DOUBLE ANEURYSM CLIPPING OF TRUE FETAL POSTERIOR COMMUNICATING ARTERY BY MINIPTERIONAL APPROACH PLUS CONTROL WITH SODIUM FLUORESCEIN: A CASE REPORT

Clipaje de doble aneurisma de la arteria comunicante posterior fetal verdadera por abordaje minipterional más control con fluoresceína sódica: reporte de caso

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ABSTRACT

Introduction: True fetal or fetal type posterior communicating artery aneurysms (PComA) are a technical challenge for the neurosurgeon in both endovascular and microsurgical treatment. Microsurgical clipping using minimally invasive approaches is a safe and optimal alternative solution.
Clinical case: a 53-year-old patient who presented subarachnoid hemorrhage, Hunt & Hess scale III, Fisher scale III, and Glasgow Coma Scale of 13. Cerebral angioCT showed two saccular aneurysms in the right true fetal PComA. The patient underwent a right interfacial minipterional craniotomy and clipping of the 2 aneurysms, using sodium fluorescein as a guide. Total occlusion of the aneurysms was achieved, maintaining the patency of the fetal PComA.
Conclusion: The minipterional approach allows adequate access to the fetal PComA and the aneurysms originating from it. It is essential to review the patency of the adjacent vessels, being the use of intraoperative fluorescein is an essential complement to avoid complications such as cerebral infarction.

Keywords: *Intracranial Aneurysm, Craniotomy, Fluorescein, Subarachnoid Hemorrhage, Neurosurgeons (Source: MeSH NLM)*

RESUMEN

Introducción: Los aneurismas de la arteria comunicante posterior (AcomP) fetal verdadera o tipo fetal son un desafío técnico para el neurocirujano tanto en el tratamiento endovascular como en el microquirúrgico. El clipaje microquirúrgico mediante abordajes mínimamente invasivos es una alternativa de solución segura y óptima.
Caso clínico: Paciente de 53 años que presentó una hemorragia subaracnoidea, escala de Hunt & Hess grado III, escala de Fisher III y escala de Glasgow de 13. La angioTEM cerebral mostró dos aneurismas saculares en la AcomP fetal verdadera derecha. La paciente fue sometida a una craneotomía minipterional interfacial derecha y clipaje de los 2 aneurismas, utilizando como guía, fluoresceína sódica. Se logró la oclusión total de los aneurismas, manteniendo la permeabilidad de la AcomP fetal.
Conclusión: El abordaje minipterional permite un acceso adecuado a la AcomP fetal y a los aneurismas originados en ella. Es esencial la revisión de la permeabilidad de los vasos adyacentes, siendo el uso de fluoresceína intraoperatoria un complemento esencial para evitar complicaciones como el infarto cerebral.

Palabras Clave*: Aneurisma Intracraneal, Craneotomía, Fluoresceína, Hemorragia Subaracnoidea, Neurocirujanos (Fuente: DeCS Bireme)*

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The circle of Willis is complete in 20% of patients and has several variants, including the true fetal posterior communicating artery (PComA) and the fetal type, which have an incidence of 4 to 29%.[1] The presence of the fetal variant implies that the territory of the posterior cerebral artery is perfused by a branch of the internal carotid artery. Therefore, it is very important to recognize it at the time of endovascular or microsurgical planning.

Endovascular treatment has not proven to be totally effective in this type of aneurysm, achieving only a partial occlusion; It even presents a technical challenge with a greater potential risk of ischemic injury due to compromise of the fetal PComA,

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as it causes a total closure of this artery; therefore, microsurgical clipping remains an optimal option.[2,3]

The advancement of technology and the improvement of the technique have made it possible to develop less invasive craniotomies, with the Minipterional craniotomy (MPT) being an approach that provides a safe corridor and similar to that of a classic pterional craniotomy, but with the advantage of obtaining a minimum degree of extra and intradural manipulation, achieving less parenchymal exposure and thus avoiding injury.[4,5] In addition, the use of cerebral angiography with sodium fluorescein is key in the review of the permeability of the vessels adjacent to the aneurysm.[6,7]

The objective of this case report was to present a minimally invasive approach in the safe occlusion of complex aneurysms such as those associated with the fetal PComA variants.

