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Case Report

Dissecting aneurysm of the right middle cerebral artery in a young patient: A case report ☆,☆☆

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ARTICLE INFO

Article history:
Received 13 August 2024
Revised 28 August 2024
Accepted 29 August 2024

Keywords:
Intracranial aneurysm
Endovascular aneurysm repair
Therapeutic embolization
Blood vessel dissection (deCS)

ABSTRACT

Dissecting aneurysms are common in early stages of life, and minimally invasive intervention is recommended to reduce the risk of complications due to the challenge of identifying structures with a higher risk of bleeding. An 18-year-old patient presented with a dissecting aneurysm of the right middle cerebral artery, characterized by a poorly defined neck and a high risk of rupture. Endovascular treatment with a flow-diverting stent and coils was performed, successfully correcting the lesion without complications. Recent advances in endovascular therapy allow precise localization of blood vessels and aneurysms, crucial for managing dissecting aneurysms, which damage vascular walls. Treatment should be individualized based on the lesion's characteristics. In this case, minimally invasive endovascular therapy was chosen to reduce risks such as bleeding, surgical complications, and prolonged anesthesia, particularly important due to the complexity of the patient's vascular structures.

Introduction

Dissecting cerebral aneurysms are aneurysms of low incidence in the adult population; however, they are the most common in the pediatric population with an incidence of 50%, which are usually located in the bifurcation of the internal carotid artery in 25%-50% of cases [1]. Therapeutic management of these lesions can be either surgical or endovascular, however the management of choice is minimally invasive or endovascular, since these are pediatric patients, so it is difficult to identify the Sylvian fissure, the distinction of arteries from veins, the low volume of blood circulation and the risk of prolonged anesthesia [1].

A case is described below of an 18-year-old female patient who presented dissecting aneurysm in right middle cerebral

☆ Competing Interests: The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

☆☆ Acknowledgments: We declare that we have not received any funding to write this article.

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https://doi.org/10.1016/j.radcr.2024.08.155

