

Radiographic Evaluation of the Marginal Adaptation of Lithium Disilicate Crowns Using Seven Different Vertical Angulations

Abstract

Objectives: To evaluate how different vertical angulation with X-rays affects the detection of different marginal discrepancies assessment with radiographs.

Materials and Methods: 21 lithium disilicate crowns were fabricated on 3 prepared extracted human teeth (premolar, canine, and central incisor) and imaged using 7 different vertical angulations (-10°, 0°, 5°, 10°, 15°, 20°, 25°) between the CEJ (cemento-enamel junction) and the BID (beam indicating device). Intentional marginal discrepancies ranging from 0 to 300µm were created. Radiographic images were assessed by 30 evaluators and marginal discrepancy scores were given (5 = present, 4 = probably present, 3 = uncertain, 2 = probably absent, 1 = absent). Scores given for each marginal adaptation for each image/ angulation were assessed statistically.

Results: The ability to accurately assess marginal discrepancies by the study variables of angulation, tooth type, and marginal discrepancy was significant ($P < 0.001$). Angulations -10 degrees to 10 degrees were rated as 'probably present', while angulations 15 through 25 degrees were rated as 'probably absent' (Spearman Rank = .521, $P < .001$).

Conclusions: The radiographic interpretation of the marginal discrepancies of lithium disilicate crowns is significantly affected by the vertical angulation of the X-ray beam and the dimension of the marginal discrepancy. Caution should be used when evaluating crowns with vertical angulation more than 10 degrees.

Contact: Mathew T. Kattadiyil, BDS, MDS, MS, mkattadiyil@llu.edu