CLINICAL CASE

History and examination: A 53-year-old female patient with a history of uncontrolled arterial hypertension. She is referred to an emergency, with a time of illness of 24 hours, characterized by headache, nausea, vomiting, and loss of consciousness. On clinical examination: Confused, eye-opening on call, photoreactive isochoric pupils, 3/5 left hemiparesis, Glasgow Coma Scale 13 (eye-opening: 3, motor response: 6, verbal response: 4). Hunt Hess scale: 3

A brain CT scan showed a Fisher III scale subarachnoid hemorrhage (SAH) *(Fig 1)*. A cerebral angioCT revealed the presence of a true right fetal communicating artery *(Fig 2)*, with two aneurysms, a ruptured inferior aneurysm of 5.57 x 5.48 mm with a neck of 4.86 mm, a second non-ruptured superior aneurysm of 3.13 x 2.1 mm with a neck 4.01mm *(Figure 3)*. The distance between the right anterior clinoid and the aneurysms was 2.4mm.

Surgical treatment: The patient underwent emergency surgery, undergoing an interfacial minipterional craniotomy, using a subfrontal approach and clipping of cerebral aneurysms, without intraoperative complication; checking the patency of the arteries with the help of sodium fluorescein. *(Fig 4 and 5)*

Clinical evolution: The postoperative clinical evolution was favorable, the patient showed improvement in the Glasgow Coma Scale and improvement in her left hemiparesis. The postoperative tomography showed the clips in the 2 aneurysms and the total closure of the neck of both aneurysms, with patency of the fetal posterior communicating artery.

DISCUSSION

The high incidence of intracranial aneurysms in the posterior communicating artery (PCom) makes its variants important to obtain adequate treatment.[8]

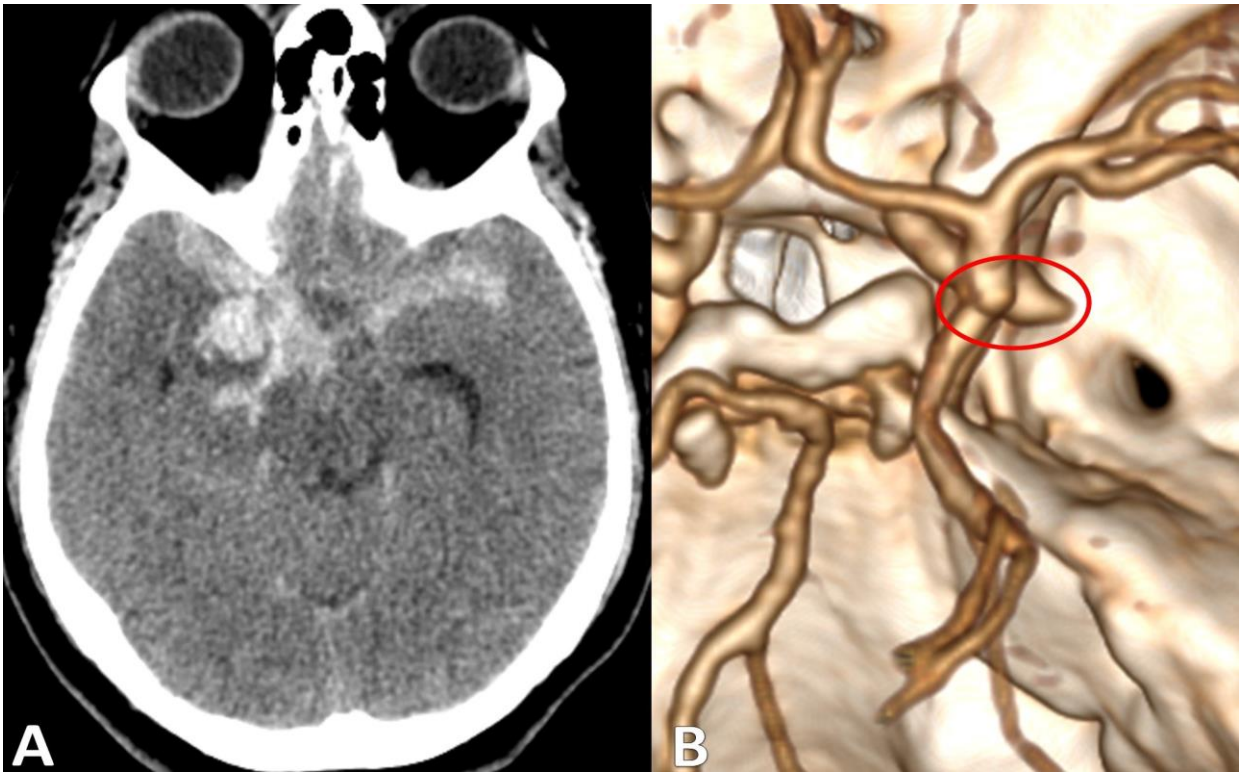

Fig 1. (A) Brain tomography in axial view, showing a diffuse subarachnoid hemorrhage with clots in the cisterns and a right temporal intraparenchymal hematoma. **(B)** Cerebral angioCT in axial view showing two aneurysms in true fetal PComA.

