

Evaluation of retroocular pain improvement in patients with giant carotid-cavernous aneurysms submitted to endovascular treatment

Avaliação da melhora da dor retro-ocular em pacientes com aneurismas gigantes do segmento intracavernoso da artéria carótida interna submetidos a tratamento endovascular

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Abstract

Introduction and objective: Intracavernous aneurysms represent 3 to 11% of all intracranial aneurysms. As they are completely extradural lesions, they present a low risk for intracranial bleeding. Thus, they generally manifest by cranial nerves compression and headache. The objective of the present study is to evaluate the improvement in retroocular pain condition in patients with giant intracavernous aneurysms submitted to therapeutic endovascular occlusion of the internal carotid artery. **Methods:** In this descriptive, retrospective and prospective study, 23 patients diagnosed with giant aneurysm in the cavernous segment of the internal carotid artery were submitted to endovascular treatment with occlusion of the compromised internal carotid artery. The symptomatology of retroocular pain was evaluated before and after treatment by means of the Visual Analogue Scale. **Results:** In the preoperative evaluation, retroocular and periocular pain were present in 21 cases (91.30%), being characterized as strong intensity in 12 patients (52.17%) and moderate intensity

in nine remaining patients (39.13%). In the postoperative evaluation, we observed the absence of pain in 15 patients. The pain symptoms were present in eight cases (34.78%), being characterized as moderate intensity in two and light intensity in six patients. **Conclusions:** The endovascular treatment showed an improvement in retroocular pain in patients with intracavernous giant aneurysms, especially in those suffering from uncontrollable pain.

Keywords: Pain; Headache; Intracranial aneurysm; Carotid artery, internal; Cavernous sinus; Endovascular procedures

Resumo

Introdução e objetivo: aneurismas intracavernosos representam 3 a 11% de todos os aneurismas intracranianos. Como são lesões completamente extradurais, apresentam baixo risco de hemorragia intracraniana. Portanto, geralmente, manifestam-se por sintomas de compressão dos nervos cranianos e dor de cabeça. O objetivo do presente trabalho é avaliar a melhora da dor retro-ocular nos pacientes com aneurismas gigantes intracavernosos submetidos à oclusão endovascular da artéria carótida interna. **Métodos:** Neste estudo descritivo, retrospectivo e prospectivo, 23 pacientes com diagnóstico de aneurisma gigante no segmento cavernoso da artéria carótida interna foram submetidos a tratamento endovascular por meio da oclusão da artéria carótida interna comprometida. A sintomatologia de dor retroocular foi avaliada antes e após o tratamento por meio da Escala Visual Analógica. **Resultados:** Na avaliação pré-operatória, a dor retroorbitária e periocular estavam presentes em 21 casos (91,30%), que se caracterizam por ser de forte intensidade em 12 pacientes (52,17%) e de intensidade moderada nos nove restantes (39,13%). Na avaliação pós-operatória, observou-se ausência de dor em 15 pacientes. Os sintomas de dor retroorbitária e periocular permaneceram em oito casos (34,78%), que se caracterizavam por ser de moderada intensidade em dois, e de intensidade leve nos seis restantes. **Conclusões:** O tratamento endovascular mostrou melhora

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da dor retro-ocular nos pacientes avaliados, especialmente naqueles que sofriam de dor incoercível.

Descritores: Dor, Cefaleia, aneurisma intracraniano, Artéria carótida interna, Seio cavernoso, Procedimentos endovasculares

Introduction

Intracavernous aneurysms (IA) represent from 3 to 11% of all intracranial aneurysms and approximately 14% of the internal carotid artery (ICA) aneurysms⁽¹⁻³⁾. The cavernous internal carotid artery (CICA) aneurysms are completely extradural and instead of intradural lesions, present a low risk of progressing to spontaneous subarachnoid hemorrhage (SAH), thus presenting a significantly lower morbidity/mortality rate^(4,5). These lesions represent a distinct entity, capable of producing compression to the cranial nerves (CN)^(2,6) and headache⁽⁷⁾. They are also able to cause symptoms related to an eventual rupture, with the appearance of a carotid-cavernous fistula, epistaxis or, eventually, SAH, depending on the extent of the lesion in relation to the dura⁽⁷⁾.

The recommendation for surgical treatment of the IA is controversial and any decision in favor of this treatment should be evaluated carefully, in light of the scarcity of knowledge from the natural history of this condition and potential risk associated with its treatment⁽⁷⁾. However, a therapeutic intervention is well accepted when neurological symptoms are progressive or headache is difficult to control⁽⁷⁾. In these situations, endovascular treatment constitutes the method of choice for its treatment⁽⁸⁾.

