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CASE REPORT

Stent-Graft Repair of a Large Cervical Internal Carotid Artery Pseudoaneurysm Causing Dysphagia

Vivek Gupta · Khandelwal Niranjan · Lokesh Rawat · A. K. Gupta

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Abstract Pseudoaneurysms of the cervical internal carotid artery (ICA) are rare and most frequently result from trauma, infection, or sometimes spontaneously. They have the potential to cause life-threatening hemorrhage; thus, their immediate management is necessary. Endovascular treatment by stent graft placement in the affected artery appears to be a safe and effective treatment option. We present a case of a child who presented with neck swelling and dysphagia caused by a ruptured cervical ICA pseudoaneurysm which was managed by stent graft placement.

Keywords Pseudoaneurysm · Dysphagia · Internal carotid artery · Stent graft

Introduction

Pseudoaneurysms of the cervical internal carotid artery (ICA) are a rare but well described entity which are usually associated with traumatic injuries but may occur spontaneously or due to adjacent infective focus [1–5]. Cervical ICA pseudoaneurysms may produce visible neck swelling or parapharyngeal swelling causing dysphagia, dysphonea, etc., and can rarely cause cerebral embolism and transient ischemic attacks [6–8]. Rupture of these pseudoaneurysms may lead to epistaxis or life-threatening external hemorrhage.

Traditionally surgery was the treatment in such cases. However, it is often difficult because of a damaged arterial wall or the lesion's being located near the skull base, and it may result in sacrifice of the ICA [9, 10]. Presently, endovascular management in the form of exclusion of the pseudoaneurysm from the circulation with or without parent artery occlusion is the preferred treatment for such lesions.

We present the case of a child with a large ruptured cervical ICA pseudoaneurysm causing dysphagia which was successfully treated with stent-graft placement.

Case Report

A 13-year-old male child presented with swelling in the right preauricular and submandibular regions for 15 days. There was a history of attempted needle aspiration from this swelling, after which the patient developed mild neck pain and serosanguinous discharge from the right ear which progressed to frank intermittent bleeding. On examination, the swelling was tender and nonpulsatile. After admission the patient had one episode of frank bleeding into the oropharynx while taking semisolid food.

CT angiographic evaluation of neck vessels revealed a giant pseudoaneurysm arising from the right middle cervical ICA, measuring 3 × 2 cm, associated with a large surrounding hematoma (Fig. 1A). The ICA in the region was attenuated in caliber (Fig. 1B and C). The pseudoaneurysm and the hematomas were causing a large swelling in the neck region with medial projection into the naso- and

V. Gupta · K. Niranjan · L. Rawat
Department of Radiodiagnosis and Imaging, Postgraduate Institute of Medical Education and Research, Chandigarh, India

