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Endovascular Treatment of a Post-Traumatic False Aneurysm of the Extracranial Right Internal Carotid Artery: A Case Report

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Abstract:
False aneurysms of the extracranial internal carotid artery are rare but clinically significant due to the high risk of rupture and thromboembolic ischemic stroke. Historically, these lesions were treated surgically by arterial repair, ligation and anticoagulation. In recent years; endovascular approaches, including angioplasty and stent placement, have become increasingly preferred.
We report a case of a post-traumatic false aneurysm of the extracranial internal carotid artery successfully treated with a covered stent, resulting in a favorable postoperative course and long-term outcome.

Keywords: false aneurysm, pseudoaneurysm, carotid artery, endovascular treatment, covered stent

Introduction:

False aneurysms of the carotid arteries are uncommon lesions, most frequently resulting from trauma and less often from infectious or inflammatory processes. Delayed presentation is rare and is typically reported only in isolated case reports.
We present a unique case of post-traumatic pseudoaneurysm of the right internal carotid artery in a patient with late presentation (6 months after the trauma). The patient underwent successful endovascular treatment.

Case presentation:

A 52-year-old female patient with a history of hypertension managed with an angiotensin II receptor blocker and diet-controlled diabetes was admitted six months after a road traffic accident. Initial evaluation revealed a non-displaced humeral fracture, managed conservatively, with no neurological deficits or loss of consciousness.
Six-month post-trauma, the patient developed a pulsatile, right lateral cervical mass, initially non-tender and non-inflammatory. The mass had appeared two months after the accident and gradually enlarged. Two days prior to admission, it became painful and was associated with dyspnea and dysphagia. Neurological examination was unremarkable.
There was no history suggestive of Behçet's disease or folliculitis. Laboratory investigations, including inflammatory and infectious markers, were within normal limits.

Carotid and vertebral Doppler ultrasound demonstrated a heterogeneous, turbulent vascular structure consistent with a pseudoaneurysm arising from the right internal carotid artery with mural thrombus. Contrast-enhanced computed tomography confirmed a saccular aneurysmal dilation measuring 30 × 22 mm (Figure 1).

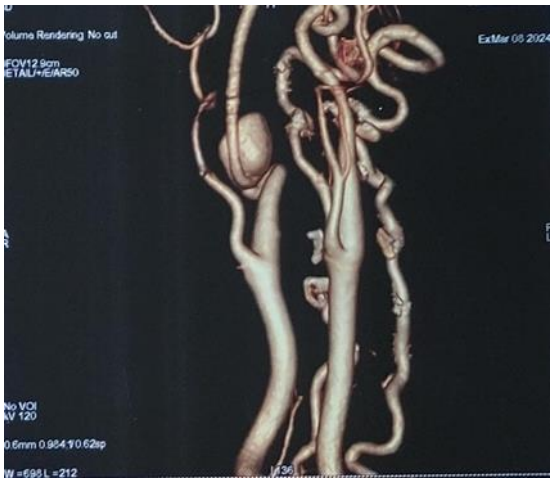

Figure 1: CT scan showing a false aneurysm of the distal internal carotid artery

Brain scan done; no abnormalities detected.

The patient was admitted to the hybrid operating room, she underwent selective arteriography via the transcarotid route under local anesthesia, which revealed a false aneurysm at the origin of the right internal carotid artery measuring 35 mm x 26 mm in diameter (Figure 2).

