CAVERNOUS CAROTID ARTERY PSEUDO-ANEURYSM TREATED BY STENTING IN ACROMEGALIC PATIENT

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ABSTRACT - We report on a case of endovascular management of pseudoaneurysm of the cavernous segment of the internal carotid artery with covered stent reconstruction. A 36 years-old woman with a history of previous transsphenoidal approach for pituitary macroadenoma and false aneurysma formation was studied in a protocol that included balloon test occlusion and cerebral blood flow evaluation. An endovascular covered stent deployment in the area of the carotid laceration was performed with isolation of the aneurysm from the circulation and maintenance of the carotid flow. Helical angio-CT and cerebral digital subtraction angiography showed the carotid preservation without stenosis in the stented area. In conclusion, endovascular stent reconstruction for post-transsphenoidal carotid artery laceration and false aneurysm is demonstrated as useful technical adjunct in the management strategy and with the potential for carotid sacrifice morbidity avoidance.

KEY WORDS: cerebral aneurysms, intravascular stents, transsphenoidal surgery, pituitary tumor.

Vascular injury can be one of the most serious complications associated to the surgery of the sphenoid-sellar region. Cavernous internal carotid artery (ICA) injury is uncommon during transsphenoidal surgery and may result in carotid-cavernous fistula or pseudoaneurysm with a reported incidence of 0 to 1.2%¹. The most common presentation is massive bleeding during the operation, usually controlled by nasal packing. The resulting false aneurysm does not have a real wall and its limits are formed by organized clot. Its natural history is not entirely defined, some authors show expansion of those lesions without a timing pattern²-³. Most pseudoaneurysms following transsphenoidal operation described in the literature were associated to growth hormone (GH) secreting tumors and it is intriguing that acromegalic patients also have tendency to develop intracranial elongated and ectatic arteries⁴-⁶.

CASE
A 38-year-old acromegalic woman presented with a history of being submitted to a transsphenoidal operation for treatment of pituitary macroadenoma seven months previously at another institution. There was a report of massive bleeding during the operation and an extended period of admission in the intensive care unit for recovery. She was referred to our university hospital for evaluation and definitive treatment. Her physical examination disclosed typical acromegalic features without arterial hyper-
tension or cardiac symptoms. There was no headache. The neurological examination was essentially normal as well as her campimetric test. Laboratory tests including her hormonal profile and coagulation studies were unremarkable except for increased serum level (13 ng/dl) of the GH and abnormal glucose tolerance curve.

Magnetic resonance imaging (MRI) revealed a parasellar mass next to the right cavernous ICA, invading the sellar compartment and with a of flow void rim. A macroadenoma with supra-sellar extension and optic chiasm distortion was clearly demonstrated close to the lesion surrounded by a layer of hyperintense signal. There was also enhancement of the adjacent sphenoid sinus wall (Fig 1.A). Magnetic resonance angiography (MRA) showed an image suggestive of an aneurysmal dilatation at the level of the right cavernous ICA (Fig 1.B). A digital subtraction angiography (DSA) of the right ICA confirmed the right cavernous carotid irregular aneurysm and a stenotic supra-aneurysmal segment (Fig 1.C).

After discussion of risks, treatment alternatives and potential complications, the patient consented with the right internal carotid artery collateral flow evaluation with balloon test occlusion (BTO) SPECT in order to establish the most appropriate management for the aneurysm.

**Procedures**

She was neurologically intact during the BTO but showed moderate asymmetry on the right side on SPECT imaging. It was decided for the stenting of the arterial segment harboring the false aneurysm as the best option for her case as opposed to the carotid definitive occlusion. Under general endotracheal anesthesia and systemic heparinization, a 7-French sheath (Cordis Endovascular, Miami Lakes, FL) was advanced into the ICA and an extra-stiff 14

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**Fig 1.** A. MRI T1 coronal showing a parasellar mass next to the right cavernous ICA, invading the sellar compartment and with a of flow void rim (arrowhead). A macroadenoma with supra-sellar extension and optic chiasm distortion surrounded by a layer of hyperintense signal. There was also enhancement of the adjacent right chamber of the sphenoid sinus wall (arrow). B. MRA depicting vascular lesion at the cavernous segment of the ICA. C. Digital Angiography with the false aneurysm.

