



Association of Age, Tooth related and Gender distribution in patients undergoing Prefabricated Metal Post

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Article History:

Received on: 08 Sep 2020

Revised on: 08 Oct 2020

Accepted on: 12 Oct 2020

Keywords:

Endodontically treated teeth,
Metal Posts,
Prefabricated Posts,
Post and Core,
Post endodontic restoration.

ABSTRACT

A root canal treatment will have a loss of coronal and radicular tooth structure. This will affect the anchorage of the teeth. Therefore, post-retained crowns are indicated to prevent fracture. The study aims to associate age, tooth-related and gender distribution in patients undergoing prefabricated metal post after root canal treatment. The details of the 86,000 patient records were reviewed and analysed from DIAS (dental information archiving system), out of which 451 case records of the patients who underwent prefabricated posts after root canal treatment were retrieved. The collected data were cross-verified and compiled together in an excel sheet. Compiled data were statistically analysed with the help of SPSS software (23.0). In this study, we can contemplate that there is a significant association between age and type of teeth underwent prefabricated metal posts, 18-30 yrs of age group patients had more posts after root canal treatment compared with other age groups ($p < 0.05$). On comparing the gender to the type of teeth which had posted after root canal treatment, female patients had more number of posts compared to male patients. There is a significant difference seen ($p < 0.05$). Within the limitations of the study, maxillary premolars are predominantly used prefabricated metal post in females. Mandibular molars are commonly treated among male patients and maximum metal post are given after root canal treatment in less than 40 years of age as the masticatory forces are more, so to support the remaining tooth structure rigid posts are required after root canal treatment.



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ISSN: 0975-7538

DOI: <https://doi.org/10.26452/ijrps.v11iSPL3.3496>

Production and Hosted by

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INTRODUCTION

Endodontically treated teeth are associated with coronal and radical loss of tooth structure. Dentin is considered to be the resilient structure present in the tooth that is responsible for transmitting the occlusal load of a tooth. The loss of dentin structure will compromise in the anchorage of the endodontically treated teeth. On that account, it is important to provide posts for root canal treated teeth to prevent fracture (Gbadebo *et al.*, 2014; Bolla *et al.*, 2007). The loss of structural integrity associated

with the access preparation, rather than changes in the dentin, that lead to a higher occurrence of fractures in endodontically treated teeth compared with "vital" teeth (Reeh *et al.*, 1989). Access preparations result in increased cuspal deflection during function (Gutmann, 1992; Pantvisai and Messer, 1995) and increase the possibility of cusp fracture and microleakage at the margins of restorations.

There is a constant occlusal load on all the teeth during all functions of the oral cavity. These forces intend to damage dental restoration (Bessone and Bodereau, 2010). Post, therefore, helps in distributing equal amounts of forces in endodontically treated teeth. Post failure and prosthetic failure have been cited as the most common cause of failure in endodontically treated teeth (Holliday, 2011).

Wide range of post and core systems are documented among which preformed and custom cast, metallic and nonmetallic, stiff and flexible, aesthetic and unaesthetic were commonly used (Shillingburg and Kessler, 1982; Weine, 1989). Prefabricated posts are generally made of stainless steel, nickel-chromium alloy, or titanium alloy. They are very rigid and very strong. They offer little resistance to rotational forces (Dallari and Rovatti, 1995; Chandra *et al.*, 2016). This affects if there adequate tooth structure, but if case of minimal tooth structures, anti-rotation features such as slots or pins should be incorporated into the post preparation. A bonded material should be used for the core. Passive, tapered posts need minimal removal of radicular dentin because of its tapering morphology similar to root canal morphology. But they offer the least retention. If adequate canal length is available, they are the right choice, particularly in thin roots such as maxillary premolars (Raiden *et al.*, 1999). Adequate length is considered to be greater than 8 mm (Neagle, 1969). Additional retention can be gained with a parallel post (Standlee *et al.*, 1978), by the use of resin cement (Junge *et al.*, 1998), or by the use of an active post.

Many of the prefabricated posts are made of titanium alloys and some are made of brass. Titanium posts were introduced as a result of considerations regarding corrosion. Most of the metal alloys utilized in posts have a radio density almost like gutta-percha and sealer and typically onerous to find on radiographs. Titanium posts are fragile, which means they have low fracture strength, thereby implies they are not sturdy enough to be utilized in narrow post channels. Removal of metal posts are often a haul as a result of they generally break once force is applied with a post-removal instrument. Ultrasonic energy is widely used to

retrieve the titanium posts, which might be damaging to the tooth or close tissues. For these reasons, titanium and brass posts ought to be avoided, as a result of they provide no real benefits over the stronger metal posts.

