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Incidence of Number of Roots in Maxillary Second Molars – A Cbct Analysis

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ABSTRACT

The aim of the study is to find the incidence of the number of roots in maxillary second molars. In endodontic therapy, a comprehensive awareness of the root-canal anatomy is of great importance, and clinicians' failure to recognize an unusual canal morphology may lead to unsuccessful treatment. It is generally accepted that a serious explanation for the failure of passage therapy is an inability to localize and treat all of the canals of the basis canal system. In the present study, a total of 50 CBCT scan reports were collected from the Radiology department, Saveetha Dental College, Chennai, for evaluation. The CBCT scans were analysed for the number of roots and number of root canals present in maxillary second molars. The collected results were entered in Microsoft excel. Data analysis was done using SPSS software 20.0. The study results that the incidence of three roots are 83% , two roots are 10%, one root is 5% and four roots are 2 %. The incidence of three root canals is 86% , four root canals are 11% and two root canals are 3 % . Although the occurrence of maxillary second molar with one root or two roots isn't high, diagnosing these unusual cases at its early treatment stage is of significance for the success of endodontic treatment

KEY WORDS: MAXILLARY SECOND MOLARS, ROOT CANAL MORPHOLOGY, NUMBER OF ROOTS, NUMBER OF ROOT CANALS.

INTRODUCTION

Endodontic therapy consists of a series of treatments, including removing pulpal tissue, filing and shaping root canals, obturation of the root canal space, and placement of a permanent restoration for the tooth. In endodontic therapy, a comprehensive awareness of the root-canal anatomy is of great importance, and clinicians' failure to recognize an unusual canal morphology may lead to unsuccessful treatment (Sha, Sun and Chen, 2018). It is generally accepted that a serious explanation for the failure of passage therapy is an inability to localize and treat all of the canals of the basis canal system. The risk of missing anatomy during passage treatment is high due to the complexity of the basis canal system.

All categories of teeth may have extra roots and/or canals, but the likelihood of finding aberrant canal configurations is higher in premolars and molars. The impact of missed anatomy on the result of endodontic treatment is difficult to assess, and therefore the literature on this subject is limited; a promising approach for future investigation may be a comparison of the amount of canals found in failed treatment cases and after re-treatment. The clinical impact of missed anatomy is often clearly demonstrated with an outsized number of re-treatment case reports

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available within the literature; within the majority of those cases, failure of endodontic therapy is related to untreated canal space. Localization and treatment of this missed anatomy typically results in complete clinical and radiographic healing. (Cantatore, Berutti and Castellucci, 2006). The standard configuration of maxillary second molars has been described to have three roots and either three or four canals, with the fourth canal usually being the second mesiobuccal (MB2).

Peikoff et al. (Peikoff, Christie and Fogel, 1996) conducted a retrospective study of 520 endodontically treated maxillary second molars and have classified the anatomical root and canal variations found in maxillary second molar into six variants:

- Three separate roots (MB, DB, and P-palatal) with one canal in each root;
- Three separate roots (MB, DB, and P) and four canals (two in the MB root);
- Three roots but MB and DB canals combine to form a common buccal (B) with a separate P canal;
- One B and one P canal with a single canal in each;
- Single canal in a single conical root; and
- four separate roots – MB and DB and two palatal roots – a mesiopalatal and a disto palatal root.

Most of the researchers have focused on more number of roots (Deveaux, 1999) (Libfeld and Rotstein, 1989) (Fahid and Taintor, 1988), (Kottoor et al., 2010) and root canals in the maxillary second molar. Presence of single root and single canal is commonly found in mandibular second molar, describing the possibility of single root and single canal in maxillary second molar. Researchers have found only 0%–3.1% incidence of occurrence of single root and single canal in maxillary second molar. (Peikoff, Christie and Fogel, 1996)

We have numerous highly cited publications on well designed clinical trials and lab studies (Govindaraju, Neelakantan and Gutmann, 2017; Azeem and Sureshbabu, 2018; Jenarthanan and Subbarao, 2018; Manohar and Sharma, 2018; Nandakumar and Nasim, 2018; Teja, Ramesh and Priya, 2018; Janani and Sandhya, 2019; Khandelwal and Palanivelu, 2019; Malli Sureshbabu et al., 2019; Poorni, Srinivasan and Nivedhitha, 2019; Rajakeerthi and Ms, 2019; Rajendran et al., 2019; Ramarao and Sathyanarayanan, 2019; Siddique and Nivedhitha, 2019; Siddique et al., 2019; Siddique, Nivedhitha and Jacob, 2019). This has provided the right platforms for us to pursue the current study. Our aim is to find the incidence of the number of roots in maxillary second molars.

