



Morphometric Study of the Mastoid Process and Notch in Dry Human Skulls

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

Introduction: Mastoid process is a pyramidal bony projection. It is located in the posterior inferior region of the temporal bone. Mastoid notch is on the medial side of the mastoid process. Clinical significance causing infection of the middle ear could spread to the mastoid area causing mastoiditis. The aim of the study is to determine the morphometric and morphological analysis of mastoid process and mastoid notch in dry human skull and their clinical implication.

Materials and Methods: The present study was taken from the department of Anatomy in Saveetha Dental College and Hospital by taking 72 dry human skulls. Digital vernier caliper was used to measure the mastoid process and mastoid notch of different parameters. The data was measured and analyzed statistically, using paired sample 't' tests.

Results: The present study shows 0.641 significance in the right and left length of the mastoid process which is not significant. Right breadth and left breadth of the mastoid process of 0.007 and mastoid notch of right and left length 0.00 are significant.

Conclusion: It concludes that the mastoid process and mastoid notch have varied significant differences in the dry human skulls. This study will be helpful in mastoid surgeries.

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Keywords: Skull bones; temporal bone; mastoid process; mastoid notch; sex differentiation.

1. INTRODUCTION

The posterior part of the temporal bone is the mastoid. The conical projection of the mastoid bone is the mastoid process. Behind the external acoustic meatus the mastoid process is located. The parietomastoid and occipitomastoid sutures articulate the parietal and occipital bones with the mastoid temporal bone. The mastoid bone is fused with the descending process of the squamous temporal bone inferior to the supramastoid crest. It has a rough outer surface and it has grooves and a notch on the inner side [1]. The phenotypic difference between the male and female is found in the mastoid process and it is unrhythmic [2]. It is the most secured part because of its anatomical position at basolateral [3]. Mastoid region always helps in the determination of the sex [4]. The median region that has a deep groove of the mastoid process is the mastoid notch [5]. It acts as a potential landmark for locating the sigmoid sinus junction. The clinical implication of this mastoid process is mastoiditis, which is caused by middle ear infection and it gives damage to the mastoid bone [6].

Previous studies show that mastoid process helps in the determination of the sex [7]. Mastoid process determines the shape variation of male and female [8]. Ideally in the mastoid process the male skull is larger than the female skull [9]. On the basis of discriminant function analysis the sex was determined by mastoid process [10]. Morphometry and morphology of mastoid process and mastoid notch are needed to find any anatomical variations as there is less number of work done in South India on this topic.

Our team has extensive knowledge and research experience that has been translated into high quality publications [11-30]. The main aim of the study was to determine the morphological and morphometric analysis of mastoid process and mastoid notch in dry human skulls and its clinical implications.

2. MATERIALS AND METHODS

The study was performed in 72 dry human skulls taken from the department of Anatomy in Saveetha Dental College and Hospitals, Chennai. Pros of the study is 72 dry human skulls are examined and the skulls which were damaged or deformed were excluded from the study. Investigator and Principal investigator are the people involved in this study. Minimize sampling bias is Random sampling. With the help of the digital vernier caliper it was used to measure the length and breadth of the right and left side of the skull in the mastoid process and the length of the right and left side of the skull in the mastoid processes and mastoid notches. All the data measurements were analyzed statistically using SPSS version 23.0, using paired sample 't' tests.

3. RESULTS

The morphological and morphometric analysis of mastoid process and mastoid notch was found and analysed. The mean right length of the mastoid process was 31.34 mm \pm 0.37 mm. The mean right breadth of the mastoid process was 16.54 mm \pm 1.65 mm. The mean left length of the mastoid process was 32.46 mm \pm 1.31 mm. The mean left breadth of the mastoid process was 16.08 mm \pm 0.99.

