

Publication

Evaluating tooth restorations: Micro computed tomography in practical training for students in dentistry

JournalArticle (Originalarbeit in einer wissenschaftlichen Zeitschrift)**ID** 1192818**Author(s)** Deyhle, Hans; Schmidli, Fredy; Krastl, Gabriel; Mueller, Bert**Author(s) at UniBasel** Müller, Bert ;**Year** 2010**Title** Evaluating tooth restorations: Micro computed tomography in practical training for students in dentistry**Journal** Proceedings of SPIE**Volume** 7804**Pages / Article-Number** 780417**Keywords** composite polymers, inlay, tooth, micro computed tomography, defect analysis, tooth restoration, dental education

Direct composite fillings belong to widespread tooth restoration techniques in dental medicine. The procedure consists of successive steps, which include etching of the prepared tooth surface, bonding and placement of composite in incrementally built up layers. Durability and lifespan of the composite inlays strongly depend on the accurate completion of the individual steps to be also realized by students in dental medicine. Improper handling or nonconformity in the bonding procedure often lead to air enclosures (bubbles) as well as to significant gaps between the composite layers or at the margins of the restoration. Traditionally one analyzes the quality of the restoration cutting the tooth in an arbitrarily selected plane and inspecting this plane by conventional optical microscopy. Although the precision of this established method is satisfactory, it is restricted to the selected two-dimensional plane. Rather simple micro computed tomography (mu CT) systems, such as SkyScan 1174 (TM), allows for the non-destructive three-dimensional imaging of restored teeth ex vivo and virtually cutting the tomographic data in any desired direction, offering a powerful tool for inspection of the restored tooth with micrometer resolution before cutting and thus also to select a two-dimensional plane with potential defects. In order to study the influence of the individual steps on the resulted tooth restoration, direct composite fillings were placed in mod cavities of extracted teeth. After etching, an adhesive was applied in half of the specimens. From the tomographic datasets, it becomes clear that gaps occur more frequently when bonding is omitted. The visualization of air enclosures offers to determine the probability to find a micrometer-sized defect using an arbitrarily selected cutting plane for inspection.

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