SINGLE-SESSION CURATIVE EMBOLIZATION OF A RUPTURED SUPRATENTORIAL ARTERIOVENOUS MALFORMATION: CASE REPORT

Embolización curativa en una sola sesión de una malformación arteriovenosa supratentorial rota: Reporte de caso

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ABSTRACT

Introduction: Microsurgery has been the gold standard for the treatment of arteriovenous malformations (AVM), however, endovascular therapy has emerged as an option in recent years.
Clinical case: We present the case of a previously healthy 45-year-old woman that presented with a ruptured AVM treated successfully with curative embolization.
Conclusion: Endovascular treatment is a feasible and safe option for the treatment of arteriovenous malformations.

Keywords: *Arteriovenous Malformations, Embolization, Therapeutic, Cerebral Hemorrhage. (source: MeSH NLM)*

RESUMEN

Introducción: La microcirugía ha sido el Gold estándar en el tratamiento de las malformaciones arteriovenosas (MAV), sin embargo, la terapia endovascular ha surgido como una opción en años recientes.
Caso clínico: Presentamos el caso de una mujer previamente sana de 45 años que presentó una MAV rota tratada exitosamente con embolización curativa.
Conclusión: El tratamiento endovascular es una opción factible y segura para el tratamiento de malformaciones arteriovenosas.

Palabras Clave*: Malformaciones Arteriovenosas, Embolización Terapéutica, Hemorragia Cerebral (fuente: DeCS Bireme)*

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Arteriovenous malformations (**AVMs**) are vascular lesion consisting of a nidus connected to arteries and veins, with thin and abnormal vessels instead of capillaries. Supratentorial AVMs account for the 84-88%.

This high flow lesions can develop symptoms when rupture and cause intracranial hemorrhage, subarachnoid, seizures, neurological deficits and headache, being the risk of hemorrhage 2 – 4% per year and re-bleeding 6% in the first year, returning to basal risk posteriorly.

Morbidity and mortality rates after rupture ranges between 20-30% and 10-15% respectively, for this reason these lesions require an aggressive and definitive management as soon as possible. [1]

For the previously aforementioned, we present a case of an adult woman presenting a ruptured supratentorial AVM with a successful outcome, treated and cured with single-session embolization with embolic agent SQUID® through an arterial approach, achieving complete obliteration without complications.

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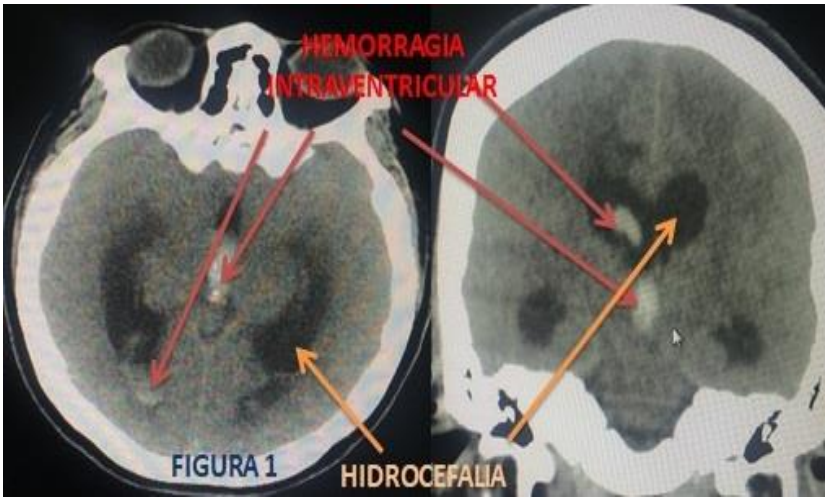

Fig 1. Cerebral tomography (CT) in axial and coronal view, showing intraventricular hemorrhage in lateral ventricles and III ventricle.

Fig 2. Cerebral angiotomography (AngioTEM) showing a ruptured right parietal AVM.

CLINICAL CASE

History and clinical examination: Previously healthy forty-five-year-old woman presents episodes of mild chronic headache, 12 hours previously to hospital admission presents sudden headache associated with loss of consciousness.

