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The effectiveness of combination of auxiliary retentive features on a tooth preparation with in adequate retention and resistance form – An in-vitro study

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ABSTRACT:

***Statement of problem*:** Tooth preparations with inadequate retention and resistance form often contribute to dislodgment of complete cast crowns. Before crown preparations are made, factors such as length, diameter, and occlusal convergence angle must be evaluated. Existing dental anatomy often limits the dentist in modification of crown length and diameter, but occlusal convergence angle can be reduced to increase resistance form. The auxiliary retentive features like Grooves and Boxes have been effective in increasing the surface area and also reducing the rotational radius, thereby increasing the retention and resistance of crowns.

Purpose: The purpose of the study is to evaluate the effect of auxiliary retentive features like grooves, boxes and a combination of groove and box on the proximal surfaces of tooth with in- adequate retention and resistance.

Material & methods: Metal dies were prepared on a milling machine with 20 degree total occlusal convergence (TOC), 2.5 mm of occluso cervical dimension and a shoulder finish line. This design lacked geometric resistance and retention form. The crown preparation was subsequently modified to include Grooves, Boxes and a combination of Grooves & Boxes. These grooves and boxes were placed into the tooth with the same 20 degree TOC as initial axial walls. Ten standardized metal dies were used for each preparation design. Standardised complete metal crowns were fabricated for all specimens. The metal crowns were cemented on the metal dies with zinc phosphate cement. The retention of each specimen was evaluated when force was applied at a 45degree angulation to the long axis of the die in a lingual to buccal direction. The peak loads during the crown dislodgement were measured using Universal testing machine in kgs for each specimen.

Results:. Grooves, Boxes and a combination of both grooves and boxes were effective at increasing crowns resistance to dislodgement when the tooth preparation lacked retention form. The only modification that offered enhanced retention form when compared with control group was the group with two grooves in the cervical half of the axial wall.

Conclusion: Within the limitations of this in vitro study all the test groups significantly enhanced the retention form of a compromised tooth preparation and within the test groups, one with two proximal grooves showed enhanced increase in the retention form

Keywords: Retention form, Resistance form, Auxiliary features, Total occlusal convergence, cementation, crowns

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