

Original Article

Preference for Using Posts to Restore Endodontically Treated Teeth among Dentists in College of Dentistry/ Hawler Medical University

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Abstract

Objective: Traditional restorative approaches are being modified as newer materials become available and patient preferences shift. The purpose of the study was to see if dentists' preferences for using posts and other materials associated to post used to restore endodontically treated teeth are influenced by practical experience, whether measured by the length of clinical practice time or level of specialty.

Methods: A cross-sectional study was conducted with dentists (n = 108) working at Hawler Medical University/College of Dentistry utilizing a questionnaire. Data on sociodemographics, clinical experience, postgraduate training, and post-endodontic restoration characteristics (posts/types of cement, rubber dam application) were obtained. The samples only included general and specialist dentists. A descriptive analysis was performed on the data. The Chi-square test and Fisher's exact test investigated the relationships.

Results: The most chosen materials were metal posts (53.7 %) and resin cement (50 %). There was a statistically significant association between clinical practice duration and post-use type (P = 0.017). In addition, there was a highly significant relationship (P = 0.001) between clinical practice time, level of specialty, and the use of rubber dams.

Conclusions: Dentists favored metal posts for post endodontic restorations, while resin-based cement was the preferred luting cement for the posts' cementation. Additional training and more clinical practice time were factors in several dental post-selection decisions.

Keywords: Metal post, Fiber post, Rubber dam, Endodontic restoration.

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Introduction

Endodontic treatment is used extensively on teeth with severe caries, multiple restorations, or fractures. The management of pulp conditions is known as endodontic treatment. It is generally intended to maintain or restore the health of the dental pulp and periradicular tissues by filling or blocking all root canals and forming a fluid-tight seal on the apical foramen of the tooth to prevent secondary infection from the mouth cavity or periradicular tissue leakage into the root canal system⁽¹⁾. When compared to unrestored vital teeth, endodontic treated teeth experience tooth structure loss and physical alterations, leading to greater fracture risk⁽²⁾. To restore endodontically treated teeth, various materials and procedures are currently available. Past restorative practices are updated as newer materials emerge and patient preferences change⁽³⁾. As a restorative material, amalgam and composite resin are commonly used in core foundations⁽⁴⁾. A post is routinely put into the root canal system to retain the core in a badly traumatized tooth. The goal of post-placement is to keep the core foundation intact. Its purpose is not to strengthen a tooth with a root canal⁽⁵⁾.

For restoring endodontic-treated teeth, there are a variety of post and cement options. There is a wide range of techniques that use various types of metal posts and cores and the newer fiber-reinforced polymer post⁽⁶⁻⁹⁾. Physical properties close to dentin, such as modulus of elasticity, compressive strength, and coefficient of thermal expansion, are ideal for post material. Furthermore, posts should not corrode, bond easily, and bond effectively to dentin within the root. The bond should be formed with the proper cement so that the entire post and core assembly appear like the original tooth⁽¹⁰⁾. Several factors, including factors related to posts and factors associated with teeth, have been observed to influence post-selection and restoration durability. Material, esthetics, design, and cementing procedures are all factors to consider regarding post selection. However, surviving coronal tooth structure, ferrule existence, and the root length are the characteristics associated with teeth⁽¹¹⁻¹⁴⁾.

Additionally, characteristics associated with dentists can influence decision-making, particularly in terms of clinical experience and postgraduate training. A dentist's skills can be improved with more clinical experience. However, dentists must be trained and have up-to-date expertise when new materials are introduced. This is so that dentists can apply the new materials properly. It's crucial to understand dentists' preferences for materials

and techniques and their level of understanding of how to use these materials correctly so that their experience can be used to teach undergraduate dental students and presented in dental education courses⁽¹⁵⁾.

Several studies have been published concerning the knowledge and practices of post-endodontic restoration abroad. Though, the information given is not strong enough to apply it to a proper treatment procedure for the dentists⁽¹⁶⁾. Such data exist for Brazil⁽¹⁵⁾, Sweden⁽¹⁶⁾, Saudia Arabia⁽¹⁷⁾, Palestine⁽¹⁸⁾, India⁽¹⁹⁾, and Switzerland⁽²⁰⁾. However, there is a lack of such studies in Erbil, Iraq. Questionnaires are valuable for understanding dentists' knowledge and treatment methods in root canal-treated teeth. The objective of this research was to see if a dentist's choice for using posts/materials relevant to posts used to restore endodontic-treated teeth is influenced by clinical experience, whether concerning the length of practice time and level of specialization among dentists in Erbil, Iraq.

