

Aberrant Course of Carotid Arteries Presenting As Retropharyngeal Mass

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Introduction

Anatomical variations of carotid arteries are well known and reported in the medical literature. Normally carotid arteries from its origin from arch of aorta up to the skull base does not give any branches and follow a straight course (1). Approximately 10-40% shows anatomical variations in the cervical course of internal carotid arteries (ICA) in the form of abnormalities in curvatures, notching, elbowing (2). Medial transposition of ICA i.e. retropharyngeal course is one of the unusual anatomical variations. It sometimes presents as dysphagia, foreign body sensation in the throat or sometimes detected incidentally during neck imaging for throat complaints. Prior knowledge of the anatomy in this region is mandatory to avoid life threatening complications resulting from injury to the vascular structures during diagnostic procedures like biopsy or any surgical intervention done in this region and also before undergoing anaesthesia. In old patients, atherosclerotic changes are seen in these CAs and associated with risk of cerebrovascular accidents (2). In elderly persons, these variations mimic neoplasm so imaging is required before undergoing any diagnostic or therapeutic procedures. In paediatric patients, information of these anatomic

variations is must before adenotonsillectomy to avoid disastrous consequences (3, 4).

Imaging studies e.g. CT or MRI can very well demonstrate these anatomical variations and should be undertaken before any diagnostic or therapeutic procedure in these regions to avoid catastrophic events.

Case Report

A 65 year old female patient came with chief complaints of dysphagia and burning sensation in the throat since one month. Patient gave no history of hypertension, Diabetes. She was a tobacco chewer.

On the basis of her complaints, patient was subjected to the contrast-enhanced CT scan of the neck. CT scan was done on Toshiba Activion multidetector 16 slice scanners. Imaging plane included arch of aorta up to the skull base.

Arch of aorta showed atherosclerotic changes in the form of calcification of the wall.

Right Common Carotid Artery (CCA) after its origin from the innominate artery was seen coursing cranially posterior to the right lobe of the thyroid gland. It was divided into external and internal carotid artery at the level of superior endplate of C4 vertebra. External carotid artery (ECA) was anterolateral and internal carotid artery (ICA) was tortuous, medial to ICA, in close

proximity to the Para pharyngeal wall. Thickening of intima media complex of right ICA was noted (Fig 1).

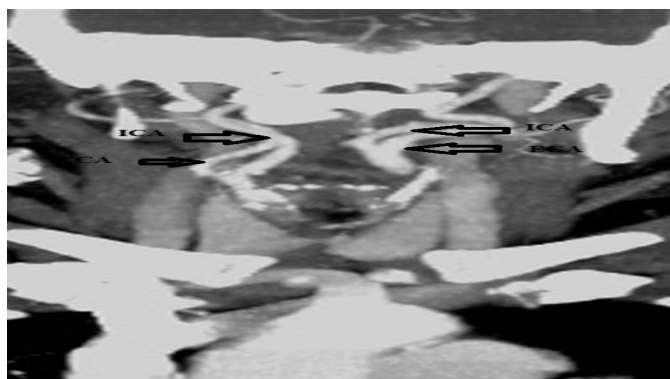


Fig 1. CT post contrast coronal reformatted image showing right and left external carotid artery (ECA) and internal carotid artery ICA. Note the medial deviation of the carotid vessels.

Left CCA was taking origin from arch of aorta and ascending superiorly posterior to the inferior pole of left thyroid lobe slightly in the midline. It was bifurcating at the level of superior endplate of C3 vertebra, a one vertebral level above the right one. Left ECA was medial and Left ICA was lateral. At this level, both the vessels are causing indentation over the posterior pharyngeal wall with reduction in the lumen same (Fig 1, Fig 2 & Fig. 3).

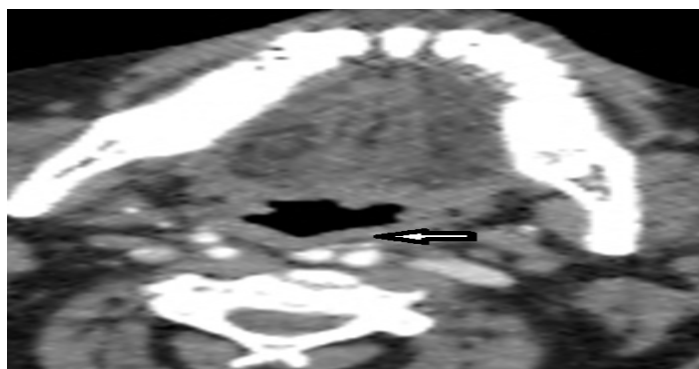


Fig 2. CT post contrast axial image showing significant indentation over retropharyngeal soft tissue on left side.

