Ruptured fusiform aneurysm of the proximal anterior cerebral artery in young patient - case report

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Abstract: A 16-year old male presented with a ruptured aneurysm of the proximal segment of the anterior cerebral artery, with symptoms like sudden headache. Paraclinical explorations revealed a fusiform aneurysm of the right A1 segment. The optimal treatment used was the microsurgical one via right pterional approach. The aneurysm was associated with a saccular pseudoneurysm at the proximal part. The saccular portion was clipped and the fusiform one was wrapped with muscle. The postoperative evolution was favorable, without neurological deficits.
Key words: fusiform aneurysm, wrapping, dissecting aneurysm, child.

Introduction

In children, fusiform aneurysms typically affect a major intracranial artery and involve a segment several centimeters long. Regarding the treatment, these aneurysms are difficult to manage both endovascular and microsurgical. Sometimes a combination of these methods may be needed. Trapping by ligation proximal and distal to the aneurysm may be an option if the perfusion is maintained by a collateral blood flow. This technique should lower the risk of rebleeding.

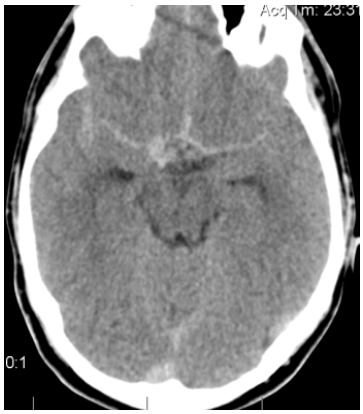
Fusiform aneurysms represents 1% of all intracranial aneurysms, the incidence in A1 segment is about 0,76-3,4%,often associated with vascular anomalies. In children are four times more common. The most frequent location is vetebrobasilar system, then internal carotid artery, middle cerebral artery and in more rare cases- anterior cerebral artery. These aneurysms are characterized by the spindle shape dilatation sometimes associated with a saccular expansion-beer belly. Our case is a saccular aneurysm developed on the proximal A1 fusiform aneurysm.

Case report

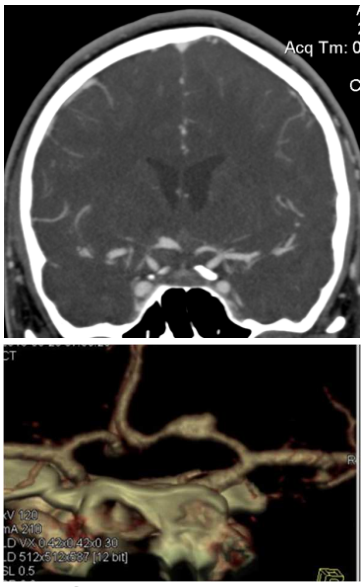
History and Presentation

A 16 year old boy suddenly complained of severe headache and vomiting followed by loss of consciousness. He was brought to our hospital with Hunt&Hess score of 2, Fisher 2. The neurological and general examinations were unaltered. Personal history with no other conditions associated or alcohol and cigarettes consuming. Is important to note the family history of subarachnoid hemorrhage in a parental uncle.

Brain computer tomography revealed subarachnoid hemorrhage in bilateral sylvian fissure and carotid cistern.

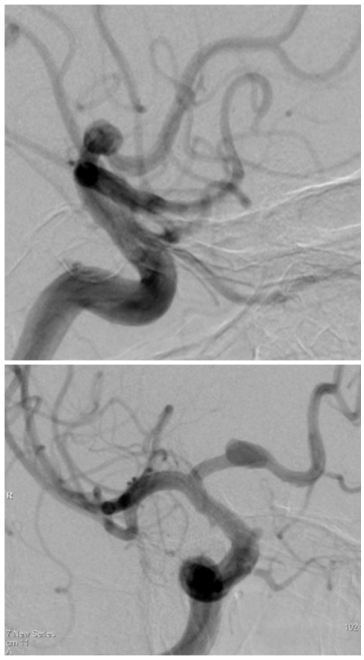


Native CT scan at admission



CT angio reconstructions

CT angio exploration and 3D reconstructions demonstrated a fusiform aneurysm in the proximal part of the A1 segment. For a better visualization of the configuration of the aneurysm and relationship with adjacent vessels, Seldinger angiography was necessary. A bilateral internal carotid artery catheterization was performed, demonstrating the right ACA aneurysm and the right A1 dominant.

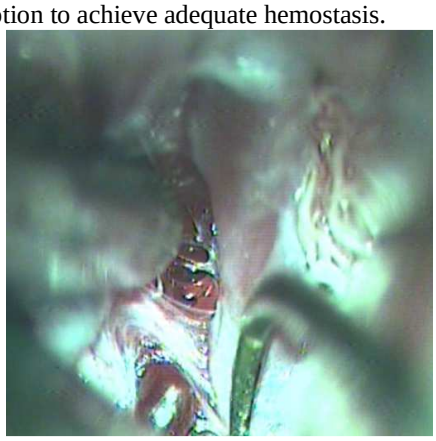


Right carotid artery angiography

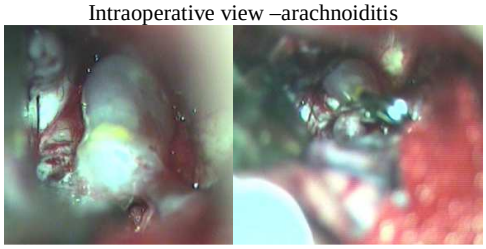
After review by the multidisciplinary neurovascular team, was decided that the best treatment option is the microsurgical one.