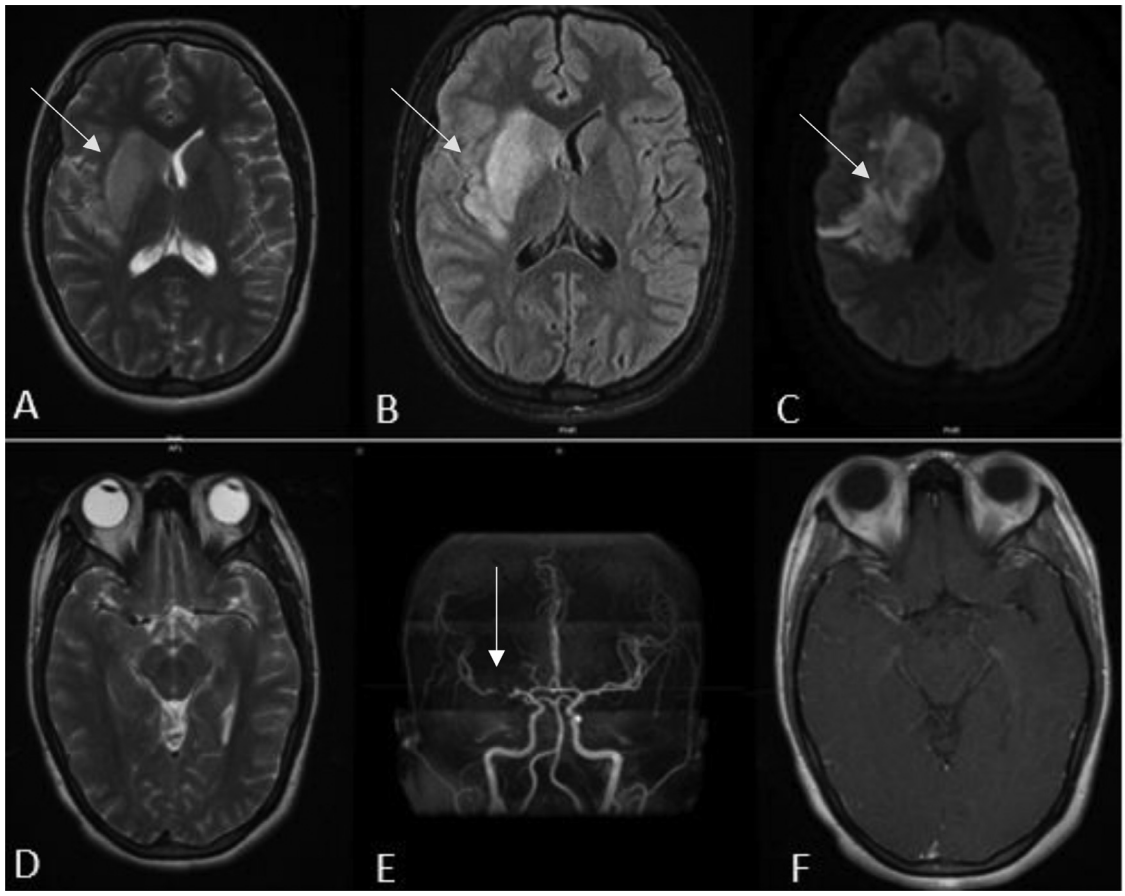

Fig. 1 – (A, B) Axial T2 and FLAIR showing ischemic area in the territory of the right middle cerebral artery. (C) Diffusion. Area of restricted movement of water molecules in the right middle cerebral territory. (D) Axial T2 showing irregular and alteration in the normocology of the signal vacuum of the right middle cerebral artery. (E) MIP showing thinning and suspected dissection of the M1 segment of the right middle cerebral artery. (F) Axial T1 with contrast with enhancement of the wall of the right middle cerebral artery.

artery in M1 segment in which she underwent endovascular intervention with flow-correcting stent and platinum coils in the aneurysmal sac without subsequent ischemic or hemorrhagic complications. The case is reported for academic purposes due to the natural history of the disease, the location of the lesion in the anterior circulation and the therapeutic results, in order to expand scientific knowledge for this type of pathology.

Case presentation

A 18-year-old female patient with a history of premature birth by cesarean section at 36 weeks of gestation due to premature rupture of the membrane, requiring hospitalization in the neonatal intensive care unit for 5 days for neonatal adaptation, complete immunization schedules during infancy, complete neurodevelopment, without alterations in medical controls, The clinical picture begins at 16 years of age with pulsatile headache of left temporal location, intensity 5/10 on the analogue pain scale (EVA), associated with right eye pain, paresthesia in right hemiface and photophobia, persists with symptoms for 5 days, with no improvement of the picture after taking nonsteroidal anti-inflammatory drugs (NSAIDs) on an outpatient basis.

Subsequently, the patient refers to physical exertion where she manifests worsening of intensity of headache EVA 10/10, with right eye pain, deviation of labial commissure to the right side, vomiting, dizziness and left hemiparesis, with subsequent generalized tonic-clonic episode of approximately 20 seconds duration, then drowsy in postictal state with persistence of left hemiparesis, afebrile, is taken to health center showing by neuropediatrics service to the neurological physical examination: alert and oriented, deviation of the labial commissure to the right, effacement of the left nasolabial fold, ocular opening and closing preserved, left Babinsky with left arm plegia, paresis 3/5 left leg and left central facial paralysis, no aphasia, no agnosia and no apraxia, perform contrasted cerebral angioresonance in order to characterize the lesion (Fig. 1).

