

## Evaluating the Number of Walls Present and its Significance on the Teeth Restored with Metal Post in Mandibular Molars

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### ABSTRACT

The control of the process–structure–property relationship of a material plays an important role in the design of biomedical metal devices featuring desired properties. In the field of endodontics, several post-core systems have been considered, which include a wide range of industrially developed posts. Endodontists generally use posts characterized by different materials, sizes, and shapes.

The prognosis of endodontically treated teeth depends not only on the treatment itself, but also on sealing the canal and minimizing the leakage of oral fluids and bacteria into periradicular areas by prompt placement of coronal restorations. This treatment includes the decision of whether or not posts

should be used. After many years of scientific work involving post material, post geometry, post length, core material, and other considerations, the indication for posts is reemerging as a topic of discussion.

Aim of this study is to find out the significance of the number of walls present in mandibular molars that are indicated for prefabricated metal post and core treatment. The study was a retrospective analysis done in a university set up. Data of patients who underwent post and core treatment were collected by evaluating the patient records and tabulated. Data was imported to IBM SPSS version 20 software and statistical analysis was done. From the study it was observed that most commonly post and core treated teeth was mandibular 1st molar [36]. It was also found that there is significant correlation found between teeth undergoing metal post and core treatment and number of walls remaining.

**Key words:** Prefabricated metal post, Root canal treatment, Walls, Innovative

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### INTRODUCTION

Excessive loss of dental hard tissues makes subsequent prosthetic restorations more difficult to look at. In such cases, employing a mix of endodontic and prosthetic treatment, an interdisciplinary approach is required to evaluate, diagnose, and correct aesthetics concerns. To restore structurally impaired endodontically treated teeth, a wide range of materials and procedures are available [1]. Teeth have been used post and core endodontically for almost a century. When more retention is needed to keep the core and coronal restoration in place, a post is a dental component put in

the root of a structurally deficient tooth.

The use of Post & core is still an area of great debate within Dentistry. Custom cast post and core allow for a close adaptation of the post to post space preparation and should fit optimally. Cast posts and cores do not require an auxiliary retention such as pins to retain the core as in some prefabricated systems [1,2].

The indications for a post and core restoration are tooth with extensive crown loss, crown susceptible to cervical area fracture, grossly discolored tooth, loss of two proximal surfaces, shortened tooth with insufficient retention form with favorable periodontal and periapical condition [3]. The fit of the post with the canal walls depends on the configuration and size of the root canal. Prefabricated metal, carbon fiber, ceramic, and glass fiber posts are available. These last two options provide esthetic alternatives to metal posts. They are used in conjunction with a plastic material such as composite resin, amalgam, or glass ionomer [4,5]. Although one-piece post-crowns were once made, such prostheses are of historical interest only. Superior results can now

be obtained with a two-step technique consisting of a post-and core foundation and a separate crown. Most often a metal post is used, which provides the necessary retention for the core. This replaces any lost coronal tooth structure of the tooth preparation. The shape of the residual coronal tooth structure, combined with the core, should result in an ideal shape for the preparation [4].

Regarding quantity, in general, when more than half of a tooth's structure is missing, the clinician should consider placing a post. The issue is whether or not there is enough structure present to retain the crown. It depends on the ferrule, which can be defined as a 360° collar of the crown that surrounds the parallel walls of the dentine and extends coronally to the shoulder of the preparation.[5] Sometimes, the clinician has a situation in which there is no ferrule, and other times, the ferrule is almost ideal. Although there are exceptions, the ideal is when no core is required-just the natural tooth functioning as the core [6].

When restoring a tooth, it is optimal to have 3 mm of the wall on one side and 2 mm on the other, which indicates at least a 2-mm ferrule. 6With these conditions, the clinician is going to have a higher chance of success. Restorations can occur in other situations, but the patient should be warned that failure could be possible in certain scenarios [7].

When assessing the quality of the tooth structure, the clinician is looking for indications of nonideal conditions, such as discoloration, cracks, an undercut, and concavities [8]. The first premolar has a concavity, but sometimes there are concavities in molars as well, such as on the distal aspect of a mandibular molar or the palatal aspect of a maxillary molar. These are teeth that should get posts [9]. The clinician should aim to place the post in the canal with the straightest path.

In the field of endodontics, the fracture resistance of teeth should be improved by cementing a post into the root. Generally, cast metal posts and prefabricated posts are employed. The use of cast metal posts requires expensive and time-consuming procedures as well as a direct pattern or impression of the root cavity, whereas prefabricated posts involve less expensive and straightforward procedures which can be carried out in a single visit [10,11].