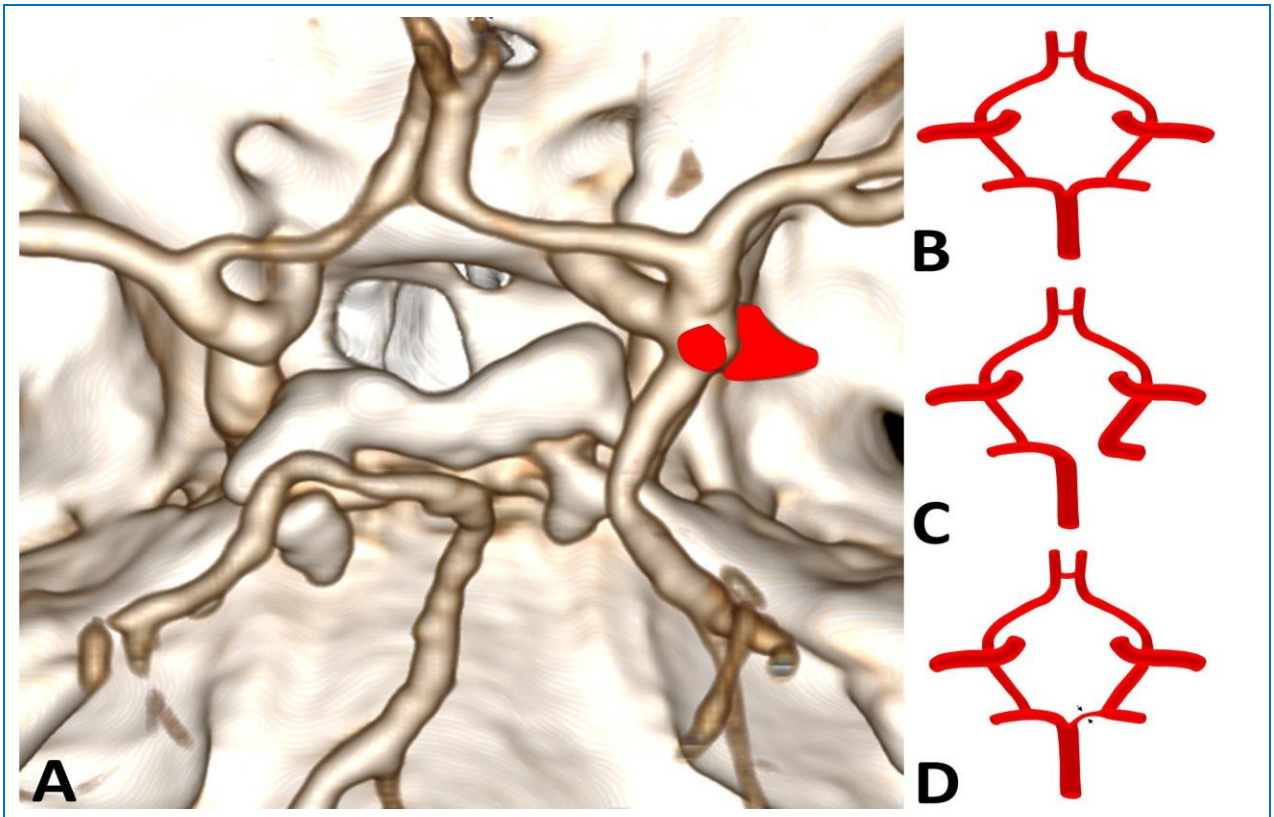

Fig 2. (A) Cerebral angioCT in axial view at the level of the Circle of Willis, where two cerebral aneurysms are evidenced in the true fetal posterior communicating artery. **(B)** Complete Circle of Willis. **(C)** True fetal posterior communicating artery **(D)** Artery fetal-type posterior communicator with hypoplastic P1 segment.

