Acta Scientific Otolaryngology (ISSN: 2582-5550)

Volume 5 Issue 7 July 2023

Case Report

Case Report: Extracranial Internal Carotid Artery Aneurysm in Neck: Ultrasound and Colour Doppler as a Primary Tool in Diagnosis and Evaluation

Rajesh C Kamble*, Alpana N Joshi, Pravin Mestry and Abhijeet Soni

Shobha Diagnostic Centre, Dhiraj Apartments, Mumbai, India

***Corresponding Author:** Rajesh C Kamble, Shobha Diagnostic Centre, Dhiraj Apartments, Mumbai, India.

DOI: 10.31080/ASOL.2023.05.0580

Received: May 03, 2023

Published: June 19, 2023

Abstract

Extracranial internal carotid artery aneurysms are rare. They account for less than less than 1% of arterial aneurysms. Causes of aneurysms could be congenital, atherosclerotic, traumatic leading to pseudoaneurysm, infections and fibromuscular dysplasia [1].

These aneurysms are at potential risk of rupture leading to significant neurological thromboembolic events and causing cranial nerve compression causing significant morbidity and mortality,

Today, the ultrasound technology has grown leaps and bound with availability of high frequency ultrasound – linear transducers and colour doppler available to us. These USG tools can be a primary tool to diagnose and evaluate all the vascular lesions in the neck. Having done that one can further subject the patient to cross sectional imaging like CT/MRI for further evaluation and confirmation of the lesion.

The expanding field of radiology today has interventional radiology playing a great role in offering complete treatment of these lesions in minimally invasive manner and avoid surgical procedures, thereby reducing patient morbidity.

Keywords: Extracranial Internal Carotid Artery Anuerysm; Ultrasound and Colour Dopple; Neck Vascular Lesions

Introduction

Extracranial internal carotid artery aneurysms are rare. They account for less than less than 1% of arterial aneurysms [1].

Pathologically they are classified as true or false aneurysms with true aneurysm having all three vessel wall layers (intima, media and adventitia). False aneurysm is also known as pseudoaneurysm having defect in the vessel wall forming a extravascular hematoma which communicates with the intravascular space [11,15].

Causes of aneurysms could be congenital, atherosclerotic, traumatic leading to pseudoaneurysm, infections and fibromuscular dysplasia [1,3,5,6].

These aneurysms are at potential risk of rupture leading to significant neurological thromboembolic events and causing cranial nerve compression causing significant morbidity and mortality.

Today, the ultrasound technology has grown leaps and bound with availability of high frequency ultrasound – linear transducers and colour doppler available to us [3,5,6].

These USG tools can be a primary tool to diagnose and evaluate all the vascular lesions in the neck. Having done that one can further subject the patient to cross sectional imaging like CT/MRI for further evaluation and confirmation of the lesion.

The expanding field of radiology today has interventional radiology playing a great role in offering complete treatment of these lesions in minimally invasive manner and avoid surgical procedures, thereby reducing patient morbidity [2,7,8].

Case History

A 66 year old female patient went for a dental checkup where the dentist observed a large mass at the angle of the right mandible which showed pulsations and referred back to his primary general physician for further work up. The patient complained of this swelling since many years and gave progressive increase in the size of the lesion over years. The patient had no constitutional symptoms. The physician suspected this mass to be parotid mass and sent for ultrasound evaluation.

The patient was evaluated with high frequency linear transducer (L12-3) using GE ultrasound machine – Voluson S8.

The USG findings revealed – The visualized bilateral thyroid, submandibular and parotid glands were completely normal and showed no focal lesion within them.

Infact, at the angle of the right mandible, there was a large anechoic pulsating lesion which measured 3.9 x 3.6 cms in dimensions. It showed swirling flow within it on b mode sonography and was situated near the common carotid artery bifurcation which was clue to suspect the lesion to be vascular in nature.

On colour Doppler, this lesion showed complete filling up of colour. The visualized right common carotid artery and the right external carotid artery showed normal flow velocities and hence a preliminary diagnosis of extracranial internal carotid artery aneurysm was done and patient was advised CT/MRI angiography for further evaluation and confirmation.

Multislice multiplanar ultrafast CT angiography of the neck was performed with 3D multiplanar reconstruction.

The CT showed a large rounded vascular lesion in the right anterior aspect of the neck along the course of the internal carotid artery with center at mid C3 level and 2 cm above the common carotid artery bifurcation displacing the external carotid artery anteriorly and internal jugular vein posteriorly.

Multiple tortuous veins were seen in the right side of the neck, one of which showed thrombosis. The distal cervical and intracranial internal carotid artery is normal. The right common carotid, the left common carotid and left cervical internal carotid artery is normal.

