



The Role of Microscope-Integrated Near-Infrared Indocyanine Green Videoangiography in the Surgical

Treatment of Intracranial Dural Arteriovenous Fistulas

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Introduction

The successful treatment of an intracranial dural arteriovenous fistula (dAVF) requires complete obliteration of blood flow through the fistulous point. Surgical ligation is often used along with endovascular techniques. Digital subtraction angiography (DSA) can be utilized for confirmation of fistula obliteration; however, this technique can be cumbersome intraoperatively and difficult to correlate anatomically with the surgical field. Near-infrared indocyanine green (ICG) videoangiography (Raabe 2003, Schuette 2011) has been described as a complementary tool for this purpose.

Methods

Retrospective evaluation of all intracranial dAVF cases treated with surgical ligation over a 10-year period at our institution (N=47) identified 28 cases in which ICG videoangiography was used. These results were compared with findings on preoperative and intra- or postoperative DSA.

References

Raabe A, Beck J, Gerlach R, Zimmermann M, Seifert V. Near-infrared indocyanine green videoangiography: a new method for intraoperative assessment of vascular flow. *Neurosurgery*. 2003;52(1):132-139.

Schuette AJ, Cawley CM, Barrow DL. Indocyanine green videoangiography in the management of dural arteriovenous fistulae. *Neurosurgery*. 2010;67:658-662.

Results

- ICG videoangiography successfully confirmed the identity of the fistula point intraoperatively in 96% of cases as compared to preoperative angiography.
- ICG videoangiography demonstrated complete obliteration of fistulas as well as intra- or postoperative DSA in 91% of cases.
- There were not significant differences in dAVF grade, prior treatment, or presenting symptoms in patients who underwent ICG studies versus those who underwent DSA only.

Results

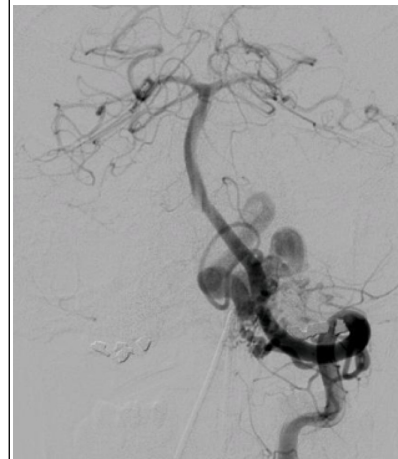
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- The false-negative rate of ICG when compared to postoperative DSA was 8.7%, which was not statistically different compared to the false-negative rate of intraoperative DSA when compared to postoperative DSA (10.5%).

Conclusions

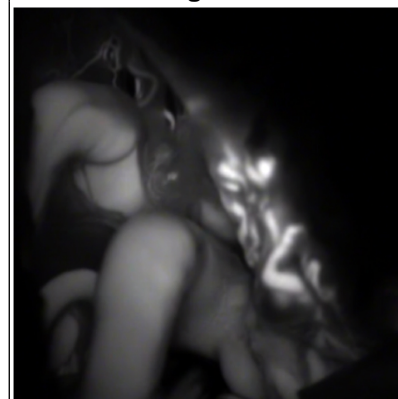
Microscope-based ICG videoangiography provides real-time information about the intraoperative anatomy of dAVFs. In addition, it can confirm complete obliteration of the fistula. This technique may be useful during dAVF surgery as an independent form of angiography or as an adjunct to intra- or postoperative DSA.

Figure 1



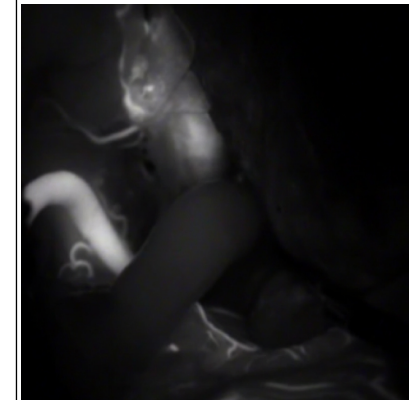
Preoperative DSA, VA injection, of a posterior fossa dAVF

Figure 2



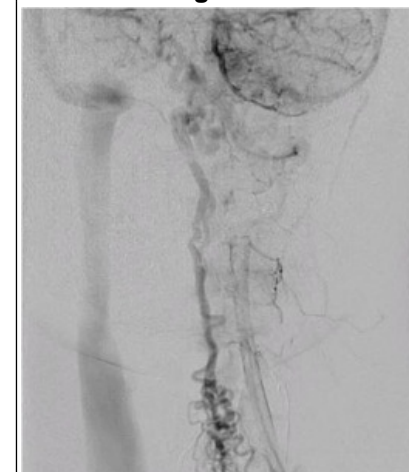
Intraoperative ICG run pre-ligation demonstrating arterialized veins

Figure 3



Post-ligation ICG run demonstrating cessation of flow through fistula

Figure 4



Postoperative DSA demonstrating no residual fistula or early vein filling