

Case Report

Cervical carotid pseudoaneurysm: A carotid artery stenting complication

Jair Raso, Rogerio Darwich, Carlos Ornellas¹, Gustavo CaririDepartments of Neurosurgery and ¹Cardiology, Instituto Mineiro de Neurocirurgia, Biocor Instituto, Belo Horizonte, MG, BrazilE-mail: *Jair Raso - jraso@uol.com.br; Rogerio Darwich - dr.rogeriodarwich@gmail.com; Carlos Ornellas - ceornelas@uol.com.br; Gustavo Cariri - agragustavo@yahoo.com

*Corresponding author

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Abstract

Background: As carotid artery stenting becomes increasingly used, more complications are likely to occur. We present a case of *Staphylococcus septicemia* and pseudoaneurysm arising in the neck portion of the carotid artery after stenting.

Case Description: A 51-year-old man was admitted with mild left hemiparesis. CT and MRI showed right hemisphere ischemia. Duplex Scan and MRA showed bilateral severe stenosis of the carotid arteries in the neck. A percutaneous angioplasty with stenting of the left carotid artery was performed. Two weeks after the procedure, he developed fever and swelling in the right leg and shoulder. An abscess, near where the groin had been punctured for the angioplasty was surgically drained. Blood samples were positive for *S. aureus*. After treatment the patient complained of a painful bulky pulsatile left cervical mass. Duplex scan and MRA showed a pseudoaneurysm of the left carotid artery. We excised the pseudoaneurysm and rebuilt the carotid artery with a saphenous vein graft. The postoperative period was uneventful, and the MRA revealed a patent saphenous graft.

Conclusion: Mycotic pseudoaneurysm of the carotid artery is a rare complication of percutaneous angioplasty and stenting. Surgical treatment with saphenous vein graft is the treatment of choice.

Key Words: Carotid artery, mycotic pseudoaneurysm, percutaneous angioplasty, stenting

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INTRODUCTION

Percutaneous carotid artery angioplasty and stenting is becoming a common alternative to endarterectomy for treatment of severe carotid stenosis. As the procedure becomes more widely used, more complications associated with this procedure are bound to occur. Mycotic pseudoaneurysm of the carotid artery is a rare complication of percutaneous angioplasty and stenting.

We present a case of *Staphylococcus septicemia* after carotid artery stenting and the late development of cervical carotid pseudoaneurysm. We also discuss aspects concerning the diagnosis and the surgical treatment of this rare complication.

CASE REPORT

A 51-year-old man was admitted to the emergency

room of Biocor Institute with left-side hemiparesis and dysarthria. Hypertension, chronic alcoholism, and cigarette smoking were his main comorbidities. CT and MRI scans showed ischemia of the right middle cerebral artery territory. Carotid and vertebral arteries duplex scan, MRA and digital angiography showed severe bilateral carotid stenosis in the neck [Figure 1(a)]. He nearly recovered completely from the deficits. He underwent a percutaneous left carotid artery angioplasty and stenting with cerebral protection. 5000 IU of heparin were intravenously injected. We punctured his right femoral artery in the groin and inserted a 6F Robbe Sheath (Cook, Bloomfield, Ind), advancing it all the way to the left common carotid artery. We passed an EZ Filterwire embolic protection system (Boston Scientific, Mountain view, CA) through the catheter into the distal internal carotid artery. We then predilated the high-grade stenosis of the internal carotid artery with a 3.5×30 mm Maverick balloon (Boston Scientific, Galway, Ireland). It was followed by the deployment of a 7×30 mm wall stent (Boston Scientific, Galway, Ireland) and post dilatation was achieved with a 6.0×20 mm Gazzelle balloon (Boston Scientific, Mountainview, CA) yielding a satisfactory technical result [Figure 1(b)]. We withdrew the EZ protection system, which was followed by the catheter. We then compressively draped the puncture. Heparin was not reversed. Perioperative antibiotics were not administered during the procedure.

He was discharged in good shape two days after the procedure. Two weeks later he was readmitted due to fever and swelling near the groin puncture site. He also had right shoulder swelling and pain. Blood cultures were positive for *S. aureus*. He had abscesses in the thigh and in the right shoulder, which were drained. He was treated with oxacillin for 24 days, linezolid for 25 days and cefepime for 14 days. At the end of treatment, with no signs of systemic infection, he complained of



Figure 1: (a) Angiography: severe stenosis of the left carotid artery. (b) Angioplasty with stenting – final result.

a painful cervical mass. Neck duplex scan and MRA showed a pseudoaneurysm of the left carotid artery, over the stenting area. He was submitted to cervical mass exploratory surgery. The pseudoaneurysm was resected along with a segment of the common carotid and a proximal segment of the internal and external carotid arteries. The external carotid artery was ligated. Reconstruction of the internal carotid artery was accomplished with a saphenous vein graft between the common and internal carotid arteries [Figure 2].