Subsequently, paraclinical and extension studies were ordered considering the possible origin of the event secondary to autoimmune alterations, antiplatelet therapy with acetylsalicylic acid (ASA) was indicated and anticommitment prophylaxis was continued. She was discharged 12 days later with an

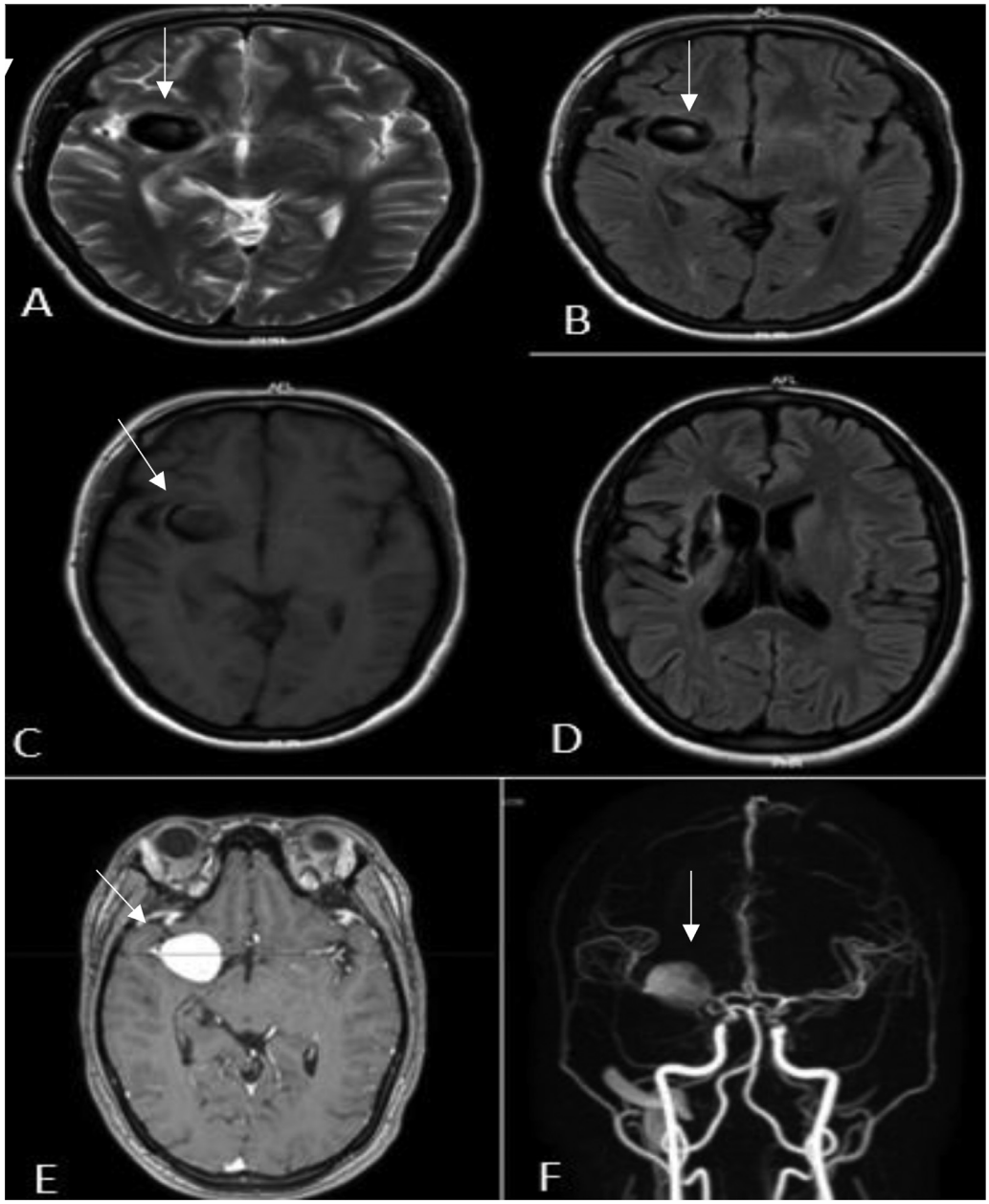

Fig. 2 – (A-C) Axial T2, FLAIR and T1 slices showing signal void due to aneurysmal formation in the territory of the right middle cerebral artery. (D) Axial FLAIR with encephalomalacia in the territory of the right middle cerebral artery. (E) Axial T1 with contrast showing filling of aneurysmal lesion of the right middle cerebral artery. (F) MIP showing aneurysmal lesion of the M1 segment of the right middle cerebral artery.