V. Gupta (✉)
3472, Sector 12, Chandigarh, India
e-mail: drvivekgupta.pgi@gmail.com;
vivek_gupta21@hotmail.com

A. K. Gupta
Department of Otolaryngology, Postgraduate Institute of Medical Education and Research, Chandigarh, India

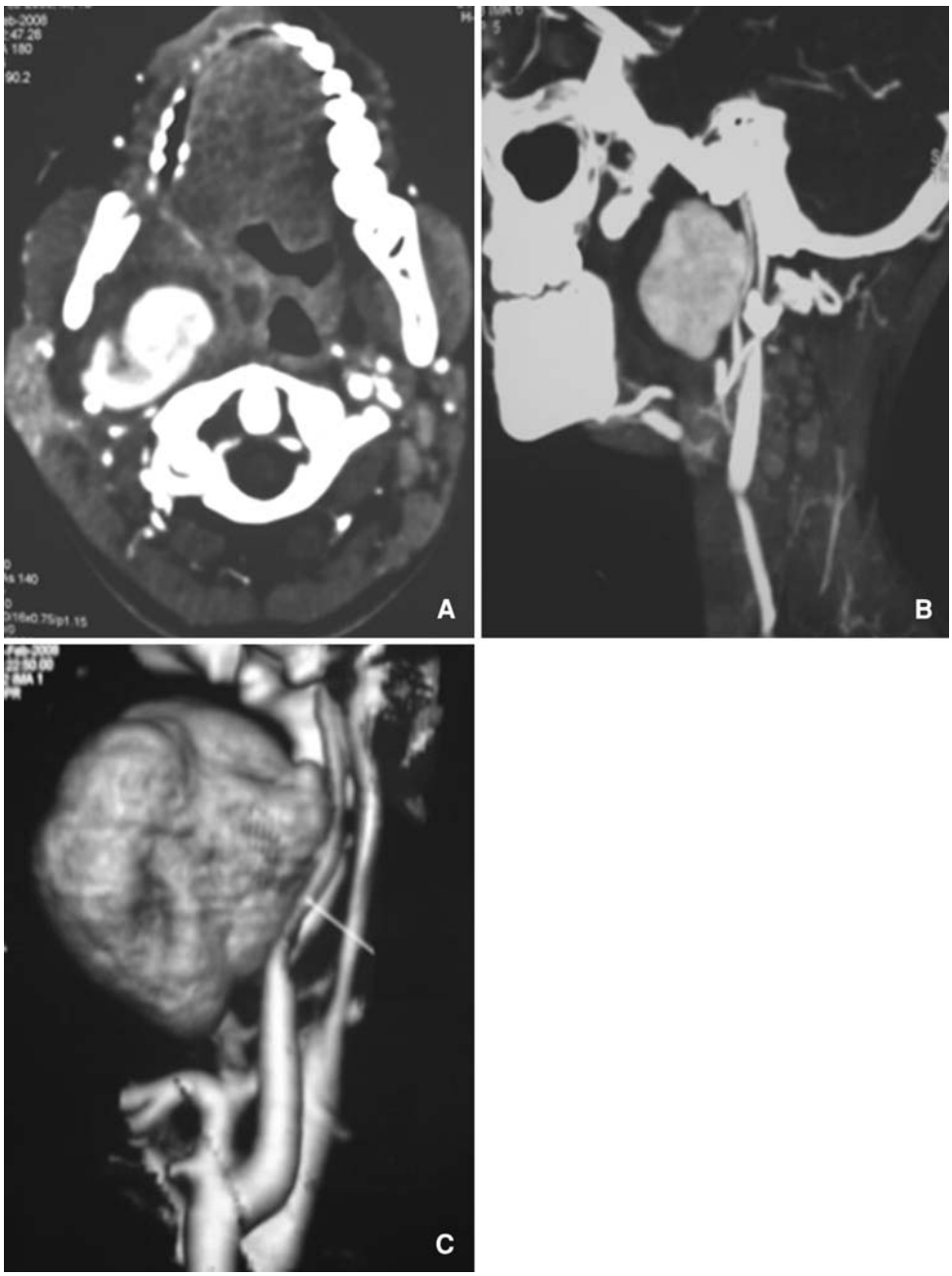

Fig. 1 (**A**) CTA axial MIP image showing a large hematoma with a central pseudoaneurysm projecting into the oro- and nasopharynx with luminal compromise. (**B**, **C**) CTA saggital MIP and VR images showing a large right ICA pseudoaneurysm with irregular contour compressing on the cervical right ICA

oropharynx with luminal compromise. Endovascular stent-graft placement across the ICA pseudoaneurysm was planned.

With the patient under conscious sedation and local anesthesia, diagnostic digital subtraction angiography was done via a right transfemoral route using a 5-Fr diagnostic catheter. It revealed a large pseudoaneurysm, measuring approximately 3.1 × 1.8 cm, filling through a rent (9 mm wide) in the mid part of the right cervical ICA (Fig. 2). The involved segment of the ICA showed mild focal irregularity of luminal outline. Intracerebral circulations were normal.

The patient was administered intravenous heparin to achieve an activated clotting time >250 s. An 8-Fr arterial sheath (65 cm; Arrow) was placed in the proximal right common carotid artery, through which an 0.018 superstiff guidewire was advanced across the aneurysm neck and placed in the petrous ICA under roadmapping.

