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# **Strategies for Embolization of Brain Arteriovenous Malformations' Direct Arteriovenous Shunts**

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## **Abstract**

Intranidal direct arteriovenous (AV) shunts are non-rarely observed in brain arteriovenous malformations (bAVMs).<sup>1</sup> The endovascular treatment of such direct AV shunts may be challenging. Indeed, there is a significant risk of venous migration of the embolic agent used to occlude the AV shunt, leading to a subsequent risk of nidus bleeding due to impairment (slowdown or even occlusion) of the bAVM's venous drainage.<sup>2</sup>

Various endovascular techniques have been developed to avoid the risk of such inopportune impairment of the venous drainage during attempts to occlude a direct intranidal AV shunt.<sup>3-5</sup>

We present in this Technical video (**Video 1**) different endovascular strategies to occlude such direct AV shunts using dual lumen balloons with various liquid embolic agents, or using occlusion plugs.

## **References**

<sup>1</sup>. Krings T, Hans FJ, Geibprasert S, Terbrugge K. Partial "targeted" embolisation of brain arteriovenous malformations. *Eur Radiol.* 2010;20(11):2723-31. doi: 10.1007/s00330-010-1834-3.

<sup>2</sup>. Baharvahdat H, Blanc R, Termechi R, Pistocchi S, Bartolini B, Redjem H, Piotin M Hemorrhagic complications after endovascular treatment of cerebral arteriovenous malformations. *AJNR Am J Neuroradiol.* 2014;35(5):978-83. doi: 10.3174/ajnr.A3906.

<sup>3</sup>. Andreou A, Ioannidis I, Nasis N. Transarterial balloon-assisted glue embolization of high-flow arteriovenous fistulas. *Neuroradiology.* 2008;50:267-72.

<sup>4</sup>. Shotar E, Al Raaisi A, Lenck S, et al. Injection of N-butyl Cyanoacrylate Through a Dual-Lumen Balloon for Embolization of High-flow Intranidal Fistulas in Brain Arteriovenous Malformations: Technical Note. *Clin Neuroradiol.* 2020;30(2):313-319. doi: 10.1007/s00062-019-00780-6.

<sup>5</sup>. Guglielmi G, Viñuela F, Duckwiler G, Dion J, Stocker A. High-flow, small-hole arteriovenous fistulas: treatment with electrodetachable coils. *AJNR Am J Neuroradiol.* 1995;16:325-8.

## **Contributorship statement:**

Frédéric Clarençon: Manuscript redaction, video preparation

Eimad Shotar: Manuscript preparation, critical review of the manuscript

Stéphanie Lenck: Critical review of the manuscript

Mathilde Aubertin: Data collection, critical review of the manuscript

Kevin Premat: Critical review of the manuscript

Anne-Laure Boch: Critical review of the manuscript

Nader-Antoine Sourour: Data collection, Critical review of the manuscript