improvement of mobility status. One year after the last event, the patient reached legal age and continued outpatient follow-up with neurology, who requested control neuroimaging such as magnetic resonance imaging of the brain with contrast and contrasted angioresonance (Fig. 2).

Patient is evaluated by endovascular neurosurgery who decide to perform panangiography of cerebral vessels finding: Right carotid artery: There is the presence of saccular aneurysm of discordant aspect of the m1-m2 segment of the right middle cerebral artery which measures 20 × 24 mm in diameter (Fig. 3), without a defined neck that compromises the origin of the branches of the right middle cerebral artery. Poor collaterality by right anterior cerebral artery and posterior cerebral arteries.

Neurosurgical joint is performed by endovascular neurosurgery team of neurodinamia determining the presence of a dissecting aneurysm of the M1 segment of the right middle cerebral artery, without a defined neck, with high risk of rupture, so it is decided its endovascular treatment with flow-diversifying stent and coils. The purpose of this reconstructive technique was to preserve the distal circulation of the right middle cerebral artery 48 hours after her diagnosis, she was taken to surgery with previous preparation with double platelet antiplatelet therapy (Fig. 4).

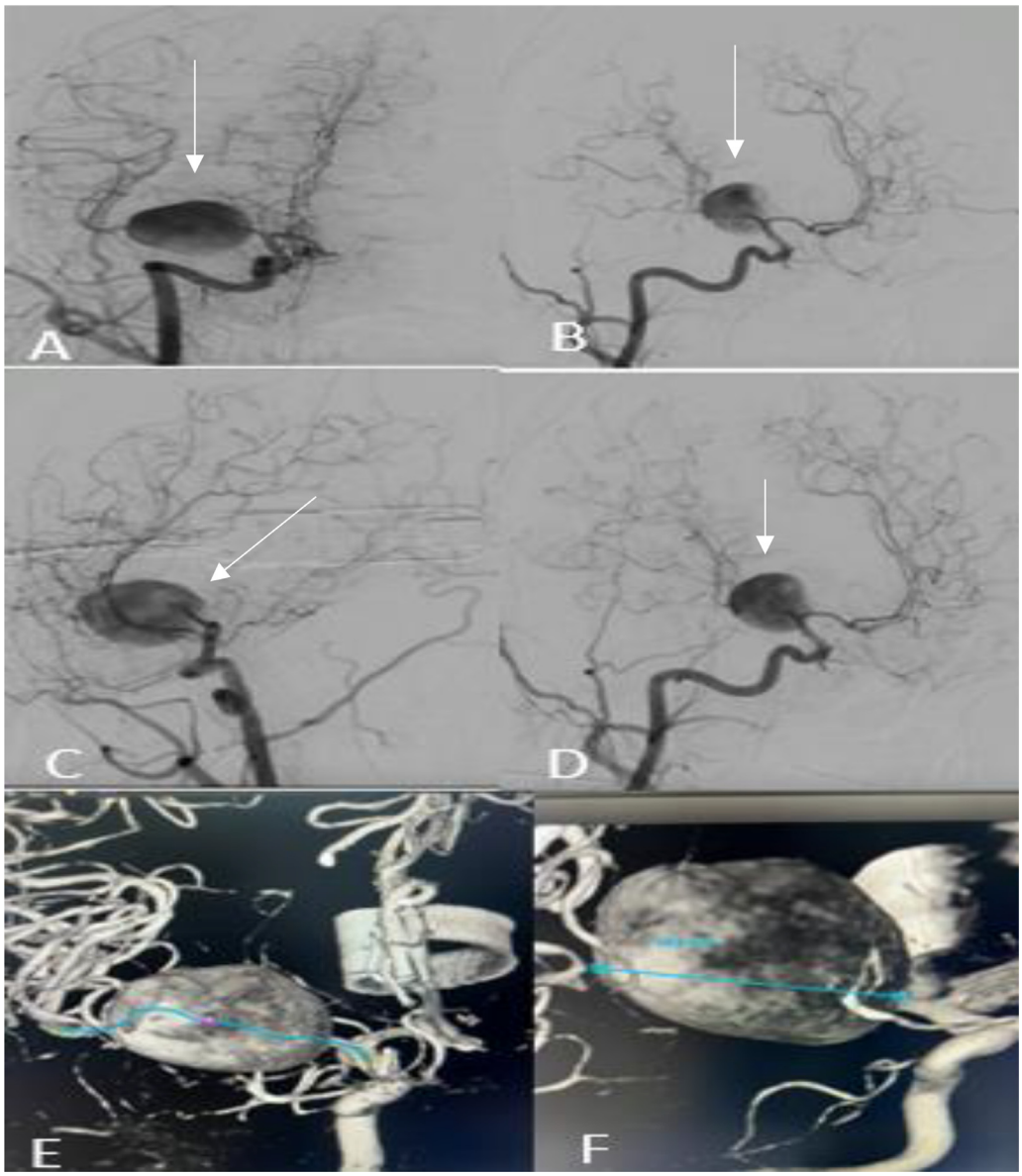

Fig. 3 – Angiography by digital subtraction and 3D reconstruction that shows: saccular aneurysm of dissecting aspect of the m1-m2 segment of the right middle cerebral artery measuring 20 x 24 mm in diameter, without a defined neck that compromises the origin of the branches of the right middle cerebral artery.

