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Giant Petrous Segment Aneurysm Causing Facial Palsy: Case Report

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ABSTRACT

Objectives: Co-occurance of aneurysm causing facial palsy by compression and fibrous dysplasia.

Background: The aim of this study is to acknowledge this condition due to its rare frequency.

Methods: We report a case of a 54 year old patient presenting with sporadic right hemifacial spasms, lasting up to a minute. In 2023 it evolved with facial palsy House Brackmann V and episodes of headache. Imaging investigation showed a giant petrous segment aneurysm on the right internal carotid artery, with signs of aneurysm thrombosis, compression of the internal acoustic meatus and fibrous dysplasia of the temporal bone as well as erosion in the petrous apex. In our case embolization with coils was proposed.

Results: Petrous segment aneurysms are rare, so is fibrous dysplasia. The majority of cases is asymptomatic although they might cause hypoacusis, tinnitus, otorrhagia and epistaxis if located in proximity to the medium ear. Ruptured cases do not present with subarachnoid hemorrhage but Horner's syndrome and symptoms of the jugular foramen nerves. The involvement of the VII nerve is not common. About the fibrous dysplasia, it is characterized by fibrous tissue replacement of normal bone. The temporal bone is affected in 18% of cases. Current treatment options for those aneurysms include carotid artery balloon occlusion, embolization with coils, remodelling with stents or conservative management by serial imaging exams.

Conclusion: Although compression of the VIIth-VIIIth nerve complex is uncommon for posterior fossa aneurysms it represents an important potential complication of vascular pathological features by disabling patients.

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Introduction

Aneurysms of the petrous segment are rare entities, so is fibrous dysplasia. The majority of cases is asymptomatic although they might cause hypoacusis, tinnitus, otorrhagia and epistaxis if located in proximity to the medium ear. Ruptured cases do not present with subarachnoid hemorrhage but Horner's syndrome and symptoms of the jugular foramen nerves. The involvement of the VII nerve is not common [1,2].

The clinical presentation depends on multiple variables being the aneurysm's location, size, and direction of growth the most important ones.

About the fibrous dysplasia, it is characterized by fibrous tissue replacement of normal bone, being the temporal bone affected in 18% of cases [3]. This entity was originally described by McCune and Bruch in 1938 and it´s a genetic but nonfamilial disorder encompassing a wide range of phenotypes due to a mutation in the GNAS14 [4].

Current treatment options for those aneurysms include carotid artery balloon occlusion, embolization with coils; remodelling with stents or a conservative management by serial imaging exams [1,2].

Materials and Methods

We report a case of a 54 year old patient presenting with sporadic right hemifacial spasms, lasting up to a minute. In 2023 it evolved with facial palsy House Brackmann V and episodes of headache. Imaging investigation showed a giant petrous segment aneurysm on the right internal carotid artery, with signs of aneurysm thrombosis, compression of the internal acoustic meatus and fibrous dysplasia of the temporal bone as well as erosion in the petrous apex. In our case embolization with coils was proposed.

Discussion

Carotid aneurysms from the petrous segment are not common, and its presentation with an isolated peripheral facial palsy is even more rare. Their true incidence is unknown and most are considered congenital with fusiform morphology [1-6].

Typically, these lesions are large at the time of diagnosis, often with intraluminal thrombus [7,8].

The internal carotid becomes the petrous segment as it enters the petrous temporal bone at the base of the skull, anterior to the internal jugular vein and medial to the styloid process, through the carotid channel until its emergence through the cavernous sinus. In the petrous segment, the carotid has a vertical and horizontal

component, with a knee (genu) in between. Two branches may arise from the petrous carotid: the vidian and caroticotympanic arteries. The vidian artery passes anteriorly and inferiorly through the foramen lacerous, and anastomoses with external carotid branches. The caroticotympanic artery is an embrionary vestige of the hyoid artery that originates from the petrous carotid knee and passes superiorly through the stapedius to supply blood into the medium ear cavity [1-5].

There are three proposed mechanisms in the etiology of aneurysms from the carotid petrous portion: mycotic, traumatic, and congenital [1-9,10].

