

Prevalence Of Age And Sex In Uses Of Custom Made Cast Post In Endodontically Treated Teeth- A Retrospective Study

Research Article

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Abstract

Aim: The aim of the study was to find the prevalence of age and sex in uses of custom post in endodontically treated teeth and to find the most preferred technique for impression taking in cast posts.

Materials and Methods: The study was a retrospective study and was done in a university setting. The total sample size includes 161 patients who have been placed with cast posts from June 2019 to April 2021. The case sheets were verified with the help of photographs. The data was obtained from the category of Custom made posts and impression technique used. General history including age, sex, type of tooth was tabulated. Data was verified by one external reviewer. The data was imported to SPSS and the variables were verified.

Results: A total of 161 samples were included. The association between the impression technique used and the type of teeth in which cast post was done was not significantly associated. It can also be concluded that the prevalence of using patterned resin technique is the maximum and it produced posts that had better marginal adaptation and durability.

Conclusion: Within the limitations of the current study, it can be concluded that the prevalence of using patterned resin technique is the maximum and it produced posts that had better marginal adaptation and durability.

Clinical Significance: The association between the impression technique and type of teeth was not established. With more number of sample size, it can be established which technique will serve as a better impression technique in recording cast posts for its longer life and better marginal durability.

Keywords: Cast Post; Marginal Integrity; Durability; Adaptability.

Introduction

The longevity of endodontically involved teeth has been greatly enhanced by continuing developments made in endodontic therapy and restorative procedures[1]. It has been reported that a large number of endodontically treated teeth are restored to their original function with the use of intraradicular devices. These devices vary from a conventional custom cast post and core to one-visit techniques, using commercially available prefabricated post systems. In the last few decades, various prefabricated post systems have been developed. The selection of post design is important, because it may influence the longevity of the tooth[2].

Prosthetic restoration of a root-filled tooth frequently requires pre-prosthetic treatment of the remaining tooth structure before

fitting the permanent restoration. The rationale for this is often that generally a root-filled tooth will have already got considerable coronal hard-tissue defects before root filling and therefore the tooth structure is further reduced by the particular passage treatment (preparation of access cavity, exposing the canals, preparing the canals)[3].

The pre-prosthetic treatment of a root-filled tooth consists primarily of rebuilding lost tooth structure using an alloplastic material to supply a preparation with adequate frictional surfaces for retaining a crown or bridge. If the remaining tooth structure is insufficient for permanent retention of an immediate core build-up material, a root post must be used for retaining the core[4]. A prefabricated root post or an indirect, custom fabricated post and core are often used for this purpose. Custom-fabricated cast

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posts and cores are still considered the established technique or gold standard for restoring extensively damaged teeth. In the basic evaluation of the therapeutic value of post and core treatment, survival time is a crucial parameter[5].

Cast posts and cores were the standard for many years and are still used by some clinicians. Generally, they do not perform as well as other types of posts during in vitro tests and clinical studies. They have fallen from favor because they require two appointments, temporization, and a laboratory fee[6]. Nonetheless, some studies report a high rate of success with cast post and cores, and they offer advantages in certain clinical situations. For example, when multiple teeth require posts, it is sometimes more efficient to make an impression and fabricate them in the laboratory rather than placing a post and buildup in individual teeth as a chair-side procedure[7].

A cast post and core may be indicated when a tooth is misaligned and the core must be angled concerning the post to achieve proper alignment with the adjacent teeth[8]. Cast posts and cores also may be indicated in small teeth such as mandibular incisors, when there is minimal coronal tooth structure available for anti-rotation features or bonding. Cast posts and cores are generally easy to retrieve when endodontic retreatment is necessary[9]. Perhaps the biggest disadvantage for cast posts and cores is in areas that require an esthetic temporary restoration. Temporary post/crowns are not effective in preventing contamination of the root canal system. When a temporary post and crown are needed, a barrier material should be placed over the obturating material. The cast post and core should be fabricated and cemented as quickly as possible[10].

