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RESEARCH

AN EVALUATION OF STRAIN IN THE RETAINERS OF FIXED-FIXED RESIN BONDED BRIDGES

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Aims and Objectives This investigation was designed to determine the strains present in the metal frameworks of fixed-fixed resin bonded bridgework when loaded *in vitro*.

Materials and Methods Three NiCr alloy resin bonded bridges of varying retainer thickness (0.5, 0.7 and 0.9mm) were fabricated using a lift off technique from a master abutment jig. Linear pattern strain gauges were bonded to the retainers orientated in the circumferential direction in close approximation to the connector. A resin based cement, Panavia™ F 2.0 was used cement the bridges which were subjected to static loads (50, 100, 150, 200, 250 and 300N) applied at an angle of 45 degrees to the upper surface of the pontic using an Instron universal testing machine. Microstrain measurements were made using amplifiers with the strain gauges attached to a wheatstone bridge circuit. Each bridge was cemented and tested 5 times. Identical tests were also applied to bridges that were seated on the abutments but not cemented.

Results and Discussion The strains recorded for the cemented bridges were compressive in nature and decreased in magnitude with increasing retainer thickness. There was a generally linear increase in microstrain with increase load. The decreases in microstrain with increasing retainer thickness were statistically significant ($p<0.05$). For the bridges that were not cemented, the microstrains recorded were tensile for all bridges and the results less linear.

Conclusions The strain gauges were sensitive to their position and their orientation. Thicker retainers resulted in lower levels of microstrain: this should enhance the frameworks resistance to distortion and reduce the magnitude of stress concentration within the cement lute. Understanding the stress-strain behaviour of resin bonded bridge frameworks would allow for better design to minimize the chances of a retainer debonding.