Morphometric study of carotid canal

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ABSTRACT

Aim: This study aims to analyze measurements of carotid canal in dry human skulls of South Indian origin. Introduction: The carotid canal was described as a bony canal located within the middle cranial fossa at the apex of the petrous temporal bone. It transmits the internal carotid artery to pass into the cranium. The carotid canal has rounded exterior opening lying at the base of the skull in the petrous part of the temporal bone. The average length of the carotid canal is 2 cm approximately. The position, dimensions, and extensions of the carotid canal are of vital importance in cases of skull base surgery as in the identification and isolation of the internal carotid artery throughout its petrous course. Materials and Methods: This study used about 44 dry human skulls of unknown sex and South Indian origin. The length and breadth of the carotid canal were determined using Vernier calipers. Results: The shape of the carotid canal was found to be rounded or oval in shape. In some skulls, it is directed downward while in other is directed downward and slightly medially. The mean length of the carotid canal found to be 0.77 mm and the mean breadth of the carotid canal was found to be 0.67 mm. There are no significant differences between the left and right sides of the carotid canal and length and breadth of the canal in both the left and right sides. Conclusion: The present study concluded that morphometric data on the carotid canal have great significance in the medical imaging, surgical procedures, anthropological, and forensic studies.

KEY WORDS: Carotid canal, Carotid plexus, Internal carotid artery

INTRODUCTION

The human dry skull possesses numerous foramina and canals which are served as a passage for structures such as vessels and nerves. There are so many foramina present in norma basalis such as foramen ovale, jugular foramen, hypoglossal canal, and carotid canal. In that, carotid canal has its own clinical importance in the field of anatomy, radiology, and neurosurgeons. Anatomically, the carotid canal is located near the apex the petrous part of the temporal bone which opens on the lateral wall of foramen lacerum and it is limited by posterior margin of the greater wing of sphenoid bone and the basilar aspect of occipital bone postero-emediately. The canal transmits the internal carotid artery with sympathetic plexus into the cranial cavity.

Clinically, the carotid canal considered as the landmark for neurosurgeons and it can be easily visualized through magnetic resonance imaging angiography. The anatomy of position, dimensions, and extensions of the carotid canal is of vital importance in surgery at the base of the skull and in identification and isolation of the internal carotid artery. The anatomical variations and its morphometrical values add its importance in the field of surgical, i.e., tracing neurovascular routes, anthropological, and forensic studies. The following study aimed to analyze the significant differences between the left and right sides of the carotid canal through morphometrical measurements.

MATERIALS AND METHODS

The study used about 44 South Indian dry human skulls of unknown sex, collected from the Department of Anatomy, Saveetha Dental College. The length and breadth of both the sides of carotid canal were determined using Vernier caliper. The shape of the carotid canal is analyzed on both sides of each skull [Figures 1-3]. The study adopted $t$-test for two independent mean as statistical analysis with $P < 0.05$. The obtained values were collected and statistically analyzed.

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RESULTS

The shape of the carotid canal was found to be round and oval in shape. In some skulls, it is directed downward while in other, it is directed downward and medially. In this study, about 74% of the carotid canal was found to be oval in shape and about 26% was found to be round in shape. The mean length of the carotid canal was found to be 0.77 mm and the mean breadth of the carotid canal was found to be 0.67 mm. The statistical analysis shows that there was no significant differences between left and right sides of the carotid canal was observed and even no significant differences were observed in total length and breadth of the canal in both the left and right sides.

DISCUSSION

In anatomical perspectives, each and every structure of the body is considered to be very important. In the foramina in the various parts of the body play a key role by transmitting important vessels and nerves. Interestingly, foramina at the skull region transmit important structures to and from the skull.

The external opening of the carotid canal is a prominent feature at the base of the skull as it transmits internal carotid artery and its development starts at early embryonic life.⁵,⁶,¹³,¹⁴ From the present results, the study shows that there are no significant differences between the length and breadth of both the sides of the carotid canal. The diameter of the carotid canal is ultimately dependent on the embryological development of the internal carotid artery. Developmentally, the internal carotid artery arises from the third aortic arch at the 3rd and 4th weeks of intrauterine life, whereas base of the skull develops during the 5th week.

From this, it is clear that the development of the internal carotid artery will determine the morphometric presence of the carotid canal. Despite the rare occurrence of internal carotid artery hypoplasia or agenesis, it may often result in the formation of collateral circulations.¹⁵

Similarly, a study has demonstrated that the measurement of the canal length achieving through silicon cast and bony method, in that they have observed that there is no significant difference between length and dimension of the carotid canal on both the sides.¹⁶ In another study, the shape of the carotid canal was found to be round (28.4%), oval shaped (49.4%), and teardrop shaped (22.2%), but the present study has observed that around 74% of the carotid canal was found to be oval 26% of round shape.⁴

CONCLUSION

The anatomical relationship of the carotid canal to the adjacent structures is considered to be very importance for accurate examination during imaging of cranial base, approaching the structure through surgically. For this, the present study concluded that morphometric data on the carotid canal have
great significance in the medical imaging, surgical procedures, anthropological, and forensic studies.

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REFERENCES


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