

**MORPHOLOGICAL AND MORPHOMETRIC ANALYSIS OF
EMINENTIA ARCUATA IN DRY HUMAN SKULL OF SOUTH INDIAN
POPULATION AND ITS CLINICAL IMPLICATIONS**

Jeswin Immanuel and Karthik Ganesh Mohanraj

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Jeswin Immanuel

Saveetha Dental College and Hospitals,
Saveetha Institute of Medical and Technical Sciences (SIMATS),
Saveetha University,
Chennai – 600077
Tamil Nadu, India
Email ID: jeswinimmanuel55@gmail.com

Karthik Ganesh Mohanraj,

Assistant Professor,
Department of Anatomy,
Saveetha Dental College and Hospitals,
Saveetha Institute of Medical and Technical sciences (SIMATS),
Saveetha University,
Chennai – 600077
Tamil Nadu, India
Email ID: karthikm.sdc@saveetha.com

Corresponding Author:

Karthik Ganesh Mohanraj,

Assistant Professor,
Department of Anatomy,
Saveetha Dental College and Hospitals,
Saveetha Institute of Medical and Technical sciences (SIMATS),
Saveetha University,
Chennai – 600077
Tamil Nadu, India
Email ID: karthikm.sdc@saveetha.com
Phone Number: +91 9940545168

ABSTRACT

Introduction: Eminentia arcuata is a crescent like raised projection observed at the middle cranial fossa on anterior surface of petrous part of the temporal bone. The Arcuate eminence, in anatomical term referred as the “eminencia arcuata” shows the site of the superior semi-circular canal of inner ear.

Materials and Methods: The research work was carried out in Department of Anatomy, Basic Medical Science, Saveetha Dental College. No sampling bias is used. The disadvantage of this study is that skulls from different geographical regions are not included. The parameters included are length and breadth of Eminentia arcuata on left lateral and right lateral side. The measurements are taken with a digital sliding vernier caliper.

Results: Length along with the breath of Eminentia arcuata on the left and right side was found to be nearly the same. This work was done to analyse the clinical implications and morphometric examination which found that length breath of Eminentia arcuata in most of the cadaveric skulls were nearly the same. In another research there was a controversy going on whether the Eminentia arcuata is formed by sulcus and gyri of the brain or by superior semi-circular canal.

Conclusion: On taking that research it is clear that the brain sulcus and gyri are just brain tissues which cannot cause Eminentia arcuata and its formation is by the superior semi-circular canal which is a bony structure of the inner ear.

Keywords: Morphology, morphometry, petrous part of temporal bone, Eminentia arcuata, clinical implications

INTRODUCTION

Skull bones serve as an important landmark in many anatomical, surgical, anthropological interventions. Eminentia arcuata is a crescent like raised projection observed at the middle cranial fossa on anterior surface of petrous part of the temporal bone. The Arcuate eminence, in anatomical term referred as the “eminencia arcuata” shows the site of the superior semi-circular canal of inner ear (1). Semi-circular canals are a constituent of the bony labyrinth which is at right angles from each other. At one end of each of the semi-circular canals is an expanded bag called an osseous dilatation which is more than double the width of the canal (2,3). The Eminentia arcuata lies above this superior semi-circular canal.

The cranial cavity serves as an important landmark in many anatomical, clinical and surgical conditions. It has several anatomical features which have vital functions in many cases. Many landmarks serve as a significant landmark in the surgical aspect. Many clinical manifestations can take place in this region which is the bed of the brain. Several vascular structures and their impressions can be seen here. These impressions provide a good site for surgical locations. One such feature is the Eminentia arcuata in the petrous portion of temporal bone. Adjacent to it lies the lesser and greater petrosal grooves for the lesser and greater petrosal nerves. The eminence is at the apex of the petrous bone which can be seen clearly in a cut cranial cavity of the skull bone.

The current research work was done to examine the importance of Eminentia arcuata and its clinical implications. It will be helpful in a clinical way like a landmark during surgery. Our scientist experts with their encompassing information, research experience, data has transformed to several publications globally in well reputed indexed Journals (4–11),(12),(13),(14),(15,16),(17),(18),(19–23). The objective of this analysis is to evaluate the eminentia arcuata of the dry human skull of the South Indian population and its clinical implications.

