

MORPHOLOGICAL AND MORPHOMETRIC ANALYSIS OF SUPRAMEATAL SPINE IN DRY HUMAN SKULL OF SOUTH INDIAN POPULATION

Rasveya. S and Karthik Ganesh Mohanraj

Rasveya. S

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

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Running title: Analysis of suprimeatal spine in dry human skulls

Abstract

Introduction: Henle's spine is also called, spina supra-meatalis, meatal spine, spine supra-meatica, spine meatus is a bony minor eminence which is present front to supramastoid cavity. JACOB HENLE has mentioned suprimeatal spine as a dependable guiding structure for the localization of the foramina during surgeries. As it has a key position it could be an important anatomical landmark or could have clinical importance. So this study has aimed to study and assess the morphometric alterations of suprimeatal spine in the dry processed human skull of south indian population.

Materials and Methods: The work was done using 65 dry processed human skulls obtained from Department of Anatomy, Basic Medical Science, Saveetha Dental College. The length of the suprimeatal spine was measured in vernier caliper. Results are tabulated and analyzed in SPSS. The study adopted the rank test of Wilcoxon for biostatistical investigation with $p < 0.05$ is fixed to be significant for current data analysis.

Results: There is no significant difference between the right and the left spine of Henle. The significant value is 0.575. It is evident in which there is no major significant difference regard to the length of right adjacent side and left adjacent side of the mastoid region. It was hard to find an undamaged Henle's spine because of its size and delicacy. Only few specimens were studied, the study is done in a small geographical area. It has to be done in a wider population with more number of specimens.

Conclusion: The length of the spine is studied hence it will be of clinical importance. It will add up information to the surgeon on the anatomical position of Henle's spine

Key words: Henle's spine, skulls, suprimeatal spine, anatomical landmark, temporal region

Introduction

The suprimeatal spine is the small spine which is present below the zygomatic processes' posterior root and on the upper part of the orifice of the external acoustic meatus (1,2), it is at the projection attached to the attachment of auricular cartilage it is also called as spine of Henle. Lateral wall of mastoid air cells are guarded by the Henle's triangle (3). The supra-meatal spine varies in shape, position and size.

The suprimeatal spine has been the point where the ligaments of cartilaginous aspect of auditory tube and temporal fascia (4,5). The suprimeatal spine is of clinical importance for the otologic surgeons (1).

The suprimeatal spine is a co-ordinate to the adjacent lateral walls of the mastoid antrum (6). Macleod Yearsley, has mentioned that he considers suprimeatal spine to be the guide to mastoid antrum (7). The distance between sigmoid sinuses and henle's spine was significant; it is interrelated to the reduction in the distance (8). The spine of henle is not present in all the skulls it is hard to find (4). The suprimeatal spine grows and varies in shape only in early adolescence; no changes are noted in adult bones. Suprimeatal spine lower border becomes larger when the suprimeatal triangle grows. The suprimeatal spine is mostly in crest type (9) (10). The suprimeatal spine found in both males and females, right temporal bone 77.6% was seen on left temporal bone 86%, in female right side 9.1% and on left side 87% was observed in male's right lateral side it was 1.7% and left lateral side it was 2.5%, it is shallow in females and has maximum depth in males.

The preceding investigation was completed in this title, namely the morphology of henle's spine and its clinical significance. The data suggested that, 411 temporal bones were chosen, 195 left temporal and 216 right temporal. 81.8% of people have observed the presence of henle's spine. It is very difficult to find an undamaged henle's spine. Our scientist experts with their encompassing information, research experience, data has transformed to several publications globally in well reputed indexed Journals (11–18),(19),(20),(21),(22,23),(24),(25),(26–30). The aim of the study is to analyse the morphological and morphometric analysis of suprimeatal spine in dry human skull of south indian population and its clinical implication. To mainly study the difference of length of the right and left suprimeatal spine so that it will be of clinical use.

Materials and methods

The work was done using 65 dry processed human skulls obtained from Department of Anatomy, Basic Medical Science, Saveetha Dental College. The length of the suprameatal spine was measured in vernier caliper. Results are tabulated and analyzed in SPSS. The study adopted the rank test of Wilcoxon for biostatistical investigation with $p < 0.05$ is fixed to be significant for current data analysis. The abnormal and broken skulls were excluded. The length of the spine is measured for both sides and compared. Digital Vernier calliper was used to measure the length of the henle's spine.

Results

The presence of various forms of suprameatal spine is presented in Figure 1. The data analysed showed that the mean length of the suprameatal spine on the right side was 5.44 ± 0.69 mm. The mean length of the suprameatal spine on the left side was 5.57 ± 0.51 mm. The morphometric values of the right and left suprameatal spine was shown in Table 1.

There is no much significant variance among the right and the left spine of henle. Wilcoxon signed rank test was used. The mean and standard deviation are given in the table below. There is no significant difference between right length and the left length of the spine of henle. The significant value is 0.575, the p value is more than 0.05, so statistically it is not significant.