Prefabricated posts are usually characterized by parallel or tapered forms and are made of anisotropic materials or isotropic materials. The levels of stress and strain generated in endodontically treated teeth are strongly related to the employed post-and-core systems. Nevertheless, it remains unclear whether a flexible or stiff post is needed. The risk of root fracture in endodontically treated teeth depends upon the restoration stiffness, and many studies focusing on which material might reduce stresses suggest that neither flexible nor stiff posts are ideal [12]. Cast posts and prefabricated metal posts usually generate high stresses at the post-dentin

interface as a consequence of the use of high modulus materials. Taking into account that stress concentration generally occurs at the apical and cervical regions of the tooth, flexible posts cause stress concentration in dentin, whereas rigid posts concentrate stresses at the interfaces [1]. This study focuses on the use of metal posts in endodontically treated mandibular molars and its significance in the number of walls present post root canal treatment. Our team has extensive knowledge and research experience that has translate into high quality publications [13-32].

## MATERIALS AND METHODS

This is a retrospective study conducted in a university setting. The case records were reviewed from June 2019 to April 2021 and the patient data who underwent root canal treatment in relation to mandibular molars was collected and evaluated. An institutional committee approval was obtained to access the personal data of the patients. A total of 410 records of patients who underwent molar RCT were retrieved and both photographic and radiographic evaluation was done. Cross verification was done by two reviewers to minimize bias. All the mandibular teeth that underwent root canal treatment followed by metal post and core treatment were recorded. The samples were divided into groups based on the number of walls present in the teeth post endodontic treatment and the tooth number. The data was tabulated and analysed using IBM SPSS software version 20. Descriptive statistics was done to determine the frequency percentage of age, gender, tooth number and number of walls present in the tooth, and Chi square test was done to find the association between the teeth undergoing pulp capping with the age and gender of the patients. The level of significance was set at 0.05. The results were presented in the form of graphs.

## RESULTS

In the current study it was found that 55.41% of the patients who underwent mandibular posterior meal prefabricated post and core treatment were males and remaining 45.59% were females. From the current study we can observe that the most commonly Root Canal treated teeth followed by post and core treatment is 36 (34.3%), followed by 46 (30%), 45(17.32%), 35(16.52%), very least in 38 and 48 (0.24%). Among all the metal post and core treated mandibular posterior teeth most of the tooth had 2 walls (53.41%), followed by 3 walls 35.61%, one wall (6.59%) least number of teeth had 4 walls (Figures 1 to Figure 5).

## DISCUSSION

Figure 1 indicates that most commonly Root Canal treated teeth, followed by metal post and core treatment in mandibular posteriors is mandibular first molars of 4th and 3rd quadrant. Incidence of post and core treatment is comparatively more in relation to 36

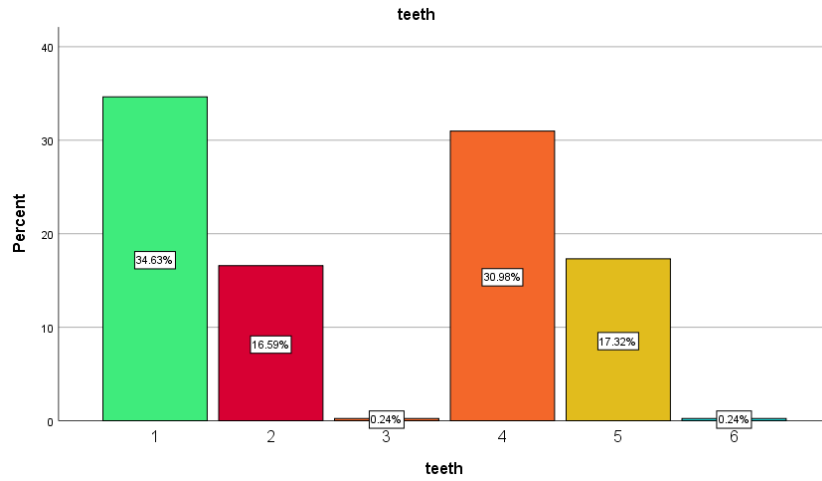


Figure 1: Bar diagram representing the distribution of post and core treatment done in different tooth numbers. X-axis represents the different tooth numbers and Y-axis represents the frequency of post and core treatment.

