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Association of prefabricated metal post with the method of removal - a retrospective study

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Abstract: Removal of post forms an integral part of endodontic retreatment. The aim of this study is to evaluate the association between prefabricated metal post and the method of post retrieval. A study of sample size eight was conducted of patients who had undergone metal post retrieval. Excel calculation was done, analysed and transferred to SPSS for statistical analysis. The p value was set at 0.05. From this study, it is observed that mechanical method of removal of posts was commonly practised (62.5%). Ultrasonic removal of prefabricated metal posts was performed in 37.5%. Post removal in 22 was done with ultrasonics as well as mechanically in equal numbers. Removal of post in 12 was done solely with ultrasonics. Within the limits of the study, mechanical removal of post has been done predominantly in the upper and lower central incisors. Ultrasonic removal of post is done solely in the lateral incisor in the present study.

Keywords: Endodontics ; Posts ; Removal; Root Canal Treatment

INTRODUCTION

Dentists are regularly required to decide whether to retain and restore an extensively damaged tooth or to extract it and replace it with an implant supported restoration. This decision can be difficult and must be made by the dentist and an informed patient on a tooth by tooth basis. If the decision is to perform endodontic therapy and retain the tooth, additional decisions are required regarding the optimum protocol for restoring the tooth. Not all endodontically treated teeth need a post-and-core and coronal restoration. This decision largely depends on the amount of remaining tooth structure. There are different types of posts namely; active/passive posts, prefabricated posts/ cast posts and cores, parallel sided/tapered posts [(Ahmed, Donovan and Ghuman, 2017)]. Active posts increase stress on root dentin. Metal screws have a reported survival rate of 76%. Failure of active posts causes root fracture [(Schmitter *et al.*, 2007)].

Endodontic retreatment often involves the removal of intraradicular posts. In a study done by Abott et al, it is reported that 36.7% of the cases received endodontic treatment and 25.7% of these required post retrieval. This represents 9.4% of the cases treated and demonstrates the need to be proficient in removing pose atraumatically, thus cracks and vertical fractures can be prevented that develop in the root [(Abbott, 1994)].

Factors that may affect the retention of a post are its type (custom or prefabricated) , design (parallel, tapered, smooth, serrated, threaded), cementing medium, depth of the cement, adaptation of post in the root canal and variation in any of these factors affects retention [(Hauman, Chandler and Purton, 2003)].

The removal of intraradicular posts or dowles is indicated when an endodontic or restorative treatment failure has been diagnosed. The approach to the non-surgical retreatment of the root canal and restorative needs of the tooth is indicated to facilitate proper cleaning, shaping and Obturation of the canal to ensure the presence of a well-fitted and secured post [(Stamos and Gutmann, 1993)].

Although many original techniques advocated for post removal were present with potential problems, like damage to the supporting structures and root fracture, recent advances in post removal techniques and equipment has minimised the potential for traumatic removal. These developments include post pullers or removers, extractors and ultrasonic vibratory instruments [(Lovdahl and Gutmann, 1992),(Gaffney, Lehman and Miles, 1981)].

Various clinical trials, in-vitro studies and reviews have been conducted by our team [(Ramamoorthi, Nivedhitha and Divyanand, 2015; Ramanathan and Solete, 2015; Noor, S Syed Shihaab and Pradeep, 2016;