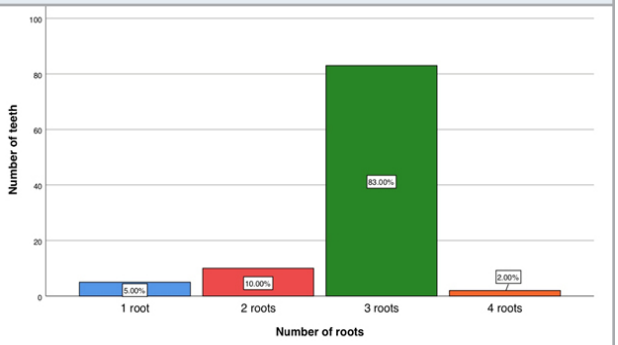
MATERIAL AND METHODS

In the present study, a total of 50 CBCT scan reports were collected from the Radiology department, Saveetha Dental College, Chennai, for evaluation. The CBCT scans were analysed for the number of roots and number of root canals present in maxillary second molars. Dependent variables were the maxillary second molars, number of root canals, number of roots. Independent variables were the name, age, gender. The data collected were cross verified by another examiner. The collected results were entered in Microsoft excel. Data analysis was done using SPSS software 20.0. Statistics used for analysis was Descriptive statistics and comparison of variables were done using chi square test where $p<0.05$, statistically significant.

RESULTS AND DISCUSSION

The study results that the incidence of three roots are 83% , two roots are 10%, one root is 5% and four roots are 2 % (Figure 1). The incidence of three root canals are 86% , four root canals are 11% and two root canals are 3 % (Figure 3). According to figure 2 chi-square tests p value = 0.9 > 0.05 statistically not significant. And according to figure 4 chi-square tests p value = 0.7 > 0.05 statistically not significant. The study revealed the occurrence of three roots with three root canals (76%) were higher than three roots with four root canals (7%). The incidence of fused roots, that is, the presence of two roots with three root canals (7%) were more prevalent than one root with three canals (3%). There were also incidence of four roots with four root canals (2%). And according to chi-square tests p value = 0.0 <0.05 statistically significant. (Figure 5).

Figure 1: This graph represents the number of roots present in the maxillary second molars. X- axis depicts the number of roots and Y-axis depicts the number of teeth. The results from this graph show that maxillary second molars (17 and 27) mostly have three roots (green-83%) but sometimes they may also contain two roots (red-10%) or a single root (blue-5%) and in very rare conditions it may also contain four roots (orange-2%).



Most studies on anatomical variations of maxillary molars appear to deal with maxillary first molars, as anatomical variations in second molars are not so common. Only a few cases of maxillary second molars have been reported with variations in the number of roots and root canals such as two MB roots, three MB canals, two palatal roots with two or three root canals, and a second distobuccal (DB) canal. (Deveaux, 1999) (Libfeld and Rotstein, 1989) (Fahid and Taintor, 1988) (Kottoor et al., 2010)

Figure 2: This graph shows the association between the tooth number and the number of roots present. X-axis depicts the tooth number and Y-axis depicts the number of the teeth. The results from this graph show that there is no significant difference between the right (17) and left (27) maxillary second molars in the number of roots. Chi-square tests were done and the association was found to be statistically insignificant ; p value = 0.9 (> 0.05) hence not statistically not significant.

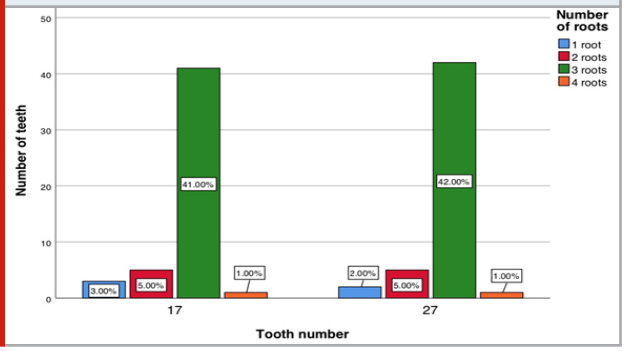
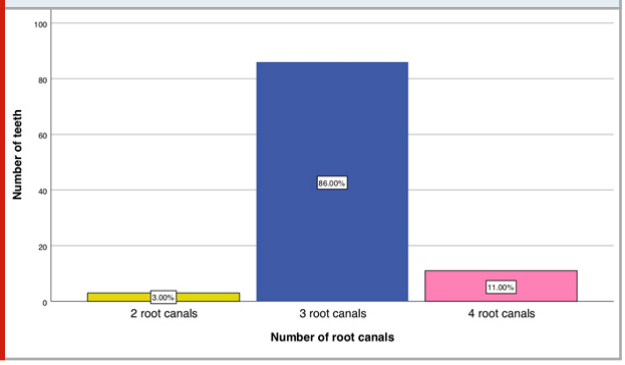


Figure 3: This graph represents the number of root canals present in the maxillary second molars. X- axis depicts the number of root canals and Y-axis depicts the number of teeth. The results from the graph shows that the maxillary second molars (17 and 27) mostly have three root canals (blue-86%) but sometimes they may also contain four root canals (pink-11%) and in rare conditions it may also contain two root canals (Yellow-3%). The incidence of three root canals (86%) are more prevalent than other numbers of root canals.



