

Comparison of fracture patterns and resistance of endodontically treated molars, restored with lithium disilicate or composite overlays and endocrowns

Objectives: Besides the conventional crown, which demands invasive tooth preparation, overlay and endocrown allows a less invasive approach to cover weakened tooth cusps, avoiding catastrophic tooth fracture. The aim of this study was to evaluate the fracture resistance and fracture patterns of endodontically treated molar teeth, restored with ceramic and composite overlays and endocrowns.

Materials and methods: In this prospective cross-sectional in vitro study 40 extracted human molars were included (An Ethics approval Nr. 22-2/94/2021). Teeth were divided into 4 groups: composite core build up with pressed lithium disilicate overlay (n=10); composite core build up with milled composite overlay (n=10); pressed lithium disilicate endocrown without composite build up (n=10); milled composite endocrown without composite build up (n=10). According to a certain treatment protocol for each group the following treatment was performed: root canal treatment, composite core build up (if necessary), tooth preparation, cementation of restorations. Then the specimens underwent thermocycling (10000 cycles, 5^o-55^o C) for 7 days, mechanical cyclic loading (0-50 N, 1.6 Hz, 600000 cycles in 10^o slope) for 7 days, and again thermocycling as described before. After preloading, the specimens were subjected to a fracture strength test (5 mm steel ball, 10^o inclination, load rate 0.5 mm/min).

Results: All the specimens fractured after mechanical loading (fracture of restoration, n=14 ; fracture of tooth, n=26). Teeth restored with both material overlays did not have fractures escalating from restoration to enamel, dentin and cement simultaneously. Catastrophic tooth fractures were seen in teeth restored with both material endocrowns.

Conclusions: Teeth restored with endocrowns presented catastrophic fracture patterns therefore could not be restorable. Teeth restored with overlays and especially lithium disilicate overlays are the best choice for restoring endodontically treated molars.