The CT report confirmed the ultrasound diagnosis of right cervical extracranial internal carotid artery aneurysm and patient was referred to tertiary institute for further treatment and management.

As the patient was elderly patient and had co morbidities like diabetes and hypertension, the case was referred to the interventional radiology department for further management and a Digital subtraction angiography (DSA) was planned with CVTS surgeon on the standby.

The interventional radiology department did successful treatment of the lesion and completely occluded the aneurysm by deploying a stent graft and the patient was completely cured by minimally invasive procedure like DSA.

Review of Literature and Discussion

Extracranial carotid artery aneurysms (ECCAs) are very rare. They account for < 1% aneurysms and account for 4% of peripheral artery aneurysms.

The most common causes of these aneurysms are atherosclerosis (40%) and trauma. The less common causes are mycotic and post procedures or instrumentation in the neck [16].

The carotid bulb and the proximal internal carotid artery are most common sites and aneurysms of external carotid artery are very rare. They can be divided into true aneurysms (most common cause atherosclerosis ; wherein there is localized enlargement of the artery diameter with integrity of the all the three vascular layers) and pseudo/false aneurysms (most common cause – post traumatic/post instrumentation) with interruption in the continuity of all three layers of the arterial wall. Pseudoaneurysms are more common than true aneurysms [18].

On basis of the shape, ECCAs are classified into fusiform and saccular aneurysm.

Most cases of ECCAs are clinically silent. Few cases can have symptoms secondary to compression of the neural structures, cranial nerve damage and pain.

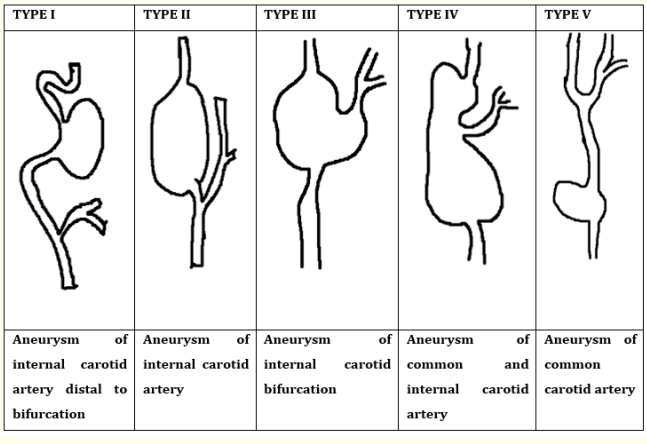
It is very important to diagnose these ECCAs as they are prone to rupture leading to cerebrovascular accidents and causing neurological complications [12].

Ultrasound with colour doppler is first line investigation of choice to diagnose ECCAs and confirmed further on cross sectional modalities like CT and MRI [10,12].

Ultrasound due to its wider availability, cheaper, no ionizing radiation, non-invasive and quicker to interpret is the most efficient tool to diagnose ECCAs [12].

Though there is no consensus criteria to define an ECCA and no significant differences in the lumen of the bilateral carotid arteries, it has been accepted that the contralateral normal side can be used as the reference value to determine the normal expected diameter of the vessel [10].

Depending on the location of the aneurysms, the ECCAs are classified into 5 types [11]. In type 1, the aneurysm is distal to the ICA. In type 2 it begins from the proximal ICA and extends toward the distal. In type 3, the aneurysm is in the carotid bifurcation. In type 4, it is located in the ICA and common carotid artery (CCA) as a long segment. In type 5, it is localized in the CCA.



Diagram

The surgical management of the lesions depends on their location [4,9,11], hence ultrasound reporting should always specify these locations. Also, ultrasound with colour doppler should be able to analyze whether the ECCAs are true aneurysms or false aneurysms. False aneurysms will always show neck communicating between the vessel wall and the pseudo aneurysmal sac. Colour doppler analysis showing classic "Ying yang sign" on colour flow imaging could be a clue to diagnosing pseudoaneurysm.

There could be certain conditions which could mimic ECCAs like – bulb ectasia, carotid body tumors, excessive coiling/kinking of carotid arteries and internal jugular vein ectasia. Ultrasound with colour doppler has 94% and 97% sensitivity and specificity to diagnose ECCAs. The only limitations of doppler is that it is operator dependent, difficult in very short neck patients, inability to pick-up deep-seated aneurysms and in severe trauma patients with hematomas.

The treatment options for ECCAs aneurysms can be surgical with aneurysmectomy with Dacron graft inter position and endovascular treatment with covered stent by deploying a stent graft across the diseased segment done by interventional radiology team [13,14,17].

Our case was type II ECCAs with true aneurysm most likely atherosclerosis being the possible etiology and complete treatment done by endovascular interventional radiologist by deploying a stent graft.

