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Relato de caso

Cavernous carotid traumatic dissecting aneurysm and subarachnoid hemorrhage after orthognathic surgery treated with arterial embolization

Aneurisma dissecante traumático da carótida cavernosa e hemorragia subaracnóidea após cirurgia ortognática tratado com embolização arterial

*Guilherme Cabral de Andrade**
*Helvércio F. Polsaque Alves**
*Roberto Parente Júnior**
*Cármine P. Salvarani**
*Walter M. Clímaco**
*Eduardo R. Pereira**
*Ângelo Pavan***

RESUMO

Introdução: *Dissecção aneurismática da artéria carótida interna em seu segmento cavernoso é uma lesão incomum, assim como sua associação com hemorragia subaracnóidea. Esta descrição é relatada com traumatismo direto ou indireto da região cervical. Apresentamos paciente masculino de 26 anos submetido a cirurgia ortognática que evoluiu em pós operatório imediato, com paralisia de nervos oculares direitos (IIIº , IVº e Vº) oftalmoplegia, sem quemose ou proptose e com hemorragia subaracnóidea. A angiografia revelou aneurisma dissecante da artéria carótida interna direita em seu segmento cavernoso. Na evolução, apresentou ressangramento e a opção de tratamento foi a embolização arterial com micromolas de platina. Extensa revisão da literatura foi realizada, sendo proposto tratamento endovascular como opção terapeutica.*

Palavras-chave: *Aneurisma dissecante. Hemorragia subaracnóidea. Cirurgia ortognática.*

ABSTRACT

Introduction: *Aneurysmal dissection of the internal carotid artery in the cavernous segment is an uncommon lesion, as well as the association with subarachnoid hemorrhage. Its description is related to direct or indirect trauma of the neck region. We report on a 26 year-old male patient who presented in the imediate postoperative after an orthognathic surgery with paralysis the right ocular cranial nerves (IIIº , IVº and VIº) with ophthalmoplegia, without chemosis or proptosis and with subarachnoid hemorrhage in the cranial tomography. Angiography disclosed a dissecting aneurysm of the right internal carotid artery in the cavernous segment, presenting with rebleeding during his evolution. The therapeutic option was arterial embolization with platinum microcoils. After extensive literature review, endovascular treatment was suggested.*

Key words: *Dissecting aneurysm. Subarachnoid hemorrhage. Orthognathic surgery.*

*CINN – Centro Integrado de Neurologia e Neurocirurgia, Maringá-PR
**Serviço de Cirurgia Buco-Maxilo-Facial – Hospital Santa Casa de Maringá

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Introduction

Traumatic dissection of the carotid and vertebral arteries in the cervical segment is an important cause of stroke in young and young adult patients[24]. It can occur after trivial trauma with rotation and hyperextension of the cervical region in activities that include sports, yoga, chiropractic manipulation, violent coughing and vomiting, automobile accidents, orotracheal intubation, sexual activity[20,28]. Dissecting aneurysm of the cavernous internal carotid as a cause of subarachnoid hemorrhage (SAH) in young patients is considered a rare condition[2,17]. In a multicenter retrospective study, it was observed a frequency of 0,3% of all cases of SAH, as a consequence of internal carotid dissecting aneurysm, reaching 3.1% when there were no other identified causes of SAH[21]. The presence of ocular cranial nerves palsy in cases of arterial dissection is also unusual. In a review of the literature, only two reports of internal carotid artery dissection after surgical trauma of the maxillofacial region due to third molar extraction were found[5]. Descriptions of cavernous internal carotid dissecting aneurysms with SAH and ophthalmoplegia were not found.

Orthognathic surgery consists of osteotomies so the jaws can be repositioned without causing any damage to their structure, using the sagittal type (Le Fort I) with jaws repositioning and fixation with titanium plates and screws.

Case Report

Patient M.B., male, 26 years old, showing orofacial deformation with maxillary retrusion and mandibular prognathism, underwent orthognathic surgery for correction, with the objective of teeth alignment.Panoramic X-rays of the jaws (Orthopantomogram) were normal. The patient underwent surgical treatment with maxillary advancement and extrusion and mandibular setback. In the immediate postoperative period, right ophthalmoplegia, with IIIº, IVº and VIº nerve palsy was noted, without chemosis or proptosis. Cranial computed tomography (CT) revealed subarachnoid hemorrhage Fisher II (Fig.1A). Cerebral angiography diagnosed a dissection of the cavernous segment of the right internal carotid associated with dissecting aneurysmal dilatation (Fig.1B). The patient was treated with endovascular aneurysm occlusion using platinum microcoils by arterial route, with preservation of the arterial lumen (Fig.2A). Late control angiotomography (24 months FU) shows aneurysm occlusion and preservation of the arterial lumen(Fig.2B).

