navigation overlays is presented as a major leap forward in AVM surgery. Ninety patients, split into two groups. Outcomes like hemoglobin drop and mRS are tracked. Sounds solid. Until you actually read it.

⚠ Fatal Methodological Flaws Retrospective Bias Parade: No randomization. No matching. No controls for AVM grade, eloquence, or preoperative hemorrhage. The groups may as well be different species.

Selection Bias in Disguise: Surgeons probably chose to use the “combined approach” in cases where they already expected better outcomes. That’s not innovation — it’s cherry-picking.

The Repetition Problem: Results are stated twice, almost copy-pasted, a red flag for editorial padding and weak analysis.

Outcomes Without Depth: Hemoglobin drop is statistically significant? Great. But was the surgical time longer? Were AVMs larger in one group? Were there intraoperative conversions? You’ll never know — because they didn’t ask.

 Technological Fanfare ≠ Scientific Rigor FLOW800 is useful — but not new. ICG-VA has been around for two decades. Multimodal navigation is standard in many centers. What this paper calls a “combined approach” is what high-volume centers consider routine. Wrapping these tools together doesn’t create a paradigm shift. It creates a PowerPoint slide.

 What It Should Have Been A prospective, stratified study with AVM grading, eloquence mapping, and independent radiological adjudication. Instead, we got a glorified before-and-after comparison with soft endpoints and flashy tools.

 Final Verdict This article is a sales pitch disguised as science — useful to tech vendors, not to evidence-based neurosurgeons. It recycles known tools and rebrands them as revolution — with no real control, no blinding, and no humility.

Publishable? Maybe. Transformative? Not even close.

1)
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