



Evaluation of dead space in post endodontically treated cast post cases - A retrospective study

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ABSTRACT

The success of endodontic therapy is 53-96%. It depends on a multitude of factors like tooth type, preoperative apical status, method of obturation, irrigation, coronal seal permanent restoration. Grossly decayed endodontically treated teeth are often restored with post and core. Apical microleakage can lead to failure of the endodontic therapy. So, the aim of this study was to measure the distance between the post and residual gutta-percha in cast post cases. Dental records and radiographs of patients treated with cast post cases were obtained from DIAS (From June 2019- March 2020) examined by the same examiner. Patients were categorized into three groups based on the distance between the remaining obturation material and post. A total of 70 cases were examined. Out of which 21% of cases belonged to Group I and 68% of the cases were categorized into Group II. Within the limitation of the study, most of the cases had an average dead space of 0.1-2 mm (68%). Within the limitation of the study, most of the cases had an average dead space of 0.1-2 mm (68%). The dead space occurring after a post-restoration can be a good shelter for the microorganisms. So, radiographic confirmation of the post adaptation should be performed before cementation of all kinds of posts.



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INTRODUCTION

The success of the endodontic treatment is 53%-96% (Sjogren *et al.*, 1990; Farzaneh *et al.*, 2004). Depends on a multitude of factors like tooth type, preoperative operator skills and quality of the coronal seal. The recent advances in endodontics and post endodontic restorative procedures have

improved the longevity of endodontically treated teeth (Alves *et al.*, 1998; Nasim *et al.*, 2018). Endodontically treated teeth are often broken teeth which requires restoration with endodontic post and post help in the uniform dispersion of the forces along the vertical axis of the tooth into the periodontium, thereby help in the better retention of the final restoration (Ray and Trope, 1995; Fernandes and Dessai, 2001). But on the other hand, post space preparation compromises the seal provided by full-length obturation. This might lead to coronal microleakage resulting in the failure of the endodontic therapy (Kumar and Antony, 2018; Ravinthar and Jayalakshmi, 2018). So, immediate and proper coronal restoration is very important (Cabrera *et al.*, 1994; Heling *et al.*, 2002). Apical leakage is one of the critical parameters which decides the outcome of the final outcome (Gomes *et al.*, 2015; Ramamoorthi *et al.*, 2015). Studies which have evaluated the success of root canal treatment have also proved that the coronal leakage to the periapical region

along the root canal was also a major contributing factor (Siqueira *et al.*, 2005; Ramanathan and Solete, 2015; Swanson and Madison, 1987; Torabinejad *et al.*, 1990). A custom-made cast post can either be fabricated from a direct pattern or an indirect pattern. In the case of the direct technique, the pattern can either be made using inlay wax, or it can be made using pattern resin. In the case of conventional indirect technique, an elastomeric impression material along with some kind of reinforcement is used (Al-Dhalaan, 2012). So, the aim of the present study was to evaluate the dead space in post-endodontically treated cast post cases.

MATERIALS AND METHODS

This was a retrospective study, carried out at Department of Conservative Dentistry and Endodontics at Saveetha dental college and hospitals, Chennai. As this study was entirely based on data collection from existing dental records available in DIAS (Dental Information Archiving Software) Saveetha Dental College, ethical clearance was not obtained. Dental record of the patients who had undergone treatment for the management of mutilated teeth with cast post from June 2019 to March 2020 was retrospectively examined by a single examiner. Only the patient who had got their treatment done by the same clinician and full dental records were included for the study. Data were collected from 70 patient records. Following data were collected from each patient - Age, Gender, Type of teeth and the radiographs of each were evaluated for the dead space (Distance between obturating material and the post) and were broadly divided into three categories based on this into Group I, II and III.

I-No gap- 0mm

II-less than 2mm

III-more than 2mm [Table 1].

Table 1: Criteria for the dead space evaluation.

