

Effect of reconstruction parameters on cone beam CT trabecular bone microstructure quantification in sheep

ABSTRACT

Background: Cone Beam Computed Tomography (CBCT) is a reliable radiographic modality to assess trabecular bone microarchitecture. The aim of this study was to determine the effect of CBCT image reconstruction parameters, namely, the threshold value and reconstruction voxel size, on trabecular bone microstructure assessment. Methods: Five sectioned maxilla of adult Dorper male sheep were scanned using a CBCT system with a resolution of 76 μm^3 (Kodak 9000). The CBCT images were reconstructed using different reconstruction parameters and analysed. The effect of reconstruction voxel size (76, 100 and 200 μm^3) and threshold values ($\pm 15\%$ from the global threshold value) on trabecular bone microstructure measurement was assessed using image analysis software (CT analyser version 1.15). Results: There was no significant difference in trabecular bone microstructure measurement between the reconstruction voxel sizes, but a significant difference (Tb.N = 0.03, Tb.Sp = 0.04, Tb.Th = 0.01, BV/TV = 0.00) was apparent when the global threshold value was decreased by 15%. Conclusions: Trabecular bone microstructure measurements are not compromised by changing the CBCT reconstruction voxel size. However, measurements can be affected when applying a threshold value of less than 15% of the recommended global value.

Keyword: CBCT; Trabecular bone; Reconstruction parameters; Threshold value