Figure 1: Clinical photograph of the patient showing a large lesion seen at angle of right mandible in the right aspect of the neck.

Figure 2: B Mode Ultrasound image shows a large anechoic lesion with swirling motion seen.

Figure 3: Colour doppler showing complete filling of the lesion with colour confirming the vascular lesion like aneurysm.

Figure 4: Spectral doppler flow in the vascular lesion in the internal carotid artery with arterial high velocity flow.

Figure 5: B mode and colour doppler image confirming the aneusrym (ICA).

Figure 6: Axial and coronal CT images showing filling of the large right ICA saccular aneurysm.

Figure 7: CT Angiography 3D multiplanar reconstruction showing the right ICA aneurysm and the entire carotid artery anatomy.

Figure 8: Unsubstracted DSA view showing a tortuous distal right common carotid and proximal ICA just proximal to the aneurysm.

Figure 9: Post Stent graft placement DSA showing complete exclusion of the aneurysm with reconstruction of the proximal right ICA.

Conclusion

B mode ultrasound and colour doppler with high frequency linear transducer can be a valuable tool in evaluation of vascular lesions in the neck in both paediatric and adult population in day-to-day clinical practice. Its widely available, no ionizing radiation, quick, cheaper and fastest modality to use and interpret in neck lesions.

Bibliography

1. El-Sabrout R and Cooley DA. "Extracranial carotid artery aneurysms: Texas Heart Institute experience". *Journal of Vascular Surgery* 31 (2000): 702-712.
2. Rosset E., *et al*. "Surgical treatment of extracranial internal carotid artery aneurysms". *Journal of Vascular Surgery* 31 (2000): 713-723.
3. Longo GM and Kibbe MR. "Aneurysms of the carotid artery". *Seminars in Vascular Surgery* 18 (2005): 178-183.
4. Welleweerd JC., *et al*. "Management of extracranial carotid artery aneurysm". *European Journal of Vascular and Endovascular Surgery* 50 (2015): 141-147.
5. Bemelman M., *et al*. "Bilateral extracranial aneurysm of the internal carotid artery - a case report". *Vascular Surgery* 35 (2001): 225-228.
6. Cinar B., *et al*. "True aneurysm of extracranial internal carotid artery in a 10-year-old". *European Journal of Vascular and Endovascular Surgery* 32 (2006): 386-388.
7. Li Z., *et al*. "Endovascular stenting of extracranial carotid artery aneurysm: a systematic review". *European Journal of Vascular and Endovascular Surgery* 42 (2011): 419-426.
8. Ni L., *et al*. "Endovascular stenting for extracranial carotid artery aneurysms: experiences and mid-term results". *Medicine (Baltimore)* 95 (2016): e5442.
9. Rivera-Chavarría IJ and Alvarado-Marín JC. "Endovascular repair for an extracranial internal carotid aneurysm with cervical access: a case report". *International Journal of Surgery Case Reports* 19 (2016): 14-16.
10. Szopinski P., *et al*. "A series of 15 patients with extracranial carotid artery aneurysms: surgical and endovascular treatment". *European Journal of Vascular and Endovascular Surgery* 29 (2005): 256-261.

11. Johnston KW., *et al*. "Suggested standards for reporting on arterial aneurysms. Subcommittee on Reporting Standards for Arterial Aneurysms, Ad Hoc Committee on Reporting Standards, Society for Vascular Surgery and North American Chapter, International Society for Cardiovascular Surgery". *Journal of Vascular Surgery* 13.3 (1991): 452-458.

12. Zhou W., *et al*. "Carotid artery aneurysm: evolution of management over two decades". *Journal of Vascular Surgery* 43.3 (2006): 493-496; discussion 7.

13. Fankhauser GT., *et al*. "Surgical and medical management of extracranial carotid artery aneurysms". *Journal of Vascular Surgery* 61.2 (2015): 389-393.

14. Zhang Q., *et al*. "Management of extracranial carotid artery aneurysms: 17 years' experience". *European Journal of Vascular and Endovascular Surgery* 18.2 (1999): 162-165.

15. Winslow N. "Extracranial aneurysm of the internal carotid artery: history and analysis of the cases registered up to Aug. 1, 1925". *Archives of Surgery* 13.5 (1926): 689-729.

16. Idovic L., *et al*. "Carotid artery aneurysms". *Vascular* 12.3 (2004): 166-170.

17. Ni L., *et al*. "Endovascular stenting for extracranial carotid artery aneurysms: experiences and mid-term results". *Medicine (Baltimore)* 95.46 (2016): e5442.

18. Lucien Chassin-Trubert., *et al*. "Asymptomatic Internal Carotid Aneurysm: An Uncommon Disease of the Carotid Arteries". *Annals of Vascular Surgery* 70 (2021): 570.e-570.