Over this guidewire a dual-lumen polyethylene delivery catheter, with a working length of 110 cm, was advanced into the right ICA, and a 5-cm × 5-mm self-expanding e-PTFE stent-graft (Viabahn; W. L. Gore & Associates, Inc., Flagstaff, AZ, USA) was deployed across the pseudoaneurysm, with its distal tip 2 cm beyond the rent and its

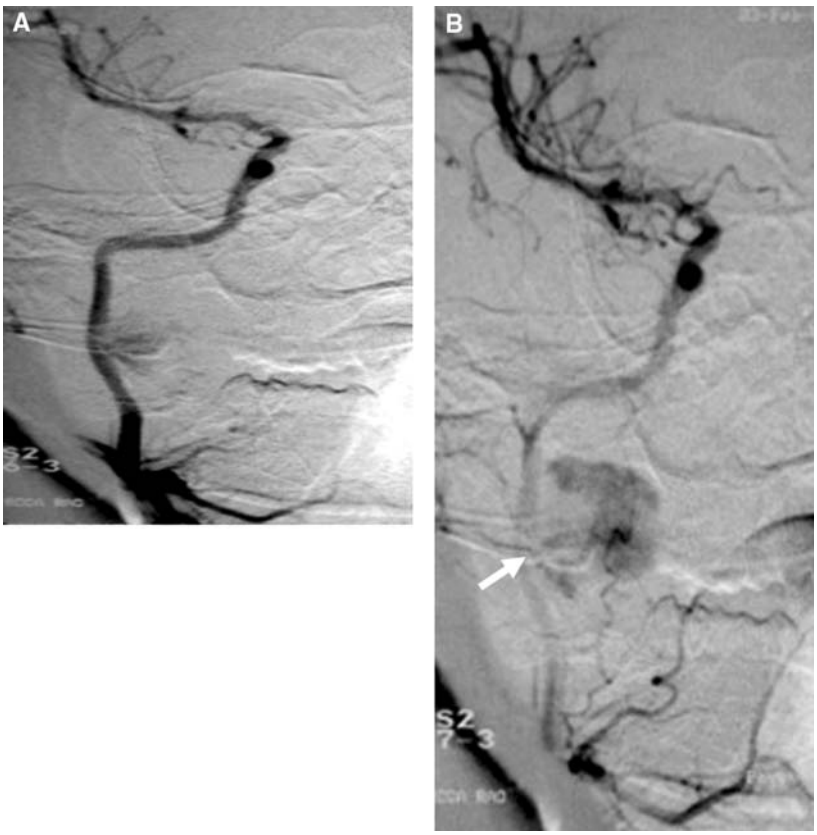

Fig. 2 Digital subtraction angiography image, right anterior oblique projection (RAO): early (**A**) and late (**B**) phase of right common carotid injection showing a large rent (arrow) in the right ICA approximately 3 cm beyond its origin filling the pseudoaneurysm

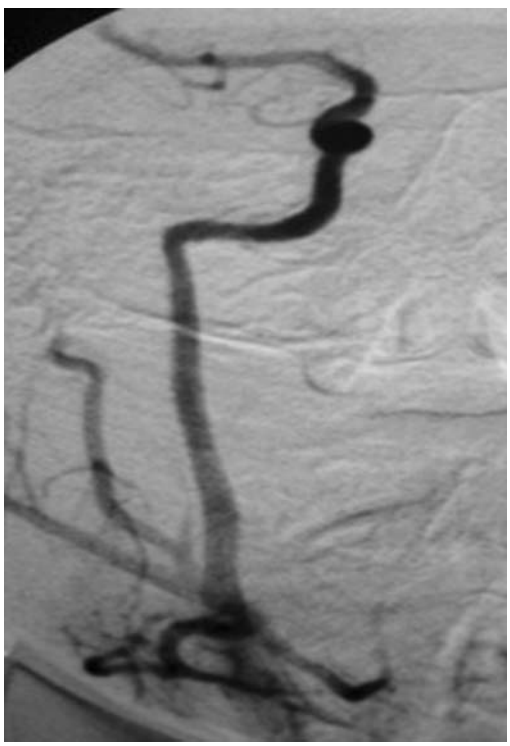

Fig. 3 Digital subtraction angiography image, right anterior oblique projection. Poststenting right common carotid artery injection showing complete exclusion of the pseudoaneurysm from the circulation, with normal-caliber right ICA and good intracerebral flow

proximal tip 2 cm proximal to the rent under real-time high-resolution digital roadmap angiography.