Trauma is a significant cause of petrous ICA aneurysms and has been well documented [9].

Infections and inflammations of the medium ear may erode bony structures and involve the artery adventitia, which can become weak and predispose the medium ear to aneurysmal dilatation [11-13].

The cervical petrous transition of the carotid artery makes it susceptible to stretch forces, which in turn make this segment amenable to dissections and pseudoaneurysms, since the cervical portion is mobile and the petrous portion is not [5].

Fibromuscular dysplasias have been suggested to be the cause of congenital aneurysms of the petrous carotid. Muscle defects were found at the acute angle of the artery branches' emerging areas. In fact, most of the aneurysms of this segment were found at the caroticotympanic segment [14,15].

In the present patient, there was history of fibromuscular dysplasia which can be a cause of congenital origin of the aneurysm.

These aneurysms are generally asymptomatic, and diagnosed as imaging findings [16]. Therefore, the clinical presentation, when present, is variable and depends on the location, size, and direction of growth. Common symptoms are headache diplopia, dizziness, facial palsy, pulsatile tinnitus, hearing loss as well as Horner's syndrome, that may occur due to the involvement of sympathetic fibers [10-22]. Defects in the IX, X, XI, and XII nerves occur when the aneurysm extends posteriorly and inferiorly. Ocular movements are affected with aneurysms from the cavernous segment, but not from the petrous segment. The involvement of the VII nerve is uncommon, and generally accompanied by VIII nerve symptoms, such as hypoacusis and tinnitus [2].

The hypotheses that McCarron considered for the peripheral facial palsy were a mechanical compression of the nerve, and an alteration of its vascular supply due to emboli or local hemodynamic changes [18]. These pathophysiological mechanisms are possible in the case of an anatomical variation, in which the internal carotid is responsible for the supply of the VII nerve. Although in the majority of the cases the VII nerve vascular supply is maintained by the external carotid system via the middle meningeal arterial branches.

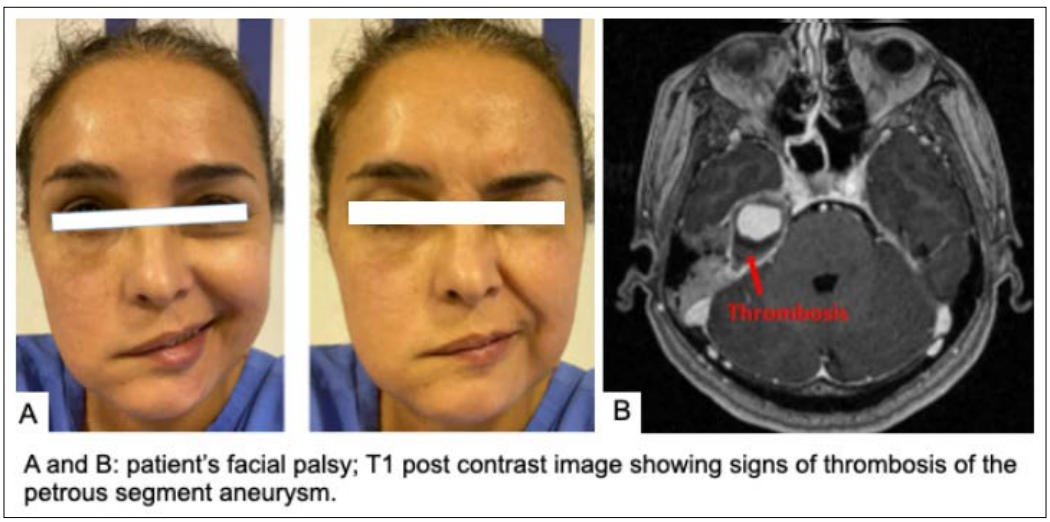
Treatment options include conservative management with serial images; carotid surgical trapping and revascularization with a bypass; endovascular internal carotid balloon occlusion; embolization with coil placement, with or without stent assistance; and flow diverting techniques.