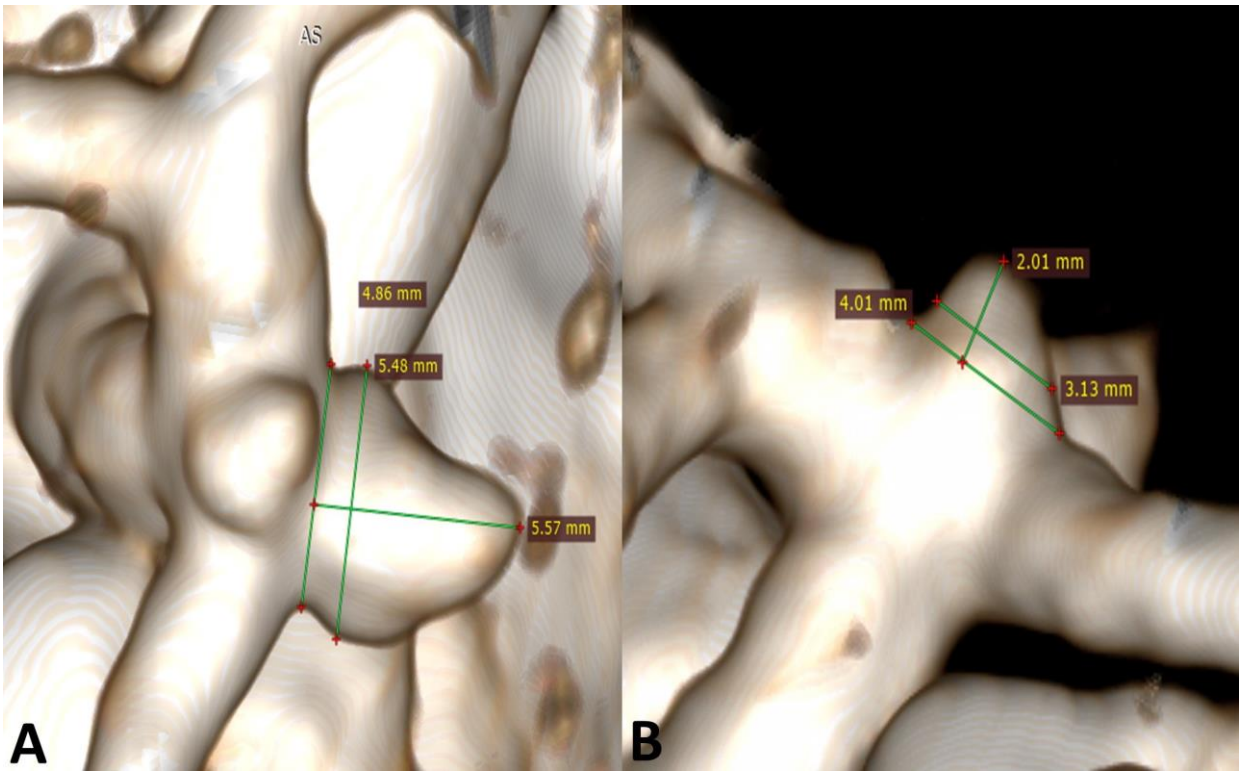

Fig 3. (A y B) Cerebral angioCT, showing the measurements of the two aneurysms of the true fetal posterior communicating artery (PComA).

Unlike non-fetal PComA, where its occlusion is generally asymptomatic thanks to the collateral circulation is present; lesions in the fetal or fetal-type PComA can trigger occipital, midbrain, or thalamic infarcts.[9]