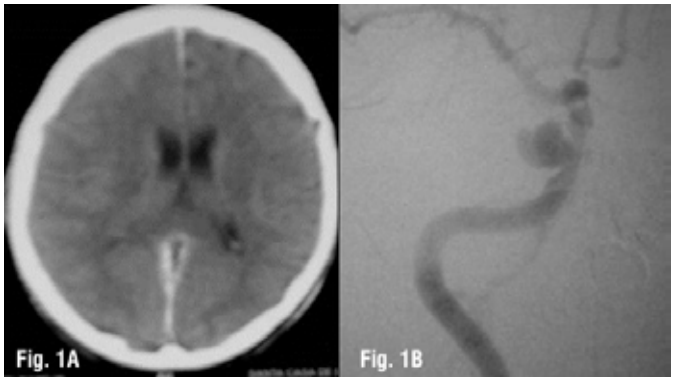

Figure 1A: CT revealed subarachnoid hemorrhage Fisher II.
Figure 1B: Digital subtraction angiography of the right ICA, with the diagnosis of dissecting aneurysm of the ICA.

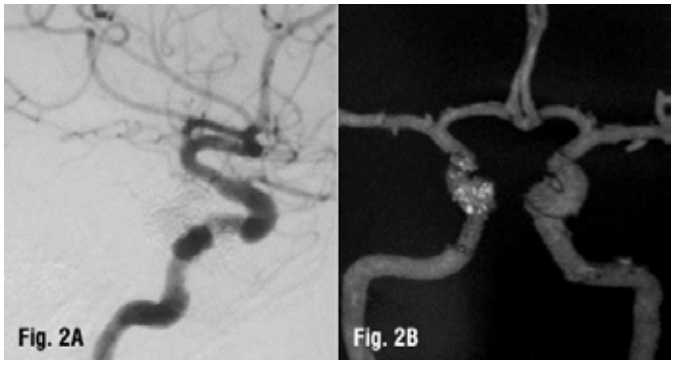

Figure 2A: Endovascular aneurysm occlusion using microcoils, with preservation of the arterial lumen.
Figure 2B: Late control angiotomography (24 months FU) shows aneurysm occlusion and preservation of the arterial lumen.

Discussion

Subarachnoid hemorrhage caused by aneurysms of the cavernous internal carotid artery is rarely described[2,17]. The first internal carotid dissection description diagnosed by angiography was in 1959[3]. The internal carotid dissecting

aneurysms have unclear definition regarding their location and nomenclature. They may be located in the anterior wall and described as "blister-like"[1], in the dorsal wall[18] and arterial trunk[22]. They are determined as dissecting aneurysms, because they differ from saccular aneurysms both in their etiology and therapeutic approach when they cause subarachnoid hemorrhage[27]. Internal carotid artery dissecting aneurysms are responsible for between 0,3% and 3,1% of subarachnoid hemorrhages[21], which differs from vertebral artery dissecting aneurysms that affect around 8,7% of hemorrhages. Other authors report show a higher incidence of arterial dissection as a cause of SAH, when there is apparent stenosis or occlusion of the internal carotid artery and absebce of other injuries[17,19].

Head and neck pseudoaneurysms as complication after orthognathic surgical procedure are described, however infrequently, because facial vessels have small caliber and lower risk of injury to the intima layer with the internal maxillary arterial system most commonly involved. During Le Fort I osteotomy the descending palatine artery is the most vulnerable vessel, because of its location in the pterygopalatine fossa, but the sphenopalatine branch may present similar lesions[4]. Vascular injury probably occurs when the maxillary tuberosity is separated from the pterygoid plate with the osteotome or during the "down-fracture" procedure and the most frequent clinical presentation is a unilateral posterior epistaxis refractory to the conservative treatment occurring from 5 hours up to 11 weeks after surgery[8,10,12].