Subjects and methods

A cross-sectional survey of dentists registered at the Hawler Medical University/College of Dentistry was conducted in Erbil, Iraq. A total of 108 dentists were invited to take part in the research. A self-applied closed survey was designed to collect data. The following details were gathered: Clinical experience (years following graduation, classified as 0-4 years, 5-9 years, and ten years), level of specialization (BDS, MSc., or Ph.D. degree), and divided into general dentist and specialist. The following data were obtained on the frequency of root canals treated per week, the need for post-placement in every endodontic treated tooth, post-insertion frequency, and post usage to restore root canal treated teeth. The most commonly utilized post (metal or fiber post), the cement used to lute these posts (glass ionomer cement, resin cement, or zinc phosphate cement), and the application of a rubber dam (yes or no). There was no information in the data that could be used to identify the dentist. Each dentist who was asked to participate in the study at the College of Dentistry received the questionnaire in person. The significance of the study and its details were explained. Only dentists with a Bachelor's or Postgraduate degree were included in the study. The undergraduates were not included in the research.

Statistical analysis

The descriptive analyses were calculated as absolute frequencies and good percentages. The Chi-square test and Fisher's exact test were used to assess the existing relationship between postgraduate education, professional experience, and dentist preferences (type of post/cement use and rubber dam application). The significance level was adjusted at ($p = 0.05$). SPSS software version 23 was used for the analysis.

Results

The mean \pm standard deviation (32.1389 ± 6.91937) of the dentists' ages was calculated using descriptive statistics, as seen in Table 1.

Table 1 shows that most of the dentists who answered had a practical clinical experience of 0-4 years 52 (48.1%). The respondents included 54 (50%) general dentists and 54 (50%) specialist, dentists. It is revealed in Table 1 that the number of root canal treatments carried out per week by the dentists was mostly around 5-9 (51.9%). The results in Table 1 show that 86 (79.6%) of general dentists and specialists both widely thought that for every root canal-treated tooth, a post was unnecessary. However, this study showed that 79 (73.1%) dentists claimed that they sometimes place a post to restore an endodontic-treated tooth. In Table 1, it is evident that 58 (53.7%) of the surveyed dentists chose metal post as the preferred technique for restoring endodontic treated teeth, while 50 (46.3%) of the dentists chose fiber post as the preferred technique for restoring endodontic treated teeth. Regarding the type of luting cement, Table 1 also shows that 54 (50%) of the dentists selected resin cement as the preferred luting cement. 75 (69.4%) dentists who participated in this study reported not using the rubber dam.

There was a statistically significant association between clinical practice time and type of post-use where it is evident in Table 2 that the use of fiber post among dentists who had clinical experience 5-9 years (72.7%) was significantly higher than the use of fiber posts among the dentists who had clinical experience 0-4 years ($p = 0.017$). Table 3 shows no significant association between clinical practice time and type of luting cement use ($p > 0.05$). Table 4 reveals that there was a highly significant association between clinical practice time and rubber dam application where it is evident that the use of rubber dam among dentists who have had practical clinical experience ≥ 10 years 20 (58.8%) was significantly higher than the use of rubber dam among the dentists who have clinical experience 0-4 years 5 (9.6%) and 5-9 years 8 (36.4%), ($p = 0.001$).

Table 5 represents no significant relationship between the level of specialization and type of post-use ($p > 0.05$). However, the metal post-use among general dentists 30 (55.6%) was slightly higher than the metal post-use among specialists 28 (51.9%), and the fiber post-use among the specialists 26(48.1%) was slightly higher than the fiber post-use among general dentists 24(44.4%). Table 5 also shows no significant association between the level of specialization and the type of luting cement ($p > 0.05$). However, the use of glass ionomer among the general dentists 24(44.4%) was higher than that of specialists. The use of resin cement among specialists 32(59.3%) was higher than that of general dentists. It is revealed in Table 5 that there was a highly significant association between level of specialization and rubber dam use where it is evident that the use of rubber dam among specialists 26 (48.1%) was significantly higher than the use of the rubber dam among general dentists 7 (13%), ($p=0.001$).

Discussion

In the last decade, the frequency of endodontic therapies has continuously risen, with relatively predictable outcomes. As a result, tooth restoration following root canal therapy is an important aspect of dentistry's restorative practice. However, although numerous novel restorative materials have been available in recent years, several basic aspects of restoring endodontic-treated teeth remain the same. Therefore, full knowledge of the materials is required to make the best choice⁽¹⁰⁾.