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**Fig 2.** A. Helical Angio-CT showing the stent at the level of the cavernous ICA in the coronal section. B. Sagittal section of the helical angio-CT with the stent in place. C. Control digital angiography with normal carotid flow and without disappearance of the pseudoaneurysm.
microguidewire (Guidant, Santa Clara, USA) was positioned beyond the lesion. A 4 x 9 mm coronary stent-graft (JOMED, Helsingberg, Germany) mounted on its 4 x 15 mm delivery balloon (Guidant, Santa Clara, USA) was navigated across the region of the aneurysm. The balloon was inflated and the stent deployed with complete exclusion of the aneurysm from the circulation.

Heparin was not reversed and the patient was asymptomatic afterwards. She was placed on ticlopidine (Ticlid; Roche Pharmaceuticals, Nutley, NJ), 250 mg twice daily for a 4-week period. Follow-up helical-CT angiogram and DSA (Fig 2 A, B and C) one month later showed good flow in the stented area, without recanalization of the aneurysm. After ticlopidine interruption she was submitted to a sublabial transsphenoidal reoperation, when became obvious that the previous operation was a transnasal paramedian transsphenoidal approach with a right lateral entry site into the sphenoid sinus. We resected the midline bony bridge that divided her sphenoid sinus and completed the adenoma resection uneventfully. She was discharged on the fifth post-operative day without intercorrence.

DISCUSSION

Transsphenoidal approach is a safe and accepted procedure for pituitary lesions, being critical to be aware of the relationships of the carotid artery with the sphenoid sinus walls as well as the sela turcica boundaries. During the operation, the midline orientation remains one of the cornerstones to the route toward the sellar floor7,8. A computerized tomography with bone window may be important in case of any doubt about variations in the septation of the sphenoid sinus. False aneurysm from carotid lesion during transsphenoidal access for pituitary lesions can be a life-threatening complication. After arterial bleeding controlled, those patients should undergo DSA in order to understand the magnitude of the lesion and to plan the treatment strategy. Endovascular balloon occlusion of the ICA has been offered as advantageous over trapping procedures minimizing the chances of thromboembolic accidents and the morbidity associated with intracranial procedures6,7,10. Bavinski et al. described seven cases of traumatic false aneurysm of the intracavernous ICA managed by balloon occlusion at the level or just below to the lesion and advocate it as a very effective and safe method of treatment10. Long-term complications of the permanent carotid artery occlusion should be considered. Several studies found the 5 to 10% of delayed infarction after therapeutic carotid occlusion in spite of normal BTO results11,12. Awad et al showed de novo appearance of subcortical hyperintense lesions on MRI after therapeutic ICA occlusion even in patients that tolerated ICA occlusion with maximal prophilaxis against thromboembolism13. Link et al. described the experience of total follow up for sixty patients of 468 patient-years with four delayed infarcts after permanent carotid occlusion14. Endovascular treatment using electrolytic detachable coils have been described and Lempert et al had two good outcome but one neck refilling afterwards15. The MRI and DSA evaluation of our case showed two well known disadvantages of using coils alone: 1) a wide neck aneurysm, due to the risk of bulging of them into the parent artery with occlusion of the vessel; 2) the possibilities of dislodging intraliesional thrombus and promote distal embolization. The current endovascular technology includes the use of endovascular constructive approaches that could preserve the parent artery either by stent deployment or concurrent use of stents and detachable coils for complex intracranial vascular diseases16-19.

The placement of a covered intravascular stent within the parent artery across an aneurysm opening promotes immediate stasis and thrombosis inside the lesion. The endoluminal reconstruction avoids the carotid sacrifice and the chances of distal embolization. Long term effects of stenting of the intracranial arterial segments are currently unknown and myointimal hyperplasia and stenosis remains as a concern for possible future hemodynamic compromise of the distal circulation, although vessels with larger diameters have a lower rate of significant stenosis than smaller ones17,20.

In conclusion, endovascular covered stent reconstruction for post-transsphenoidal carotid artery laceration and false aneurysm is demonstrated as useful technical adjunct in the management strategy and with the potential for carotid sacrifice morbidity avoidance. To our knowledge, there has been no previous description of isolated carotid covered stenting for this clinical situation.

REFERENCES


