

LOOP FORMATION OF CERVICAL SEGMENT OF INTERNAL CAROTID ARTERY - A CASE REPORT

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ABSTRACT

The internal carotid artery is one of the major arteries supplying the brain. Along with the vertebral artery it forms the carotid – vertebro – basilar system maintaining the blood flow to the brain. The internal carotid artery normally runs vertically upwards in the cervical region to enter the carotid canal & presents various bends in its intracranial course.

During routine dissection of head & neck region in an adult male cadaver, a variation in the course of internal carotid artery on left side was found. There was complete loop formation of the internal carotid artery on left side whereas internal carotid artery on the right side had normal course. Knowledge of such variation is essential for otolaryngologists, surgeons, neurosurgeons & radiologists for differential diagnosis. It is of greater relevance to the surgeons for it is important to recognize the condition before performing surgical procedures in the pharynx.

KEY WORDS: - Internal carotid artery, loop formation, surgical procedures.

INTRODUCTION

The paired internal carotid arteries, two of the four arteries that supply the brain, provide most of the blood flow to the cerebral hemispheres.

The Internal Carotid Artery (ICA) arises from the bifurcation of common carotid artery at the level of intervertebral disc between C3 & C4 vertebrae. Its course is divided into four parts – cervical, petrous, cavernous & cerebral parts. The cervical part of ICA ascends in the neck in front of transverse process of upper three cervical vertebrae & enters the carotid canal of the temporal bone. Hereafter ICA shows numerous bends & angulations while coursing through petrous temporal bone & cavernous sinus & terminates by dividing into anterior & middle cerebral arteries.

The ICA is superficial in the carotid triangle, and then passes deeper, medial to the posterior belly of the digastric muscle. Posteriorly ICA adjoins the longus capitis muscle. Pharyngeal wall lies medial to the artery, which is separated by fat & pharyngeal veins from ascending pharyngeal artery & superior laryngeal nerve. Anterolaterally ICA is covered by sternocleidomastoid muscle & is related to hypoglossal nerve, stylohyoid, occipital artery, posterior auricular artery, styloid process, glossopharyngeal nerve & pharyngeal branch of vagus. The vagus & internal jugular vein are related to it in carotid sheath.

At the base of the skull, the 9th, 10th, 11th & 12th cranial nerves lie between ICA & internal jugular vein.^[1]

CASE REPORT

During dissection of head & neck region at Mysore Medical College, a variation in the course of ICA was observed in one cadaver of an adult male, aged over 50 yrs on left side. The common carotid artery bifurcation was normal on both sides. External carotid artery was normal in its course on both sides. ICA on left side showed a circular loop above the level of hyoid bone.

The ICA was dissected completely after confirming the relations & studied on both the sides. The length of the ICA was measured using a flexible thread and a metric scale. The external diameter was measured between two sharp points of a divider.

LEFT SIDE:-

The length of Internal Carotid Artery on left side was 18.8 cm.

The length of ICA from origin to the beginning of the loop was 2.8 cm.

The length of the loop was 4.3 cm.

The length of ICA from termination of loop to the beginning of the carotid canal was 5.4 cm.

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The length of cervical ICA was 12.5 cm.
 The length of intracranial ICA was 6.2 cm.
 The external diameter of ICA was 6.5 mm.
 The external diameter of common carotid artery was 9 mm.

RIGHT SIDE: -

The length of ICA on right side was 14.1 cm.
 The length of cervical ICA was 8.4 cm.
 The length of intracranial ICA was 5.7 cm.
 The external diameter was 6 mm.
 The external diameter of common carotid artery was 8 mm.
 Microscopic study of both vessels was done using hematoxylin & eosin staining. On left side section was taken at the site of loop & stained. The vessel wall was normal without pathological changes.