The objective of the present study is to evaluate the improvement in the headache condition in patients with giant intracavernous aneurysms submitted to therapeutic endovascular occlusion of the ICA.

Methods

A descriptive, retrospective and prospective study was performed in 23 patients diagnosed with giant aneurysm in the cavernous segment of the ICA. These patients were consecutive submitted to endovascular treatment at Santa Casa de São Paulo (Hospital Central) from January 2008 to December 2011. The evaluation of the cases was made by reviewing patient files and outpatient appointments. The patients received outpatient follow-up for at least 18 months.

In relation to pain symptoms, the headache evaluation was made prior to treatment. Pain was classified as "uncontrollable" or "strong" in intensity when it was not reduce by common analgesics (dipirone or paracetamol), also being represented on the Visual

Analogue Scale (VAS) as 8-10; the pain was classified as "moderate intensity" when it decreased as simple analgesic was taken, being represented as 3-7 on the VAS; it was classified as "light intensity" when it was tolerable and without necessity for the constant use of analgesics, being represented on the VAS as 1-2, and; when it was absent, it was considered as "without pain", corresponding to 0 on the VAS.

The data obtained was included on a spreadsheet and presented in descriptive form, in tables and in graphs. The present study was approved by the Ethics in Research Committee at our institution and done according to the ethical precepts of this institution.

Results

Of the 23 patients included in the study, two were male and 21 were female (FIGURE 1). The mean age of the patients was 54.35 years ranging from 24 to 70 (FIGURE 2). Thirteen aneurysms were located on the left side and 10 on the right side.

All patients were submitted to endovascular treatment by ICA occlusion with coils. This procedure was performed always following an ICA balloon occlusion test which proved negative for deficits. Only one pa-

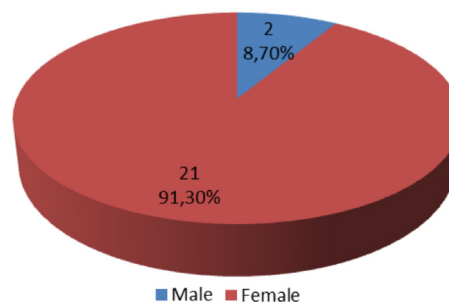


Figure 1 - Distribution by gender of patients with IA.

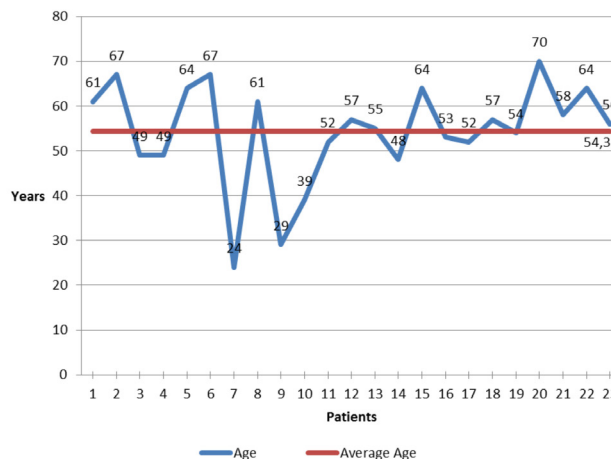


Figure 2 - Distribution of IA patient ages.

tient in a total of 23 progressed to new deficits in the postoperative period.

In preoperative evaluation, retroocular and perocular pain was present in 21 cases (91.30%), characterized as intense or uncontrollable in 12 patients (52.17%) and moderate intensity in nine patients (39.13%). In the postoperative evaluation we observed absence of pain in 15 patients. The pain symptoms were present in eight cases (34.78%) being characterized as moderate intensity in two and of light intensity in six patients (FIGURE 3).

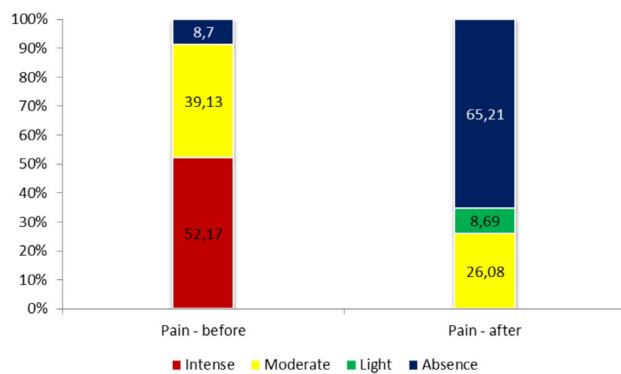


Figure 3 - Retroocular pain in IA patients before and after endovascular treatment.

