

*Estimation of Gender and Age
Using Spiral CT Scanning
of Maxillary Sinuses and
Foramen Magnum*

A thesis

*Submitted to the council of the College of Dentistry
at the University of Baghdad in Partial Fulfillment
of the Requirements for the Degree of Master of
Science in Oral and Maxillo Facial Radiology*

**By
Jalal Fadhil Abbas
B.D.S**

**Supervised by
Assistant Professor
Dr. Asmaa Tahseen Uthman
B.D.S., M.Sc.
Iraq – Baghdad**

2008 AB

1429 AH

Abstract

Background: Identification of skeletal and decomposing human remains is one of the most difficult skills in forensic medicine. Gender estimation is also an important problem in the identification. If almost all the bones composing the skeleton are present, gender estimation is not difficult, as it can be determined with 100% accuracy. This estimation rate is 98% in existence of pelvis and cranium, 95% with only pelvis or pelvis and long bones, and 80–90% with only long bones. However, in explosions, warfares and, other mass disasters like aircraft crash, identification and gender determination are not very easy.

The aim of the study: This study was undertaken to Predict gender and age from CT measurements of maxillary sinuses, foramen magnum and other craniometric measurements by discriminant analysis.

Material and Method: This study included 88 patients (45 females and 43 males) who were admitted to the radiology clinic of Al-Sadr teaching hospital in Al-Najaf city to have CT (Siemens Somatom Emotion spiral CT scanner) of the brain and paranasal sinuses between 1st October 2007 and 30th march 2008. The present study included patients who had complaints of headaches, with the suspicion of sinusitis, in whom no pathological findings were detected. The width, length and height of the maxillary sinuses with the total distance across both sinuses, sagittal and transverse diameters, circumference and area of the foramen magnum with head width were measured with the help of the measurement equipment on the CT scan as the measurement technique, and head circumference was measured using a standard flexible tape. All patients were in supine position and all scans were performed in the axial plane and the scan angle was parallel to the skull base (the same protocol for brain CT) without sedation or contrast medium. The data were subjected to a discriminative analysis using the SPSS package program (Version 13).

Results: The discriminative analysis showed that the accuracy of maxillary sinus measurements—i.e. the ability of the maxillary sinus size to identify gender was 73.3% in females and 74.4% in males, with overall accuracy rate 73.9%. The accuracy rate of gender determination from foramen magnum measurements was 62.2% in females and 76.7% in males, with overall accuracy rate 69.3%. The discriminant analysis of all variables used in this study provided the highest accuracy of correct gender classification 86.7% in females and 81.4% in males, with overall accuracy rate 84.1%, while age showed non-statistical difference among the studied age groups.

Conclusion: Computerized Tomography measurements of the maxillary sinuses may be useful to support gender determination in forensic radiology. Adding foramen magnum and craniometric measurements to the maxillary sinus measurements can significantly improve accuracy of gender determination by discriminant analysis.