The current study gathered data from general and specialized dentists at Erbil's Hawler Medical University/College of Dentistry on their preferences for utilizing posts and features associated with posts for restoring root canal-treated teeth. In the current research, most dentists (general and specialized dentists) believed that every root canal-treated tooth does not need a post (79.6%). In vivo and in vitro research show that the strength of an endodontic-treated tooth is directly proportional to the residual tooth structure but that the use of a post does not reinforce such a tooth. As a result, a post may not be required in all endodontically treated teeth^(16,18,19). Accordingly, placing a post in an endodontic-treated tooth should be made individually, evaluating the benefits and drawbacks before proceeding^(16,18,19).

According to the survey, most general and specialized dentists prefer metal posts (53.7%) to restore an endodontic-treated tooth. According to the literature, metal posts and glass fiber posts have dissimilar mechanical qualities. In comparison to dentin, metal posts exhibit a high elastic modulus. As a result,

Table 1: Descriptive analysis, Frequency of clinical practice time and level of specialization, No. of RCT per week, necessity & frequency of post-placement, and Frequency of type of post-use and variables related to post.

Mean age of the participants			Frequency of clinical practice time and level of specialization			No. of RCT per week, necessity & frequency of post-placement			Frequency of type of post-use and variables related to post		
Mean	S. Deviation	Median	Clinical practice time	No.	%	No. of RCT per week	No.	%	Type of post-use	No.	%
32.1389	6.91937	30.0000	0-4 years	52	48.1	0-4	28	25.9	Metal Post	58	53.7
			5-9 years	22	20.4	5-9	56	51.9	Fiber Post	50	46.3
			≥10 years	34	31.5	≥10	24	22.2	Total	108	100.0
			Total	108	100.0	Total	108	100.0			
			Level of Specialization			The necessity of post-use for every RCT			Type of luting cement use		
			General Dentist	54	50.0	Yes	22	20.4	Glass Ionomer	42	38.9
			Specialist	54	50.0	No	86	79.6	Resin Cement	54	50.0
			Total	108	100.0	Total	108	100.0	Zinc Phosphate	12	11.1
						Frequency of post placement			Total	108	100.0
									Rubber dam use		
						Always	22	20.4	Yes	33	30.6
						Sometimes	79	73.1	No	75	69.4
						Rarely	7	6.5	Total	108	100.0
						Total	108	100.0			

Table 2: Association between the length of clinical practice time and type of post-use.

Clinical practice time	Type of post-use						X2, df, p-value
	Metal post		Fiber post		Total		
	No.	%	No.	%	No.	%	
0-4 years	30	57.7%	22	42.3%	52	100%	X2= 8.170 df= 2 p= 0.017
5-9 years	6	27.3%	16	72.7%	22	100%	
≥10 years	22	64.7%	12	35.3%	34	100%	
Total	58	53.7%	50	46.3%	108	100%	

Table 3: Association between the length of clinical practice time and type of luting cement.

Clinical practice time	Type of luting cement								X2, df, p-value
	Glass ionomer		Resin cement		Zinc phosphate		Total		
	No.	%	No.	%	No.	%	No.	%	
0-4 years	22	42.3%	20	38.5%	10	19.2%	52	100%	X2= 9.404 df= 4 p > 0.05, NS
5-9 years	8	36.4%	14	63.6%	0	0.0%	22	100%	
≥10 years	12	35.3%	20	58.8%	2	5.9%	34	100%	
Total	42	38.9%	54	50.0%	12	11.1%	108	100%	

Table 4: Association between the length of clinical practice time and rubber dam use.

Clinical practice time	Rubber dam use						X2, df, p-value
	Yes		No		Total		
	No.	%	No.	%	No.	%	
0-4 years	5	9.6%	47	90.4%	52	100%	X2= 23.899 df= 2 p=.001
5-9 years	8	36.4%	14	63.6%	22	100%	
≥10 years	20	58.8%	14	41.2%	34	100%	
Total	33	30.6%	75	69.4%	108	100%	

Table 5: Association between the level of specialization, type of post, type of luting cement, and rubber dam use.

