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COLLEGE OF DENTISTRY

EFFECT OF DIFFERENT RESTORATION DESIGNS ON FRACTURE RESISTANCE OF ENDODONTOCALLY TREATED TEETH WEAKENED WITH MOD CAVITIES (A COMPARATIVE IN ViTRO STUDY)

This thesis is submitted to the council of the College of Dentistry/ University of Baghdad in partial fulfillment of the requirement for the degree of Master of Science in Conservative Dentistry

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ABSTRACT

The restoration of endodontically treated teeth remains a challenge in conservative dentistry. Preservation of healthy dental structure is essential to help in mechanical stabilization of tooth-restoration integrity, increasing the amount of suitable surfaces for adhesion and, thus positively affect the long-term success. The aim of this in vitro study is to compare the effect of different restoration designs with direct composite , overlays , conventional crowns and endocrowns on fracture strength and failure mode of endodontically treated maxillary first premolars with mesio-occluso-distal (MOD) cavities.

Forty sound maxillary first premolars were divided into 5 groups (n=8): **Group A** (control group), Groups B-E (test groups). In the test groups, all of the teeth were received MOD cavity and endodontically treated. **Group B**: Endodontically treated teeth (ETT) restored with direct resin composite (Filtek™ Bulk Fill Posterior Restorative, 3M ESPE). While, teeth in groups (C,D and E) were prepared to receive indirect ceramic restorations made from lithium disilicate material (IPS E-max CAD, Ivoclar-Vivadent). **Group C**: ETT restored with overlays. **Group D**: ETT restored with conventional crowns. **Group E**: ETT restored with endocrowns.

The indirect ceramic restorations were made by CAD/CAM system and adhesively cemented with dual-cure resin cement (RelyX™ Ultimate, 3M ESPE). All restored teeth were then stored in deionized distilled water at room temperature for 24 hours before testing. Specimens were mounted in a universal testing machine (LARYEE Universal testing machine, China). Each specimen was loaded until failure at a crosshead speed of 0.5 mm /min. Mode of failure was also observed. Data were analyzed using one way analysis of

variance (ANOVA) and Tukey's post hoc significance difference tests at $P<0.05$.

The results of this study showed that the highest mean value of fracture strength was recorded by conventional crowns (2013.750 N) followed by overlays (1350 N), endocrowns (1079.350 N), control group (1058.125 N) and direct composite group (872.750 N) respectively. Tukey's post-hoc test showed significant ($p<0.05$) differences among the different groups, except when compared endocrowns with the control group showed non-significant difference ($P>0.05$) . Concerning the fracture mode, the majority of samples of all groups showed irreparable fracture except group A.

In conclusion, The highest fracture strength was recorded by conventional crowns while the lowest fracture strength was recorded by direct composite resin. The most favorable combination of strength and failure mode could be observed in conventional crowns and overlays groups.

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