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CASE REPORT

Endovascular management of a giant petrous internal carotid artery aneurysm in a child. Case report and literature review

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Abstract

Background Aneurysms of the petrosal segment of the internal carotid artery are rare in children and are usually found secondary to trauma and infection or can have a congenital origin. Management includes endovascular therapy, surgery, and in rare cases observation.

Discussion Here, we report our experience with a giant petrous internal carotid artery aneurysm in a 16-year-old boy successfully managed endovascularly by parent artery occlusion.

Keywords Petrous aneurysm · Endovascular · Internal carotid artery occlusion

Introduction

Aneurysms of the petrous segment of the internal carotid artery (ICA) are rare in children and can develop secondary to a trauma or a infection or can be congenital [1, 6, 10, 12, 15–18, 22, 23, 25]. They are usually detected incidentally following routine neuroimaging for headaches, as a pulsatile cervical mass or cranial nerves dysfunction, or following penetrating trauma [24]. We present our experience in managing a patient presenting a giant aneurysm in this location.

Case description

This 16-year-old boy without any previous medical history presented with persistent moderate headaches since 2 weeks. A non-injected computed tomography (CT) scan was performed and revealed a right petrous mass eroding the petrous bone. The neurological and physical examination were normal and headache was rapidly regressive. A contrast magnetic resonance imaging (MRI) (Fig. 1) and conventional percutaneous arteriography (Fig. 2) were performed and revealed the presence of a giant fusiform aneurysm of the right petrous internal carotid artery. An endovascular treatment was decided after a multidisciplinary discussion. Occlusion test of the ICA was performed under local anesthesia and was well tolerated. Aneurysm was treated by parent artery occlusion using standard coils. Postembolization angiography showed complete aneurysm exclusion and a good collateral flow (Fig. 3). The immediate follow-up was uneventful and the patient was discharged in good neurological condition. After the embolization, he received antiplatelet therapy for 3 months. One week after the treatment, he developed a transient diplopia due to an abducens nerve dysfunction following the aneurysmal thrombosis. At 4-month follow-up, he was clinically intact and aneurysms completely excluded on MR angiography (Fig. 4).

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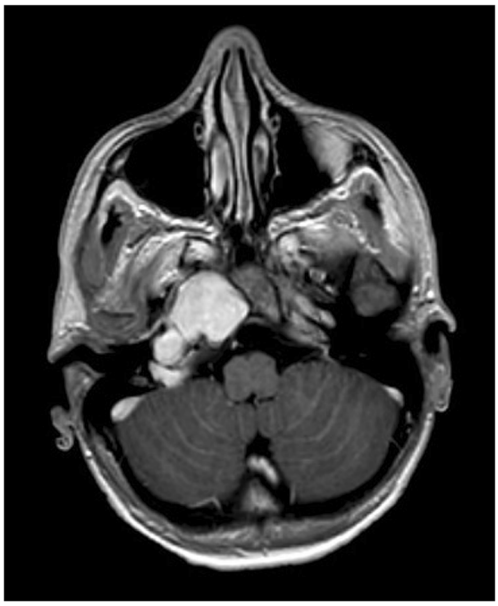

Fig. 1 MR angiography showing large right ICA petrous aneurysm

Methods

We analyzed all the articles in PubMed including petrous carotid aneurysms in a pediatric population.

Results

Petrous aneurysms in children are extremely rare and are usually case reports. We found only 15 children reported in the literature, only two cases being giant [5, 14]. Mean age was 10 years [4–18]. There were seven males and seven females. In seven cases, the etiology was described as congenital, infection in one case, and posttraumatic in three cases. Half of the patients were treated endovascularly and half by surgery with good results.

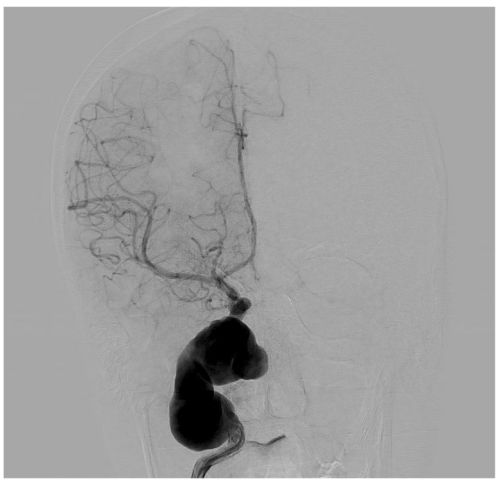

Fig. 2 Right carotid digital angiography anteroposterior view/giant aneurysm of the carotid petrous internal carotid artery