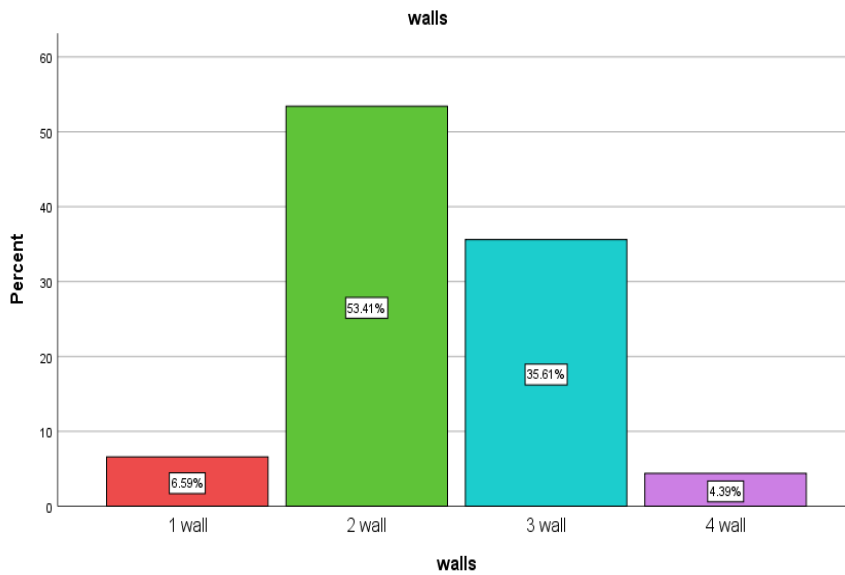


Figure 2: Bar diagram representing the distribution of post and core treatment done and number of walls present in the teeth. X-axis represents the number of walls present and Y-axis represents the frequency of post and core treatment.

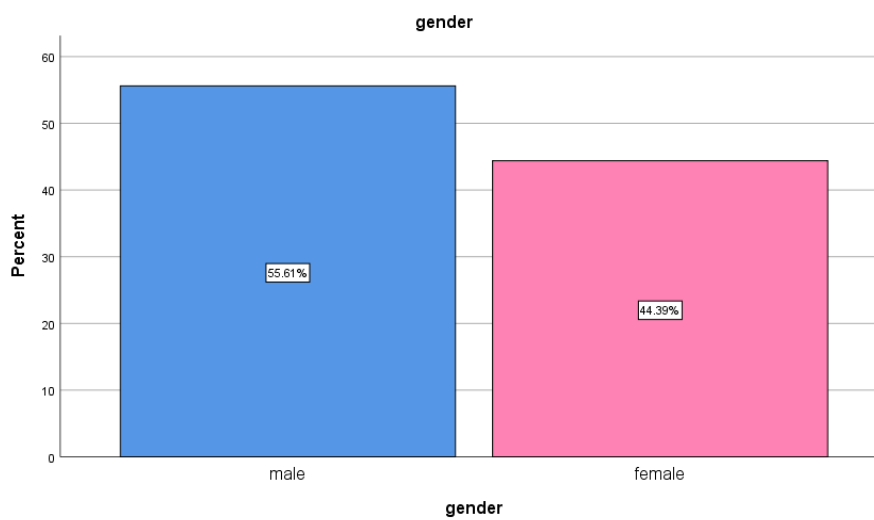


Figure 3: Bar diagram representing the distribution of post and core treatment done and gender of the patients who underwent post and core treatment. X-axis represents the gender of the patient and Y-axis represents the frequency of post and core treatment.