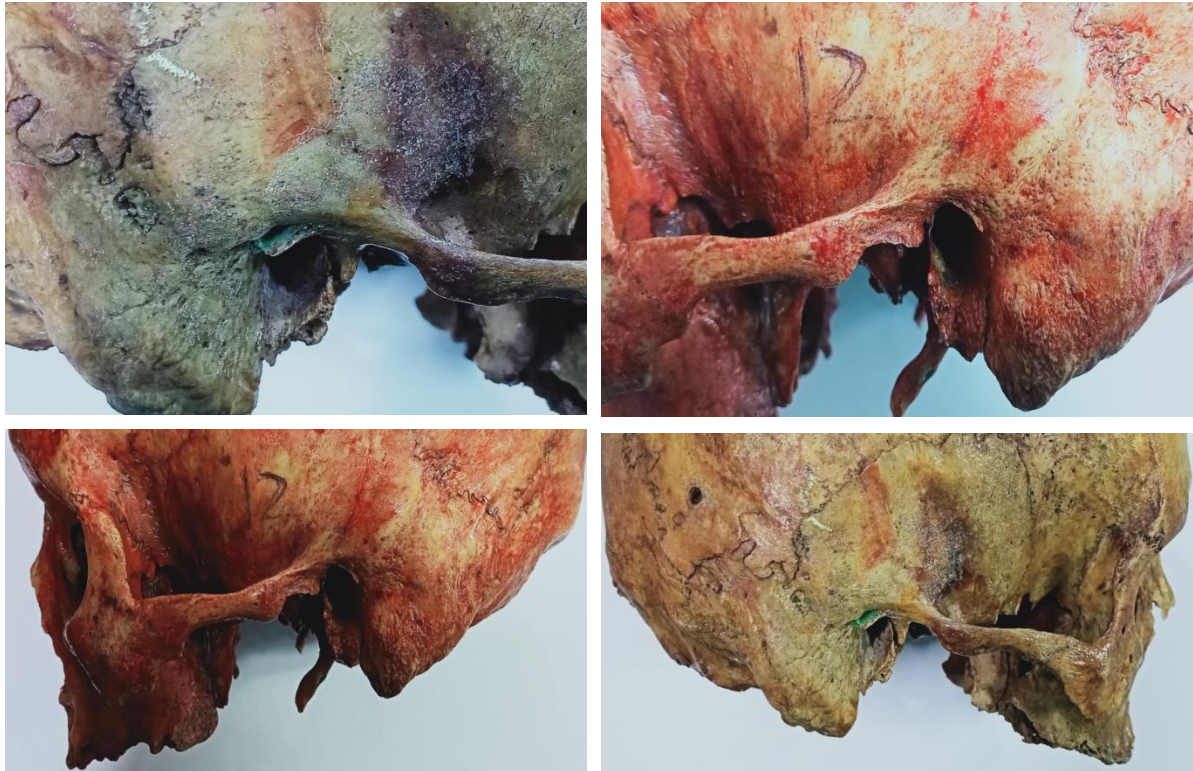


Figure 1: Photographs showing the various forms of suprameatal spine in skull.

PARAMETERS	MINIMUM	MAXIMUM	MEAN	STANDARD DEVIATION	SIGNIFICANCE (p value)
RIGHT LENGTH	4.00	6.37	5.4470	0.69714	0.575
LEFT LENGTH	4.82	6.21	5.5700	0.51668	

Table 1: The minimum and maximum values of right and left length of the suprameatal spine and the mean and standard deviation values of right and left length of the spine. All the values are expressed as Mean \pm Standard Deviation.

Discussion

In other study 363 males and 231 females skulls are used to study the type of suprameatal spines and depressions. They have used to differentiable the sex of the population with the henle's spine. In other study, the average length between spine and external acoustic meatus, distance between spine and internal acoustic measures are calculated and compared to find the landmarks which will be useful for the otologic surgeon to perform procedures and to locate anatomical positions.

In the previous article, distance between henle's spine to foramina ovale, foramina spinosum, foramina lacerum and carotid canal was mentioned. In this the right lateral side and left lateral side, the lateral margin of the carotid canal, then the distance from henle's spine was shown to be significant (10).

In another article 92 specimens from 46 cadaver were studied, 2 imaginary lines were mentioned (6). All their studies have found the distance between from the henle's spine to other anatomical position, they have mentioned about angle, sex differentiation with suprameatal spine (9). In this study the length of spine has been measured and studied for the south Indian population for the clinical implications and surgical uses.

This study says that there is no difference in the length of the suprameatal spine on the right and the left side of the temporal bone. This will be of clinical significance when the neurosurgeon or otologic surgeon deals with the temporal bone. No other studies have measured the length of the spine hence this study is more focused on the length of spine that is of clinical importance.

Limitation of the study

The limitation of the study is finding and damaging the henle's spine. Only a few specimens were chosen. It is done only in the south Indian population and that too in a specific geographic area.

Future scope

The study has to be done in more places with a variety of skulls, it has to be done in freshly taken skulls to find and damage henle's spine. The supra-meatal approach is a replaceable technique for inner ear implantation of cochlea. The mastoidectomy is not necessary whereas the procedures are done with the henle's spine as a guide or an anatomical landmark (31). Another study has examined the advantages and disadvantages of suprameatal approach (32). In previous studies, the distance from incus to tympani, foramen are all measured to study the parameters of temporal bone to add up information in cochlear implantation (33) (34) (34,35).

Conclusion

There is no much significant variation among right and left length of henle's spine on mastoid of temporal region in south indian population. The length of the spine is studied hence it will be of clinical importance. It will add up information to the surgeon on the anatomical position of henle's spine on right and left side of temporal bones.

AUTHOR CONTRIBUTIONS

Author 1: Jagadheeswari Ramamoorthy, 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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