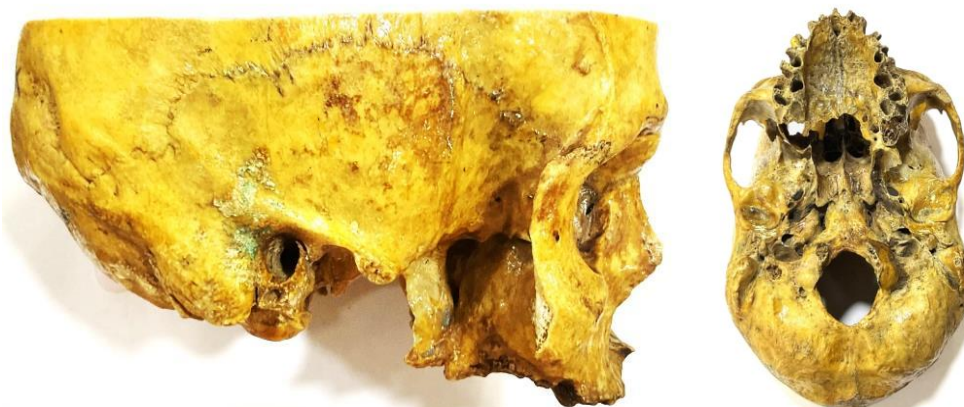


Fig. 1. Showing the mastoid process and mastoid notch in the skull

Table 1. Shows the comparison between the right and left dimensions of mastoid process and mastoid notch. $p < 0.05$ considered statistically significant

Pairs	Significance
Pair 1 - Right length and left length of mastoid process	0.641
Pair 2 - Right breadth and left breadth of mastoid process	0.007
Pair 3 - Right and left mastoid notch	0.00

4. DISCUSSION

The results of this study showed that the right and left length of the mastoid process is not significant whereas the right and left breadth of the mastoid process is significant. The right and left mastoid notch is significant.

In the study of Chinna Nneka, the length of the right mastoid process has [had] a maximum of 32.50mm and minimum of 24.38 mm. In the left length of the mastoid process it has a maximum of 31.84 mm and a minimum of 29.29mm [31]. whereas in the current study it has a maximum of 31.76mm and a minimum of 30.90mm on the right side while 33.64mm and 30.06mm respectively on the left side, 31.76mm this study it is about 31.76mm of maximum and minimum of 30.90mm in the right length and maximum of 33.64mm and minimum of 30.06mm in the left length. When comparing the significance of right length and left length are significant at $p < 0.05$ whereas in this study it is $p > 0.05$ which is not significant.

In the study of Fatma Alzhraa, the mastoid process length had a statistically highly significant difference of $p < 0.001$ [32] which was larger in males than females whereas in this study the mastoid process length was $p > 0.05$ which is not significant in this case. In the study of Harsha Bhayya, the right and left length mastoid processes had mean values of 31.48mm and 30.92mm. From the right and left breadth of mastoid process had a mean value of 13.80mm and 13.60mm [33]; the length of the mastoid process is the best predictor for determination of sex. From this study the mean value of the right and left lengths of the mastoid processes is 31.34mm and 32.46mm, respectively. From the right and left breadths of the mastoid process has a mean of 16.54mm and 16.08 mm respectively in which the length is almost the same but the breadth is higher in this case.

In the study of Rajeev Kumar Chaudhary, The mean of mastoid length of the mastoid process

was 27.50mm and the mean of mastoid process breadth was 10.63mm [34] which was much lesser when compared to this study of mean length 32.40mm and mean breadth of 16.08mm. The previous study has a significance of $p < 0.001$ for both length and breadth but in the case of this study the significance of right length $p > 0.05$ which is not significant and right breadth with $p < 0.05$ which is significant. In the study of Maryna S, the mastoid length showed a statistical difference of $p < 0.05$ which was significant [35] but from this study the mastoid process length was $p > 0.05$ which is not significant.

5. LIMITATIONS OF THE STUDY

The limitation of this study is that there were few dry human skulls. The study was conducted and completed in a very short time.

6. FUTURE SCOPE

Further studies can be done with many more dry human skulls so more significant results would have been obtained.

7. CONCLUSION

The present study concludes that there is no difference in the mastoid process significance of both the right and left side of the skull but there is a difference in the mastoid notch of both the right and left side of the skull. Mastoid surgeries are needed to be handled carefully.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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