Typically, patients with unruptured petrous ICA aneurysms with unremitting symptoms including cranial nerve palsies have undergone procedures to attain symptomatic relief. In contrast, there have been cases in which patients had only mild symptoms that resolved without intervention [10-23].

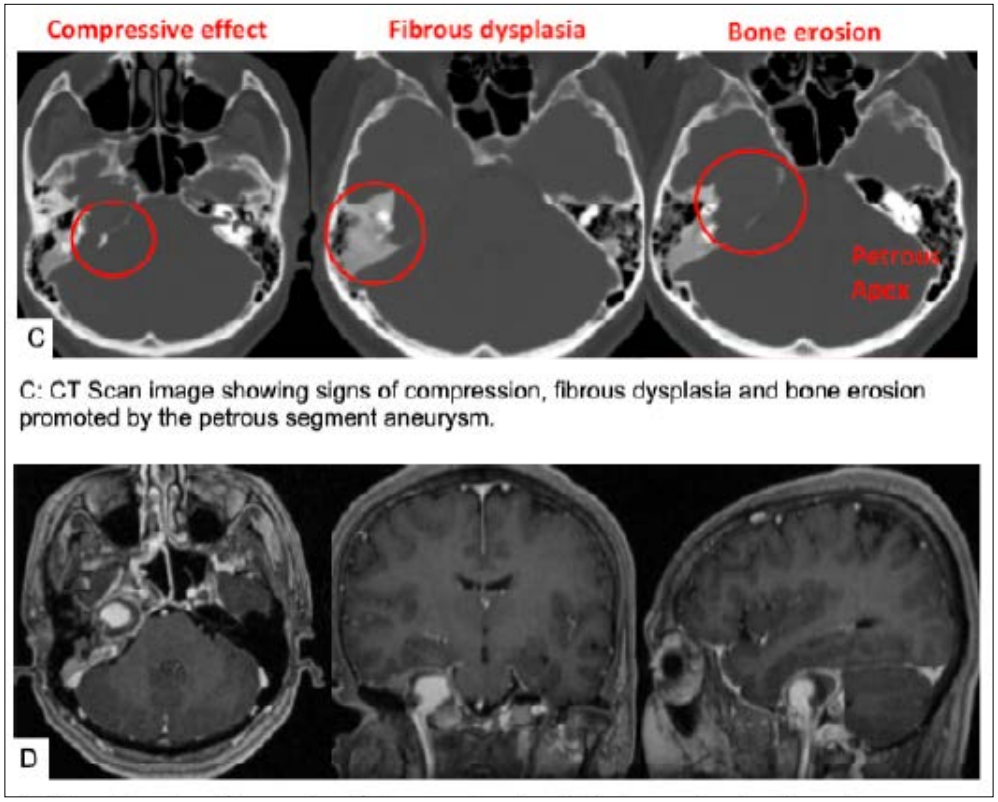
Asymptomatic patients with an incidental diagnosis could be managed conservatively with serial images. In cases of symptomatic patients presenting with cranial nerve changes without an aneurysm rupture, the risks and benefits of each procedure should be carefully analyzed. These risks include carotid occlusion and surgical morbidity. Any benefits would revolve around avoiding the growth of the aneurysm [2].

Carotid occlusion may not be possible in patients without sufficient collateral flow [2]. Bypass revascularization surgery is not commonly available and should be performed by a skilled microsurgeons for a low morbidity and mortality rate and to reduce the risk of stroke that arises with isolated ICA occlusion procedures1. There are increasing reports of petrous ICA aneurysms being successfully treated with Guglielmi detachable coils with or without the use of a stent to pre- serve the parent artery, to reconstruct the incompetent arterial wall, and to prevent future complications [24-27].

Images



A and B: patient's facial palsy; T1 post contrast image showing signs of thrombosis of the petrous segment aneurysm.



C: CT Scan image showing signs of compression, fibrous dysplasia and bone erosion promoted by the petrous segment aneurysm.

Acknowledgements

Although compression of the VIIth-VIIIth nerve complex is uncommon for posterior fossa aneurysms it represents an important potential complication of vascular pathological features by disabling patients.

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