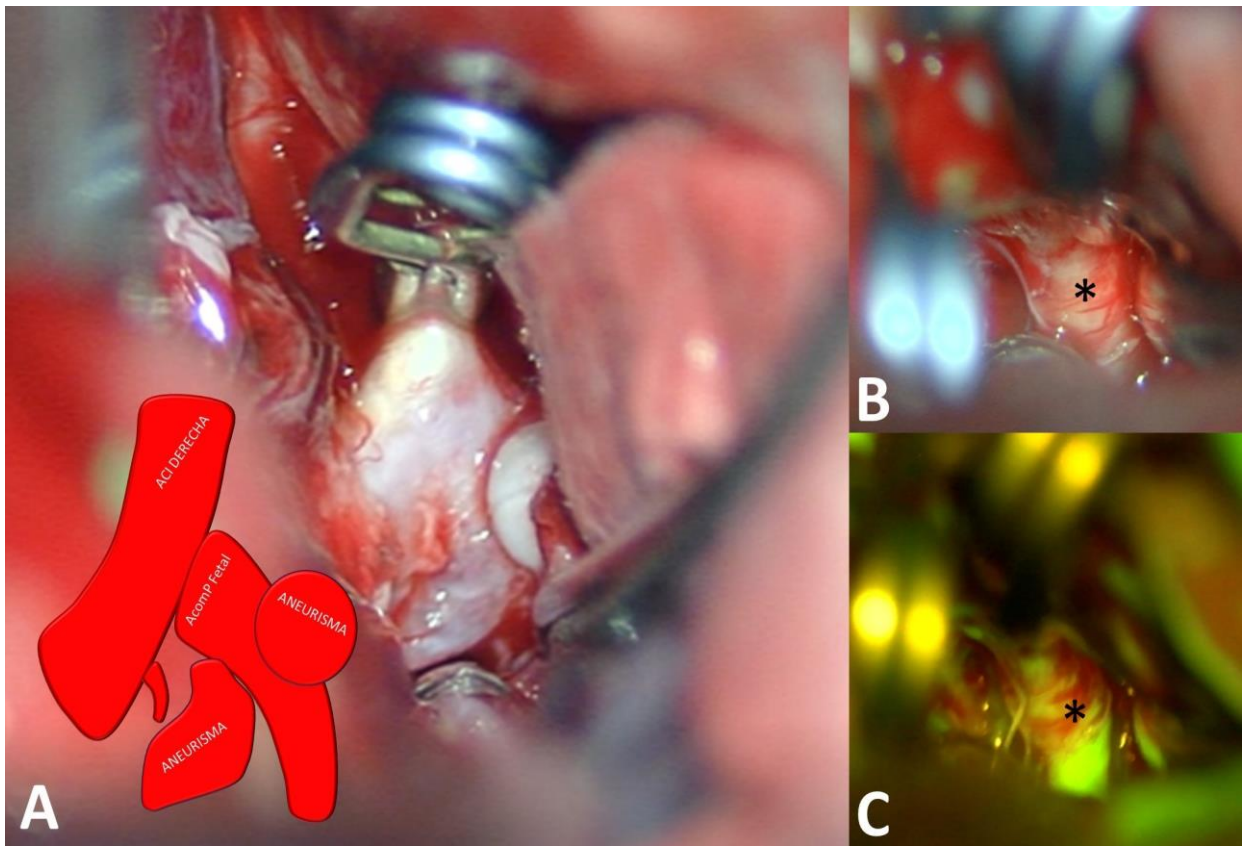

Fig 4. **(A)** Intraoperative image of the two aneurysms of the true fetal PComA. **(B)** Aneurysms with complete occlusion, with Yasargil type titanium clips. **(C)** Intraoperative control of true fetal PComA patency with sodium fluorescein. (*) Fetal PComA

Microsurgical clipping in terms of complete occlusion and preservation of the PComA has a better result than endovascular.[10] However, the advancement of endovascular treatment could bring better results soon.

The minipterional craniotomy is an alternative approach that provides the same surgical corridor as traditional approaches but has the advantages of less tissue trauma, limited bone opening, better cosmetic outcome, and preservation of temporal muscle function.[11]

The surgical technique variants used during clipping by minipterional craniotomy are diverse, among which we have anterior clinoidectomy, cisternostomy, temporal clipping, and sodium fluorescein (NaFl). [12]

Sodium Fluorescein (NaFl) is a useful technique to determine the patency of the vessels and the degree of aneurysmal occlusion, reducing the rate of the residual aneurysm; its use does not present a risk by itself, it is also easy to use and offers a clear image of the cerebral circulation. This intraoperative aid added to the direct vision of the PComA offers a great advantage in the attempt to reduce neurosurgical complications. [13]

The optimal treatment of ruptured aneurysms should include the following characteristics: Complete occlusion of the aneurysm, low percentage of complications, and the lowest possible cost/effectiveness.[14] Therefore, the minipterional craniotomy meets all the requirements for the treatment of cerebral aneurysms of the Fetal PComA. [15,16]

The case is reported due to the infrequent presentation of the true fetal variant of the right posterior communicating artery associated with a double aneurysm in its course.17

CONCLUSION

The method of treating aneurysms of the posterior communicating artery (PComA), which involves the true fetal and fetal-type variants, deserves special attention because their treatment carries a greater risk. The method selected should be aimed at fetal occlusion and preservation of fetal AcomP.