He had an uneventful recovery and was discharged with no deficits related to the procedure. Pathological examination of the excised specimen revealed a pseudoaneurysm surrounding the stent, with inflammatory response. Bacterial cultures of the lesion were negative. A postoperative MRA showed saphenous graft patency [Figure 3].

DISCUSSION

Percutaneous angioplasty with stenting is now a widespread treatment option for severe carotid stenosis, as an alternative to carotid endarterectomy. However, as angioplasty with stenting becomes increasingly used, rare complications – such as infection associated with the procedure, may ensue.

Pseudoaneurysms in the carotid artery are commonly associated with trauma and have also been reported as endarterectomy complications.^[1,4] On the other hand, infection is a rare complication of endovascular procedures. The development of mycotic pseudoaneurysm after carotid artery stenting is an even rarer event.^[13] After the introduction of antibiotic prophylaxis for surgical and endovascular procedures the incidence of mycotic

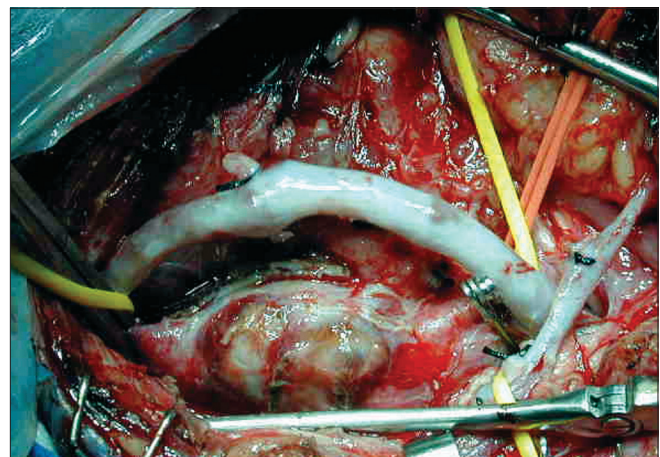


Figure 2: Surgery: a saphenous vein graft was placed between the common and the internal carotid arteries. The pseudoaneurysm was isolated with a vascular clamp across the proximal common carotid artery and a clip was placed in the internal and external carotid arteries

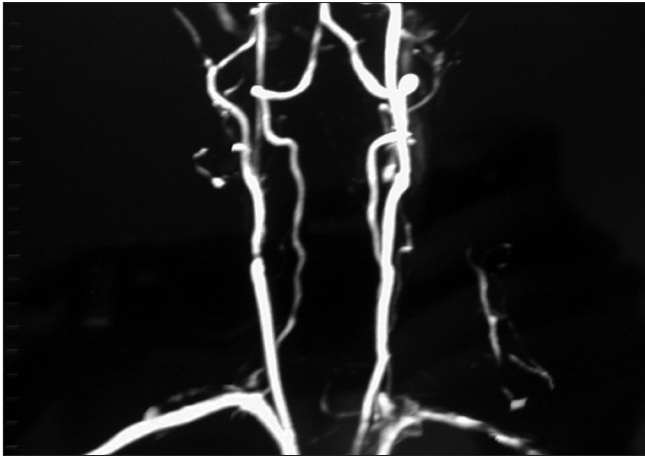


Figure 3: Postoperative MRA of the cervical vessels showing the patency of the graft in the left side.

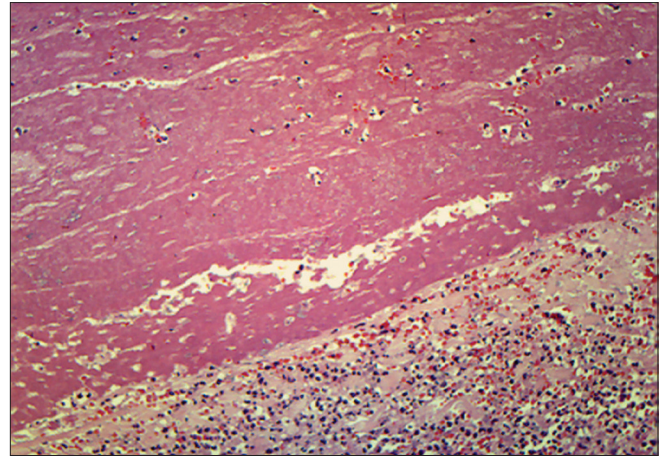


Figure 4: Inflammatory response with neutrophils and fibrin (H and E, x400)

aneurysms decreased substantially. The most frequent causative agent is believed to be *Staphylococci*.^[11]