She is transferred to our institution for treatment being admitted in the emergency, the clinical examination reveals: somnolent, breathing spontaneously, reactive to nociceptive stimuli, Glasgow 11 points, without apparent motor and sensitive deficit, isochoric and reactive pupils. Cerebral CT (**fig. 1**) and angio-CT (**fig 2**) reveals intraventricular hemorrhage due to a ruptured right parietal and paraventricular AVM that generates moderate hydrocephalus.

Intense osmotherapy is initiated and clinically the patient improves neurologically with Glasgow 13 points. After hemodynamic stabilization we decided to perform a digital subtraction angiography (DSA) with definitive treatment.

Endovascular treatment: Under general anesthesia, right femoral artery is approached. With Envoy 6F guide catheter DSA of bilateral internal carotid artery is performed, revealing a right parietal and paraventricular AVM grade II according to Spetzler-Martin classification.

The dimensions of the AVM are 13.9 x 11 in antero-posterior view (**fig. 3**) and 16.8 x 12.8 mm in lateral view (**fig. 4**), with feeding arteries arising from the pericallosal artery and posterior communicating artery with superficial and deep venous drainage, associated with an intranidal aneurysm with dimensions of 4.7mm x 3.3mm.

After diagnostic angiogram, embolization is decided, which is performed with a SONIC detachable tip microcatheter with Hybrid 007 microwire. We first navigate through the

Fig 3. AP projection angiography of left internal carotid artery (ICA) pre-embolization, showing arteriovenous malformation (AVM) and an intranidal aneurysm.

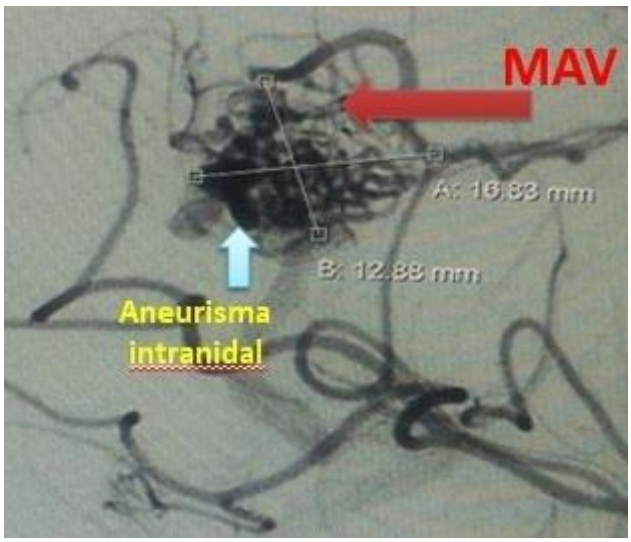

Fig 4. Lateral projection angiography of right internal carotid artery (ICA) pre-embolization, showing arteriovenous malformation (AVM) and an intranidal aneurysm.

right posterior communicating artery, partial embolization is performed with 0.4 cc of Squid.

After this, we navigate through the anterior cerebral artery from left to right, reaching the feeding arteries through the pericallosal artery, embolization is performed with 1.22 cc of embolic agent Squid. Immediate DSA confirms complete obliteration of the AVM with patent adjacent normal vessels. (**fig. 5 and 6**)

Clinical evolution: The patient tolerates the procedure without complications, sedation is withdrawn. After that, she is awakened with Glasgow 15 points, without motor and sensitive deficits, pupils are reactive and isochoric. Control brain CT shows absence of infarcts, no intracranial hemorrhage with adequate ventricular volume.