The major advantages of cast posts are low cost, no technique or special cement for fixation, a long history of clinical use, and excellent radiopacity. However, the result of dental lost-wax casting techniques is greatly influenced by the inherent properties of the dental materials, such as the expansion and contraction of all materials used, including impression materials, waxes, gypsum products, plastics, and metals. Distortions in the casting process result[11] in a nonuniform precementation space and absence of passivity and fitting between tooth and metal and inadequate endodontic healing. Therefore, an adequate impression technique could influence the clinical survival of the definitive restorative treatment because it directly influences the cast metal post retention.

However, few studies have compared the cast metal posts' accuracy considering impression techniques and tooth position[12]. The indirect technique with polyvinyl siloxane impression material has been found to reproduce the details of the root canal space is faster and easier than the direct technique, especially when multiple posterior teeth are involved or when shorter clinical chair time is necessary, yet the direct technique is reliable and has several advantages, including easy manipulation of acrylic resin, dimensional stability, an easy adjustment in the mouth when needed, and less working time at the laboratory, albeit with longer clinical time[13].

Previously our team has a rich experience in working on various research projects across multiple disciplines[14-28] Now the growing trend in this area motivated us to pursue this project. This retrospective study aims to point out the pros and cons of

different impression techniques used in cast posts to better understand which impression technique gives better adaptability and retention for its long-time survival.

Materials And Methods

The study was a retrospective study and was done in a university setting. The study was approved by the scientific review board of the institution. One principal investigator and 2 co-investigators were involved in the study. The total sample size includes 161 patients who have been placed with cast posts from June 2019 to April 2021. The case sheets were verified with the help of photographs.

The data was obtained from the category of Custom made posts and impression technique used. General history including age, sex, type of tooth was tabulated. Data was verified by one external reviewer. If an impression technique of the particular cast post was not mentioned, the sample was excluded from the study. The data was imported to SPSS and the variables were verified.

Results And Discussion

The data collected from the patient management software were tabulated in SPSS and the descriptive statistics were obtained. Out of 161 patients who were taken under study, 103 were male, and the remaining 58 were female [Figure 1].

According to the collected data, 11 belonging to the study population was less than 20 years of age, 75 of them were between 20-40 years of age, 55 of them belonged to 40-60 years of age, and 20 of them were above 60 years of age [Figure 2].

When comparing the teeth type, 85 cast posts were cemented in central incisors, 35 were cemented in lateral incisors, 26 were cemented on premolars, 9 were cemented on canines and 6 were cemented on molars [Figure 3].

According to the data collected on impression technique to fabricate these cast posts, 143 were obtained using patterned resin technique, 17 were obtained by elastomeric impressions and 1 was done using wax [Figure 4].

Association between the teeth type and the type of impression technique showed that patterned resin technique was mostly followed for all type of teeth, elastomeric impression technique was used mostly for molar posts and wax technique was used for central incisors[Graph 5]. Statistical analysis was performed using Chi-square test, the association was not significant since $p=0.156$ [Table 1].

The present study compared the accuracy of cast metal posts, considering the impression technique and position of the tooth on the arch. Considerable amounts of articles were present in the literature regarding the correlation between the impression technique used and the marginal adaptation and retention of the cast post.

A study conducted by Aman Merchant et al[29], was a study where more males were cemented with cast posts than females. Custom-made posts were more commonly seen in male patients

Figure 1: This graph represents the percentage of gender distribution in the study where blue denotes male and green denotes female. The X-axis denotes the Gender distribution and Y-axis denotes the percentage. The male population [63.98%] was greater than the female population [36.02%].