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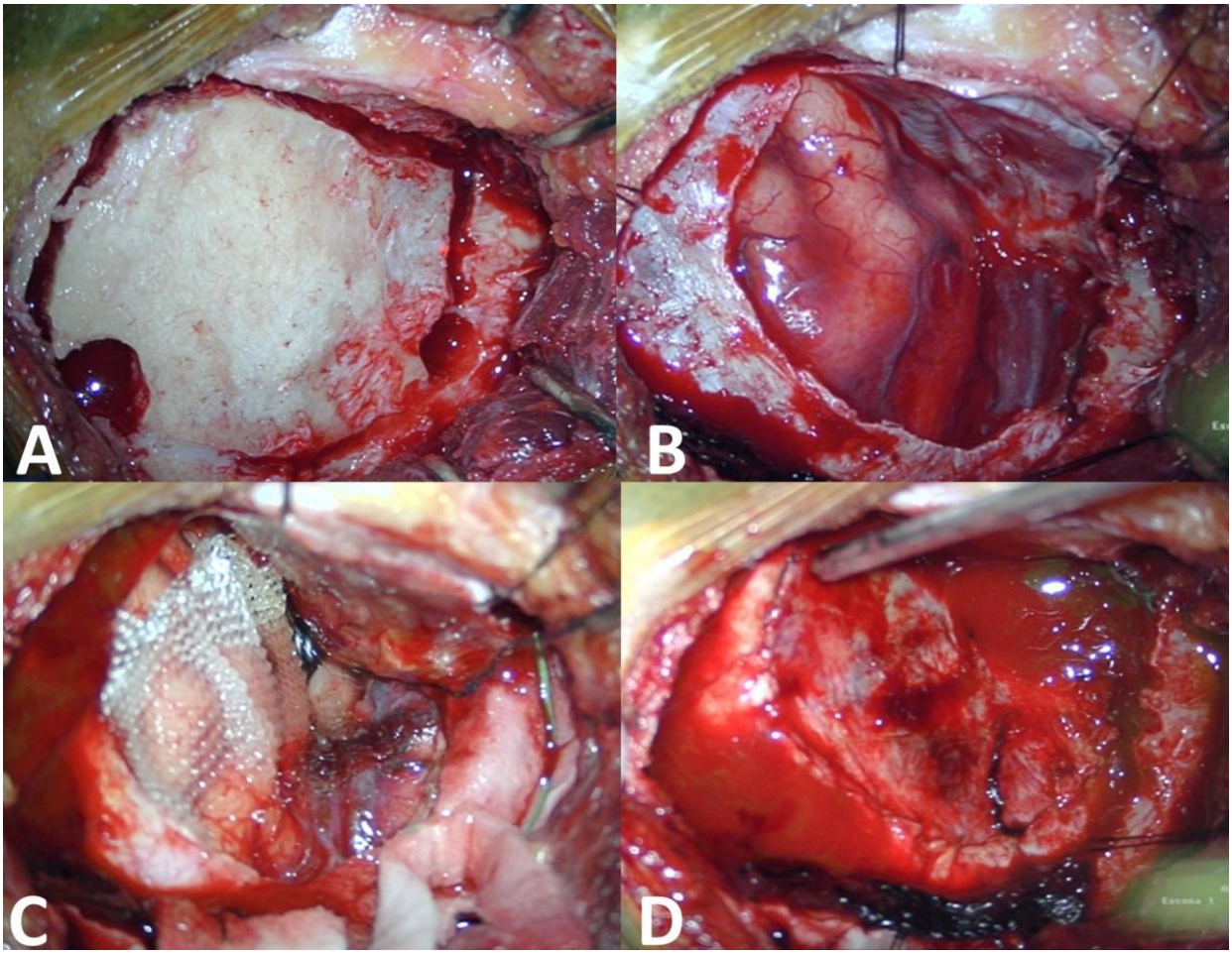

Fig 5. **(A)** Right minipterional craniotomy. **(B)** Dural opening with exposure of brain parenchyma with subarachnoid hemorrhage. **(C)** Hemostatic material after aneurysm clipping. **(D)** Hermetic dural closure.

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Ethical considerations
The patient was informed about the publication of the case and the use of her photos, obtaining informed consent, attachments in the history under strict confidentiality.

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

Authors Contributions
Conception and design: All authors. *Drafting the article:* Salazar C. Critically revising the article: Díaz, Rojas, Gaitán, Lúcar. *Reviewed submitted version of manuscript:* Salazar. *Approved the final version of the manuscript on behalf of all authors:* Salazar.

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