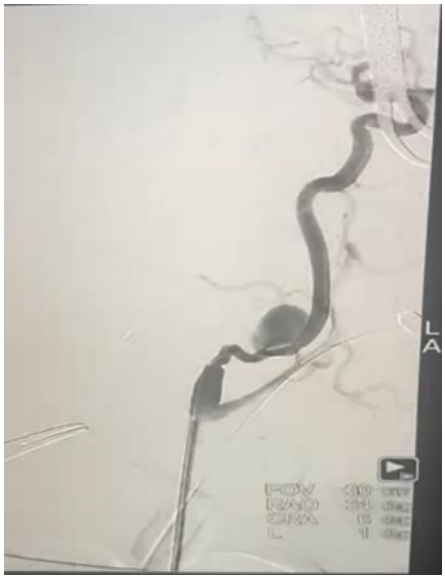

Figure 2: Selective arteriography showing a false aneurysm of the right internal carotid artery

A covered stent 5.9 × 56 mm was deployed (Figure 3A). Initial angiographic control demonstrated exclusion of the pseudoaneurysm but revealed a stenosis upstream of the stent (Figure 3B),

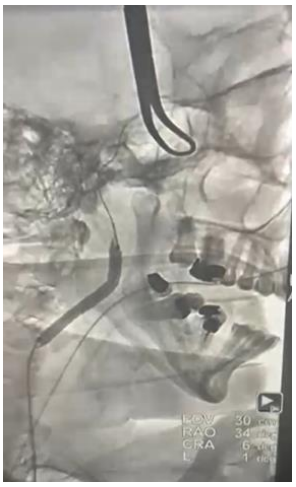

Figure 3A: Covered stent placement

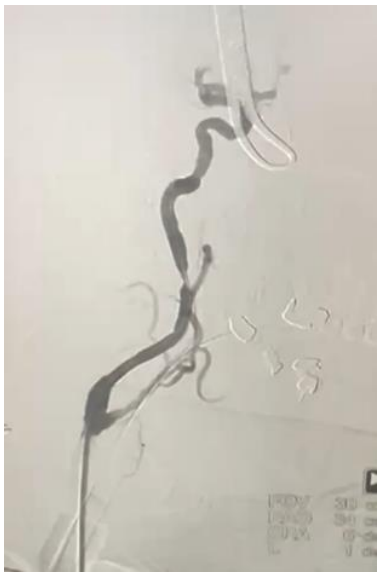

Figure 3B: First check: exclusion of aneurysm with stenosis at the base of the stent

which was successfully treated with balloon angioplasty (Figure 4A). Final angiography confirmed complete exclusion of the lesion without residual stenosis or dissection (Figure 4B).

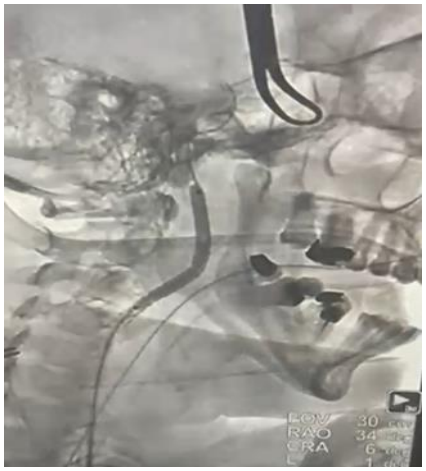

Figure 4A: Angioplasty of residual stenosis

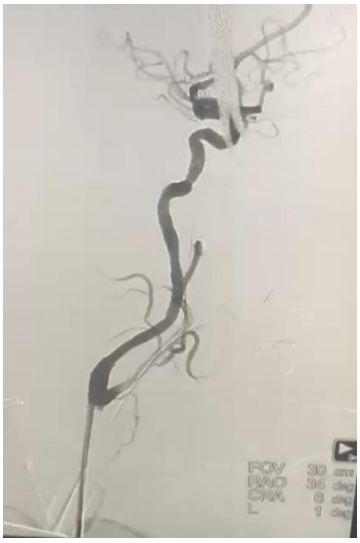

Figure 4B: Final check-up

The postoperative course was uneventful. Stent patency was monitored by duplex ultrasound at three and six-month post-procedure and annually thereafter. At 18-month follow-up, no complications were observed.