Postprocedure selective right common carotid artery angiography was done, which demonstrated complete exclusion of the pseudoaneurysm from the circulation. The right ICA was patent, having a normal caliber and outline with the stent in situ (Fig. 3). After stent deployment the patient was administered 300 mg clopidogrel and 75 mg aspirin (po) stat, followed by 75 mg clopidogrel and 75 mg aspirin (od) for 3 months, then 75 mg aspirin indefinitely.

Check CT angiography was done 3 days after stent-graft repair, which revealed the stent-graft in situ, with normal patency of the right ICA, having no communication with the surrounding hematoma in the right parapharyngeal space (Fig. 4).

In the 3-month follow-up available, the hematoma resolved spontaneously and the patient remained asymptomatic.

Discussion

The natural history of untreated carotid artery pseudoaneurysm is not well known. The most serious complication is life-threatening hemorrhage, and urgent arterial occlusion of the feeding artery is presently the treatment of

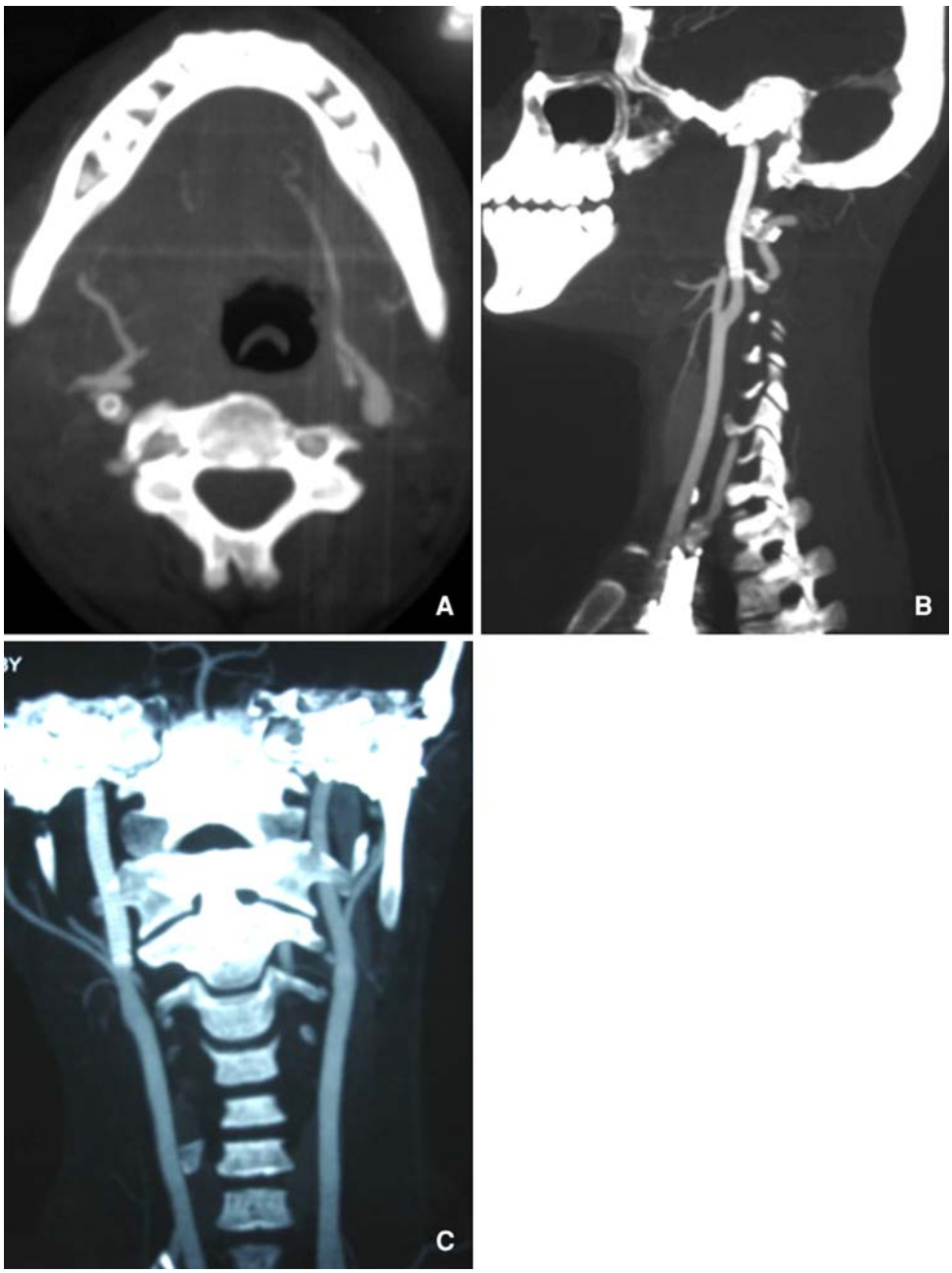

Fig. 4 Poststenting CTA MIP images: stent is seen in situ, with good apposition to the vessel walls. (**A**) It is covering almost the entire cervical ICA, with sparing of the carotid bifurcation and the proximal right ICA (**B**, **C**)

choice in such patients. Most patients undergo prophylactic surgical or endovascular treatment because of the catastrophic consequence of rupture and hemorrhage. Many treatment options have been pursued involving deconstructive and reconstructive surgical and endovascular techniques [7–13, 17–19].

Surgical reconstructive techniques are effective, but they are difficult for lesions near the skull base [9]. Carotid sacrifice with trapping or clipping of the aneurysm, either surgically or by endovascular means using detachable balloons or coils, is an effective treatment but is possible in only the limited population of patients with adequate collateral circulation without concomitant bypass [10, 11].

