

Giant cervical ICA aneurysm: An unusual cause of recurrent strokes - A case series and management algorithm

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Abstract

A 73-year-old male patient suffered from recurrent strokes over 2 years. An angiogram revealed a giant cervical ICA aneurysm located in the retromandibular region with a tortuous loop of redundant artery anterior to it. He was taken up for surgery where the aneurysm was resected and the free ends anastomosed under shunt cover. The patient recovered well and was discharged without deficits.

Another 70-year-old lady presented with a swelling in the retro mandibular region of the neck associated with fainting episodes every time she opened her mouth wide or chewed. Angiographic studies showed a giant retro mandibular ICA aneurysm, which was treated with an EC-IC bypass with ligation of the aneurysmal sac. The patient was discharged without deficits and has hence been living normally.

Cervical aneurysms are rare and challenging modality to treat for the vascular neurosurgeon. These reports highlight the variability of presentation and the choice of modalities available for treatment. Selection of the appropriate modality can be challenging. Hence, we suggest a treatment algorithm for diagnosing as well as treating the disease successfully.

Keywords: Giant, Cervical aneurysm, Coiling, Surgery.

Introduction

Giant aneurysms of the cervical internal carotid system are rare and mimic diseases associated with the surrounding structures of the neck.¹ A high index of suspicion coupled with patient investigation is required to diagnose the disease. Once recognized, the treatment modalities are various and require careful study, competence as well as the knowledge to correctly match the best modality to each patient in order to attain the best results. Here we present 2 such cases seen in the OPD of a quaternary care centre in Bangalore, India and their respective courses in hospital. We endeavor to highlight the nuances of diagnosis and treatment, by presenting an algorithm that might enable future encounters with the same disease to be made simpler and efficient enabling the patient to have the best of treatment along with a short and pain free experience in the hospital.

Case Report 1:

A 73-year-old male presented with a history of recurrent right-sided thrombotic strokes in the same middle cerebral artery territory over the past 6 years.

He was apparently well 6 years ago when he developed sudden onset of weakness of his left upper limb, which gradually improved over time after medical management. No investigations regarding the cause of stroke were conducted then. 4 years later after completely recovering from the stroke, he experienced another sudden onset weakness in the upper and lower limb on the left side associated with altered sensorium. His symptoms were serious enough for his relatives to admit in multi-specialty hospital where he was

investigated for the cause of stroke. He was thought to have a no plaques in the ICA on routine Doppler ultrasonographic study. He was put on antiplatelets and sent home for observation. An angiogram of the carotid arteries showed a suspected AV fistula in the neck. He was then referred to our centre for Neuro-endovascular intervention.

On angiographic evaluation, he was found to have a giant 3.5x2.8cm partially thrombosed, fusiform aneurysm in the right cervical ICA, located behind the angle of the mandible adjacent to the carotid canal. The proximal ICA segment was extremely convoluted with 3 180 degree bends rendering endovascular access impossible. The aneurysm extended beneath the proximal ICA, draping the artery across the fundus of the aneurysm. The distal segment was seen deep to the aneurysm, extending 3cms from the fundus to the carotid canal opening. The arteries were significantly arteriosclerosed with thick irregular plaques across the walls. The aneurysm was itself partially thrombosed and calcified. Cannulation of the femoral arteries was itself difficult owing to the extreme tortuosity and rigid arteriosclerosed walls of the vessels. Both vertebral arteries were small and insignificant. The posterior circulation appeared to draw the majority of the blood supply from the fetal posterior communicating arteries.

Based on these findings surgery was planned. An interdepartmental approach to patient care was formulated with the cardiologist, vascular surgeon, neuro-anaesthetist and vascular neurosurgeon attending to the patient. The patient was planned for a resection and anastomosis of the aneurysm under Shunt cover.

Post-surgery the patient was alert and conscious without any deficit. He was monitored in the ICU for a day before shifting to the ward. He was discharged the following day on antiplatelets, and has no reported problems till date.

Case Report 2:

A 75 year old lady presented to the emergency with frequent episodes of loss of consciousness precipitated by eating or talking for long spells. On examination she was alert and conscious without deficits. Her EEG was normal and Brain CT scans showed no meningitis or space occupying lesions. On examination of her carotids to look for atherosclerotic plaques a giant 4.1x3.7cm aneurysm was detected in the retro mandibular region of the neck extending just up to the carotid canal. On a DSA the aneurysm was seen to have severely turbulent flow with pooling of blood in the dependent regions. The shape was fusiform with thick atheroma impacted walls. On dynamic compression studies, the mandibular margin was seen to impinge upon the aneurysm cutting off the distal outflow and

causing temporary obstruction to the cerebral circulation on the left side leading to syncope. Due to the location and delicate nature of the walls, it was decided to post her for a Bypass and trapping of the aneurysm procedure. The internal carotid artery was tapped 3cms proximal to the aneurysm and connected to the middle cerebral artery using a saphenous venous graft harvested from the left leg. Post bypass, the distal end of the aneurysm was ligated tightly leading to eventual collapse and atrophy. Post-surgery the patient was maintained on antiplatelets and anticoagulants. She was discharged on the 3rd post-operative day and was followed up at regular intervals without incident

Digital subtraction angiography of the carotid arterial system in the neck demonstrating the giant aneurysm emanating from the ICA. The incomplete filling might indicate poor flow into the sac thereby encouraging thrombosis and eventual thrombo-embolization into the intracerebral circulation causing strokes.