Surgery was performed in day 1 after the rupture and was used a right pterional transsylvian approach. During the Sylvian fissure proximal dissection is distinguished some arachnoiditis changes fronto-basal, around optic nerves and right internal carotid. Then is identified the bifurcation, A1 segment up to anterior communicating complex. The right A1 segment included a saccular aneurysm developed on a fusiform dilatation that extends approximately 10mm. The saccular dilatation was surrounded by a fresh clot. One perforator was identified branching proximal from the aneurysm. At first the saccular aneurysm is closed with a Yasargil straight phynox clip, then the fusiform dilatation was wrapped with muscle and aponeurosis going between the aneurysm and supraoptic recess and fixed on the anterior part

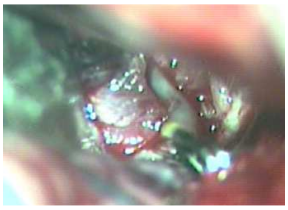
with an oblique phynox clip. The rupture point was identified on the anterior surface of the saccular aneurysm. After wrapping the blod flow through the distal ACA was maintained. Aneurysmal wall was not so thin, there were no perforators branching from the dilatation, therefore wrapping was considered the best option to achieve adequate hemostasis.



Intraoperative view –arachnoiditis

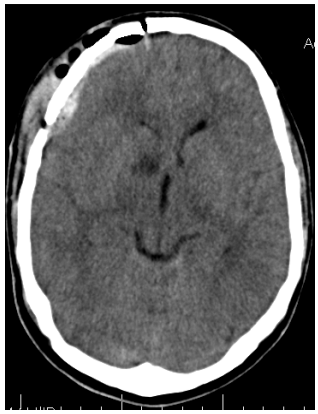


a. Intraoperative aspect of the aneurysm
b. saccular dilatation clipped



c. fusiform dilatation is wrapped with muscle

The postoperative evolution was favorable, without vasospasm during the 3 weeks of hospitalization. The CT scan 24 hours after surgical treatment demonstrated a hypodense area located at the level of basal ganglia. Pacient was discharged without neurological deficits or psychiatric symptoms.



Postoperative 48 h CT scan

Discussion

Natural history of unrupted fusiform aneurysms is not very well studied, but in case of rupture the rebleeding rate is about 10% per year. First it has to be discussed the term of fusiform aneurysm and the clear differentiation from the dissecting ones, due to the difference regarding the natural history and optimal therapy. Some consider that fusiform aneurysms may be predisposant for a dissecting aneurysm. Angiographic characteristics of dissecting lesions are represented by the double lumen sign, the pearl and string sign, retention of contrast media in false lumen, intimal flap or vascular occlusion. In the case presented was found none of these criteria. Based on angiographic images and the intraoperative ones the morphological diagnosis was fusiform aneurysm. They may be caused by collagen and elastin affections, infections or neoplastic invasion of the arterial wall. In younger population, according to a recent study comorbid conditions found in the goup were-trauma, immune dysfunction, cardiovascular malformation, dermatologic disorder, hormonal abnormality and genetic syndromes

like polycystic kidney disease, tuberous sclerosis, Osler-Weber–Rendu disease, Klippel-Trenaunay-Weber syndrome, alpha 1-antitrypsin deficiency. Aterosclerotic origin in the development of these lesions is well known but not mandatory. Histopathological studies revealed a thinning of the media, atrophy of the muscle fibers, hyalinization of the connective tissue or deficiency of reticular fiber.

These aneurysms located on A1 segment, usually are symptomatic by neural compression, ischemia and rarely due to bleeding. These aneurysms may expand gradually transforming into saccular or spherical shape. If the aneurysm is rupted, then treatment is required. Clipping only the neck of the saccular dilatation is not sufficient. Regarding the circumferential fusiform dilatation, clipping is not an option, but trapping or wrapping are. Trapping is recommended if there is a confirmation of a good collateral blood flow and if the preservation of the perforating artery is possible. Therefore if these criteria are not fulfilled, wrapping may be the next treatment option.

The ideal procedure in the case presented was to clip the saccular dilatation and wrapping (reinforcement) of the fusiform segment especially that intraoperative, the aneurysmal wall was not so thin. Incomplete wrapping can be the cause of re-rupture and re-growth. Some studies (Vivek RD, Udaya KK, Joseph Robert 2006) shown that half of the patients treated by wrapping, the follow-up angiography showed no changes regarding the configuration and the size of the aneurysm. Is safe to mention that, in pediatric population development of new and enlarging aneurysms (many within 3 years) is hard to quantify, but is more common in patients with fusiform aneurysms. Should be considered and the risk of rebleeding which is between 12-18 %, according to many studies. Other complications may be obstruction of one of the branches that emerge from A1 segment-medial lenticulostriate arteries or occurrence of a new aneurysm adjacent to the previously treated one. These perforantes supply the globus pallidus and medial portion of putamen. Intraoperative could observe the recurrent artery of Heubner and a small branch running proximal to the aneurysm. However, 48 hour postoperative CT scan revealed an ischemic area at the level of basal ganglia, probably because of affecting a small medial lenticulostriate branch, without clinical manifestation.

Conclusion

Brain aneurysms in pediatric population may be considered as a potentially aggressive chronic progressive condition. This impose a rigorously follow-up with MRI or CT angiography at three year interval, for a long period of time considering the long life expectancy. However, more data should be gathered to reach a consensus about the nature of this pathology.

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