

## **STUDY OF INTERNAL CAROTID ARTERY IN HUMAN CADAVERS**

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### **ABSTRACT**

Internal Carotid Artery is one of the major sources of blood supply to the frontal lobe, temporal lobe & parietal lobe with the exception of occipital lobe. The study of the course of ICA gains more significance from clinical point of view since exaggerated angulations and kinks of the vessel may lead to a serious condition known as carotid insufficiency syndrome with a manifestation of cerebral ischaemia. It is therefore worthwhile to explore the causative factors which are responsible for exaggeration of angulation. Hence this study undertaken on the sagittally bisected, 50 Head & neck specimens of adult male and female human cadavers to find out any possible variations in the course of ICA.

**Key Words:** *Internal Carotid Artery, Length, Diameter*

### **INTRODUCTION**

Internal Carotid Artery is one of the major sources of blood supply to the brain and it is a branch of common carotid artery given in the neck. The Internal Carotid Artery does not give any branches in the neck and enters the cranial cavity through the carotid canal in the petrous part of the temporal bone.

Internal Carotid Artery supplies blood to the frontal lobe, temporal lobe & parietal lobe with the exception of occipital lobe. The Internal Carotid Artery arises from the bifurcation of Common Carotid Artery at the level of upper border of thyroid cartilage i.e. at the level of intervertebral disc between C3 & C4 vertebra. Its course is divided into four parts (Standring *et al.*, 2005).

1. Cervical
2. Petrous
3. Cavernous
4. Cerebral part

The cervical ICA ascends in the neck in front of the transverse process of upper three cervical vertebrae, and enters the cranial cavity through the carotid canal of the temporal bone.

Here in our study all parameters including length, external diameter are taken to observe the anatomical variations.

### **MATERIALS AND METHODS**

The study undertaken on the sagittally bisected, formalin fixed, 50 Head & neck specimens of adult male and female (age 30-70yrs) human cadavers. Specimens were obtained from Dept. of Anatomy, Kamineni Institute of Medical Sciences and Kamineni Institute of Dental Sciences, Narketpally.

#### **Materials Used**

The following materials were used.

- |                    |                          |
|--------------------|--------------------------|
| a) Scale           | f) Colour chalk pieces   |
| b) Thread          | g) Colour pencil         |
| c) Vernier Caliper | h) Bending metallic wire |
| d) Protractor      | i) Chisel, mallet        |
| e) White sheet     | j) Dissection set        |

#### **Methods**

The Internal Carotid Artery was exposed in the cervical part by clearing the superficial relations to it. The following parameters are measured

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1. *Length* -Measured from the origin of Internal Carotid Artery in the neck till it enters the cranial cavity through carotid canal.

2. *External diameter*- The external diameter of the artery was measured using the Vernier Calipers. Data thus collected was entered in MS excel sheet. Analysis was carried out by using SPSS 10.0 version. Appropriate statistical test was applied where ever required.

**RESULTS**

Total cadavers dissected—25 (Males-21, Females-4)

Sagittal sections of head & neck specimens separated into right & left groups-- 50 specimens.

Specimens were numbered from 1-50.

42 specimens were from male cadavers –1M-42M (R & L)

8 specimens were from female cadavers----43F-50F (R&L)

**Table 1: Length of Extra Cranial Part (cm)**

	Extra cranial Part	
	Right	Left
n=50		
Range	6.7-11.3	6-11.4
Mean	8.44	8.83
S.D	1.16	1.48

**Table 2: External Diameter of Extra Cranial part (cm)**

n=50	Extra cranial Part	
	Right	Left
Range	0.4-0.7	0.4-0.8
Mean	0.55	0.58
S.D	0.06	0.99
	N S	

**Table 3: Comparision of length of Internal Carotid Artery**

		Present Study	Nirmala 2006	Nikolai A.O <sup>(1)</sup> 2006		Riberio <sup>(2)</sup> 2006
				2cdvr	12cdr	
				Length of ICA		
ECP	Right	8.5	8.4	5.3 & 9.7		--
	Left	8.7	8.8	7.8 & 5.0	4.8- 6.6	
Total	Right	14.9	14.5	--	--	--
	Left	14.8	14.7	--	--	--
				Diameter of ICA		
ECP	Right	0.56	0.54	0.8	--	0.8
	Left	0.56	0.55	0.6	--	0.8

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**DISCUSSION**

Mean of length of ECP of ICA is more on left side than right side as in table 1. Mean of diameter of ECP of ICA is more on left side than right side which is statistically not significant as in table 2. We studied 50 specimens (21 males and 4 females). Nirmala (2006) studied 50 specimens. Nikolai studied 14 specimens. They studied length of ECP of ICA in 2 specimens separately on right side and left side. But in 12 specimens they quoted average length of ECP of ICA on right and left side. Riberio (2006) studied diameter of ECP of ICA in 46 specimens.

**1) Length**

a) Length of Extra Cranial Part is more on right side in our study with comparison to Nirmala study and less on left side in our study with comparison to Nirmala study.

b) In our study, length of Extra Cranial Part is 8.5cm on right side 8.7cm on left side. This was more when compared with study by Nikolai who observed length of Extra Cranial Part on right side 5.3cm and 7.8cm on left side in study of one cadaver of ICA. Length of Extra Cranial Part on right side was observed 9.7cm and 5.0cm on left side in other cadaver ICA in Nikolai study which is more on right side and less on left side as compared with our study. Length of Extra Cranial Part is more or less symmetrical on average lengths of both sides ranging from 4.8cm to 6.6cm in Nikolai study in remaining cadavers.

**2) Diameter**

Diameter of ECP is more on both right & left side in our study with comparison to Nirmala study.

In our study average diameter of the ICA at cervical part (ECP) at origin of ICA is 0.56 cm in both right & left sides. In Nirmal study average diameter of the ICA at cervical part (ECP) at origin of ICA is 0.54 cm on right & 0.55 on left side. Ribeiro, Ribeiro, Rodrigues Filho, Caetano, Fazan (2006) studied 46 heads from male embalmed human cadavers. Average diameter of the ICA at cervical part (ECP) at origin of ICA is 0.80 cm in both right & left sides which is more when compared with our study. Mean of length of ECP of ICA is more on left side than right side. Mean of diameter of ECP of ICA is more on left side than right side which is statistically not significant. Previous authors did not compare their observations between males and females. Here in our study we have compared observations between males and females as follows:

In males length of Extra Cranial part of Internal Carotid Artery is more on left side.

In females length of Extra Cranial part of Internal Carotid Artery is more on right side.

In males External diameter of extra cranial part is equal on both sides.

In females External diameter of extra cranial part is equal on both sides.

It is a known fact that blood flows at a greater pressure in the left ICA since left CCA arises directly from the arch of aorta causing frequency of cerebral hemorrhages on the left side (Viken and Wechsler, 1999). In the present study the length of ECP of ICA on left side was more than the right side. Probably this suggests a means of accommodating increased blood flow from the arch of aorta, forming a lengthy column of blood. The blood from ICA has to reach the brain at a favourable optimum pressure. To achieve this condition the other alternative for the ICA is to undergo kinks (angulations) to provide dampening effect to the flow of blood, since the vital tissues like brain and retina cannot withstand the blood flow at high pressure. Moreover the central branches of cerebral arteries are end arteries, thin walled and more susceptible for rupture leading to various localized cerebrovascular insults.

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