Association between the level of specialization and type of post-use									
Level of specialization	Metal post		Fiber post		Total		X2, df, p-value		
	No.	%	No.	%	No.	%			
General Dentist	30	55.6%	24	44.4%	54	100%	X2= .149 df= 1 p > 0.05, NS		
Specialist	28	51.9%	26	48.1%	54	100%			
Total	58	53.7%	50	46.3%	108	100%			
Association between the level of specialization and type of luting cement									
Level of specialization	Glass ionomer		Resin cement		Zinc phosphate		Total		X2, df, p-value
	No.	%	No.	%	No.	%	No.	%	
General dentist	24	44.4	22	40.7	8	14.8	54	100%	X2= 4.042 df= 2 p > 0.05, NS
Specialist	18	33.3	32	59.3	4	7.4	54	100%	
Total	42	38.9	54	50.0	12	11.1	108	100%	
Association between the level of specialization and rubber dam use									
Level of specialization	Yes		No		Total		X2, df, P-value		
	No.	%	No.	%	No.	%			
General dentist	7	13.0%	47	87.0%	54	100%	X2= 15.753 df= 1 p=.001		
Specialist	26	48.1%	28	51.9%	54	100%			
Total	33	30.6%	75	69.4%	108	100%			

enhancing the risk of root fracture and failure, whereas fiber posts possess mechanical properties likewise to those of dentin, minimizing the chance of failure and subsequent failures relative to their utilization. Post debonding is the most common cause of fiber post failures⁽²¹⁾.

This study's findings matched those of research conducted in Saudi Arabia⁽¹⁵⁾, Palestine⁽¹⁷⁾, Switzerland⁽¹⁸⁾, and Brazil⁽²⁰⁾ on post-endodontic restorations, where metal posts were more commonly used. The subject of the best post material has been hotly debated in the literature for years⁽²²⁻²⁵⁾. According to recent systematic reviews on prospective clinical research, glass-fiber posts have improved survival rates^(26,27). Because of its higher advantages, lower risk of tooth damage, and likeness to dentin, it's better to raise awareness and shift dentists' attitudes about employing fiber posts more often than metal posts⁽²⁷⁾. There is, however, no evidence to support the "optimal technique" to restore a tooth that has been root canal

treated. When determining the type of post to utilize in restoring ETT, numerous aspects should be considered, including intact coronal structure, ferrule availability, and post material⁽²⁴⁾. Indeed in root endodontically teeth, maintaining at least one wall ensures greater tooth longevity⁽²⁸⁾.

In this study, most dentists favored resin cement over lute posts (50 %). In 2015, Sarkis-Onofre et al.⁽¹⁵⁾, and in 2013, Kon et al.⁽²⁰⁾ showed similar findings to the present study where the preferred luting cement was also seen as resin cement. In contrast, Akbar⁽¹⁷⁾ sought that the preferred choice of luting cement among dentists was glass ionomer cement.

The long-term clinical performance of the various cement used for post cementation is hardly understood⁽¹⁷⁾; Zinc phosphate has the longest track record of success. It is well-suited with zinc oxide eugenol (ZOE), which is incorporated in most root canal sealers and has a long working duration. Furthermore,

when an endodontic failure occurs, a metal post cemented in the root canals with zinc phosphate is easier to remove and has a reduced risk of root fracture than a metal post cemented in the root canal space with resin-based composite cement⁽¹⁰⁾. However, our findings contradicted the literature because zinc phosphate was the least popular luting cement among the respondents (11.1 %); this is most likely due to dentists' lack of understanding of the benefits of utilizing zinc phosphate for post cementation⁽¹⁰⁾.

When utilizing glass ionomer cement, microleakage is a big issue. Compared to zinc phosphate and dentin, these types of cement have a substantially lower modulus of elasticity. The capacity of resin-based composite to bond to dentin, on the other hand, is gaining popularity. Some authors have worried about the thermocycling of resin cement and microleakage^(29,30). However, others have found that using resin cement instead of another cement increases post retention, reduces microleakage, and increases tooth fracture resistance⁽³¹⁻³³⁾.

Some dentists claimed to utilize resin cement in conjunction with metal posts. However, the use of resin to bond a metal post raises the possibility that the post will be difficult to remove in the event of endodontic failure. A well-bonded resin cemented metal post is difficult and time-consuming to remove, and the potential of a root fracture remains a major challenge. However, when fiber-reinforced posts are used in conjunction with resin cement, this difficulty is avoided because fiber-reinforced posts can be removed. As a result, more people should be urged to utilize fiber posts with resin cement⁽³³⁾.

The usage of rubber dams for isolation is a significant concern. According to Goldfein et al.⁽³⁴⁾, using a rubber dam during prefabricated post insertion increases the success rate substantially of endodontic-treated teeth. Furthermore, they also said applying a rubber dam for nonsurgical root canal therapy is already a recognized standard of care. This finding is significant because many dentists in the study didn't use rubber dams to cement posts; this could be because dentists were not taught how to apply and use the rubber dam during clinical practice as undergraduates in dentistry school⁽³⁴⁾. This study's findings are comparable to those of a study conducted in Brazil⁽¹⁵⁾, which found that non-use of rubber dams dominated.