Discussion

Extracranial carotid pseudoaneurysms are rare, accounting for less than 1% of carotid artery pathology [1]. They most often result from cervical trauma, carotid dissection, or prior carotid surgery, though spontaneous cases may occur due to infection, inflammation, or connective tissue disorders [2]. They result from a rupture of all arterial wall layers, with haemostasis occurring on contact with adjacent structures, creating a false wall. Under the effect of arterial pressure, a false aneurysmal lumen is created, unlike true aneurysms where the arterial wall is intact but distended [3].

The causes of carotid pseudoaneurysms are varied, but trauma and previous carotid repairs are the most common causes. Other causes include atherosclerosis, infection, and rare etiologies such as collagen vascular disease, fibromuscular dysplasia, and radiation exposure [4]. Local manifestations are usually secondary to their mass effect; they manifest as a local thrill, an audible bruit, or a pulsatile mass, sometimes with edema due to compression of adjacent venous structures [5]. Thrombosis or infection may also occur, and rupture is the most serious complication due to hemorrhage and hypovolemic shock. Doppler ultrasound is the first-line investigation for suspected internal carotid pseudoaneurysms but may be limited in identifying distal lesions, especially in patients with unfavorable neck anatomy (short or thick neck, high bifurcation) [6]. The diagnosis is confirmed by arteriography, which has been superseded in recent years by non-invasive imaging techniques such as CT angiography and magnetic resonance angiography, but still retains its dual diagnostic and therapeutic value by allowing endovascular treatment at the same time [7]. The risk of rupture and thromboembolic neurological events in carotid false aneurysms is high and unpredictable, requiring immediate treatment [8].

Due to the lack of adequate guidelines and operational experience, there is no consensus on treatment planning. Attending physicians can choose between surgical treatment and endovascular treatment options, depending on the size, location, extent, etiology of the false aneurysm, and the patient's overall clinical condition [9]. The presence of proximal arterial plication is also a major deciding factor [10].

Resection of the false aneurysm with arterial reconstruction is currently the standard surgical approach for extracranial carotid false aneurysms. [11] Ligation has been associated with a high complication rate, with 25% of patients suffering ischemic strokes and a mortality rate of 20%. [12]

However, the surgical option carries a risk of cranial nerve damage of between 2.2 and 44%. Surgery is technically difficult if the false aneurysm reaches the base of the skull and in hostile cervical conditions such as previous surgery and after radiotherapy. The endovascular treatment option has become an acceptable alternative after Z. Li et al. demonstrated a 92.8% success rate for the procedure with relatively better mortality (4.1%), stroke (1.8%) and cranial nerve injury (0.5%) rates [13].

Various endovascular treatment options have been described, including isolated coiling of the false aneurysm, the use of bare metal stents (SMB) with or without coiling of the aneurysm, stenting with autogenous venous graft, occlusion of the parent artery, stent grafts, and flow diversion. The choice of option depends on several factors, primarily the specific characteristics of the pseudoaneurysm, arterial anatomy, patient age, and intracranial collateral circulation [14]. Isolated embolization of the pseudoaneurysm using coils is not commonly used due to the increased incidence of coil migration and recanalisation of the pseudoaneurysm. SMB alters arterial flow, leading to thrombosis of the aneurysm and may be combined with coil embolization. Covered stents are used in non-branched arteries, wide-neck aneurysms and false aneurysms formed after carotid surgery or trauma. Embolization of the pseudoaneurysm by direct injection of thrombin into the pseudoaneurysm, via a percutaneous route, is considered too risky due to thromboembolic complications [15].

In this case, the diagnosis was confirmed by CT angiography. Given that the false aneurysm of the internal carotid artery was distal and in order to avoid surgical risks, we selected endovascular treatment. Therapeutic transcarotid arteriography was therefore performed, with the placement of a covered stent, resulting in satisfactory final control.

Conclusion

False aneurysms can form on any segment of the internal carotid artery I. They can be observed at any age and are caused by various etiological factors. Stroke and massive hemorrhage are important tell-tale signs in some patients and therefore require urgent treatment. There are no clear recommendations for choosing an appropriate treatment modality. Endovascular treatment is a viable alternative to surgery, and the short- and medium-term results are encouraging.

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