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Association between the Number of Walls Present and Teeth Restored with Prefabricated Metal Posts in Mandibular Molars - A Retrospective Analysis

Research Article

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Abstract

Background: A post and core crown is a type of dental restoration required where there is an inadequate amount of sound tooth tissue remaining to retain a conventional crown. A post is cemented into a prepared root canal, which retains a core restoration, which retains the final crown. Aim of the study is to assess the number of prefabricated metal posts placed in mandibular molars with two or more walls present. A Retrospective study was conducted using the records of the patients. Overall, 283 case sheets were reviewed which were dated between june 2019 to march 2020. The data was collected by the patient records of Saveetha Dental College and Hospitals. Data was recorded in Microsoft excel and later exported to IBM SPSS (version 20.0 Chicago USA) and subjected to Statistical analysis Data consisted of all the patients who underwent restorative procedure and opted for post and core with a total of 285 patients were analysed. Association between the number of walls present and the gender of the patient revealed that male patients with two walls present had the highest number of prefabricated metal post (29.72%) and the least being in the patients having 4 walls with 1.75% among males(Pearson's chi square test value-125.7, $p<0.005$), statistically significant. More numbers of prefabricated metal posts were diagnosed in the age group of 51-70years with 2walls (18.86%), 3 walls (15.73%) and 4 walls(1.75%), however it was statistically significant. (Pearson Chi square Test :125.7, $P<0.05$). Most frequent anatomical site in which prefabricated metal post was seen in 36 with 2walls (16.43%) and 3 walls (15.73%) followed by 46 with 2 walls (15.73%), 3 walls (11.89%) and 4 walls (4.55%).The least number of prefabricated metal post with 2walls(9.79%), 3 walls (5.59%) and 4 walls(1.05%) was 47. Based on Chi square test, it was statistically significant (Pearson Chi square Test :17.25, $P<0.05$). Within the limitations of the study, it can be concluded that prefabricated metal posts are the most preferred posts in posterior teeth, due to its rigidity and strength greater than dentin.

Introduction

A post and core crown is a type of dental restoration required where there is an inadequate amount of sound tooth tissue remaining to retain a conventional crown. The role of the post is firstly to retain a core and secondly to redistribute stresses down onto the root, thereby reducing the risk of coronal fracture. The post does not play any role in reinforcing or supporting the tooth remaining tooth structure [1]. The benefit of placing a post into a root canal is improved retention of the crown. However there are also disadvantages, during the preparation for the post space there is a risk of perforation, a post can also make a tooth more likely to fracture, it makes future orthograde root canal treatment much more difficult and finally it is very destructive and requires excessive removal of tooth tissue. The presence of ferrule can increase the fracture resistance of the post.Posts are more commonly required for anterior teeth rather than posterior teeth. The primary reason for this is that multi-rooted teeth have a large pulp chamber which can be utilised for retention of the core and therefore the crown, whereas anterior teeth are much smaller and less retentive [1, 2].

Metal post and cores take less time to place, as they do not involve any lab work and can be inserted immediately upon the decision to utilize them, once the endodontic therapy has been completed and the post space cleared of gutta percha. Metal prefabricated

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post systems are being superseded by fibre reinforced composite resin post systems which offer improved resistance to untreatable fracture of tooth substrate such as vertical root fracture. Offers advantages of easy retainability of post great strength ; excellent core retention better adaptation in cases of elliptical and extremely tapered canals [3]. In cases where the post space is not a good match for a prefabricated post, a cast post and core can be custom fabricated for the tooth. A resin pattern is produced by placing a preformed plastic "burnout" post into the post space and a resin material, such as Duralay resin, is used to build up the tooth to the proper dimensions [3, 4]. Many recent advancements on post and core have surfaced. Some of them include carbon fibre post, silica fiber post,aesthetic post, aesthetic plus, para post x post system, parapost fiber post system.

Snow post, light transmitting post, double taper light post. Various posts systems have been introduced in the market and the research indicates that they can be safely included in the clinical practice. The selected post and core technique must be conservative, morphologic, retentive, aesthetic and resist radicular failure. [3-5].

Previously our team had done many studies which helped in aiding the current study. They include in vitro study [6-13] systemic review [14-16] survey randomised clinical trial [17, 18]. Now we are focussing more on retrospective analysis. The aim of this study is to find the association between the number of walls present and teeth restored with prefabricated metal posts.

Materials And Method

This comparative Retrospective study was conducted at Saveetha dental college in 2020. Case sheets were analyzed from 1st June 2019 to 31st March 2020. The case sheets and patient details were obtained from the dental record management system database which chronologically has all the patient details, treatment done and their follow up visits information. The ethical approval number was SDC/SIHEC/2020/DIASDATA/0619-0320.