MATERIALS AND METHODS

The study setting is done in Saveetha dental college anatomy department. No sampling bias is used. The disadvantage of this study is that skulls from different geographical regions are not included. The parameters included are length and breath of Eminentia arcuata on the left and right side. The measurements are taken with a digital vernier caliper. The ethical approval by srb. Number of people involved were 2 (one investigator and principal investigator). The Sample size is 10. Sample is taken from a dry human skull. Case sheet verification is not applicable here. Minimise sampling bias is random sampling. Internal validity is abnormal and broken skulls were excluded from the study.

RESULTS

This study was done to analyse the clinical implications and morphometric analysis which found that the length breath of Eminentia arcuata in most of the cadaveric skulls were nearly the same. The mean of length on the left side was found to be 12.3270.

Table 1: Shows the morphometric measurement of the length and breadth of Eminentia arcuata. All the values are expressed as Mean \pm SD.

PARAMETERS	MEAN	STANDARD DEVIATION
LEFT LENGTH	12.370	1.71853
RIGHT LENGTH	11.6330	1.53757
LEFT BREATH	9.2110	1.17936
RIGHT BREATH	8.0840	1.45314

Table 2: Paired Sample Correlations

PARAMETERS	NUMBER	CORRELATION	SIGNIFICANCE
LEFT LENGTH AND RIGHT LENGTH	10	-0.420	0.908
LEFT BREATH AND RIGHT LENGTH	10	-0.014	0.969

Table 3: Paired Samples Test

PARAMETERS	PAIRED DIFFERENCES		SIGNIFICANCE
	MEAN	STD.DEVIATION	
LEFT LENGTH-RIGHT LENGTH	0.69400	2.353	0.375
LEFT BREATH-RIGHT BREATH	1.12700	1.894	0.093

The mean of length on the right was 11.633. The mean value for breath on the right side was 8.0840 and the mean for breath on the left side was 1.46531. Standard deviation of length on the left side was 1.71853. The standard deviation breath on the right was one of length on the right side was 1.53757. Standard deviation of breath on the left side was 1.17936. Standard deviation for breath on the right side was 1.4331. The standard error mean for length on the left side was 0.54345. The standard error means for length on the right 0.48622. The standard error mean for breath on the left was 0.37295. The standard error mean for breath on the right was 0.46337.



Figure 1: Skull showing Eminentia arcuata

DISCUSSION

The previous work done on eminentia arcuata had the most common shape and was linear in incidence of eminentia arcuata in their research was found to be 85% (n=15/18). The angle between eminentia arcuata and semi-circular canal was 19 degrees. The eminentia arcuata overlapped the semi-circular canal at an angle of 40 degree. It has been thought and classically imparted that eminentia arcuata is a projection produced by the superior semi-circular canal (SSC) bone (24).

In another research there was a controversy going on whether the Eminentia arcuata is formed by sulcus and gyri of the brain or by superior semi-circular canal. On taking that research it is clear that the brain sulcus and gyri are just brain tissues which cannot cause Eminentia arcuata and its formation is by the superior semi-circular canal which is a bony structure of the inner ear (2,25). The clinical significance of Eminentia arcuata is it's a good landmark for semi-circular canal and used to guide during any surgery in middle cranial fossa (26). There were many disadvantages in measuring like some of Eminentia arcuata in cadaveric skulls were rough and were not proper which was also faced by many researchers (27).

CONCLUSION

The Eminentia arcuata corresponds to the SSC in 40% of cases, but it can serve as a rough guide to the Semi-circular canal in most cases that is 93% of cases. Surgeons need to be familiar with the varying morphology of Eminentia arcuata in order to execute a surgery over middle cranial fossa.

FUTURE SCOPE:

In future Eminentia arcuata has to be studied in a large number of samples to get a better result.

LIMITATION:

This study is limited to the south indian population and skulls from different geographical locations were not included.

AUTHOR CONTRIBUTIONS

Author 1: S. Jeswin Immanuel, carried out the study by collecting data and drafted the manuscript after performing the necessary statistical analysis and in the preparation of the manuscript.

Author 2: Karthik Ganesh Mohanraj, aided in conception of the topic, designing the study and supervision of the study, correction and final approval of the manuscript.

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CONFLICTS OF INTEREST

None declared.

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