

**SEX DETERMINATION BY MASTOID PROCESS IN SOUTH INDIAN POPULATION BY 3D
COMPUTER TOMOGRAPHY IMAGING****Suresh sukumar^{1*}, Sushil Yadav², Vipinkumar G³**^{1*} Assistant professor, MSc. Medical Imaging Technology, Department of Medical Imaging Technology, Manipal College of Allied Health Sciences, Manipal University, Manipal.² Assistant professor, Department of Medical Imaging Technology, Manipal College of Allied Health Sciences, Manipal University, Manipal.³ MSc. Medical Imaging Technology, Department of Medical Imaging Technology, Manipal College of Allied Health Sciences, Manipal University, Manipal.*Corresponding Author Email: suresh.medicalimaging@gmail.com**ABSTRACT**

Aim: The purpose of this study was to evaluate the significance for sex determination of the measurement of the area formed by projection of 3 craniometric points related to the mastoid process: the porion, asterion, and mastoidale points of 3D reconstructed computer tomography of skull. **Method:** 3D reconstructed computer tomography of 30 males and 30 females were analyzed. The three craniometric points were located and marked on both side of the 3D skull and the measurement was done by advanced post processing techniques. The area of mastoid triangle was calculated by means of the Heron's formula. Total area calculated was done by adding the areas (mm²) obtained on each side. **Result:** From this study the areas of the male Mastoid is 828.532±118.54 which is greater than female Mastoid which is 577.502±71.22 (t test value 9.943 and P Value 001). **Conclusion:** The area of the mastoid triangle measured by 3D reconstructed computer tomography of skull can be used to determine the sex of the skull but the determination of sex can be better confined if the studies are carried out with greater number of samples.

KEY WORDS

3D reconstructed computer tomography, Sex determination, Mastoid process.

INTRODUCTION

In the skull, the temporal bone is highly resistant to physical damage; thus it is commonly found as remainder in skeletons that are very old; of this, the petrous portion has been described as important for sex determination (Kalmey & Rathbun, 1996). Paiva & Segre (2003) introduced a easy technique for sex determination starting from the temporal bone, with a small observational error and with a high predictability degree. The technique is based on the triangular area calculation obtained between the point's porion,

mastoidale, and asterion, measured from xerographic copy of skulls. They found significant differences in the area between the right and left mastoid triangle when comparing male and female skulls, but owing to the asymmetries present in the skulls, it is recommended to observe the value of the total area (adding right and left sides), which was also significant, so that when it is higher than or equal to 1447.40 mm², the skull is diagnosed as male skull, and a value near to 1260.36 mm² or less is indicative of female skull (De Paiva & Segre). The present study is aimed at describing

radiological methods identification sex of skull by 3D computer tomography image.

OBJECTIVE

The purpose of this study was to evaluate the significance for sex determination of the measurement of the area formed by projection of 3 craniometric points related to the mastoid process: the porion, asterion, and mastoidale points of 3D reconstructed computer tomography of skull.

METHOD

3D reconstructed computer tomography of 30 males and 30 females were analyzed. The three

craniometric points were located and marked on both side of the 3D skull and the measurement was done by advanced post processing techniques. The area of mastoid triangle was calculated by means of the Heron's formula. Total area calculated was done by adding the areas (mm^2) obtained on each side.

RESULT

From this study the areas of the male Mastoid is 828.532 ± 118.54 which is greater than female Mastoid which is 577.502 ± 71.22 (t-test value 9.943 and P Value 001).

| Measurement | | gender | N | Mean | S.D | t value | P value |
|------------------------|---------|--------|----|---------|--------|---------|---------|
| 3D computer Tomography | Mastoid | male | 30 | 828.532 | 118.54 | 9.943 | 0.001 |
| | Value | female | 30 | 577.502 | 71.22 | | |

Table – 1:- The areas of male and female mastoid using 3D computer Tomography imaging

DISCUSSION

The analysis of the mastoid process characteristics is important in the determination of sex for forensic purposes. The mastoid region used in this study, being a part of the temporal bone, is recognized as being the most protected and resistant to damage, due to its anatomical position at the base of the skull. This has been demonstrated by Kloiber (1953), Wells (1960), Schaefer (1961), Gejval (1963), and Spence (1967), as cited by Wahl and Henke¹⁰ (1980) According to Paiva & Segre (2003), When it is higher than or equal to 1447.40 mm^2 , the skull is recognized as male skull and When the total area was lower than or equal to 1260.36 mm^2 , the skull is recognized as female skull. From our study the areas of the male Mastoid is 828.532 ± 118.54 which is greater than female Mastoid which is 577.502 ± 71.22 (t test value 9.943 and P Value 001).

CONCLUSION

The area of the mastoid triangle measured by 3D reconstructed computer tomography of skull can be used to determine the sex of the skull but the determination of sex can be better confined if the studies are carried out with greater number of samples.

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