

Morphometric Computed Tomography Study of the Mastoid Process and Its Role in Sex Differentiation

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The mastoid process plays a significant role in forensic science, medicine, and anthropology. This study addresses a gap in the literature regarding the use of computed tomography (CT) for morphometric analysis of the mastoid process in sex determination within a specific population. To examine morphometric differences in the mastoid process between males and females, to evaluate the relationship and prevalence patterns of the measured parameters of the mastoid process and to analyze the differences between the measurements of the right and left mastoid processes in males and females. This retrospective study was conducted using 177 samples of CT brain scans (88 male and 89 female) from the National Hospital Kandy and the Teaching Hospital Peradeniya. Morphometric parameters including true mastoid height, oblique sagittal diameter, oblique coronal diameter, and volume of mastoid process were measured using the RadiAnt DICOM viewer version 2024.1. Statistical analysis of the morphometric differences and correlations with sex was performed using IBM SPSS statistics version 30.0. All recorded parameters were higher in males. The volume of the mastoid process was the most significant parameter for sex determination, showing 70.6% accuracy using CHAID model analysis, with higher accuracy in females (87.6%) than in males (53.4%). Asymmetry between the right and left sides was observed and was significant in males but not in females. CT-based morphometry of the mastoid process has potential for sex estimation. The volume of the mastoid process is the most useful morphometric parameter for sex differentiation. Population-specific data are required and further research using a larger sample and with more advanced modalities is justified for improved accuracy.

Keywords: Mastoid process, sexual dimorphism, computed tomography, morphometry