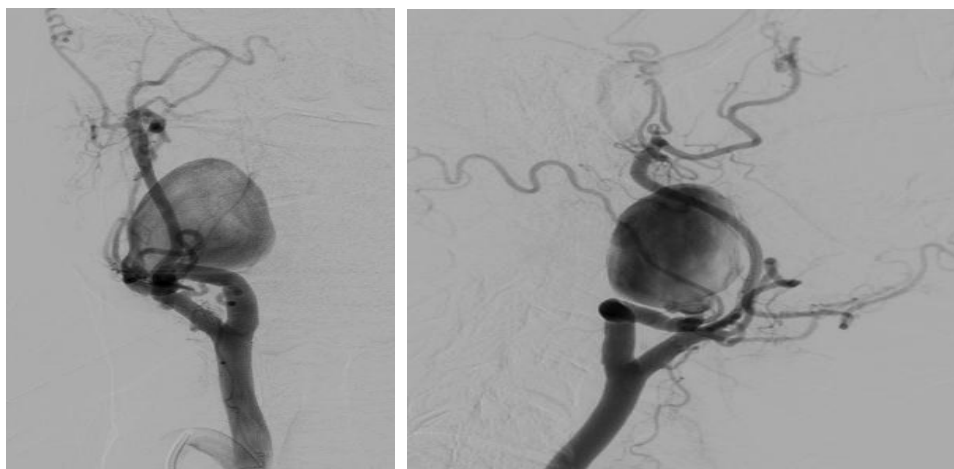


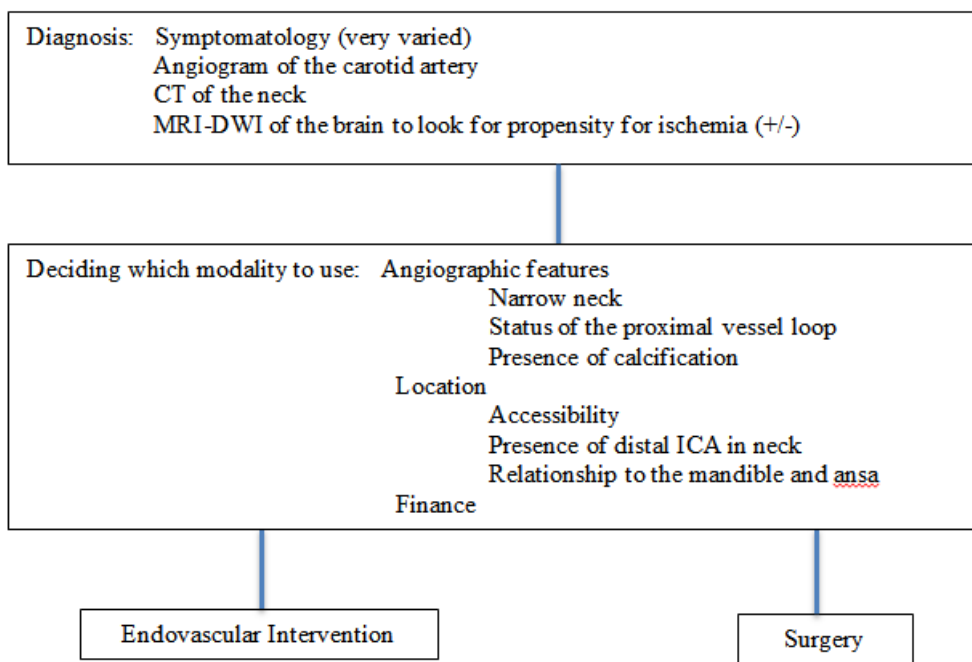
Fig. 1(a): angiogram of the carotid system showing the giant aneurysm just before the angle of the mandible with a tortuous proximal segment. There are blebs and teating seen on the posterior aspect as shown in (b) below. The neck appears small yet posteriorly placed hidden by the fundus.

Table 1: Therapeutic interventions for giant cervical aneurysms, options and applications

Type of procedure	Endovascular intervention	Surgery
Ideal For	<ul style="list-style-type: none"> elderly patients with co-morbidities compliant anatomy no contraindications for long term anticoagulant and antiplatelet use 	<ul style="list-style-type: none"> younger patients poorer patients if no contra-indication for surgery exist
Advantages	<ul style="list-style-type: none"> minimally invasive no blood loss no damage to cranial nerves or Ansa comfortable for patient reduced hospital stay immediate complications less 	<ul style="list-style-type: none"> less operating time proximal control possible no need for dual antiplatelets post procedure anatomical correction possible