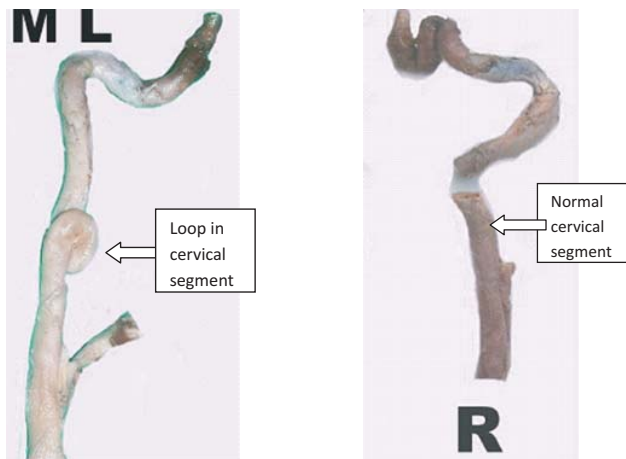


Fig 1a- ML – Male cadaver
 Left side Internal Carotid Artery

Fig 1b- R - Right side
 Internal Carotid Artery

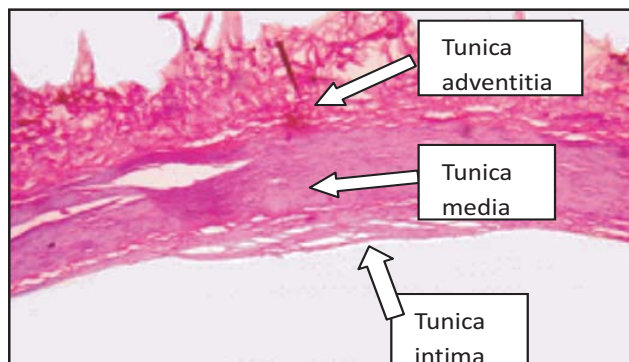


Fig 2a Haematoxylin & eosin staining of left Internal Carotid Artery

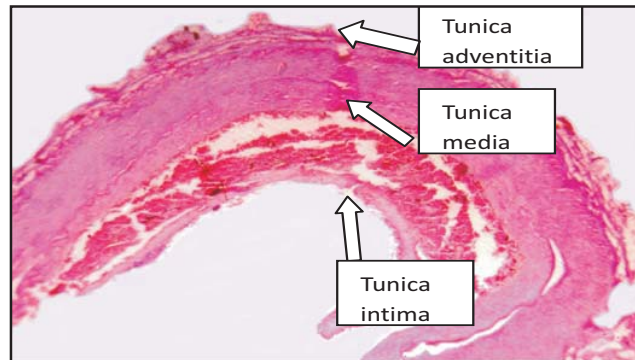


Fig 2b Haematoxylin & eosin staining of right Internal Carotid Artery

DISCUSSION

The length of the internal carotid artery on left side was 18.8 cm whereas length on the right side was 14.1 cm, with coiling on the left side. The length of extracranial portion of left side was 12.5 cm, & right side was 8.4 cm. This leads to disproportionate segmental blood flow in both internal carotid arteries. The blood flow on the left side is longer in cervical region by about 4.7 cm.

The diameter of the ICA on left side was more compared to the right side by about 0.5 cm. The diameter of the common carotid artery was also slightly more on the left side. This leads to increased blood flow on the left side vessels compared to right side.

It is a known fact that blood flows at a greater pressure in the left side ICA since left common carotid artery arises directly from the arch of aorta causing increased frequency of cerebral haemorrhages on the left side. Anatomic asymmetry between the two ICAs is considered secondary to the circulatory requirements placed by respective ipsilateral cerebral territories fed by each vessel. Extracranial & intracranial ICA asymmetry has also been identified in fetuses in support of above hypothesis.^[2]

Initial clinical descriptions of lethal complications based on injuries of aberrant ICA segments at the lateral & posterior pharyngeal wall subsequent to tonsillectomy & adenoidectomy came from otolaryngologists. The other symptoms of recurring difficulties with swallowing & speech or increasing sensation of a foreign body in the area of pharynx are also due to aberrant ICA segments.^[3]

According to Kelly a loop is formed at the junction between two blood vessels, reaching its maximal extension in the 5th & 6th embryonic weeks. ICA is formed from 3rd aortic arch & from dorsal aorta; hence in the embryo it is normally kinked. As the developing heart & large blood vessels descend into the mediastinal space, there is elongation & straightening of the artery & the loop is eliminated. Failure of this process, incomplete development or accelerated linear growth of the artery can result in persistence of the loop.^[4] Coiling & complete loop formation of the ICA occurs in 5 to 15 % of patients in unselected angiographic series. This appearance is thought to be partially developmental, unrelated to either age or hypertension.^[5]

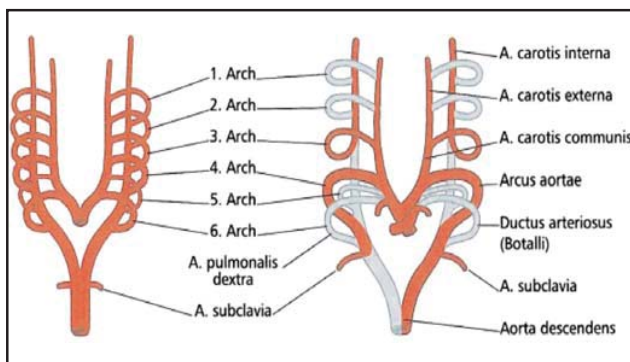


Fig 3. Schematic drawing of the embryonic development of the branchial arch arteries. Blood vessel segments which obliterate during development are dotted grey (modified from Braus-Elze, 1960). [3]

The other cause suggested by Kelly in elongation & tortuosity of the artery is because of atherosclerotic changes.^[5] The histological preparation of the ICA did not show any pathological changes indicative of atherosclerosis in the vessel wall.

CONCLUSION

In the present study the coiling & loop formation of the ICA on the left side could be an adaptation from embryological & functional aspects. The probability of pathological cause is ruled out by the histological observation. Due to the close relation of the ICA with the pharynx, such anomalies require a thorough probe to avoid confusion in differential diagnosis clinically & to arrive at a definite diagnosis.

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