Kumar and Antony, 2018; Manohar and Sharma, 2018; Nandakumar and Nasim, 2018; Nasim *et al.*, 2018; Ravinthar and Others, 2018; Teja, Ramesh and Priya, 2018; Rajakeerthi and Ms, 2019; Rajendran *et al.*, 2019a; Siddique *et al.*, 2019; Teja and Ramesh, 2019; Janani, Palanivelu and Sandhya, 2020; Jose, P. and Subbaiyan, 2020)]. Now, we are focussing on epidemiological studies.Our team has rich experience in research and we have collaborated with numerous authors over various topics in the past decade (Deogade, Gupta and Ariga, 2018; Ezhilarasan, 2018; Ezhilarasan, Sokal and Najimi, 2018; Jeevanandan and Govindaraju, 2018; J *et al.*, 2018; Menon *et al.*, 2018; Prabakar *et al.*, 2018; Rajeshkumar *et al.*, 2018, 2019; Vishnu Prasad *et al.*, 2018; Wahab *et al.*, 2018; Dua *et al.*, 2019; Duraisamy *et al.*, 2019; Ezhilarasan, Apoorva and Ashok Vardhan, 2019; Gheena and Ezhilarasan, 2019; Malli Sureshbabu *et al.*, 2019; Mehta *et al.*, 2019; Panchal, Jeevanandan and Subramanian, 2019; Rajendran *et al.*, 2019b; Ramakrishnan, Dhanalakshmi and Subramanian, 2019; Sharma *et al.*, 2019; Varghese, Ramesh and Veeraiyan, 2019; Gomathi *et al.*, 2020; Samuel, Acharya and Rao, 2020)
The aim of this study is to evaluate the association of prefabricated metal posts with the method of retrieval.

MATERIALS AND METHODS

The study was done in a University based hospital setting in a private dental college. The population selection was done at random. The population type that was selected was endodontic patients with prefabricated metal posts. The ethical approval was given by SRB- Scientific Review Board of the institution. The sample size collection was done from June 2019- April 2020. 8 case sheets with metal post retrieval were reviewed. Cross verification of the data was done using photographs. To minimise sampling bias, simple random sampling was done.

Data analysis

The data for the study was collected from the Dental Information Archiving System (DIAS) Of Saveetha Dental College. It is a patient management software, in which data on post retrieval, type of post retrieved and technique used was collected. The data was transferred to excel, tabulated and analysed. Incomplete and censored data was excluded.

Statistical analysis

The data collected from DIAS, was tabulated in excel. The data was imported to SPSS. Analysis was done using SPSS version 19. Descriptive statistics and chi square test was used to determine the correlation between type of post retrieved and method of removal. The independent variables in the study are age, gender and dependent variables is the type of post.chi square test was done on the collected data. The type of analysis that was performed was correlation and association. The level of significance was set at 0.05.

RESULTS AND DISCUSSION

From this study, of the 8 metal posts that were retrieved, mechanical removal was done in 62.5% and ultrasonic removal was done in 37.5% of the patients. (Figure 1) It was found that mechanical removal was the sole method of removal in 11,31 in the present study. Post removal in 22 was done with ultrasonics as well as mechanically in equal numbers. Removal of post in 12 was done solely with ultrasonics. (Figure 2)
Many techniques have been devised to aid in the retrieval of posts such as the use of burs or trephines, that are devices that grasp the posts so that the post can be pulled out of the root and the use of ultrasonic vibrations[(Castrisos and Abbott, 2002),(Abbott, 1994)]. In ultrasonic technique, the restorative material and the luting cement is initially removed from around the post, followed by the application of an ultrasonic instrument to the post. The cement is broken down and the post loosens as the ultrasonic energy is transferred through the post. According to few studies, this method of post retrieval minimises loss of tooth structure and decreases the risk of root damage [(Krell *et al.*, 1986),(Chenail and Teplitsky, 1987)].
In a survey conducted by Stamos et al on endodontic retreatment methods, it was found that the use of hemostats for post removal was the most popular technique followed by drilling out of the post which is similar to the present study [(Stamos and Gutmann, 1993)]. But, this result is reported in a study done by Castrisos et al, where in the survey showed that ultrasonic removal of posts was the most common method of removal [(Castrisos and Abbott, 2002)].
It has also been reported that the dentists who commonly used post removers were more likely to have experienced a root fracture during post removal. It has been studied that the removal of carbon posts generally took a longer time for removal when compared to glass and quartz fibre posts. It was also found that there was higher risk for root perforation during the removal of fibre posts [(Haupt, Pfitzner and Hülsmann, 2018)]. Capar et al, found that fibre post removals with drills does not does not have a significant effect on crack propagation [(Çapar *et al.*, 2015)].
Altshul et al compared the incidence of dentinal cracks in teeth after post had been removed with either ultrasonic vibration or with Gonon post remover and reported a higher number of roots with intradentine cracks in the ultrasonic group even though vertical fractures did not occur [(Altshul *et al.*, 1997)].

