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Fracture resistance of porcelain veneers with different preparation designs

Katerina Zlatanovska¹, Natasha Longurova¹, Julija Zarkova Atanasova¹, Bruno Nikolovski¹, Sanja Nashkova¹, Aneta Mijoska², Mihajlo Petrovski¹, Ivona Kovacevska¹, Vesna Trpevska¹, Budima Pejkovska Shahpaska¹

¹Faculty of Medical Sciences, Goce Delcev University, Stip, North Macedonia

²Faculty of Stomatology, University "Ss. Cyril and Methodius", Skopje, North Macedonia

AIM or PURPOSE: The purpose of this in-vitro study was to investigate the fracture resistance and failure mode of porcelain veneers using three preparation designs. **MATERIALS and METHOD:** Ninety porcelain veneers with different designs were fabricated using the refractory die method and divided into three groups (n=30 each): G1 - Feather preparation, G2 - Bevel preparation and G3 - Incisal overlap (palatal chamfer). Specimens from all three groups were subjected to failure testing using a triaxial testing machine (TRITECH WF 10056, Wykeham France, Milan, Italy). Pressure was applied at a constant speed of 0.5 mm/min at a 45° angle to the long axis of the specimen until failure occurred (debonding or fracture). The compressive load (N) required to cause the failure was recorded. The statistical analysis of the obtained results was performed using statistical programs Statistic 7.1; SPSS 17.0. **RESULTS:** The mean values of the mechanical force leading to changes in porcelain veneers were 150.2±38.9 N for G1, 192.8±45.7 N for G2, and 246.8±50.4 N for G3. Post hoc Tukey (HSD) test revealed significant differences between G1 vs. G2, G1 vs. G3, and G2 vs. G3 (p<0.05, p=0.001423, p=0.000107, p=0.000141, respectively). A statistically significant correlation was observed between failure mode (debonding and fracture) and the three preparation designs (Pearson Chi-square: 53.8500, df=2, p=0.000000). **CONCLUSION(S):** Porcelain veneers demonstrate sufficient strength to withstand masticatory forces and ensure restoration durability. However, the preparation design significantly influences the fracture load of porcelain veneers. Notably, the use of an incisal overlap (palatal chamfer) design significantly enhances fracture resistance compared to other designs.

Keywords: Failure mode, fracture resistance, porcelain veneers, preparation design.

Metal abutments and porcelain veneers with different designs



Triaxial testing machine (TRITECH WF 10056)



Failure mode



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