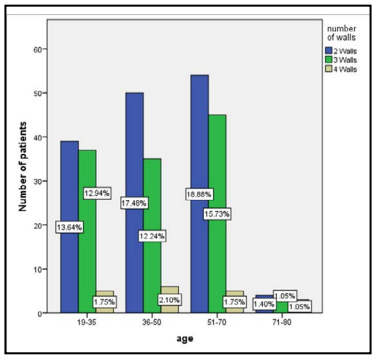
A total of 285 case sheets of patients undergoing posts and core restorations with prefabricated metal posts were evaluated, reviewed and analyzed. The case sheets were cross verified by another examiner to avoid missing any data. The age, gender, treated teeth, type of post (fiber/metal) were checked by data evaluation and photographs. The patients above the age group of 18 yrs only were included in the study. Teeth treated with posts and core with prefabricated metal posts were only included in this study. Sampling bias was minimized by verifying photographs and age groups. Incomplete data was verified from concerned patient case sheets or departments. The acquired data were recorded in Microsoft excel and later exported to IBM SPSS software (SPSS Inc, Chicago) for statistical analysis.Chi square test was then employed with the level of significance set at P<0.05. The statistical analysis between age,gender,teeth number,number of walls remaining were analysed using SPSS software. The outcome was represented in a form of tables and bar charts.

Results And Discussion

In this study a total of 283 patients were analysed. Association between the number of walls present and the age of the patient revealed, patients aged between 51-70 with two walls (18.88%) had the highest number of prefabricated metal post cemented, Pearson's chi square test value 125.7 DF 114] p-0.002 (p<0.005), statistically significant. Association between the number of walls present and the gender of the patient revealed that male patients with two walls present had the highest number of prefabricated metal post (29.72%) and the least being in the patients having 4 walls with 1.75% among males.Pearson's chi square test value 125.7 DF 114] p-0.002 (p<0.005), statistically significant. Maximum number of male patients with two walls present had the highest number of prefabricated metal post (29.72%).

Among females it revealed that patients with 2 walls present had the highest number of prefabricated metal posts with 21.68% and the least in the patients having 4 walls with 4.90%. Among all the posterior teeth tooth no 36 was encountered maximum times and patients who underwent the treatment in 36 with 2 walls had the highest number of prefabricated metal posts placed with 16.43% and with that of the 3 walls with 15.73%. 47 was least treated with 2 walls had 9.79% of prefabricated metal posts and with 3 walls had 5.59% and with 4 walls was 1.05%. . Pearson's chi square test value 17.25 DF 6] 0.007 (p<0.05), statistically significant. Tooth number 36 with two walls present had the highest number of prefabricated metal post cemented 16.43% (2 walls) and 15.73% (3 walls).

Figure 1. Bar chart showing the association between the remaining walls present and the age of the patients. X axis represents the age range of the patients and number of walls present, 2 walls (blue), 3 walls (green) and 4 walls (beige) with Y axis represents the number of patients with prefabricated metal posts. Chi square test was done to find the association between the number of walls present and the age of the patient. Pearson's chi square test value 125.7 DF 114] p-0.002 (p<0.005), statistically significant. Patients aged between 51-70 with two walls (18.88%) had the highest number of prefabricated metal post cemented.



In this study more male predilection was seen than females. According to figure 2, most patients had undergone treatment in tooth number 36 and the least number was 47.

Coming to the number of walls, in our study predominance of 2 walls is seen compared to 3 walls and 4 walls.(fig 1,2,3) . Similar studies done by Ferrari et al.,[19] Creugers et al., [20] and Nam SH et al., [21] where they showcased that most of the times 2 walls were encountered when posts were placed. The fact that due to extensive caries a lot of tooth structure loss can be seen. A similar study by theodosopoulou et al revealed that most of the time only 1 wall was encountered [22].

The fact that fracture resistance is highly dependent on the no of coronal walls was supported by many studies [23]. Also the no of coronal walls plays an important role in determining the type of post and also the type of permanent restoration. A study done by Nam SH et al., [21] stated that restoration with post for teeth having 1 and 2 walls was in 100%of the cases and teeth with 3 and 4 walls was around 60%.

Many studies have been done proving the efficiency and survival rate of metal posts.According to study done mentink et al [24] stated that survival rate was found to be around 82% after 10 years of placement. Another study about the survival rate done by Figueiredo et al., [25] also states that the survival rate of metal post was about 90%. A study done by Fokkinga et al., [26] stated that metal posts had very low failure load compared to other loads.