Endovascular stent reconstruction of the carotid artery is an option to repair traumatic injuries of the carotid artery.^[3,5,6] However, the use of stent grafts to treat infected pseudoaneurysms of the carotid artery may not be ideal, since reinfection and embolic complications have been described.^[2,8,10]

Therefore, it is important to distinguish infectious pseudoaneurysms from those related to surgical and endovascular procedures. In the hereby-reported case, the endovascular procedure was uneventful, with good immediate outcome. The pseudoaneurysm developed after documented skin infection at the puncture site and with positive blood cultures for staphylococci. Moreover, the pathological examination of the excised pseudoaneurysm showed an inflammatory response with neutrophils and fibrin, which points to a pathological response to infection [Figure 4].

The main treatment step for this complication is to excise the pseudoaneurysm. Reconstruction of the artery is desirable since carotid ligation carries a high risk of stroke.^[9] Even in patients who tolerate immediately ligation of the internal carotid artery (ICA), long term complications may ensue. Nicholls *et al.*,^[12] reported 25% of stroke after carotid occlusion in their series of 24 patients. For late events, the average annual risk along the first 2 years was 10%.

SHEA was the first to report the excision of a mycotic aneurysm followed by end-to-end anastomosis.^[15] Since these aneurysms are commonly large, end-to-end anastomosis may not be possible. In such cases, the placement of an autologous graft is the treatment of choice. The saphenous vein appears to be the graft of

choice, since it is easily available to harvest.

Although stenting can be very useful to control acute hemorrhage or to treat traumatic pseudoaneurysm, it should be avoided in cases of mycotic aneurysms. It represents a foreign body and, as such, it may have a tendency to extrude through the vessel.

Warren *et al.*, reported three patients with carotid blowout managed with endovascular stents, and they challenge the long-term safety of the device in the event of the patient developing head and neck malignancies.^[18] Two of the patients reported, despite initial favorable outcomes, had their stents extruded, and one of them suffered a stroke.

Simental *et al.*, also reported delayed stent-related complications in two cases of carotid blowout in neck malignancies.^[17]

Early revascularization after a stroke remains controversial. In patients with a recently symptomatic carotid stenosis, surgical or interventional treatment is often delayed for weeks to months. The inability to predict who is at higher early risk of developing recurrent strokes and hemorrhage after revascularization may explain the variation in the management of acute strokes across different institutions.

Kastrup *et al.*, studied 131 patients who had been referred to their service within 14 days; during a median follow-up period of 7 days no patient had a stroke, 4 patients (3.1%) developed a hemispherical transient ischemic attack, and 15 patients (12%) had new asymptomatic DWI lesions present in the territory of the treated artery. A multivariate regression analysis revealed that motor symptoms or the presence of a contralateral carotid stenosis were significant independent predictors of further cerebral ischemic events. Therefore, they advocate urgent preventive treatment in these high-risk patients.^[7]

Setacci *et al.*, studying early revascularization in a series of 43 patients demonstrated that early treatment with protected carotid stenting is safe in selected patients. Major stroke or cerebral ischemic lesions greater than 2.5 cm, as documented by a computed tomography scan was excluded.^[16]

Rerkasem and Rothwell performed a systematic review of all studies published from 1980 to 2008 reporting the risk of stroke and death due to carotid endarterectomy in relation to the time between symptom onset and surgery. Only 47 studies stratified risk by timing of surgery among 494 published series. They concluded that surgery in the first week in neurologically stable patients with TIA or minor stroke is not associated with a substantially higher operative risk when compared to delayed surgery.^[14]

Further data is needed on the risk and benefit of more urgent surgery for TIA and minor stroke and on early versus delayed surgery in patients with major nondisabling strokes.

In our Institution we prefer to perform endarterectomy or angioplasty in patients with moderate to severe ischemic injuries after 2 weeks. In the case hereby reported we decided to perform early angioplasty in the left asymptomatic severe carotid stenosis and we planned on treating the symptomatic side latter on. The documented staphylococcal skin infection and the carotid artery pseudoaneurysm prevented us from following our plan. The patient refused further treatment until 6 months latter, when a carotid endarterectomy of the right side was performed with good outcome.

CONCLUSION

Mycotic pseudoaneurysm of the carotid artery as an angioplasty complication is a rare condition.

Since it is a percutaneous procedure, *Staphylococci* infection should be suspected and treated appropriately.

Excision of the aneurysm is mandatory and reconstruction of the artery with autologous graft, when feasible, is the treatment of choice.

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