The patient was transferred to the intensive care unit for strict neurological monitoring. She received double platelet antiplatelet therapy and intravenous corticosteroids. On the third postoperative day with adequate evolution without signs of neurological focalization, with adequate tolerance to the surgical procedure, so postoperative control imaging is requested with brain magnetic resonance imaging (Fig. 5).

The patient was discharged with outpatient follow-up by endovascular neurosurgery and clinical neurology.

Discussion

Cerebral aneurysms in pediatric patients have an incidence of 0.5% to 5% with a predominance in the male gender, the characteristics of aneurysms in children are markedly different from those of adults in both pathogenicity and clinical appearance [2]. They can present in different ways, but the most common symptoms are alterations in neurological status and seizure episodes [3].

Aneurysms in the pediatric population tend to be more fusiform than saccular, larger and more irregular in shape, and are considered congenital in origin, since they arise due to dysfunction of the vessel wall and vascular repair processes [1.] They can be found in various locations in the brain, most frequently in the internal carotid bifurcation (25%-50%) followed by the posterior circulation in the posterior cerebral artery, basilar artery, and vertebral artery. Location in the middle and anterior cerebral arteries are less common [2]. Their categorization consists of 4 types, mentioned below: dissecting aneurysms (50%) which are larger, fusiform and partially