Figure 2. Bar chart showing the association between the remaining walls present and the gender of the patients. X axis represents the gender of the patient and number of walls present, 2 walls (blue), 3 walls (green) and 4 walls (beige) with Y axis represents the number of patients with prefabricated metal posts cemented.. Chi square test was done to find the association between the number of walls present and the gender. Pearson's chi square test value 125.7 DF-114 p-0.002 (p<0.005), statistically significant.Hence males who reported for restoring teeth with two walls required maximum number of prefabricated posts than females (29.72%).

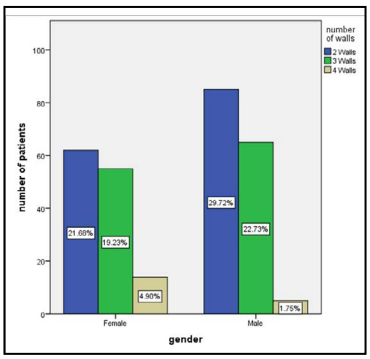


Figure 3. Bar chart showing the association between the remaining walls present and the tooth number. X axis represents the tooth number and number of walls present, 2 walls (blue), 3 walls (green) and 4 walls (beige) with Y axis represents the number of patients with prefabricated metal posts cemented. Chi square test was done to find the association between the number of walls present and the tooth no. Pearson's chi square test value 17.25 DF 6] 0.007(p<0.05), statistically significant. Left mandibular first molar with 2 or 3 walls was the most commonly restored tooth with prefabricated posts followed by the right mandibular first molar.

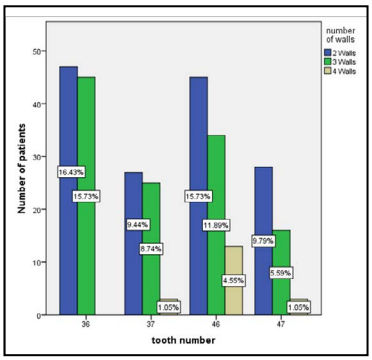


Table 1. Shows the chi square test for association of the teeth type to the reason of retreatment with the p value =0.007(<0.05) ,which implies that there is significant association between the number of walls and the prefabricated metal post among the lower molar teeth.

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	17.725a	6	0.007
Likelihood Ratio	21.818	6	0.001
Linear-by-Linear Association	0.317	1	0.573
N of Valid Cases	283		

But contradicting the above studies a study done by Uthappa et al [27] stated that metal posts had more failures as compared to fiber posts. The retention of metal posts are affected by post surface area, shape, and type of cement used. Parallel posts need more tooth structure to be removed. Tapered and cemented posts need retentive characteristics (grooves, threads) for sufficient retention. When two or more different components are placed in close contact with one another, the components and interfaces created will be subjected to considerable clinical and functional demands and forces. Components with higher elastic-modulus (post/core) will transfer functional stresses to the lower elastic-modulus components, that is, dentin and ultimately result in endodontic or restorative failures. When all components in contact have similar elastic-moduli there is more uniform stress distribution and lowered interfacial stress and failure. This phenomenon has been coined by "monobloc." "Monobloc" requires that, all components of a tooth restoration have similar elastic-moduli to dentin and to allow the components to move, flex, and stresses one assembly.

The number of endodontic procedures has increased steadily in the past decade with highly predictable results. Therefore, restoration of teeth after endodontic treatment is becoming an integral part of restorative practice in dentistry. Proper restoration of endodontically treated teeth requires a sound knowledge of the endodontic, periodontal, restorative, and occlusal principles. Post space preparation requires good understanding and knowledge of tooth anatomy to avoid unnecessary mishaps. Endodontically treated molar teeth should receive cuspal coverage, but in most cases, they do not require a post. When a post is required as a result of extensive loss of the natural tooth substance, it should be placed in the largest and straightest canal to avoid weakening the root, during post space preparation and root perforation in curved canals.

The limitation of this study is that it was conducted among very small population and is a single centered study and inclusion of other factors like reasons for tooth structure loss etc, thus future studies can be done by conducting a multi centered study and including the missed out factors.Extensive multicentered research can be done for more accurate results.

Conclusion

Within the limitations of the study, it can be concluded that remaining coronal walls influence the type of post selected for the restoring endodontically treated teeth. It's been observed that prefabricated metal posts are the most preferred posts in posterior teeth, due to its rigidity and strength greater than dentin and its better distribution of stress among the remaining tooth structure.

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