

## POSTER

### Resistance to load and marginal quality of composite CAD/CAM endocrowns with and without margin relocation

Area: Computer Assisted Technology, Biomechanics, Imaging and Diagnostic Systems

University/Department:

University of Trieste/University Clinical Department of Medical, Surgical and Health Sciences

Authors:

Angerame D, De Biasi M, Lenhardt M\*, Moratti M, Marchesi G.

Presenter:

Dott. Lenhardt Massimiliano

Objective:

To evaluate the influence of the margin relocation on the resistance to load and marginal quality of molar teeth restored with composite endocrowns obtained via computer-aided-design/computer-aided-manufacturing (CAD/CAM) processes.

Materials:

Sixteen maxillary third molars were axially sectioned with a cylindrical diamond bur 2 mm coronal to the cemento-enamel junction. After endodontic access cavity preparation, the canal system of each tooth was mechanically instrumented with Mtwo nickel-titanium rotary files and filled with the continuous wave of condensation technique. At this point, the teeth were randomly assigned to two experimental groups (n=8): in the control group, the canal orifices were sealed and the cavity undercuts filled with flowable composite (AP+ Flow) after self-etch adhesive procedures; in the margin relocation group, a 4 mm-wide proximal box was prepared 2 mm apical to the cemento-enamel junction and the same flowable composite was used for margin relocation. Making use of the Cerec 3 CAD/CAM system, the prepared teeth were scanned and composite endocrown restorations produced (Lava Ultimate). After luting the milled endocrowns with self-adhesive cement, the specimens were thermomechanically aged with a chewing simulator (1,200,000 cycles, 1 Hz). Positive resin replicas of the restored teeth obtained before and after aging were observed at the scanning electron microscope to score the margin quality. The restored teeth were occlusally loaded to fracture with a universal testing machine, recording the type of fracture. The two tested groups were compared in terms of resistance to load with an independent-sample t-test and in terms of margin quality and fracture pattern with a chi-squared test; a McNemar test served for the comparison of margin quality before and after aging within the same group ( $p < 0.05$ ).

Results:

The maximum load to fracture was  $1802.13 \pm 440.45$  N in the control and  $1598.45 \pm 442.75$  N in the margin relocation group. The prevalent fracture type was the fracture below the cemento-enamel junction. In the margin quality assessment, gap and irregularities at the adhesive interfaces were absent in almost the totality of the observed surfaces and unaltered by the simulated aging. No statistically significant difference between the groups with regard to the variables of interest emerged.

Conclusion:

The resistance to fracture offered by the tested composite endocrown restorations exceeded, on average, 2 to 3 times the limit of the masticatory forces. The margin relocation with flowable composite did not seem to affect the resistance to fracture, the fracture type, or the margin quality of the restored tooth. This latter variable was not influenced by the thermomechanical simulation of 5 years of clinical service.