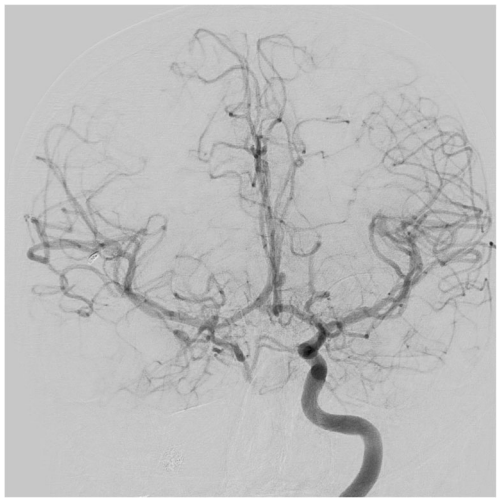

Fig. 3 Posttreatment left digital angiography showing exclusion of the aneurysm

Discussion

Petrous internal carotid artery aneurysms are usually described as a true aneurysm or pseudoaneurysms. A true aneurysm has walls continuous with the unaffected portion of the parent vessel and can develop from a traumatically weakened arterial wall. Pseudoaneurysms lack a true wall and develop when a thrombus and fibrous tissue capsule forms in response to injury to all layers of an arterial wall [8, 17].

In our case, there was a large carotid canal which is most in favor for a congenital lesion. Congenital petrous ICA aneurysms are thought to arise because of developmental weaknesses of the arterial wall at the sites of origin of regressed embryonic arteries including the caroticotympanic, pterygoid, vidian, stapedial, or the hyoid vessel [17].

Petrous carotid aneurysms can be asymptomatic or can produce various signs and symptoms depending on size or direction of growth. Clinical manifestation described in the

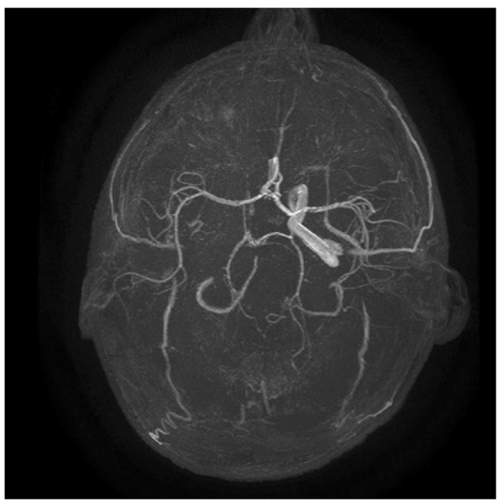

Fig. 4 Control MR angiography showing exclusion of the aneurysm

literature includes the following: headaches, hemorrhage, tinnitus, cervical pain, Horner syndrome, facial palsy, or other cranial nerve deficits. Hemorrhage is reported in up to 25% of cases of extracranial internal carotid aretery aneurysms, usually as a otorrhagia or epistaxis, and can be spontaneously or secondary to an incidental incision, or after radiotherapy [2, 3, 8, 13, 15, 18, 19, 21]. Fatal hemorrhage as an initial symptom or during treatment is extremely rarely described [3, 17].

In cases of patients with a pulsatile mass or atypical headache, special care must be done to differentiate these vascular masses from a tumoral mass.

Management of petrous ICA aneurysms includes endovascular treatment, surgery, or in some cases observation [10, 17]. Ideal treatment consists in exclusion of the aneurysm and preservation of the parent artery. However, this preservation is not always possible due to anatomical considerations and morphology of the aneurysm, especially in fusiform or giant aneurysms.

Endovascular treatment includes aneurysm exclusion with coils, cover stents, pipeline, or occlusion of the parent artery with coils or balloon [11, 15]. If the aneurysm anatomy does not allow its exclusion with stent or coils, a balloon occlusion test and Matas and Allock tests are performed with the goal to obliterate the parent artery. When the occlusion test is well clinically tolerated and shows adequate collateral circulation, the parent artery occlusion represents a therapeutic option. In case of a not well-tolerated test, a surgical option must be considered [4].

The risk associated with ICA occlusion is a cerebral infarction as a result of hypoperfusion, even in patients who have well tolerated the test occlusion, with an incidence of ischemic complications ranging from 2 to 22% [5, 17, 20]. Complications of the endovascular treatment are rarely reported and include the following: episode of amaurosis fugax, recurrence of the aneurysm in case of coil compaction, migration of the balloon, or ischemic complications [15, 19, 23].

Because they are covered by the petrous bone, these aneurysms represent a challenge for a microsurgical option, including a surgical internal carotid artery trapping or a high flow bypass [1, 17, 20].

This is a rare case of a pseudoaneurysm with a giant size. In our opinion, endovascular treatment remains the first-line therapy. In case that embolization or stenting is not technically possible, a surgical high-flow bypass must be discussed.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

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