Metal posts, glass ionomer, and non-use of rubber dam were used more frequently by dentists with less practical clinical experience (time since graduation) (0-4 years) than dentists with more time since graduation. At the

same time, those with more practical clinical experience (time after graduation) tend to utilize fiber posts, resin cement, and rubber dam more than the general dental practitioners. There was a link between clinical practice time, post-use type, and rubber dam application. Those who graduated a while ago used the rubber dam more frequently to restore a root canal-treated tooth. These findings may be because those who have graduated a while ago may have had some kind of post-graduation training or attended continuing education courses, suggesting that they are more likely to be exposed to new techniques⁽³⁵⁾.

When it comes to postgraduate education, the evidence suggests that dental specialists are better informed with the literature and attend meetings more frequently, directly influencing their clinical decisions and, as a result, their practices. These dentists are better equipped to incorporate new technology into their clinical practice⁽³⁵⁻³⁷⁾. However, there was no significant relationship between the level of expertise and the type of post used in this investigation. This study revealed that postgraduate dentists are more likely to use metal supports to restore root canal-treated teeth. However, an almost equal number of fiber posts to metal posts were registered. A similar finding was seen in a study carried out in Saudi Arabia⁽¹⁷⁾. Previous research found that specialist dentists selected fiber posts as their first option for restoring endodontic-treated teeth, while non-specialists preferred metal posts⁽¹⁵⁾. The results or findings of the present study may be due to the geographical region and the cost of fiber posts⁽³⁸⁾. Many dentists, whether specialists or non-specialists, may know the importance of using a fiber post but refuse to use it because it is more expensive than the metal post. Also, some dentists claim that they face more problems when using fiber posts because of the chance of debonding⁽²¹⁾. However, they may find the metal post preferable because if the metal post is tightly screwed within the root canal and is cemented well, they won't suffer from replacing the posts⁽³³⁾.

Regarding the cement used to lute the posts, there was no significant association between the level of specialization and the type of luting cement used in this study. The general dentists used the glass ionomer, and the resin cement was used mostly by the specialists. In contrast, Akbar⁽¹⁷⁾ found that practically all of the participants, both general and specialized dentists, applied glass ionomer to lute the post.

There was a highly significant association between the level of specialization and rubber dam use in this study.

In contrast to specialized dentists, more than half of general dentists did not use a rubber dam to isolate the operative field during a post insertion to restore a root canal-treated tooth; this could be because, as an undergraduate in Hawler Medical University/ College of Dentistry, the students were not taught to apply and use the rubber dam in clinical situations. Specialists with some postgraduate education, on the other hand, were taught the importance of utilizing a rubber dam and were compelled to use one for any restoration of an endodontically treated tooth during their training⁽³⁴⁾.

The findings of this study are consistent with those of questionnaire-based studies undertaken in another country⁽³⁵⁾. According to a study, applying a rubber dam during prefabricated post-placement considerably enhances the chances of teeth with endodontic management. Furthermore, they said that placing a rubber dam for nonsurgical root canal therapy is already a recognized standard of care⁽³⁴⁾. According to Lynch and McConnell⁽³⁹⁾, specialists tend to be more subjected to rubber dam insertion throughout their specialty. Also, specialists are more likely to do more difficult treatments requiring a more qualified sensitive technique⁽³⁶⁾.

Because it relied on a self-administered applied closed questionnaire, this study has several limitations. The downside was that the respondents did not always answer all of the questionnaire's questions honestly, and open-ended questions were not permitted⁽¹⁵⁾. Also another limitation may be that there was more chance of errors due to the small sample size.

Conclusions

Teeth with substantial coronal damage after root canal therapy may require intracanal posts for retention. The best way to restore endodontically treated teeth is unknown. Various aspects such as the type of coronal restoration, the extent of residual coronal structure, the type of luting agent, and dentist-related factors should all be considered into account. Correlating practice, knowledge, and scientific interpretation have been identified as the most effective way of resolving selection issues, and it may be adopted quickly and effectively in clinical practice. Overall, the study's findings revealed that most dentists do not believe that every root canal-treated tooth requires a post. Metal posts were the preferred type of post used for post endodontic restorations, and the resin-based cement dominated as the preferred luting cement for cementation of the posts. Continuing education and more clinical practice experience influenced some of the choices about which dental posts to select and other

post-related materials like luting cement and rubber dam.

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