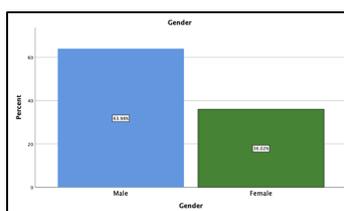


Figure 2: The graph represents the age distribution of the sample data where blue denotes less than 20 years old, green denotes population between the age group of 20-40 years old, red denotes population between 40-60 years old and purple denotes population which was above 60 years old. The X-axis denotes the age distribution and Y-axis represents its percentage. The graph shows us that more number of cast posts were cemented in the population which belonged to the age group of 20-40 years old[46.58%], followed by 40-60 years old[34.16%], followed by above 60 years old[12.42%] and then in population which is less than 20 years old[6.83%].

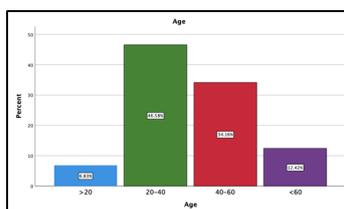


Figure 3: This graph represents the type of teeth that the cast post-restoration was done where blue represents the central incisors, green denotes the lateral incisors, pink represents the canines, red represents the premolars and orange denotes the molars. The X-axis denotes the teeth type and the Y-axis denotes the percentage. Cast post-restoration was done maximum in central incisors[52.80%], followed by lateral incisors[21.74%], followed by premolars[16.15%], followed by canines[5.59%], and then with the least was molars[3.73%].

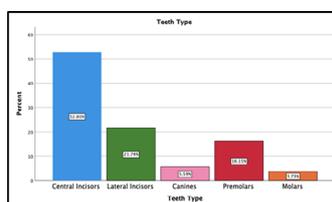


Figure 4: This graph represents the type of impression technique used for fabricating the cast post where blue denotes using patterned resin, red denotes using elastomeric impression and green denotes using wax. The X-axis represents the impression technique and the Y-axis represents the percentage. The most commonly used method was patterned resin[88.82%], followed by elastomeric impression[10.56%] and then wax[0.62%].

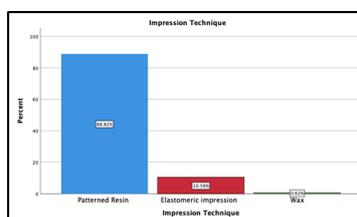


Figure 5: This graph represents the association between impression technique and type of teeth where blue denotes central incisors, green denotes lateral incisors, pink denotes canines, orange denotes premolars and brown denotes molar. The X-axis represents the type of impression technique used and Y-axis represents the percentage. Patterned resin was mostly used for all type of teeth and elastomeric impressions were used for molars.

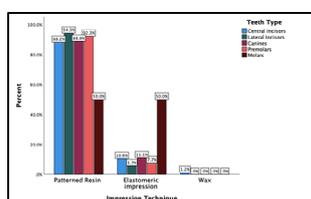


Table 1: The table represents the chi-square test between the impression technique and type of teeth. The association was not significant since $p=0.156$.

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	11.891 ^a	8	.156
Likelihood Ratio	8.401	8	.395
Linear-by-Linear Association	.466	1	.495
N of Valid Cases	161		

a. 9 cells (60.0%) have expected count less than 5. The minimum expected count is .04.

than female patients. The reason can be that there is more extensive damage in male patients, hence requiring metal post [Figure 1]. This finding is similar to a study that states that caries incidence for both genders is equal [30].

Custom made posts were more commonly seen in the age groups of 20-40 years which was by Aman Merchant et al [29]. This result is in contrast to some studies which reported that the middle-aged group population has the highest prevalence of post-treatment since at this age, it is more prone to caries as it gets weakened. The least prevalence of posts was found in the geriatric patients [31]. This can be due to the loss of most of the teeth at this age due to weakened periodontium.

