## Spinal arteriovenous malformation surgery

The pearls are the importance of identifying all the arterial inflow vessels and carefully taking out each one with non-stick bipolar cautery resulting in sequential devascularization and ultimate disconnection of the AVM. The other important technical nuance is the preservation of the pia arachnoid membrane using sharp dissection with microscissors to define the plane between the AVM and surrounding neural tissue <sup>1)</sup>

It is crucial to identify a shunt point for a spinal arteriovenous malformation (AVM) treatment. For this purpose, some intraoperative supports have been reported-the intravenous injection of indocyanine green (ICG), selective arterial injection of ICG (SAI-ICG), and selective arterial injection of saline with a high frame rate digital camera. However, there are difficulties in accurately identifying the shunt point, especially if the lesion has multiple feeders. Takamiya et al. reported a novel method, the selective arterial injection of saline to subtract signals of ICG (3S-ICG), to precisely identify the perimedullary arteriovenous fistula shunt points having multiple feeding arteries.

After exposing the lesion, a 4-Fr catheter was cannulated into the origins of the segmental artery. ICG was injected intravenously as a first step, and then, heparinized saline solution was flushed from the catheter.

Compared with other methods, this method could point out the exact shunt point and was effective for certain shunt point obliterations.

Though having similar invasiveness, 3S-ICG is superior to previously described techniques, such as SAI-ICG. Therefore, it will be useful when spinal AVM surgical treatment is performed <sup>2)</sup>.

## Videos

Techniques

https://www.neurosurgicalatlas.com/volumes/spinal-cord-surgery/spinal-cord-avm

Cervical 7-Thoracic 3 Laminoplasty for Resection of Arteriovenous Malformation: 2-Dimensional Operative Video

## https://academic.oup.com/ons/article/18/1/E3/5638294

1)

Hendricks BK, Spetzler RF. Cervical 7-Thoracic 3 Laminoplasty for Resection of Arteriovenous Malformation: 2-Dimensional Operative Video. Oper Neurosurg (Hagerstown). 2020 Jan 1;18(1):E3-E4. doi: 10.1093/ons/opz304. PMID: 31758168.

Takamiya S, Yamazaki K, Tokairin K, Osanai T, Shindo T, Seki T, Fujimura M. Intraoperative identification of the shunt point of spinal arteriovenous malformations by a selective arterial injection of saline to subtract signals of indocyanine green (3S-ICG): technical note. World Neurosurg. 2021 May 15:S1878-8750(21)00714-2. doi: 10.1016/j.wneu.2021.05.019. Epub ahead of print. PMID: 34004358.

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