After orthognathic surgery, it is most commonly seen arteriovenous fistula in arteries of large caliber, especially in the internal carotid artery[9,14]. Direct trauma of the carotid artery can occur during pterygomaxillary disjunction or jaw "down-fracture" followed by a fracture of the skull base involving areas such as the foramen lacerum or the carotid canal. In indirect trauma, injuries occur by forced and repetitive stretching of the internal carotid artery in the neck, in the cervical portion of the spine associated with cervical hyperextension with contralateral head rotation[15]. The occurrence of direct trauma to the internal carotid artery secondary to fractures of the skull base seems to be reported when there are "down-fractures" difficulties in the maxilla.

Arterial dissection is more common in females in a ratio of 3:1, twith an average age of 50 years. Risk factors include hypertension, smoking, diabetes mellitus, hyperlipidemia, alcoholism and traumatic causes, with a high risk of rebleeding reaching around 90%[21]. The anatomy of the lacerum segment of the carotid artery surrounded by the petrolingual ligament, as well as the initial segment of the cavernous carotid with fixation close to the pteroesfenoidal ligament, in case of trauma, immobility of these segments of the carotid artery, can cause stretching or tearing of the wall and branches with subsequent dissection or fistula.

Other anatomical characteristic of the cavernous segment of the carotid are its meningeal branches. From the meningohypophyseal trunk come out branches that supply the IIIº and IVº nerves, and from the dorsal meningeal artery, branch of the meningohypophyseal trunk, come out branches that supply the VIº[26], reason why in some cases paresis of ocular cranial nerves in internal carotid dissection may happen.

Angiographically, dissections present with some features such as double lumen sign[13], rosette sign[29] and the "string sign"[23]. Stenosis with upstream dilatation is present in most cases and may correspond to the angiographic signal present in dissections of the vertebral basilar circulation described as the "pearl-and-string sign"[25]. Other angiographic signs include stenosis without dilation, dilation and double lumen. In cases where there is only the aneurysmatic dilatation, it may be irregular or fusiform[6]. Another characteristic of these aneurysms is the rapid increase in diameter which is observed in control angiograms, what indicates the fragility of its wall. In the analysis of the pathology of these aneurysms, a thin layer of adventitia and fibrinous tissue is observed with rupture of the intima and media.

The approach with ligation of the artery proximal to the aneurysm, method described by Hunter[11], which promotes reduction of the pressure and flow inside the aneurysm and subsequent thrombosis, has also been a treatment option for some authors, although there is risk of rebleeding due to maintenance of the retrograde flow of the vertebral artery and posterior communicating artery, limiting the progression of the thrombus present at the site of dissection of the aneurysm. There are also other surgical treatment options such as: segmental isolation "trapping" followed by "bypass", "wrapping" and direct clipping of the aneurysm[21] in cases where there is supraclinoid portion of the aneurysm. However, aneurysms confined to the cavernous segment of the carotid artery present difficult direct surgical approach, with increased morbidity

due to paralysis of cranial nerves, as well as intraoperative complications, like aneurysm rupture of the aneurysm, either spontaneously or due to manipulation, because of the thinness of the adventitia layer.

Endovascular treatment has been a recent option used for dissecting aneurysms, via arterial route, with percutaneous transluminal angioplasty (PTA) with stent implant and internal occlusion or "trapping" with microcoils or detachable balloons[16].

Dissecting aneurysm of the cavernous segment of the carotid artery is an uncommon pathology, especially if there is an association of subarachnoid hemorrhage. Intracavernous hemorrhage associated with ophthalmoplegia is also described[29]. There are also reports of dissection in this segment of the carotid artery in patients undergoing LeFort III osteotomy in Apert syndrome maxillofacial correction[6,7]. The present case has some peculiarities for evolving with SAH and ophthalmoplegia with paresis of the IIIº, IVº and VIº nerves without proptosis or chemosis, with indirect trauma by orthognathic surgery as causal factor. In the differential diagnosis of aneurismal SAH, we should always look for the possibility of a dissecting aneurysm:digital angiography with complete internal and external carotid and vertebral arteries study is warranted. In the case of dissecting aneurysm of the cavernous carotid artery, an endovascular approach with the use of platinum microcoils for the occlusion of the aneurysm and arterial lumen preservation is suggested.

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Corresponding Author

Guilherme Cabral de Andrade M.D.
R. Santos Dumont nº 719
CEP: 87050-100 Maringá - PR
e-mail: g.c.andrade@hotmail.com
Phone: 55 44 3227 7001
Fax: 55 44 3227 7001