EFFECT OF ROOT CANAL SURFACE FINISHES ON THE RETENTION OF CAST AND READY-MADE POSTS

Thesis

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INTRODUCTION

Usually, in an endodontically treated tooth, a considerable amount of tooth structure has been lost because of caries, presence of previous restorations, and/or endodontic treatment. Restoration of such a mutilated tooth, when insufficient coronal tooth structure remains, presents a unique challenge to the prosthodontist.

The loss of tooth structure makes retention of subsequent restorations more problematic and increases the likelihood of fracture during functional loading [65]. The main function of a post is to provide retention and support of the core, which retains the final restoration without comporomising the thickness of the root canal wall as well [62,76]. It is believed that retention of a post is vital for long-term success of the final restoration [8].

The necessity of dowel and core restorations has been well established and reported for restoring endodontically treated teeth in various clinical situations[30]. Modifying the surface texture or the micro-attachment of the post [68] and the inside canal wall [41] is regarded the recent technology in achieving a higher retentive capacity of the tooth-complex system.

As well, many investigations were done, either through the use of adhesive resinous cements for cementation of posts or through the surface treatment of root canal channel to improve the retentive strength of the posts.

In the post/cement/tooth complex, there are several regions or interfaces that may be the `weak link', depending on the cement/metal system used. First, the cement/metal interface is the most possible region where bond failure may occur. Metal surfaces topography have been altered to improve adhesion. The second possibility for failure is dentin/cement interface. Improved bond strengths have been obtained with every succeeding generation of dentin adhesive systems and surface treatment of root canal. The third possible area of concern is in the cement itself that could fails cohesively. This would vary with the quality of cement used and the method of cementation [46].

In this study, concerning the posts, different materials (titanium, stainless steel, nickel-chromium alloy) and different surface treatments (sandblasted, electrolytically etched) were tested. The root canal was etched also for obtaining a maximum retentive power and long term success with the luting cement used.

AIM OF THE STUDY

The aim of this study is to compare the bond strength of different post configurations cemented with a resin-luting agent to different root canal surface finishes.

- The post variables will be the material and method of construction:

1- Prefabricated titanium posts.

2- Prefabricated stainless steel posts.

3- Cast nickel-chromium alloy posts.

- The cast posts will be treated with two different surface treatments:

a- Sandblasting.

b- Electrolytic etching.

- The inside wall of the root canal variables were:

a- As cut.

b- Acid etching.

REVIEW OF LITERATURE

Loosening of the post clinically is considered one of the main causes of the failures of the post-retained crowns [11, 29]. It has been well established from the literatures reviews that the length, the diameter, the design of the post and cementing medium & techniques used influence retention [81]. Also, micro-attachments played a great role in post retentive power including the surface configuration of posts and the inside wall of root canal surface treatments.

For descriptive purpose, the voluminous review of literature had to be divided into nine sections mainly; post length and diameter, design of the post, material of the post, luting cements, techniques of cementation, cement thickness, surface configuration of the post, surface treatment of the post and root canal surface treatment.

Post length and diameter:

Standlee J., et al [77] in 1978 compared the retentive capacity of three prefabricated endodontic dowel designs at two lengths and two diameters, with three different cements. They found that regarding post design, the most retentive were the threaded, parallel-sided dowels. The serrated, parallel-sided dowels provided intermediate retention while smooth-sided tapered posts were the least retentive. The increase in dowel length usually

corresponded to increased retention. The effect of cement type was significant only with tapered dowels. The zinc phosphate cement was most retentive, carboxylate cement exhibited intermediate retention, and the epoxy cement was least retentive. For the other post designs, cement type had no significant effect on retentive capacity. Finally, variations in dowel diameter had no significant effect on post retention.

Deutsch A., et al [18] in 1983 reviewed post retention. They studied the following aspects; shape of the post, diameter of the post, length of the post and the cementing medium. They concluded that the most retentive posts in decreasing order were parallel threaded, parallel serrated, parallel smooth and smooth wedge-shaped posts. Increasing post length provided higher retention. The cement used and the diameter of the post had a little effect on its retention.

Coony J., et al [17] in 1986 compared the retention of two parallel posts with tapered ends, with a conventional parallel-sided post (Para-Post) at different lengths and diameters. They found that the retention increased for all of the posts with greater depth rather than width.

Lewis R., et al [37] in 1988 found, through a clinical survey of failed post-retained crowns, that the length of the post is of a considerable importance in securing the retention of the post crown. The survey confirmed the clinical guideline recommendation about the post length, which should be at least equal to the length of the crown.