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Effect of cone-beam computed tomography voxel size on detection of vertical periodontal bone defects

Abstract:

Objectives: Finding the best voxel size for the detection of vertical periodontal bone defects with

minimum patient radiation dose is a priority. This study sought to assess the effect of cone beam

computed tomography (CBCT) voxel size on the detection of vertical bone defects.


Materials and Methods: In this in vitro, experimental study, 31 vertical defects including 2 one-wall, 12 two-wall, and 17 three-wall defects were randomly created in the maxilla and mandible of four sheep skulls with the associated soft tissue using round and needle burs. Forty sound sites were considered as the control group. The CBCT scans were obtained from the skulls with 0.150 and 0.300 mm³ voxel sizes and 8 x 11 cm² field of view (FOV). The images were randomly evaluated by two oral and maxillofacial radiologists and two periodontists, and their findings were recorded. The inter-rater observer agreement (weighted kappa), sensitivity and specificity values were calculated for each voxel size. Comparisons were made using paired t-test.

Results: The two voxel sizes had no significant difference in detecting one-wall and two-wall defects ($P > 0.05$). But the smaller voxel size was significantly superior for detecting three-wall defects ($P = 0.001$). The inter-rater observer agreement was unfavorable ($\text{kappa} < 0.6$) for the detection of all three defect types.

Conclusion: In general, increasing the image resolution by decreasing the voxel size increased the sensitivity and reduced the specificity of CBCT for detection of vertical bone defects, and is only recommended for detection of three-wall defects.

Biography

Dr. Eftekhar studied General Dentistry at Tehran University of medical sciences, Tehran, Iran for almost 6 and a half years and graduated as a general dentist in 2020. She received her doctoral degree on the 5th of August 2020 at the same institution. She is interested in the field of periodontology and surgery and has done some researches in this field.



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