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Symmetry of zygomatic bone through 3D segmentation on CT-scan and “mirroring” procedure: a novel approach for reconstructive maxillofacial surgery

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Zygomatic bones are among those most frequently fractured facial bones [1]: symmetry is the golden standard for a correct restoration of zygomatic shape, but literature is divided about the best method for its quantification. Also, no information about the actual 3D symmetry of this bone in healthy subjects is available. This study aims at exposing an innovative approach for the assessment of zygomatic symmetry through 3D surface analysis.

One hundred patients (50 males and 50 females) were selected from the CT-scans database from a Northern Italy hospital. Zygomatic bones from each patient were segmented, the left bone was automatically mirrored according to the sagittal plane and registered on the right one according to the least point-to-point distance between the two surfaces. Mean and RMS (root mean square) distance between the two models was then calculated. Possible statistically significant differences according to sex and age groups were assessed respectively through two-way ANOVA test ($p < 0.05$).

Repeatability of RMS measurements was 79%, with a technical error of 4.3%. Overall mean and RMS point-to-point distances were respectively 0.01 mm and 0.84 mm, without statistically significant differences according to sex or age group ($p > 0.05$).

This study first provides an overall assessment of symmetry of zygomatic bone, based on surface analysis: results may provide a useful indication for the reconstruction of zygomatic bones in maxillofacial surgery.

References

- [1] Covington DS, et al., Changing patterns in the epidemiology and treatment of zygoma fractures: 10-year review, *J Trauma* 1994;37:243

Keywords

Anatomy, zygomatic bone, radiology, maxillofacial surgery, CT scan