The success of the restoration also depends on the mechanical and chemical treatment of post surface as well as changes in the posts matrix composition appear to influence the bond strength between resin materials and fibre reinforced and metal posts (Monticelli *et al.*, 2008). The possibility of improving adhesion between prefabricated fibre-reinforced posts and metal posts and resin-based luting agent after various surface treatments have been investigated to a somewhat lesser extent (Sadoun and Asmussen, 1994). In this present study, we evaluated the association of age, gender and the type of tooth undergoing prefabricated metal post after root canal treatment.

MATERIALS AND METHODS

The study setting was a university set up in Saveetha Dental College and Hospital. Data was collected from a time period from June 2019 to March 2020. The details of the 86,000 patient records were reviewed and analysed from DIAS (dental information archiving system), out of which 451 case records of the patients underwent prefabricated posts after root canal treatment were retrieved retrospectively. Cross verification was done to avoid bias by another examiner. To avoid missing any data, age and photographic evaluation were carried out. All the relevant data were retrieved and tabulated in the Excel sheet. Later, it was statistically analysed with the help of IBM SPSS 23.0 statistics, using the Chi-Square test. The independent variables are age, gender and tooth number whereas dependent variable is prefabricated metal post.

RESULTS AND DISCUSSION

The study consisted of a total of 451 patients, among which 214 are male and 237 female patients. The distribution of prefabricated metal posts in different teeth is as follows: 148 maxillary premolars, 64 mandibular premolars, 140 to mandibular molars and 97 maxillary molars with varying age groups. The analysis amongst age groups, the age groups <40 years had more posts in molars compared to premolars and the vice versa in age groups >40 years (Figure 1), found to be statistically significant ($p < 0.05$). The association between gender and post revealed that female patients required more posts when compared to male patients ($p < 0.05$). Female patients predominantly had more posts in maxillary

premolars, whereas male patients had more posts in mandibular molar respectively following root canal treatment (Figure 2).

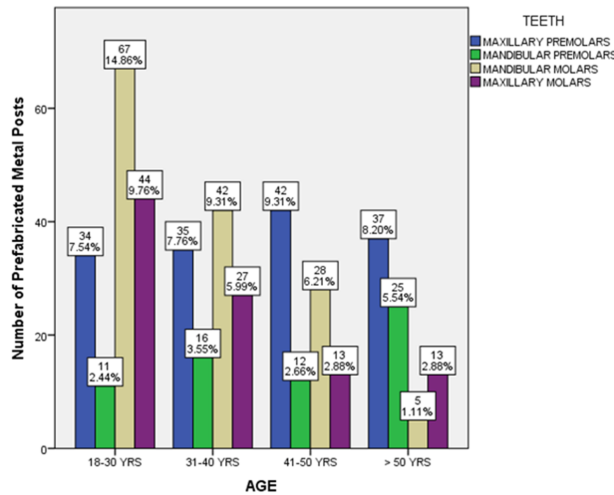


Figure 1: Distribution of age and the type of teeth restored using prefabricated metal posts

In the present study, there is a high prevalence of prefabricated metal post-treatment among 18 to 30 years, followed by 31 to 40 years old with 34.6% and 26.6% respectively. Considering age as variable, some studies show age above 50 years has a high risk for vertical root fracture followed by endodontically treated teeth. Though, other variables such as gender, endodontic treatment history had no significant association with vertical root fracture (Hsiao et al., 2020).

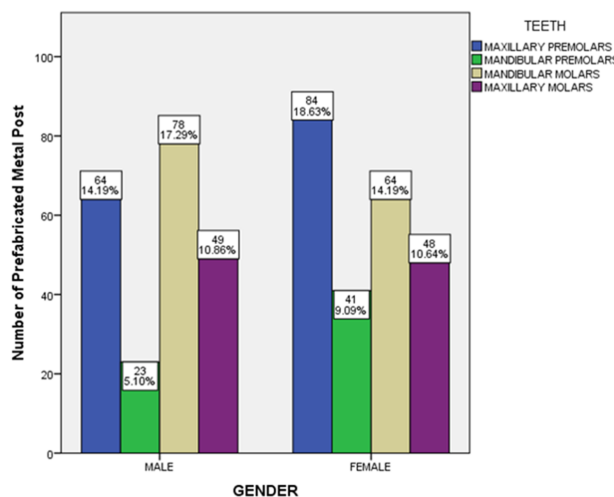


Figure 2: The distribution of gender and the type of teeth where prefabricated metal posts are placed

Recent studies by Tail showed stress could be created on the placement of a post, which indeed causes route fracture either during placement or during functional movement (Zhi-Yue and Yu-Xing, 2003).