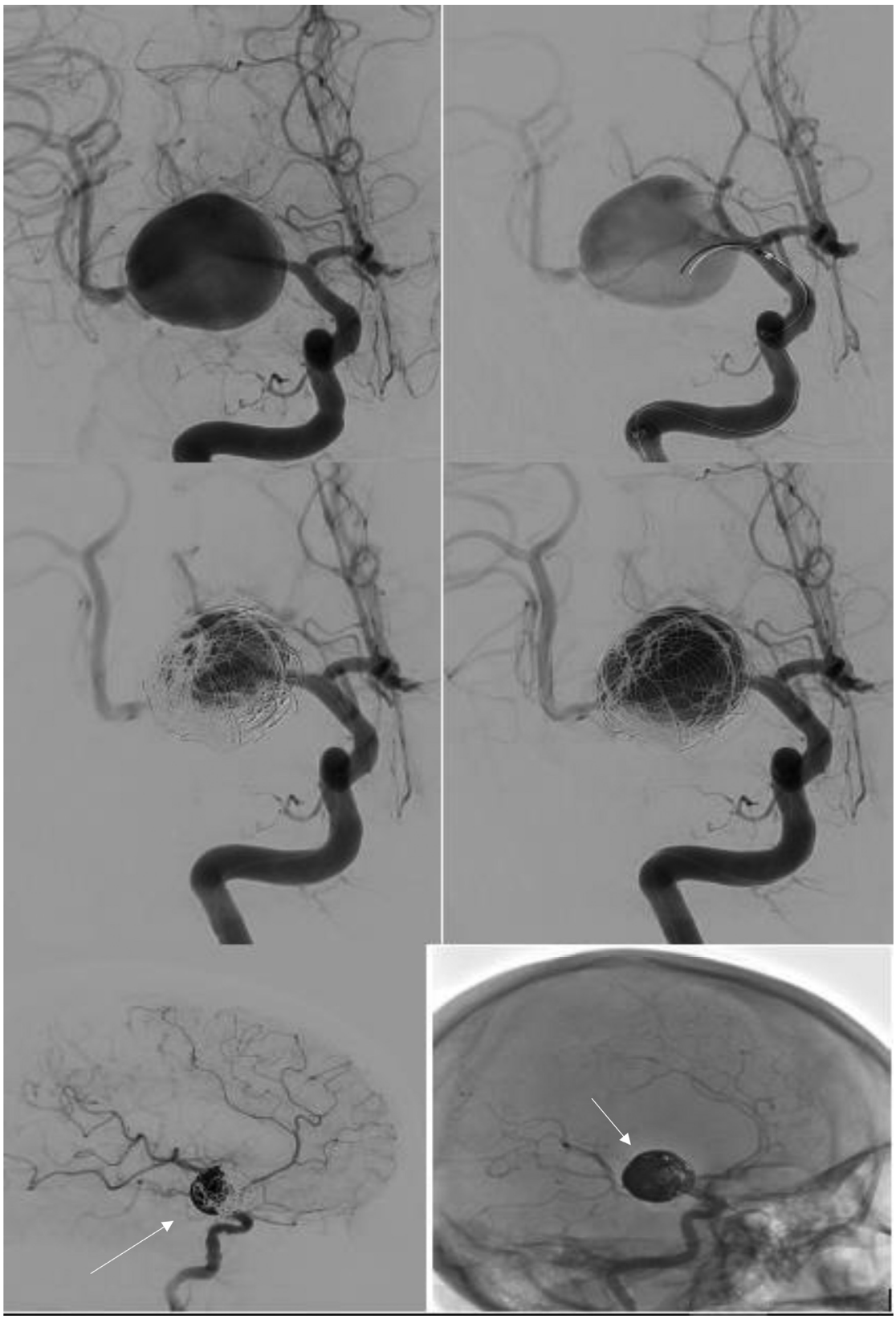

Fig. 4 – Endovascular embolization of giant dissecting cerebral aneurysm of the right middle cerebral artery, with PIPELINE flow diversion stent and coils.
Passage with microcatheter through the aneurysmal defect, placement of coils and stent implantation from healthy arterial segments is observed. With correct device opening and patency of distal vessels.

