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Evaluation of Main Factors Affecting Metal Posts Retention: A Review of Article

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Abstract

The restoration of endodontically treated teeth should reestablish its form and function. To restore these weakened teeth, reconstruction of lost tooth structure is performed using a single material or a combination of available materials. The retention is the most important single factor that affect the prognosis of a post retained restoration. There are so many factors that affect the retention of metal posts and this study will review the effect of main ones.

Keywords: Cast post, Retention, Post diameter, Luting cement

Introduction

Caries, cavity preparation and root canal instrumentation can cause a huge loss in the structure of endodontically treated teeth. The restoration of endodontically treated teeth should reestablish its form and function. Loss of retention is one of the main reasons of failure in teeth restored with metal posts [1]. Several factors, including:

I. Post length

II. Post diameter

III. Design

IV. Adaptation of the post and

V. Luting agent, can influence the retention of the metal posts [2].The retention is the most important single factor that can affect the prognosis of a post retained restoration. The retention value of various post systems had been investigated in many laboratory studies [3-6]. In the following, we will review the effect of main factors influencing the retention of metal posts.

Post length

The retention of cast post increases as the length of the post increases. A post that is too short will be failed. As Stockton LW [3] and Kurer et al. [4] declared, ideally the post should be as long as possible without influencing the apical seal. There are different guidelines for the ideal length of metal posts:

a. The post should equal the occlusocervical length of the crown.

b. The post should be two thirds or four fifths the length of the root.

c. The post should be one half of the length between crestal bone and apex.

d. Study by Johnson JK et al. [5] showed an increase of 24-30% in posts retention with 2-4mm increase in their length.

Post diameter

It is not recommended to increase the post diameter in order to increase the retention. As showed by Standlee et al. [6], increase in post diameter will not significantly affect the post retention. This can be related to the variations in canal morphology. Therefore, post diameter must be controlled to preserve radicular dentin. Study by Good acre [7] suggests that the long-term prognosis will be achieved when post diameter does not exceed one third of the root diameter and at least 1mm dentinal wall remain.

Design

Nowadays, there are so many different post systems available. Study by Johnson et al [8] declared that a parallel-sided post is the most retentive design, whereas tapered post is the least retentive one. These conclusion is relevant only if the post fits the root canal properly. According to the stress distribution, tapered

posts produced the greatest stress at the coronal section, and parallel posts produced the greatest stress at the apex of the canal preparation (1-3).As a result, according to the design of the posts, a parallel-sided posts should be selected.

Adaptation of the post

The adaptation of the posts to root canals has been identified as the main factor associated with the failure threshold of restored teeth [9]. If any rocking or rotation is present, the custom post should be remake and the prefabricated post should be change in diameter and length. The development of impression techniques that may increase the quality of reproduction and hence improve custom posts adaptation to the prepared root canal is necessary [10].

Luting agent

Zinc phosphate cement is considered as the gold standard and other cements mostly compared to zinc phosphate. Zinc phosphate and glass ionomer have comparable retentive properties, however, the retention values of polycarboxylate and composite resin are slightly less than the retention value of zinc phosphate [11,12].

Table 1 summarizes the available articles that studied the effect of these main factors on the retention of metal posts.

Table 1: Studies investigate the effect of main factors affecting retention of the posts.

Reference	Tooth	Post Length	Post Diameter	Cement	Retention
Ertugrul & Ismail. [13]	Premolars	11mm	1.60mm	Zinc-Phosphate	34.25Kg
Gavranović Glamoć et al. [14]	Maxillary ant	8.5mm	1.60mm	Zinc-phosphate	182.2
	-	-	-	Glass-inomer	272.40N
	-	-	-	Hybrid cement	312.90N
Radke et al. [15]	Single root	8mm	0.036 inch	Zinc-phosphate	16.03Kg
	(Not specified)	-	-	Glass-inomer	15.17Kg
	-	-	-	polycarboxylate	12.78Kg
	-	-	-	Composite resin	8.50Kg
Al-omari et al. [16]	Single root	10mm	1.45	Zinc-phosphate	169.5N
	(Not specified)	-	-	Glass-inomer	192.2
Muthuraj et al. [17]	premolars	9mm	N/M	Adhesive resin	20.425Kg
	-	-	-	Glass-inomer	10.055Kg
	-	-	-	Zinc-phosphate	8.76Kg

Conclusion

Retention is the most important factor that must be achieved with post-and-core retained restorations. The available articles clearly declared that factors including post diameter and length could influence the retention of the metal posts. On the other hand, according to the stress distribution and retention, the most favorable post design is parallel-sided posts. So, it can be concluded that in order to achieve longtime prognosis, clinicians should consider all of these factors together.

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