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Effect of Two Dentin Desensitizing Agents on the Retention of Cast Copings on Compromised Preparations Using Three Cements

Thesis

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By

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Dedication

This work is dedicated to

My great ***mother***

And my dear ***father &brothers****,*

for without their love and support,

this would not have been possible.

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The longevity of fixed prosthesis depends on retention and marginal integrity of restorations. Optimal retention is one of the main requirements for successful restoration when minimal amount of tooth structure is left. This led to the development of new luting cements such as adhesive resin based cement, modified glass-ionomer luting cement, which were claimed to possess higher bonding potentials to dentin. (1)

The cementation of artificial crown is commonly accompanied by sensitivity, so the clinical application of desensitizing agents has become prevalent.(2) However it was reported that the use of desensitizing agents affects the bonding between dentin and luting material. Durable bonding between dentin and luting materials in such cases is one of the most important factors for avoiding detachment of restorations as well as the prevention of microleakage, secondary dental caries and tooth fracture. Some ingredients contained in dentin desensitizers may induce chemical interaction with dentin organic substances, and this may affect the sealing and bonding characteristics of the luting agents. (3)

The retention of restorations can be compromised by short or over-tapered tooth preparations.(4) Previous studies have primarily focused on the mechanical analysis of the relationship between degree of taper, surface area, surface roughness, preparation length, or luting agents on the force necessary to remove cemented castings from machined dies.(5,6) The geometric form of the prepared tooth and the prosthesis mainly determines the retention of the casting, but the clinical success of the restoration also depends on the integrity and the mode of attachment of the intervening cement layer. (5)

The purpose of this study was to test the effect of using two dentin desensitizers on the retentive strength of cast copings cemented with different luting agents on teeth prepared with controlled surface areas and high convergence angle.

In the oral environment, failure of retention of crowns and fixed partial dentures (FPDs) occurs under a combination of masticatory forces repeated over a period of time. These are mainly direct compressive forces and some resultant shear lateral forces. In addition, there is a small component of tensile force. [7]

Retention

Certain forces (e.g., when the jaws are moved apart after biting on very sticky food) act on a cemented restoration in the same direction as the path of placement. The quality of a preparation that prevents the restoration from becoming dislodged by such forces parallel to the path of placement is known as retention.[8]

Several factors influence the retention; factors in a prepared tooth, the type of cement, and factors in a restoration manufacturing. The factors influencing the retention in a prepared tooth are the surface area, the height of the prepared surface, the degree of convergence of the opposing walls of the preparation, and the texture of the prepared area. [8-10]

Some factors influence the retention that are functions of the cementing medium, the type of cement, the effect of a planned opening in the restoration, the influence of variations in the viscosity of the cement, variations in the seating force, variations in the duration of the force, variations in the time laps between the cementing and the unseating procedures, the angle of unseating force, and the values of the compressive strength and shear strength of various cementing media. [1]

Other factors influence the retention in a restoration manufacturing as the relative adaptation of the restoration to the prepared tooth surface, and the texture of the internal surface of the restoration. [5]

Most laboratory testing for crown retention, however, uses direct tensile force. **Patil et al** in 2012[11] studied the effect of polymerizable and non-polymerizable desensitizing agents on crown-retentive-strength using zinc-phosphate, glass-ionomer and compomer cements. The high noble cast crowns were removed along the path of insertion by using a universal testing machine. Prime and Bond NT and Gluma Desensitizer were used. Compomer cement exhibited the highest retentive strength and all dentin treatments resulted in significantly different retentive values. Zinc phosphate was the least retentive. Crown retentive values of Compomer cement were improved with Prime and Bond NT and Gluma Desensitizer. Retentive values of zinc phosphate cement with Prime and Bond NT were decreased and not affected with Gluma Desensitizer. Retentive values of Glass ionomer cement were not affected by any of the desensitizers used in the study.

Retention of cast copings

The retention of restorations can be compromised by short or over-tapered tooth preparations. The retention of crowns was shown to depend on the taper. The relation between the degree of axial wall taper and the magnitude of retention was first demonstrated experimentally by Jorgensen in 1955. The relation was found to be hyperbolic, where retention rapidly decreases as taper increases. The maximum retention was found to be between 6 and 12 degrees. In