Options	<ul style="list-style-type: none"> • Coiling: <ul style="list-style-type: none"> ○ Possible if the aneurysm is saccular and pedunculated with a narrow neck to keep the coils inside. • Stent assisted Coiling: <ul style="list-style-type: none"> ○ Preferred in aneurysms with wider necks. The stent keeps the coiled from violating the vessel lumen. • Covered Stent: <ul style="list-style-type: none"> ○ Used to completely cover the aneurysm neck and isolated it from the vessel lumen. These require skill and a compliant anatomy for success. 	<ul style="list-style-type: none"> • Clipping: <ul style="list-style-type: none"> ○ Popular with intracerebral berry aneurysms. Smaller pedunculated aneurysms with narrow necks are amenable. • Resection and Anastomosis: <ul style="list-style-type: none"> ○ Here the aneurysm is removed and the proximal and distal ends of the vessel are anastomosed end to end. Anatomical correction is possible here. • Bypass: <ul style="list-style-type: none"> ○ Trapping of the aneurysm within the bypassed segment achieves good results but requires panning, skill and meticulous post-operative care
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Algorithm 1: How to approach giant cervical ICA aneurysms



Discussion

Although cervical ICA aneurysms are rare (accounting between 0.2 and 0.3%) of the ICA aneurysmal incidence, their presentation as well as management present a unique challenge to vascular and endovascular surgeons.¹ The causative factors, either vasculitis, collagen vascular disorders or atherosclerosis, tend to weaken the vessel walls leading to tortuosity, bends, kinks, redundant loops and eventually aneurysms.^{1,2} The pathology gradually occurs over many years and may remain symptomatic until detected either by accident or by symptoms secondary to complications such as thromboembolism

and recurrent strokes (particularly in patients with redundant loops).^{1,3}

The indications for surgery or coiling of these aneurysms are unclear. Authors are agreed on the need to intervene in symptomatic aneurysms where stenosis, thromboembolic strokes or bleeds occur.¹⁻³ The timing of surgery or intervention as well as a comparison between the modalities has not been stated, probably due to the rare incidence of the aneurysm.^{1,3}

Although endovascular management with coils and stents are popular in such aneurysms, the complexity of the aneurysm architecture, convolutions of the loops along with severe atherosclerosis of the vessel walls

made it difficult for us to proceed with endovascular treatment alone.

Surgical exposure is often considered the gold standard for treatment of these aneurysms.⁴ Exposure of the soft tissues along with careful protection of the Ansa nervous loop and hypoglossal branches are of utmost importance. Dissection of the posterior belly of the digastric allows better exposure of the carotid sheath.^{4,5} Further exposure of the deep distal segment beyond the siphon can be facilitated with temporomandibular joint dislocation or vertical trans oral mandibular ramus osteotomy.^{4,6} These procedures have their complications, which range from a greater incidence of postoperative infection to temporomandibular joint syndrome.^{5,6} We were able to achieve complete exposure without resorting to these procedures in both cases.

The propensity of the aged brain to sustain ischemia is always a concern. But due to the inter ICA segment shunt and zealous monitoring with EEG, we were able to limit the ischemia to a minimum.

Post operatively, the vigilance and intensity of the monitoring done pre-empted complications such as strokes or ischemia from occurring. Ample intra-op cerebral protection and antiplatelet and anticoagulant use prevented thrombosis and failure of the repair.

Algorithm: Based on our experience as well as literature search, we would like to propose the following algorithm for the management of these aneurysms.

Diagnosis: Symptomatology (very varied)

Angiogram of the carotid artery

CT of the neck

MRI-DWI of the brain to look for propensity for ischemia (+/-)

Conclusion

Although rare, cervical ICA aneurysms are treatable yielding good results. An open mind keeping the advantages and disadvantages of both surgery and endovascular intervention as well as aneurysm architecture and vessel configuration in mind will keep the neurosurgeon in good stead while treating these complex lesions.

References

1. Magdiel Trinidad-Hernández, MD, Joseph H. Introcaso, MD, DMD, and John V. White, MD. Combined open and endovascular treatment of a saccular aneurysm and redundant loop of the internal carotid artery. *J Vasc Surg* 2006;44:642-6.
2. Painter TA, Hertzner NR, Beven EG, O'Hara PJ. Extracranial carotid aneurysms: report of six cases and review of the literature. *J Vasc Surg* 1985;2:312-8.
3. El Sabrout R, Cooley DA. Extracranial carotid artery aneurysms: Texas Heart Institute experience. *J Vasc Surg* 2000;31:702-12.
4. Rosset E, Albertini JN, Magnan PE, Ede B, Thomassin

JM, Branche- reau A. Surgical treatment of extracranial internal carotid artery aneurysms. *J Vasc Surg* 2000;31:713-23.

5. Aleksic M, Heckenkamp J, Gawenda M, Brunkwall J. Differentiated treatment of aneurysms of the extracranial carotid artery. *J Cardiovasc Surg (Torino)* 2005;46:19-23.
6. Szopinski P, Ciostek P, Kielar M, Myrcha P, Pleban E, Noszczyk W. A series of 15 patients with extracranial carotid artery aneurysms: surgical and endovascular treatment. *Eur J Vasc Endovasc Surg* 2005;29:256-61.