Groups	Criteria for dead space evaluation
I	0mm
II	Less than 2mm
III	More than 2mm

Data were tabulated in excel sheets, and SPSS 21.0 version was used for the statistical analysis. Descriptive analysis of the data obtained was done, and Chi-square test was done to check the association between Age, Gender and Number of cases.

RESULTS AND DISCUSSION

A total of 70 cases were examined. 21% of cases were grouped into group I, 68% were categorized under group II and 1% of cases were grouped under Group III. On the whole, most of the cases belonged to the 21-30 age group-57%. A minimum number of cases were reported in 61-70 age group-13% Maximum number of cases were reported in Male-62%, a minimum number of cases were reported in Female-37%. When the association between the age groups and the teeth was checked, it was found to be not significant with P value more than 0.05 Table 2.

Table 2: Number of cases in each group.

Groups	Number of teeth
I	15
II	48
III	7

Figure 1 shows that the X-axis denotes the group and Y-axis denotes the total number of teeth. Most of the teeth had group 2, which is a dead space of less than 2mm. Figure 2 shows that the X-axis denotes the groups and the Y-axis denotes the total number of teeth. The most common teeth seen in all the three groups was 11 (Maxillary central incisors).

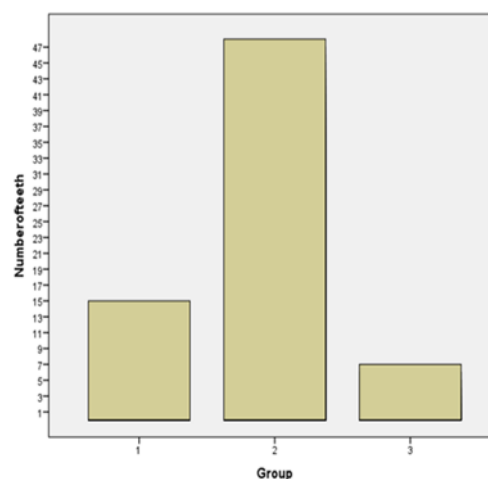


Figure 1: Bar chart represents the dead space in cast post cases.

Figure 3 shows that the X-axis gives the teeth number, and Y-axis gives the count of teeth, The most common teeth seen is 11 among all three groups. Figure 4 shows that the X-Axis denotes the groups, and the Y-axis denotes the count of teeth in each group. Chi-square test was done, and the association was found to be statistically insignificant. Pearson's Chi-square value:8.598, Df:10, P value:0.571 (>0.05).

(Hommez *et al.*, 2002; Lupi-Pegurier, 2002) This retrospective study was entirely based on the evaluation of intraoral periapical radiographs. The major limitation of this type of analysis is it gives a static description of the dynamic inflammatory process, which can lead to incorrect assessments (Teja *et al.*, 2018; Siddique, 2019; Janani *et al.*, 2020).

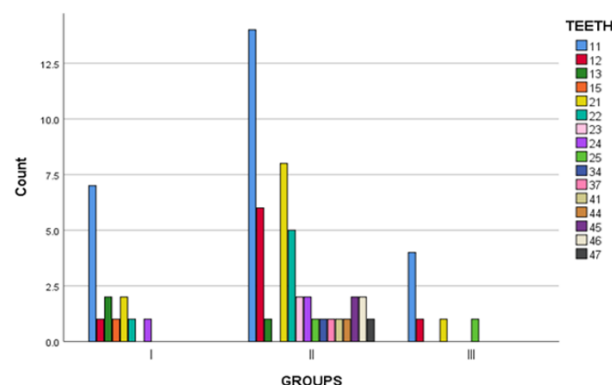


Figure 2: Bargraph represents the distribution of cast post cases with relation to tooth number.

Also, the sensitivity of the periapical radiographs is not high for the evaluation of periapical status. However, Mohammed *et al.* have mentioned that there was no significant difference between panoramic and periapical radiographs. This was in accordance with the findings of the study done by Ahlquest *et al.* (Ahlqwist *et al.*, 1986; Rajakeerthi and Ms, 2019).