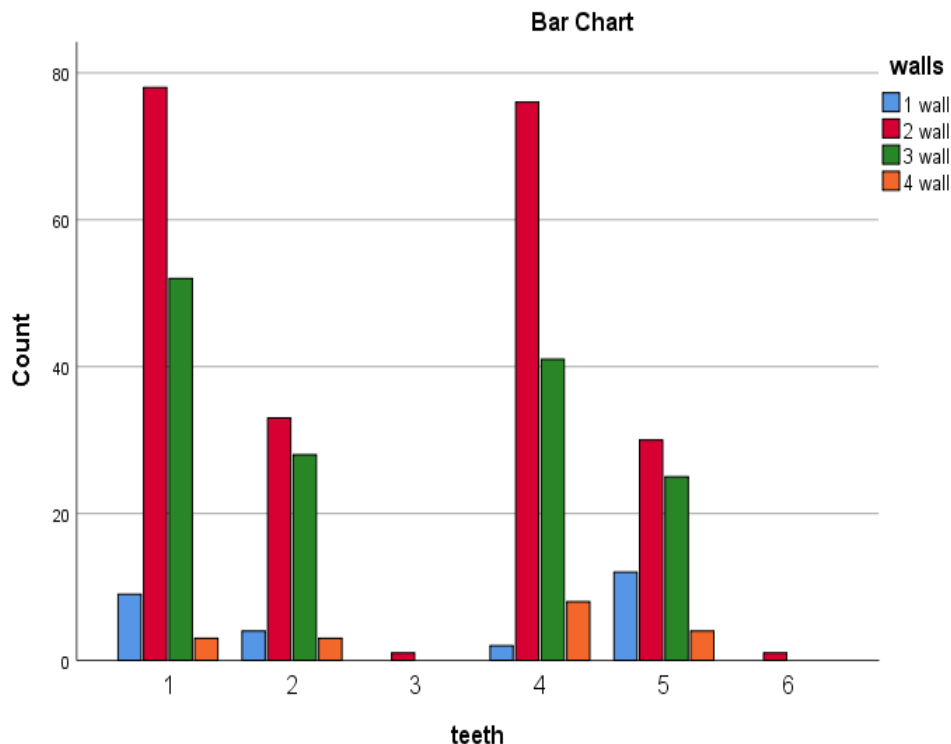


Figure 4: Bar diagram representing the association between prefabricated metal post and core treated teeth and number of walls remaining in them post endodontic therapy. X-axis represents teeth number and Y-axis represents the frequency of the treated teeth.

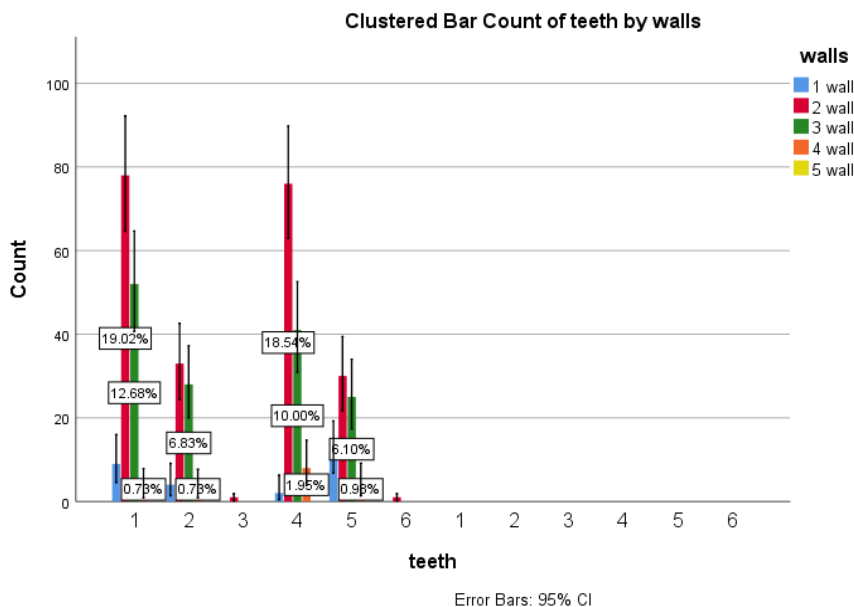


Figure 5: Error Bars help to indicate estimated error or uncertainty to give a general sense of how precise a measurement is. This is done through the use of markers drawn over the original graph and its data points. Error bars are used to display either the standard deviation, standard error, confidence intervals or the minimum and maximum values in a ranged dataset. The graph represents the association of number walls present in mandibular molars post RCT with the teeth classification. X axis denotes classification and Y axis denotes number of walls remaining. P-value =0.00 (> 0.05), hence statistically significant.

(37%) followed by 46(30%) the least commonly treated teeth is mandibular 3rd molars (0.24%). This finding is supported by (33) the most frequently treated tooth was the right permanent mandibular first molar, followed by the left permanent mandibular first molar, right permanent maxillary first molar, and left permanent

maxillary first molar. The least commonly treated teeth were the permanent mandibular third molars, followed by the right permanent mandibular lateral incisor .

From Figure 2 which shows the frequency of number of walls remaining in the root canal treated tooth it was found that among all the root canal treated

mandibular posteriors majority of the teeth had 2 walls remaining(53.4%), followed by 3 walls (35.61%), 1 wall (6.59%), and least was seen in 4 walled teeth (4.39%).

It was also found in the current study that incidence of metal post and core treatment in mandibular posteriors were seen more in males (55.61%), least was seen in females with 44.39%. Within the limitations of the study (34) , it showed that a higher number of male patients were reported in Single visit and Multi visit RCT. Maxillary Anterior and Maxillary Molars teeth had been reported to be the highest number of teeth involved in single visit RCT, and in Multi visit RCT, Mandibular Molars were reported to be the highest in Multi visit RCT.

It was found in the current study that there is significant association found between the number of walls present in the post and core treated tooth and tooth number that underwent the treatment. The p value was found to be less than 0.05 (p value=0.045).

### CONCLUSION

From the limitations of the study it was found that the metal post and core treatment was indicated in mandibular left side 1st molar (36) followed by mandibular right side 1st molar (46).

It was also found that 2 walls were present in most of the cases that were indicated for metal post and core treatment. There was significant association found between the number of walls present in the metal post indicated teeth and the tooth number of the cases that underwent post and core treatment.

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### CONFLICT OF INTEREST

Authors declare no conflict of interest.

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