Contraindicating to this study, there were no fracture of teeth. This was by changing treatment sitting. Post preparation and bonding was done in the same settings. This can be due to adhesive post-placement preparation by stabilising the route by inner splinting (Shashikala and Sharma, 2011).

A study contemplates that maxillary teeth, especially incisors and canine more failures in post to retain restoration than the mandibular teeth. Maxillary anterior teeth show high failure is due to constant horizontal forces acting on anterior teeth (Fox et al., 2004; Mentink et al., 1993; Naumann et al., 2005; Torbjörner et al., 1995).

Choudhary et al. (2014) conducted an in vitro study, which compared and evaluated the retention of prefabricated and conventional cast posts. It was found that the bond strength of all the prefabricated posts was considerably less than the conventional cast post. Among the prefabricated posts, the highest bond strength was obtained for prefabricated stainless steel posts and lowest for carbon fibre posts. Similar results were reported in another study which shows the maximum number of post failures were observed in metal posts than fibre posts (Uthappa et al., 2015).

Failure of posts also depends on the amount of residual coronal dentin and their reciprocation with prefabricated and custom made fibre posts. Light Posts (prefabricated) and Ever Stick Post (customised fibre posts) were compared whether the amount of residual dentin and placement of these posts have any influence in the survival rate of the posts. It shows the lowest survival rate was recorded for the teeth restored with Ever Stick Post (76.7%) than the Light Posts (90.9%). To obtain the highest success rate, endodontically treated teeth should have a ferrule structure, as it has a direct influence on clinical success rate (Crysanticagidiaco et al., 2008).

The in-vitro studies conducted at our university were (Ramanathan and Solete, 2015; Rajendran et al., 2019; Janani et al., 2020), the invivo studies include (Nasim and Nandakumar, 2018; Nasim et al., 2018; Siddique et al., 2019), the molecular study (Ramesh et al., 2018), the reviews and systematic reviews published are (Noor, 2016; Kumar and Antony, 2018; Ravinthar and Jayalakshmi, 2018; Rajakeerthi and Nivedhitha, 2019), the surveys conducted (Manohar and Sharma, 2018; Jose et al., 2020), and the clinical trial conducted on root canal irrigants were (Ramamoorthi et al., 2015). Currently, we are analyzing retrospective studies. In this study, we evaluated the prefabricated metal posts association with gender and age (Teja and Ramesh, 2019).

Figure 1, X-axis denotes age group and Y-axis denotes the number of teeth which have undergone prefabricated metal posts. In the age group of 18-30 years and 31-40 years, Mandibular molars (Brown) had more prefabricated metal posts than other teeth. In the age group 41-50 years and above 50 years, Maxillary premolars (Blue) had more posts than other teeth. Chi square test =66.978, p value=0.000*, statistically significant (p <0.05) implying an association between the age and type of teeth restored using prefabricated metal posts.

Figure 2, X-axis denotes gender and Y-axis denotes the number of teeth which have undergone prefabricated metal posts. Maxillary premolars (Blue) received the maximum number of prefabricated metal posts in females, whereas mandibular molars (Brown) received the highest among males. Chi square test = 8.004, p value=0.046, statistically significant (p<0.05), implying an association between the gender and type of teeth restored using prefabricated metal posts.

(Gómez-Polo *et al.*, 2010), the compared survival rate of prefabricated posts with cobalt chrome cast post-cores. Totally 112 endodontically treated teeth were restored with prefabricated posts and cobalt chrome cast post-cores. Out of 112, 93 teeth were still in a functional state both clinically and radiographically. When comparing the technique, prefabricated posts show a slightly higher survival rate than cobalt chrome cast post-cores with 84.6% and 82.6% respectively.

Limitation of our study includes minimal sample size. Furthermore, studies can be conducted to assess the survival rates of different posts in various teeth. This can help plan the treatment for any patient.

CONCLUSION

Within the limitations maxillary premolars are predominantly used prefabricated metal post in females and mandibular molars are commonly treated among male patients and maximum metal post are given after root canal treatment in less than 40 years of age as the masticatory forces are more, so to support the remaining tooth structure rigid posts are required after root canal treatment.

Conflict of Interest

The authors declare that they have no conflict of interest for this study.

Funding Support

The authors declare that they have no funding support for this study.

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