OP-9

Stress Distribution of Posterior CAD/CAM Three-Unit Implant-Supported Fixed Partial Dentures (FPDs) Fabricated with Different Esthetic Materials

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ABSTRACT

PURPOSE: High esthetic demands and advancements in CAD/CAM technologies have increased the popularity of esthetic materials to be used as implant supported FPDs that can withstand high stress occlusal loading. The aim of this study was to investigate the effect of various force modules, simulating the functional occlusal contact, on stress distribution through a three-unit implant-supported FPD fabricated with different esthetic materials. **MATERIALS & METHODS:** For FEA study, 3D model of fully assembled implant-supported three-unit FPD including supporting tissue were prepared. FPD models, fabricated with CAD/CAM design software from one design file, were divided into four groups: PEKK+CR; PEKK+LD; zirconia+FA; and monolithic zirconia. In monolithic zirconia, there is additional model with SAH. The STL file for implant, abutment and screw were provided by the implant company. The mandibular cortical and cancellous model was fabricated from CBCT image of a patient. Mesh generation and data processing were carried out using ANSYS 7 (ANSYS Inc, USA). An 800 N load was applied to the center of pontic in 0°,15°,35° to the occlusal plane. Loading conditions, single tooth loading and simultaneous loading, were also applied. **RESULTS:** FPD fabricated with PEKK framework showed reduced stress in the framework compared to zirconia framework or monolithic zirconia. Stress in monolithic zirconia without SAH is lower than with SAH. Single teeth loading: stress at premolar>1st molar>2nd molar. There is increased stress with higher angle of loading. **CONCLUSIONS:** Oblique loading will increase risk of failure in the implant components. The use of PEKK materials showed reduced stress in the PEKK framework regardless of the point of loading and axial or oblique load. In fabricating monolithic zirconia with SAH, more attention is needed in selecting the abutment materials and size. All groups showed small amount of stress that reach the bone supporting the implants.

Keywords: Implant-Supported Dentures, CAD/CAM, stress distribution