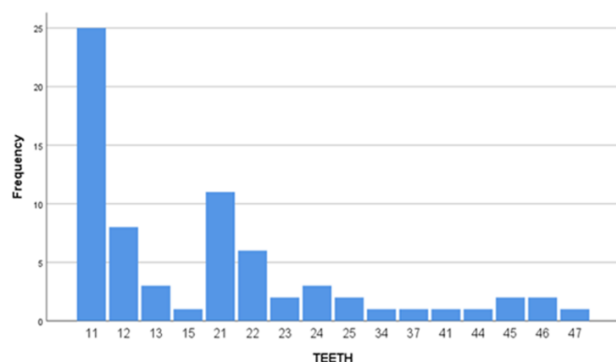


Figure 3: Bar graph represents the distribution of cast post cases in all three groups.

Majority of the root canal treated teeth require a post retained restoration (Strindberg, 1956; Metzger *et al.*, 2000; Ricketts *et al.*, 2005). There are studies which have focused on assessing and reducing the microleakage of a post retained restoration and have mentioned that the length of remaining root canal filling and the adhesion between the post and root canal dentin have a pivotal role in coronal microleakage (Abramovitz *et al.*, 2001; Noor and Pradeep, 2016; Rajendran *et al.*, 2019). Fogel *et al.* showed that stainless-steel based post systems were incapable of achieving a fluid-tight seal regardless of

the luting material. However, poor cementation of the temporary crown or a post is also a contributing factor for coronal leakage (Fogel, 1995). The distance between the post and the remaining root canal filling is another decisive factor in the breach of the tight seal. Some studies have described the influence of this gap in the success of the post endodontic treatment (Manohar and Sharma, 2018; Nandakumar and Nasim, 2018; Teja and Ramesh, 2019).

McAndrew *et al.*, mentioned in his study that the gap between the post and the obturating material could be a contributing factor in deciding prognosis. The primary functions of obturation are entombing the bacteria in the dentinal tubules. The space between the post and the obturating material (Dead space) can harbor microorganisms that could negatively affect the outcome of the endodontic therapy (Grieve and McAndrew, 1993; Jose *et al.*, 2020).

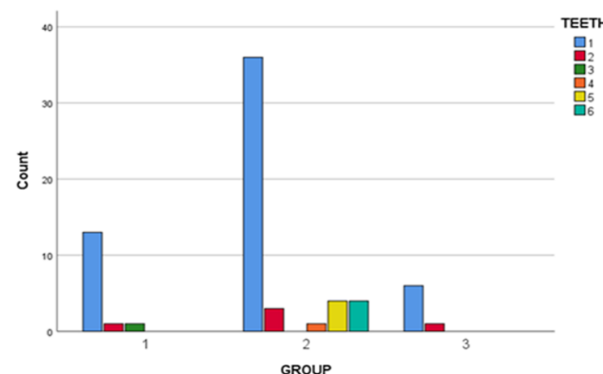


Figure 4: Bar graph represents the association between groups and the count of teeth.

A customized cast post can be fabricated by direct or indirect technique. The main disadvantage of this technique is that if the selected reinforcement, i.e., the wire or plastic post is too tight, then the impression material strips away from it when the impression is removed. Furthermore, placing the reinforcement into the canal is an additional time-consuming procedure. In addition, seating the reinforcement onto the orifices of the root canals may be difficult or impractical in cases with difficult clinical access or in cases where multiple teeth are involved (Al-Dhalaan, 2012; Al-Rashed and Al-Rashed, 2015).

In cases of the customized post, the gap could be attributed to the inaccurate impression of post space or due to technical imperfections like thermal contraction of metal alloys during the casting procedure. Therefore, radiographic confirmation of post adaptation has been mandatory before the final cementation of all kinds of posts (Ørstavik, 2005; Whitworth, 2005).

CONCLUSION

Within the limitation of this study, it can be concluded that the majority of the cases had an average dead space of 0.1-2 mm (68%). The dead space could act as a potential shelter for microorganisms. So, radiographic confirmation of the post adaptation should be performed before cementation of all kinds of posts.

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Conflict of Interest

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

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