Discussion

The prevalence of CICA aneurysms in population has not been estimated exactly and probably has underestimated data bearing in mind that the majority of the cases is asymptomatic⁽⁷⁾. In addition, there are only a small number of studies related to this disease and therefore a large number of afflicted patients⁽⁷⁾ doesn't realize the symptoms.

Various studies point out a greater incidence of CICA aneurysms in women^(1,2,6,9). These lesions are generally manifested by compressive effects and headache, which usually affect people in their 5th and 6th decades of life⁽²⁾. Our study is in agreement with the literature data. Most of patients belong to the feminine gender and the mean age was 54 years.

The IAs can remain asymptomatic or manifest themselves with symptoms caused by the compressive effect compromising the CNs II, III, IV, V and VI^(1,10) depending on the direction of their growth and their dimension. For Vasconcellos et al⁽²⁾, the most frequent symptoms were headache, followed by diplopia^(2,9). These symptoms can occur in a gradual manner or even acutely⁽⁶⁾. In the latter situation, this abrupt initiation of symptoms is due to the rapid expansion of the lesion probably by dissection of the aneurysmal wall⁽⁶⁾. About 91,30% of the patients in this study complained about headache, associated with a variation

of deficits of some CNs.

This symptomatology is directly related to aneurysm size and the occurrence of thrombosis inside it⁽¹¹⁾. For Choulakian et al⁽¹²⁾, the appearance of symptoms related to CN compression generally occur in aneurysms larger than 17 mm. The aneurysmal growth in this manner can occur following recurrent hemorrhages located between the thrombus and the aneurysmal wall or even due to the slow expansion of the true aneurysmal wall⁽¹¹⁾. However the CN course of dysfunction and headache caused by IAs appears to be variable sometimes with progression or with spontaneous regression of the symptoms⁽⁶⁾.

In addition, the relationship between the alterations in the symptoms and the size of the aneurysm is not clear. Although the symptoms can improve or worsen without significant alterations in aneurysm size, its increase is generally associated with the worsening of the symptoms⁽¹⁾.

The ideal treatment for any aneurysm is its exclusion from circulation preserving the patency of the carrier artery⁽¹³⁾. This can be attained by vascular microsurgery or endovascular techniques. In light of the relatively benign progression of CICA aneurysms, any treatment employed for these lesions will have a low rate of complications with a reasonable chance for clinical improvement in symptomatic patients^(5,6). Thus, the alternatives employed for dealing with it includes endovascular embolization of the lesion, ICA occlusion, with or without bypass^(5,6,14-16), or, more recently, the utilization of flow diverter stents^(8,17).

Carotid occlusion for treatment of CICA aneurysms is performed following the ICA balloon occlusion test. When patient's non-tolerance to vessel occlusion is observed this vessel cannot be sacrificed without a bypass. Even so, it is valid to mention that therapeutic ICA occlusion for IAs represents a low morbidity/mortality rate, taking into consideration other alternatives, mainly the microsurgical clipping or vascular bypass, which carry a morbidity rate of approximately 5-10% and mortality of 3-10%⁽¹⁸⁾.

The IA treatment by ICA occlusion, even though not representing the ideal option, is considered by many authors as the treatment of choice for this type of lesion^(10,16,19), leading up to 90% reported improvement in the CN compressive symptoms⁽¹⁰⁾ and headache⁽⁷⁾. In our series we obtained a good rate for pain improvement as no patient remained with uncontrollable pain following treatment.

Conclusion

Following the analysis of the data in the present study, we were able to conclude, although no statistical analysis, that for patients with intracavernous

aneurysms, the endovascular treatment showed an improvement in pain control, especially in those who suffered from uncontrollable pain. In addition, the endovascular procedure for the treatment of these lesions proved to be a safe method with low rates of complications.

