Intraventricular Arteriovenous Malformation embolization

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Embolization is one of the treatment options for intraventricular arteriovenous malformations (AVMs), a rare type of vascular abnormality located within the ventricles of the brain. Intraventricular AVM embolization is a minimally invasive procedure that aims to block or reduce blood flow through the abnormal blood vessels of the AVM. Here's an overview of the embolization procedure for intraventricular AVMs:

1. Evaluation and Diagnosis: Before embarking on embolization, the patient's condition is carefully evaluated through neuroimaging studies, such as angiograms and MRI scans, to determine the precise location, size, and characteristics of the intraventricular AVM. This information helps in planning the embolization procedure.

2. Preparation: The patient may need to fast before the procedure, and general anesthesia or conscious sedation is typically administered to ensure comfort and immobilization during the procedure.

3. Catheterization: A neurointerventional radiologist or neurosurgeon inserts a catheter into an artery, typically in the groin or wrist, and threads it through the blood vessels under guidance from real-time fluoroscopy and angiography. The catheter is advanced into the arterial system, allowing access to the blood vessels feeding the AVM.

4. Embolization Material: Various embolic materials can be used to block or reduce blood flow in the abnormal vessels. These materials include:

Coils: Soft metal coils are inserted through the catheter into the blood vessels feeding the AVM. These coils help create a blood clot within the vessels, reducing blood flow to the AVM.

Liquid Embolic Agents: Special liquid agents, such as Onyx or glue, can be injected through the catheter directly into the AVM nidus (the core of the malformation). These agents harden and block the abnormal vessels.

5. Monitoring: Throughout the procedure, the interventional team uses imaging techniques to monitor the placement of embolic materials and assess their effectiveness in reducing blood flow within the AVM.

6. Post-procedure Care: After embolization, the catheter is removed, and the patient is observed for a period of time in a recovery area. There may be a need for further imaging to confirm the effectiveness of the embolization.

7. Follow-up: Patients typically undergo follow-up imaging, such as angiography or MRI, in the days, weeks, and months following the embolization to assess the AVM's response and monitor for potential complications.

Embolization is often used as a preoperative or adjunctive treatment for intraventricular AVMs to make surgical resection or other interventions safer and more effective. In some cases, complete embolization may be curative, eliminating the AVM entirely.

It's important to note that the specific approach and choice of embolic material may vary depending on the AVM's characteristics and the expertise of the medical team. The decision regarding embolization as a treatment option should be made after a thorough evaluation of the individual case by a multidisciplinary team of specialists, including neurointerventional radiologists, neurosurgeons, and neurologists.

Case series

Fourteen consecutive patients with small (less than 3 cm) ventricular/paraventricular AVMs arranged for possible embolization to their nidi. All patients presented with intracranial hemorrhage. The AVMs ranged in size from 10 to 30 mm (average, 17 mm). Embolizations were performed using liquid adhesive (cyanoacrylate and iodized oil mixture at a ratio of less than 1:4) delivered by flow-guided microcatheters with the patient under general anesthesia. One patient (7.1%) was considered unsuitable for embolization, and another (7.1%) was not able to undergo embolization because of the morphological features of the AVM feeders, while the remaining 12 could be embolised successfully. Six of 12 patients who underwent embolization achieved complete occlusion of their AVMs (overall occlusion rate, 42.9%), while the remaining 6 were embolised partially with a 60-95% (mean = 80%) size reduction. One (8%) permanent neurological deficit resulted from embolization. Endovascular therapy seems to make a significant contribution to the multimodality treatment of small AVMs located in the ventricle or paraventricular deep area. Embolization alone permits complete cure in a large number of patients. It results in the obliteration of a significant volume of the nidus in most of the remaining patients, which makes those nidi more vulnerable to subsequent multimodal therapy [1)].

Case reports

A 34-year-old male presented with an intraventricular hemorrhage (IVH). Subsequently, ventricular AVM embolization in the anterior horn was performed using n-butyl-2-cyanoacrylate (NBCA) through the AChoA and medial PChoA, and complete obliteration was observed without neurological deterioration. Case 2: A 71-year-old female presented with IVH. Subsequently, ventricular AVM embolization in the lateral ventricle was performed through the AChoA and lateral PChoA with Onyx and NBCA, and partial obliteration was observed without complications. Furthermore, Gamma Knife surgery for residual lesions resulted in complete obliteration.

Conclusion: Embolization through the choroidal arteries for ventricular AVMs is an effective curative or adjunctive treatment [2)].

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Oran I, Parildar M, Derbent A. Ventricular/paraventricular small arteriovenous malformations: role of embolisation with cyanoacrylate. Neuroradiology. 2005 Apr;47(4):287-94. doi: 10.1007/s00234-005-1339-y. Epub 2005 Apr 2. PMID: 15806431.
2)
Mochizuki T, Ryu B, Sato S, Niimi Y. Successful embolization of ventricular arteriovenous malformation supplied by the choroidal artery: A case report and literature review. Surg Neurol Int. 2023 Jul 21;14:254. doi: 10.25259/SNI_413_2023. PMID: 37560570; PMCID: PMC10408606.