It has been found in surveys that devices such as Eggler post removal was commonly used in the removal of posts from the anterior teeth [(Abbott, 2002; Castrisos and Abbott, 2002)]. Cast post has been the most frequently retrieved post (65.8%)[(Abbott, 2002)]. The limitations of the present study is that the sample size is small and the type of mechanical removal is not studied. Our institution is passionate about high quality evidence based research and has excelled in various fields ((Pc, Marimuthu and Devadoss, 2018; Ramesh *et al.*, 2018; Ezhilarasan, Apoorva and Ashok Vardhan, 2019; Ramadurai *et al.*, 2019; Sridharan *et al.*, 2019; Vijayashree Priyadharsini, 2019; Mathew *et al.*, 2020)

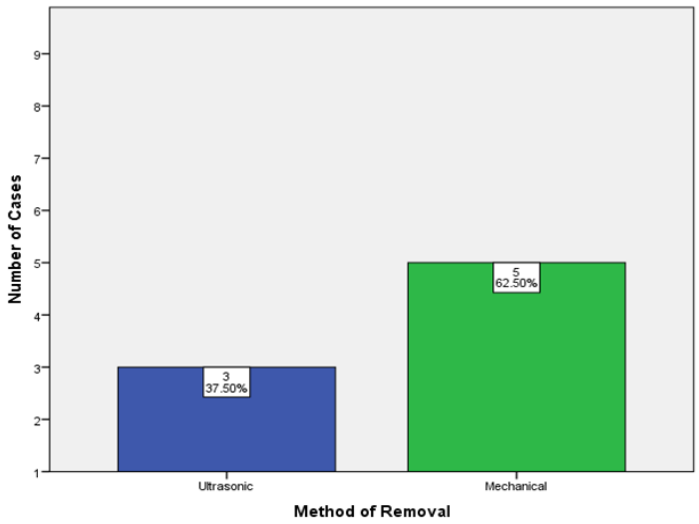

Fig.1: Bar graph depicts frequency distribution of the method of removal of posts. The X-axis denotes method of removal and Y-axis denotes number of patients. Descriptive statistics was done and frequency was calculated. Mechanical removal (green) of posts was done most commonly. (62.5%)

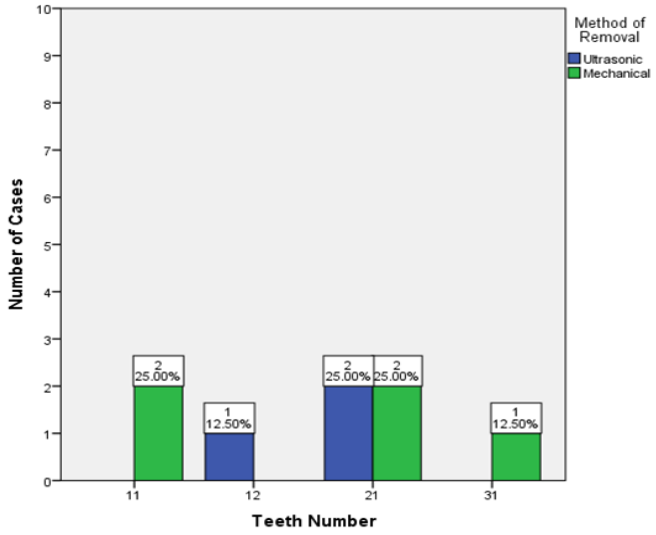

Fig.2: The above depicted graph shows association between post retrieval and teeth number. The X-axis denotes teeth number and Y-axis denotes number of cases. Mechanical removal(green) was done in 11. Mechanical(green) and ultrasonic(blue) removal was done equally in 21. Pearson's chi square value: 3.733, DF:3, p value: 0.292. However the association between the tooth and method of post retrieval was not significant.

CONCLUSION

Within the limitations of the study, it was found that mechanical removal of the prefabricated metal posts is the most common method of removal (62.5%) .Mechanical removal of post has been done more commonly in the upper and lower central incisors. Ultrasonic removal of post is done solely in the lateral incisor in the present study. The various systems for post removal should be studied in detail to prevent root fracture and various other complications, thus preventing extraction of the tooth.

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