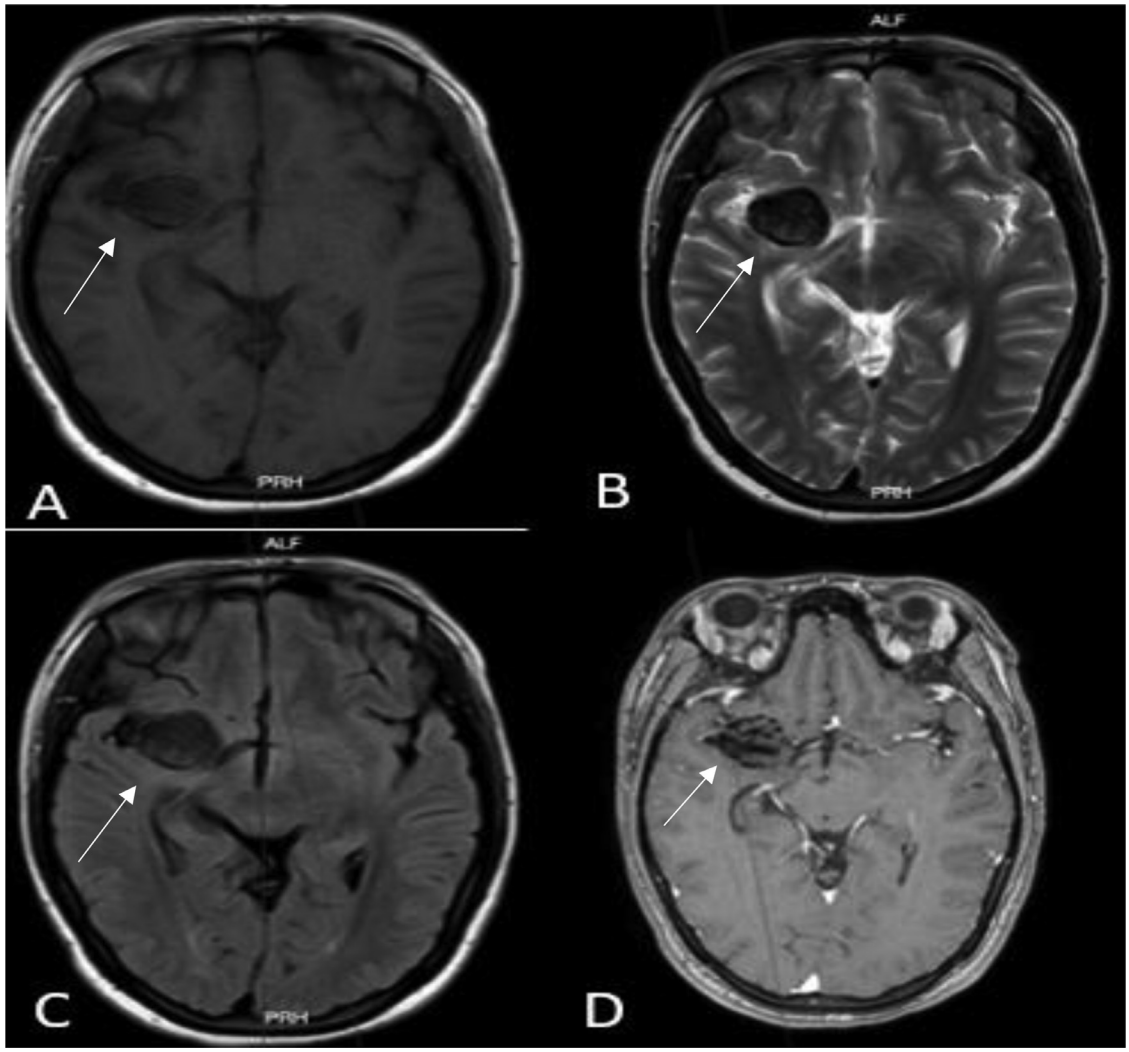

Fig. 5 – Magnetic resonance control 72 hours after surgery. (A-C) Axial. T1, T2, and Flair showing thrombus stability, without hemorrhage, ischemia or edema added postsurgery. (D) Axial T1 with contrast showing absence of intraaneurysmal filling due to effective endovascular treatment of aneurysm in the territory of the right middle cerebral artery.

thrombosed, mycotic aneurysms (15%) are found in distal vasculature and are associated with a history of septic embolism, traumatic aneurysms (1%-5%) associated with major trauma, saccular aneurysms as in adult aneurysms with predominance in the anterior circulation [1,2].