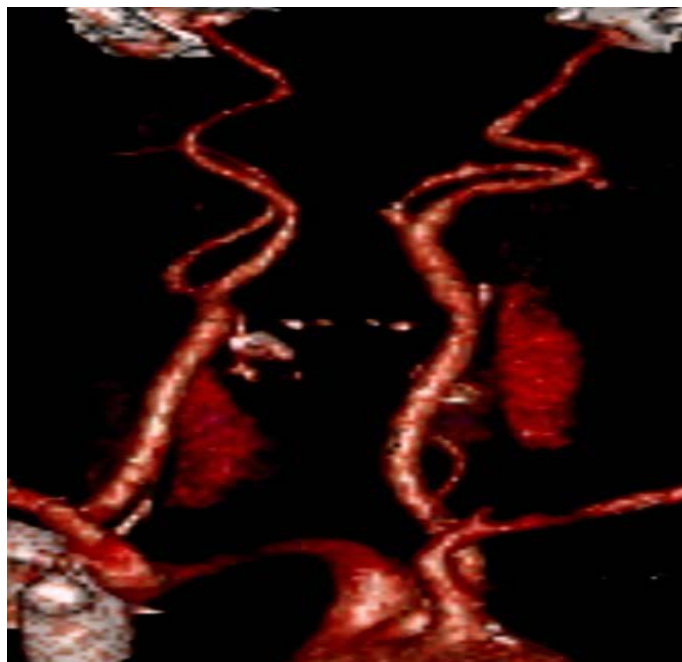


Fig 3. CT MIP images showing the abnormal medial course of carotid arteries on both the sides.

Discussion

Common carotid arteries after their origin pass obliquely upward in the neck behind sternoclavicular joint up to the upper border of thyroid cartilage, where they divide into internal and external carotid artery. ICA supplies most of the cerebral hemispheres, orbits, and also a portion of frontonasal area. ICA ascends within the carotid sheath towards the skull base. It is first crossed laterally by the hypoglossal nerve. ICA then crosses the occipital artery, as this artery passes posteriorly from its origin from external carotid artery. Near the skull base, ICA crosses laterally towards the posterior belly of digastric muscle and the muscle attached to the styloid process. Laterally to the carotid space is the deep lobe of parotid gland and medially are retropharyngeal space and the superior constrictor muscle.

Embryologically, the carotid artery originates from the third aortic arch and the dorsal aorta. The dorsal aortic root descends into the chest by the eighth week of fetal life, thus straightening the ICA (5). Inadequate

straightening of the carotid arteries resulting in persistence of the embryonic angulations has been proposed as the cause of aberrant and tortuous ICAs in the retropharyngeal space.

Tortuous ICA varies from mild kinking to complete circular loop formation (5, 6). These are more marked in elderly patients with atherosclerosis or hypertension (5).

The variations in the course of ICA are as follows:

- 1) Straight course up to the skull base;
- 2) S or C- shaped elongation with medial, lateral or ventro-dorsal displacement;
- 3) Kinking of any of the segments;
- 4) Coiling of the artery (1).

Underlying causative factor for the anatomical variations includes congenital, atherosclerosis especially in elderly, obesity and in few cases fibromuscular dysplasia (2).

The cervical prevertebral soft tissues are comprised of the prevertebral space and the retropharyngeal space. The retropharyngeal space, which is bounded posteriorly by the prevertebral fascia and anteriorly by the buccopharyngeal fascia, extends from the skull base to the level of sixth thoracic vertebral body. Here, the retropharyngeal space is closed by fibrous tissue around the tracheal bifurcation.

Normally, the retropharyngeal space contains only lymph nodes and their associated lymphatic channels.

Many spaces border the retropharyngeal space. The pharyngeal mucosal space of the nasopharynx, oropharynx, and hypopharynx is located anteriorly. Lateral to the retropharyngeal space is the carotid space that contains the common carotid artery, the internal jugular vein, and the lower four cranial nerves as well as most of the external carotid artery branches (7-10).

The abnormalities involving retropharyngeal space include inflammatory processes such as abscess, benign and malignant neoplasm, edema or lymph

fluid, posttraumatic processes, and pseudotumor (11). Tortuous or medially deviated carotid arteries can present as Pseudotumor in the retropharyngeal space (5, 11). This is a relatively rare cause of retropharyngeal soft-tissue widening.

Medial transposition of carotid artery into retropharyngeal space typically presents as pulsatile sub mucosal mass along the posterior pharyngeal wall (1). Most of the time it is found incidentally on head and neck imaging. It can be found in an asymptomatic patient during head and neck examination or presents clinically as dysphagia, change in voice, foreign body sensation in the throat (12). They mimic like tonsillitis, tonsillar abscess or sometimes with neoplastic lesions (13). Medially transposed carotid arteries into retropharyngeal space carry a risk of life threatening complications during therapeutic or diagnostic procedures (1). Retropharyngeal carotid artery can result in significant arterial puncture or arterial injection of local anesthetic agent while doing glossopharyngeal nerve block in the pharynx through transoral root (1).

Anterior and medial displacement of pharyngeal soft tissues by an aberrant carotid artery may disrupt the anatomy of the pharyngeal lumen and can act as a predisposing factor for obstructive sleep apnea (11, 14).

Imaging viz. Color Doppler, CT, MRI can be used to determine the course, calibre and contour of carotid arteries so as to avoid future catastrophic events.

Most of the time this condition is an incidental finding and needs no active management. However preoperative or pre procedure information of the same is necessary and should be documented in the radiological report to avoid complications from any type of intraoral or retropharyngeal surgical procedure in the future.

So we conclude that retropharyngeal carotid transposition is a rare but important variation and should be thoroughly

investigated with the help of imaging procedures to avoid life threatening events.

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