The effect of scan parameters on cone beam CT trabecular bone microstructural measurements of the human mandible

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Abstract

The objective of this study was to investigate the effect of different cone beam CT scan parameters on trabecular bone microstructure measurements. A human mandibular cadaver was scanned using a cone beam CT (3D Accuitomo 170, J Morita, Kyoto, Japan). 29 cone beam CT images were obtained using 5 different fields of view (4×4 cm, 6×6 cm, 8×8 cm, 10×10 cm and 10×5 cm), 2 types of rotation steps (180° and 360°) and 2 scanning resolutions (standard and high). Image analysis software was used to assess the trabecular bone microstructural parameters (number, thickness and spacing). All parameters were measured twice by one trained observer. Intraclass correlation coefficients showed high intraclass observer reliability (intraclass correlation coefficient, 0.95–0.97) in all parameters across all tested scan parameters. Trabecular bone microstructural measurements varied significantly, especially in smaller fields of view (p < 0.001). There was no significant difference in the trabecular parameters when using different resolutions (number, p = 0.998; thickness, p = 0.996; spacing, p = 0.831) and rotation steps (number, p = 1.000; thickness, p = 0.954; spacing, p = 0.759). The scan field of view significantly influences the trabecular bone microstructure measurements. Rotation steps (180° or 360°) and resolution (standard or high) selections are not relevant.

Keywords: CONE BEAM CT, TRABECULAR BONE, DIAGNOSTIC IMAGING, SCANNING PARAMETER