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Original Research Article

Study to Find Variations in the Origin of Internal Carotid Artery: A Cadaveric Analysis

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ABSTRACT

Background: Carotid arteries are the main arteries of the head and neck region. The common carotid artery bifurcates into the internal and external carotid artery (ECA). The internal carotid artery (ICA) supplies the intracranial structures, orbit, and scalp. The present cadaveric study was conducted to find the variations in the origin of internal carotid artery.

Materials and Methods: The present cadaveric study was conducted to find the variations in the origin of internal carotid artery. 50 formalin fixed head and neck specimens were obtained from adult cadavers of both sexes. The recorded data was compiled, and data analysis was done.

Results: In the present study total specimens included were 50 specimens out of which 25 belonged to the right side and 25 belonged to the left side. Among the specimens studied, 72% showed normal origin and 28% had variations in their origin. Variations present on right side were 32% and on left side were 24%. Among those specimens with variations, 11 specimens had high origin and 3 specimen had low origin of the artery. High origin of ICA was found on the right side in 6 specimens and on the left side in 5 specimens. Low origin was found only in 2 specimens on the right side and on the left side in 1 specimen.

Conclusion: The present study concluded that among the specimens studied, 28% had variations in their origin. High origin of ICA was found on the right side in 6 specimens and on the left side in 5 specimens. Low origin was found only in 2 specimens on the right side and on the left side in 1 specimen.

Keywords: Carotid Artery, Internal Carotid Artery, Specimen.

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INTRODUCTION

The word carotid is derived from the Greek word 'Kapwrides', meaning to stupefy or throttle; kapos also means heavy sleep, says Skinner.[1] The common carotid arterial system serves as the major source of arterial supply in the head and neck region. The common carotid artery (CCA) usually bifurcates into external carotid artery (ECA) and internal carotid artery (ICA) at the level of upper border of thyroid cartilage or at C3-C4 or C4-C5 intervertebral disc though the bifurcation may vary.[2-9] The ECA arises from the CCA somewhat medial to, and in front of, the ICA.[10]

The internal carotid artery (ICA) supplies the intracranial structures, orbit, and scalp.[11] The ICA consists of four parts from its origin to its termination; cervical, petrous, cavernous, and cerebral parts.[12,13] Standard textbooks and cadaveric studies have seldom mentioned carotid variations. However, they commonly appear in carotid angiographic (CA) studies where the cervical part of the ICA is shown to have unusual forms of coiling and kinking.[14,15]

Variations in the course of the ICA lead to alteration in blood flow dynamics, resulting in various neurological manifestations.[16,17] Outcomes of invasive procedures, such as carotid stenting, endarterectomy, and head/neck surgeries, may be significantly affected by a deviation in the normal course of the ICA.[18,19]

MATERIALS AND METHODS

The present cadaveric study was conducted to find the variations in the origin of internal carotid artery. Before the commencement of the study ethical approval was taken from the Ethical Committee of the institute. 50 formalin fixed head and neck specimens were obtained from adult cadavers of both sexes. Specimens with gross deformities were excluded from the study. By cadaveric dissection, the ICA was studied noting down the variations in its origin of the vessel. The carotid triangle was defined by its boundaries and the carotid sheath was traced from the root of the neck to the skull base. The contents of the triangle were exposed by opening the sheath. The ICA was traced from its

origin at the carotid bifurcation to its entry into the base of the skull. The level of origin was noted with reference to the upper border of thyroid cartilage. The recorded data was compiled, and data analysis was done.

RESULTS

In the present study total specimens included were 50 specimens out of which 25 belonged to the right side and 25 belonged to the left side. Among the specimens studied, 72% showed normal origin and 28% had variations in their origin. Variations present on right side were 32% and on left side were 24%. Among those specimens with variations, 11 specimens had high origin and 3 specimen had low origin of the artery. High origin of ICA was found on the right side in 6 specimens and on the left side in 5 specimens. Low origin was found only in 2 specimens on the right side and on the left side in 1 specimen.

Table 1: Presence or absence of variations in the origin

Variation	Side		Total
	Right n (%)	Left n (%)	
Variations absent	17(68%)	19(76%)	36(72%)
Variations present	8(32%)	6(24%)	14(28%)
Total	25(100%)	25(100%)	50(100%)

Table 2: Type of variation in the origin

Origin	Side	
	Right (n)	Left (n)
High	**6**	**5**
Low	**2**	**1**
Total	**8**	**6**

DISCUSSION

The ICA and the ECA are divided from the CCA, and an angle are formed between the two carotid arteries. These angles lead to local hemodynamic stress in the ICA and carotid bulb, forming atherosclerotic plaque. The ICA angle is defined as the angle between CCA and ICA. Previous studies have reported the effects of the anatomy of the carotid artery on focal atherosclerosis.[20]

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According to Al-Rafiah et al.[2] and Mompeo and Bajo[21], the commonest position of high carotid bifurcation was at the level of the hyoid bone in 25% and 36.85% cases, respectively.

High origin of ICA was reported to be 64% on the left and 50% on the right by Anu VR et al. in 2007[6], and 60% on the left side and 55% on the right side by Zumre O et al. in 2005.[22]

Ozgur et al. mentioned that the most common position of the ECA in relation to the ICA was the medial position.[23]

Lucev et al. mentioned that lack of experience regarding possible variations could lead to fatal errors if one blood vessel should be mistaken for another. For example, the unexpected origin of the STA from the CCA could be a cause of a possible mistake. The great blood vessels of the neck have numerous variations, and their explorations are essential for a better anatomic knowledge of the neck. This knowledge is especially important in choosing a surgical approach and for diagnosis in radiology.[24]

CONCLUSION

From the findings of present study, it can be concluded that among the specimens studied, 28% had variations in their origin of Internal Carotid Artery. High origin of ICA was found on the right side in 6 specimens and on the left side in 5 specimens. Low origin was found only in 2 specimens on the right side and on the left side in 1 specimen.

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