The incidence of an adult patient with a ruptured aneurysm with seizure episodes is 3%-18% while in the pediatric population is 71.4% this means that the probability that a pediatric patient seizure after an event is 4 times higher than in the adult population, this is due to the immature development of brain function, making it difficult to resist or adapt to the traumatic event.

This is due to the immature development of brain function, making it difficult to resist or adapt to injury or stimulation caused by head trauma and ruptured aneurysms, which can increase the risk of seizures in this age group.

Pediatric patients with intracranial aneurysmal rupture who have seizures tend to exhibit the typical radiological finding of distal arterial aneurysms with lobar hemorrhage, Compared to proximal truncal aneurysms and deep hematomas, these distal lesions are close to the surface of the brain. Therefore, they directly compress and stimulate the cerebral cortex and can cause sudden surges of electricity, promoting the onset of seizures [4].

Dissecting aneurysms are notoriously more frequent in pediatric patients than in adults [2]. The proportion of dissecting aneurysms has been reported to increase at younger ages due to disruptions or defects in the vascular lamina given by infections or congenital diseases [1]. These are more frequent in the posterior circulation and are associated with proximal and distal stenosis of the artery involved with predominance in the basilar artery (87.4%); and dissecting aneurysms in the internal carotid are uncommon (12.6%) [2], these can generate spontaneous thromboses that could cause complete occlusions of the artery with the possibility of generating neurological sequelae [1,2].

The treatment of a middle cerebral artery (MCA) dissection aneurysm is challenging because the lesion may involve

the lenticulostriate arteries (LSA). Information on surgical or endovascular treatment of middle cerebral artery dissecting aneurysms is scarce.

However, surgery is recommended for hemorrhagic cases, and conservative therapy is recommended for nonhemorrhagic cases. Endovascular treatment consists of performing shunting, sheathing, wrapping and stent embolization, and surgical treatment, consisting of trapping with arterial reconstruction, may be appropriate in the presence of subarachnoid hemorrhage because subsequent bleeding often leads to poor outcomes [5].

However, endovascular treatment is the treatment of choice in pediatric patients because of the difficulty in identifying the Sylvian fissure, the distinction of arteries from veins, the low volume of blood circulation and the risk of prolonged anesthesia [1]. Dissecting aneurysms of the M2 segment are treated with bypass and clipping of the lesion as there are fewer perforators in the M2 segment. However, wrapping is associated with a risk of re-rupture, and bypass and clipping cannot completely prevent ischemic stroke [6].

Dissection of cerebral aneurysms of the M1 segment of the MCA is particularly difficult to treat surgically because of the possible presence of the LSA in the dissecting lesion.

The success of treatment depends on whether the LSA are affected and the time of evolution of the dissection, a conservative treatment is the initiation of anticoagulant therapy with heparin infusion that helps prevent complete thrombosis and help with a compensation by collateral circulation formation [2,5].

Conclusion

Dissecting aneurysms are commonly observed in the early stages of life, primarily due to congenital and traumatic causes. This case is noteworthy as it involves a post-traumatic dissecting aneurysm in an adolescent, located in the M1 segment of the middle cerebral artery—an uncommon site for such lesions. The management of dissecting aneurysms is particularly challenging given the range of therapeutic options available, both endovascular and surgical. In this instance, successful treatment was achieved via endovascular embolization using a flow-diverting stent and platinum coils, a minimally invasive approach that provides enhanced lesion visualization and reduces the risk of complications.

Patient consent

I certify that I have obtained the patient's written informed consent for publication. This document ensures that a clear explanation of the purpose of the publication has been provided, and that the patient has voluntarily and knowingly consented to the publication.

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