Custom-made posts were more commonly seen in the anterior teeth. A cast post and core can be made using several materials like gold alloy, silver palladium alloy, or a box metal alloy, etc [32]. Cast posts are mostly placed in the anterior teeth since the angle of the crown might be changed from the angle of the root to have an aesthetic smile [33,34]. According to the study, the patterned resin impression technique for cast post was by Rosenstiel et al [35]. An advantage of this system is its low cost and the small amount of time required to fabricate custom post patterns. The amount of time needed for cooling and solidifying the thermoplastic resin is approximately 1 minute, much less than the time needed for polymerization of auto polymerizing resins. The resin flows well in its molten state, which leaves the surface of the post pattern free from voids that may affect the accuracy of investing procedures. The cast posts are often smooth and free from casting nodules that prevent complete seating [36].

The thermoplastic material is also elastic enough to be withdrawn from undercuts in the prepared canal. When undercuts are noted by visual inspection of the pattern or resistance of the seated pattern to removal forces, they can be easily removed with a scalpel blade. This system also has the flexibility to allow core fabrication to be completed as a direct or indirect procedure. If the direct procedure is used, it is recommended that the excess thermoplastic material that extends beyond the anticipated margins of the core be removed with a scalpel blade before the core is fabricated from auto polymerizing resin. When finalizing the core contours with a handpiece, the thermoplastic resin does not cut cleanly with high-speed rotary burs [37].

Because post fitting is crucial in post retention, these results support Al-Omari and Zagibeh [38], who found no effect of the fabrication technique on the retention of cast posts. However, the current study results are contradicted by the findings of Pitigoi-Aron et al [39], who reported that the indirect technique provided better fit and accuracy than the direct technique. The source of this controversy could be the difference in the method used to measure the accuracy of post fit. The varied skills of the opera-

tors, laboratory techniques, and the experimental environment must also be considered as limitations in all in vitro studies, including this one.

The comfort of the patient and reduction in chairside time is an objective of any dental procedure. The indirect technique for fabricating a cast post and core may be easier and consume less time and be less irritating to the patient than the direct technique, especially in treatments with multiple restorations, limited interarch space, or limited accessibility.

Many new techniques have been developed in recent years, in the study conducted by Hendi et al, The results showed that the retention of full-digital posts was better than the half-digital specimens. This finding might be because the full-digital technique scanned the coronal third of the canal directly. The scan posts used to record the other two-thirds of the canal length conformed to the canal shape because the drills used to prepare the canals were matched with the scan posts. However, in the half-digital group, the scanner might not have accurately transformed the indirect impression of the canal to the virtual model. Another possible explanation for the differences in retention may be attributed to milling versus casting in making sharp angles. In the half-digital group, air bubbles in the impression may lead to a negative edge in the milled posts [40]. As reproducing sharp angles in milling is poorer than casting, the half-digital technique may have resulted in less accurate posts and cores [41].

An explanation for the larger apical gap in the full digital technique compared with the conventional technique might be attributed to the fact that the length of the scan posts was larger than the canal space (12 and 16 mm versus 10 mm) and the scan bodies were not scaled. Therefore, the clinician could not determine the exact penetration length of the scan posts. In the half-digital group, insufficient space makes it difficult to ensure the flow of light-body material, which leads to the entrapment of air at the end of the canal. Therefore, the light body material cannot record the apical part of the post space as accurately as for the conventional group [42].

Our institution is passionate about high quality evidence based research and has excelled in various fields [18], [43-52]. The limitation of the study is that it is a retrospective study, only its prevalence was seen since the operators for the posts treatment were different. To improve the significance of the study, the study should be done extensively with a large amount of sample size, so that the results are reliable.

Conclusion

Within the limitations of the current study, it can be concluded

that the prevalence of using patterned resin technique is the maximum and it produced posts that had better marginal adaptation and durability. Long-term follow-up needs to be done to verify the outcome measures and longevity of the posts. Patients should be explained about posts so that more patients will be motivated for the treatment. In this way, the overall outcome of the treatment can be improved, which in turn will have an impact on the quality of life.

Clinical Significance

There are various impression techniques followed for cast posts, but which technique yields a better marginal adaptation and durability can be used as a clinical indicator for impression technique for cast posts.

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