There are few reports of successful endovascular treatment of large cervical ICA pseudoaneurysms using bare, covered, or overlapping stents with or without secondary coil embolization of the pseudoaneurysm sac. Roglu et al. [8] reported a child with a giant upper cervical internal carotid artery pseudoaneurysm presenting with dysphagia, respiratory distress, and epistaxis. Rupture of the pseudoaneurysm during treatment occurred and prompt endovascular treatment yielded a good outcome.

Endovascular intervention with bare stents has previously been reported as an alternative to surgery with reasonable results. Uncovered stents are effective in treating a dissecting aneurysm with an intimal flap or small

defects in the arterial wall, as the stent mesh impedes flow into the aneurysmal sac, inducing thrombosis or relocating the intimal flap to occlude the aneurysm. However, flow into wide-necked aneurysms is difficult to exclude with an uncovered stent, so coil embolization of the sac through the stent is often required. Wide-necked saccular aneurysms or pseudoaneurysms can be more appropriately treated with a covered stent, leading to immediate and definitive reconstruction of the arterial wall [12, 13, 15–19].

Mukherjee et al. reported that endovascular stent-graft placement is a safe, feasible, and effective way to treat carotid artery aneurysms [12]. Scavee et al. successfully treated a case of posttraumatic cervical ICA pseudoaneurysm with a covered stent [13]. Maras D et al. suggested that placement of stent-grafts is a safe and effective method of treating ICA traumatic pseudoaneurysms resulting from penetrating craniocervical injuries or skull base fractures [17]. Baldi et al. successfully treated extracranial ICA aneurysms with polytetrafluoroethylene self-expanding endografts using an endovascular approach [18]. The present case and these reports suggest that endovascular repair in the form of placement of covered stent-grafts can be accomplished with preservation of anatomic flow in the parent vessel and durable exclusion of the pseudoaneurysm sac.

There are still concerns about the long-term patency of stents [20], especially those deployed in the young population, and it requires further studies with long-term follow-ups.

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