DISCUSSION

Arteriovenous malformations are complex vascular lesions that can be treated in various modalities, while endovascular technology has improved, it is possible the embolization of this vascular lesions as unique therapy in single session. [1]

W.J van Rooij et al in his study of 24 patients with supratentorial AVMs, found that complete angiographic obliteration of an AVM with Onyx in a single-session was obtained in 96% of the patients, without hemorrhagic and ischemic complications if patients were selected correctly considering the characteristics of the AVM; such as size that can be small, feeding arteries of a single vascular territory, not located in brain stem or deep structures and with feeders easily accessible by a microcatheter with the possibility of 2-3 cm reflux. [2]

Our results are similar to recently published studies. In the large series of Saatci et al, using a comparable technique, complete obliteration of the AVM was achieved using Onyx in 179 of 350 AVMs, with a cure rate of small AVMs (Spetzler-Martin grade I and II) of 98%. [4]

Other operators as well, reported 94% cure rates of well selected AVMs. In all the studies, the same angioarchitectonic features of the AVMs predispose them to a complete obliteration. [3,4]

CONCLUSION

Encouraging results of curative embolization of small AVMs, correctly selected, has changed the paradigm of multimodal treatment for AVMs in many large centers, including ours, been possible this in a single-session and without complications.

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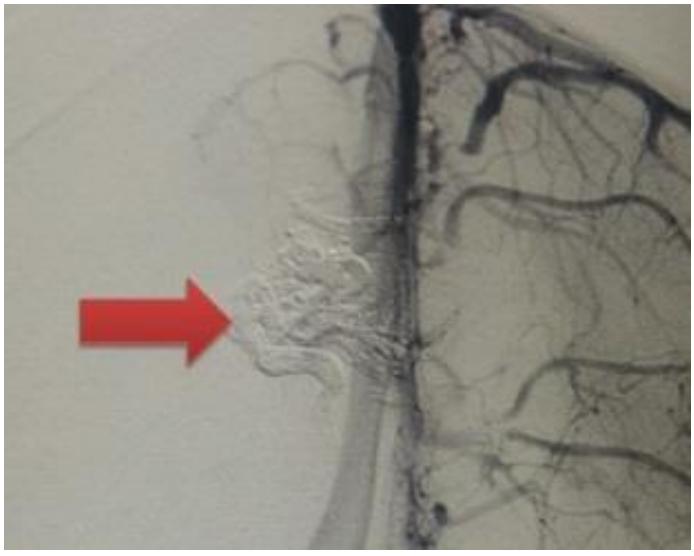

Fig 5. AP angiography of left Internal Carotid Artery (ACI) post-embolization, where there is evidence of an absence of arteriovenous malformation (AVM) and only the presence of embolization material.

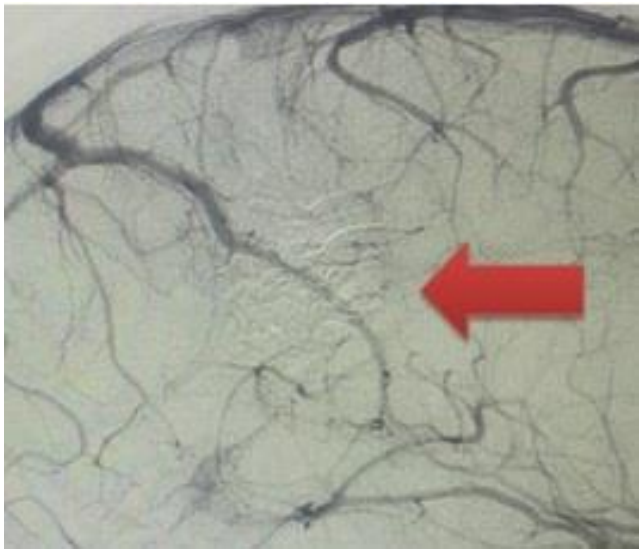

Fig 6. Lateral projection angiography of right ICA post-embolization, where there is evidence of absence of arteriovenous malformation (AVM) and only presence of embolization material.

Disclosures
The authors report no conflict of interest concerning the materials or methods used in this study or the findings specified in this paper.

Author Contributions
Conception and design: All the authors. *Drafting the article:* Rodríguez R. Critically revising the article: Flores J, Rodríguez V. *Reviewed submitted version of manuscript:* Saal-Zapata G. *Approved the final version of the manuscript on behalf of all authors:* Rodríguez R.

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