

In Vitro Comparison of Diagnostic Accuracy of DIAGNOdent and Digital Radiography for Detection of Secondary Proximal Caries Adjacent to Composite Restorations

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Background and Objectives: Early detection of secondary proximal caries is critical for preservation of tooth vitality. This study sought to assess and compare the diagnostic accuracy of DIAGNOdent and digital radiography for detection of secondary proximal caries adjacent to composite restorations.

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Materials and Methods: Sixty extracted molars including 30 teeth with carious lesions and 30 sound teeth were randomly selected. Class II cavities were prepared in all teeth and carious dentin was intentionally left in the gingival floor of cavities in 30 carious teeth. All cavities were restored with composite resin. The teeth were mounted in wax blocks (three teeth per block) and examined for caries using DIAGNOdent (kaVo Dental, Biberach, Germany). Digital radiographs using DIGORA Photostimulable Phosphor plates (PSP) (Soredex Corporation, Helsinki, Finland) were obtained from all teeth using the parallel technique and were evaluated by four observers. Repeated measure ANOVA was applied to calculate sensitivity and specificity values of the two diagnostic techniques. Receiver operating characteristic (ROC) curve was plotted for DIAGNOdent results and based on that, the cutoff points were determined.

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Results: The sensitivity and specificity values at the cut-off point of 10.5 were 0.622 ± 0.038 and 0.822 ± 0.077 for DIAGNOdent and 0.591 ± 0.093 and 0.891 ± 0.083 for digital radiography, respectively. The area under the ROC curve was 0.7 for DIAGNOdent. Weighted kappa revealed moderate to almost perfect intra-observer agreement (0.46-0.99). Intraclass correlation coefficient (ICC) for DIAGNOdent was calculated to be 0.88.

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Conclusion: No statistically significant difference was noted in diagnostic accuracy of DIAGNOdent and digital radiography for detection of secondary proximal caries adjacent to composite restorations. Thus, DIAGNOdent may be used as an adjunct diagnostic tool for detection of secondary proximal caries beneath composite restorations.