

Title

Horizontal and vertical deep subgingival margins with an intraoral scanner: Three-dimensional evaluation and accuracy

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Purpose. The purpose of the present study was to evaluate the accuracy of an intraoral scanner (IOS Medit i700) on tooth abutments with vertical and horizontal tooth-preparation designs, at different depths below the gingival margin, and to determine if the IOS can detect the surface beyond the finish area of these preparation geometries.

Materials and methods. Four abutments of a standard maxillary first molar were designed using CAD software with vertical and horizontal preparation geometries 1 and 2 mm deep below the gingival margin. These abutments were printed in resin and placed each on a reference model. Ten scans were made with the IOS on these preparation geometries to obtain 4 experimental groups. The experimental scans were named V-1 (vertical preparation at 1 mm from the gingival margin), V-2 (same at 2 mm), H-1 (horizontal at 1 mm) and H-2 (horizontal at 2 mm).

The scans were analyzed using a dedicated software to evaluate trueness and precision in μm . Descriptive statistics (95% C.I.), power analysis, and Kruskal-Wallis test were conducted to analyze differences among groups ($\alpha=.05$).

Results. Statistically significant differences were found for the trueness between V-2 and H-2 ($p=.010$). As regards the precision, significant differences were found between H-1 and H-2 ($p=.042$).

Conclusions. Only vertical preparation designs allow to detect the surface beyond the finish area with IOS. Moreover, the mean accuracy values were clinically acceptable at both 1 and 2 mm below the gingival margin for each tested tooth preparations geometries.

Keywords

intraoral scanner; ios; accuracy; trueness; precision; tooth preparation; horizontal preparation; vertical preparation; digital dentistry; cad-cam