References

1. Iwaisako K, Toyota S, Ishihara M, Shibano K, Harada Y, Iwatsuki K, et al. Intracerebral hemorrhage caused by ruptured intracavernous carotid artery aneurysm – case report. *Neurol Med Chir (Tokyo)*. 2009; 49:155-8.
2. Vasconcellos LP, Flores JAC, Veiga JCE, Conti MLM, Shiozawa P. Presentation and treatment of carotid cavernous aneurysms. *Arq Neuropsiquiatr*. 2008; 66(2-A):189-93.
3. Majidi S, Grigoryan M, Tekle WG, Watanabe M, Qureshi AI. Feasibility of using intravascular ultrasonography for assessment of giant cavernous aneurysm after endovascular treatment: a technical report. *J Vasc Interv Neurol*. 2012; 5:6-9.
4. Lee N, Jung JY, Huh SK, Kim DJ, Kim DI, Kim J. Distinction between intradural and extradural aneurysms involving the paraclinoid internal carotid artery with T2-Weighted three-dimensional fast spin-echo magnetic resonance imaging. *J Korean Neurosurg Soc*. 2010; 47:437-41.
5. Eddleman CS, Hurley MC, Bendok BR, Batjer HH. Cavernous carotid aneurysms: to treat or not to treat? *Neurosurg Focus*. 2009; 26:E4.
6. van Rooij WJ. Endovascular treatment of cavernous sinus aneurysms. *AJNR Am J Neuroradiol*. 2012; 33:323–6.
7. ter Brugge KG. Cavernous sinus segment internal carotid artery aneurysms: whether and how to treat. [Commentary]. *AJNR Am J Neuroradiol*. 2012; 37:327–8.
8. Baptista T, Fragata I, Ribeiro C, Reis J. Sistemas de derivação de fluxo no tratamento de aneurismas intra-cranianos: resultados aos seis meses de seguimento. *Acta Med Port*. 2012; 25(Suppl. 1):13-6.
9. Vasconcellos LP, Flores JAC, Conti MLM, Veiga JCE, Lancelotti CLP. Spontaneous thrombosis of internal carotid artery: A natural history of giant carotid cavernous aneurysms. *Arq Neuropsiquiatr*. 2009; 67(2-A):278-83.
10. Morita K, Sorimaghi T, Ito Y, Nishino K, Jimbo Y, Kumagai T, et al. Intra-aneurysmal coil embolization for large or giant carotid artery aneurysms in the cavernous sinus. *Neurol Med Chir (Tokyo)*. 2011; 51:762-6.
11. Baldawa SS, Pendharkar H, Menon GR, Nair SR. Case report: Thrombosed giant cavernous carotid artery aneurysm secondary to cervical internal carotid artery dissection: An unusual entity. *Indian J Radiol Imaging*. 2011; 21:225–7.
12. Choulakian A, Drazin D, Alexander MJ. Endosaccular treatment of 113 cavernous carotid artery aneurysms. *J Neurointerv Surg*. 2010; 2:359-62.
13. Elhammady MS, Wolfe SQ, Farhat H, Aziz-Sultan MA, Heros RC. Carotid artery sacrifice for unclippable and uncoilable aneurysms: endovascular occlusion Vs common carotid artery ligation. *Neurosurgery*. 2010; 67:1431–7.
14. Ohtaki S, Mikami T, Iihoshi S, Miyata K, Nonaka T, Houkin K, Mikuni N. [Strategy for the treatment of large-giant aneurysms in the cavernous portion of the internal carotid artery]. *No Shinkei Geka*. 2013; 41:107-15.
15. Murai Y, Mizunari T, Umeoka K, Tateyama K, Kobayashi S, Teramoto A. Radial artery grafts for symptomatic cavernous carotid aneurysms in elderly patients. *Neurol India*. 2011; 59:537-41.
16. Xu DS, Hurley MC, Batjer HH, Bendok BR. Delayed cranial nerve palsy after coiling of carotid cavernous sinus aneurysms: case report. *Neurosurgery*. 2010; 66:1215-6.
17. Szikora I, Berentei Z, Kulcsar Z, Marosfoi M, Vajda ZS, Lee W, et al. Treatment of intracranial aneurysms by functional reconstruction of the parent artery: The Budapest experience with the Pipeline Embolization Device. *AJNR Am J Neuroradiol*. 2010; 31:1139–47.
18. Rathore YS, Chandra PS, Kumar R, Singh M, Sharma MS, Suri A, et al. Monitored gradual occlusion of the internal carotid artery followed by ligation for giant internal carotid artery aneurysms. *Neurol India*. 2012; 60:174-9.
19. Abe H, Takemoto K, Higashi T, Inoue T. Surgical treatment for aneurysms in the cavernous-petrous portion of the internal carotid artery. *Acta Neurochir Suppl*. 2011;112:77-83.

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