Peikoff et al. (Peikoff, Christie and Fogel, 1996) stated that 3.1% of maxillary second molars had one root and one canal. The incidence of fused roots in maxillary second molars was investigated by Kim et al (Kim, Lee and Woo, 2012) in a Korean population using CBCT and was found to be 10.7%. Similarly, Zhang et al. (Zhang et al., 2011) in a Chinese population using CBCT found the incidence of a single root in maxillary second molars to be 10%. When only one root is present, the root canal system may commonly present with a single broad root canal or two canals that may or may not join or a C-shaped canal.

Carlsen et al (Carlsen et al., 1992) investigated 104 single-rooted maxillary second molars from a Scandinavian population by sectioning technique and found that 25.96% of single-rooted maxillary second molars had a single canal at the mid-root level. Hartwell and Bellizzi (Hartwell and Bellizzi, 1982) in their study of 176 teeth concluded that the occurrence of maxillary second molars with a single root and a single canal was 0.6%. Libfeld and Rotstein (Libfeld and Rotstein, 1989) in an Israel population reported that this configuration was present in 0.5% of teeth.According to Wang et al., (Wang, Hui and Huang, 2011) the occurrence of maxillary second molars with single root and a single canal is very rare. Christie et al. (Christie, Peikoff and Fogel, 1991) have reported four-rooted maxillary second molar abnormalities, that included two palatal roots.

Figure 4: This graph shows the correlation between the tooth number and the number of roots canals present. X-axis depicts the tooth number and Y-axis depicts the number of the teeth. The results from this graph shows there is no significant difference between the right (17) and left (27) maxillary second molars in the number of roots canals. Chi-square tests were done and the association was found to be statistically insignificant ; p value = 0.7 (> 0.05) hence statistically not significant.

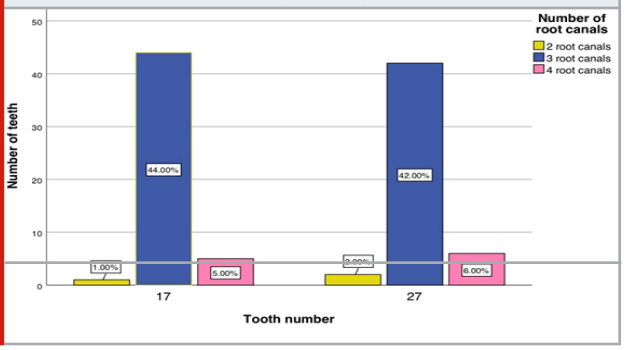
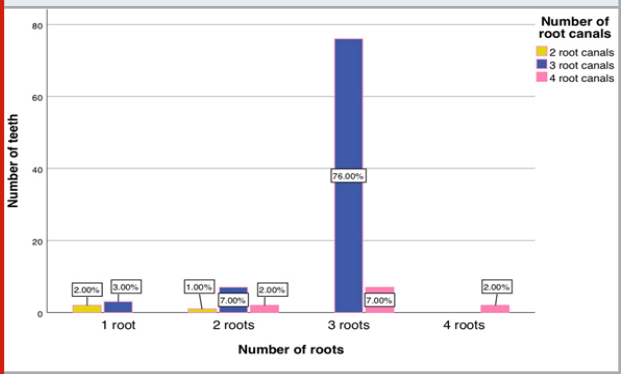


Figure 5: This graph shows the correlation between the number of roots and the number of roots canals present. X-axis depicts the number of roots and Y-axis depicts the number of the teeth. The results from this graph shows that three roots with three canals (blue) was mostly commonly seen (76%) followed by three roots and four canals (pink-7%) and two roots and three canals (blue - 7%). Chi-square tests were done and the association was found to be statistically significant ; p value = 0.00 (<0.05) hence statistically significant.



CONCLUSION

This study revealed that occurrence of the "standard" configuration in maxillary second molars, i.e. three roots with three canals (76%) or four canals(7%) was most frequent. Although the occurrence of maxillary second molar with two roots or one root isn't high, diagnosing these unusual cases at its early treatment stage is of significance for the success of endodontic treatment. CBCT must be utilized in these cases when conventional radiographic examination isn't conclusive in identifying the aberrations within the canal anatomy so as to stop excessive dentin removal in search of other canals.

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Conflict of Interest: The authors declare that there were no conflicts of interest in the present study.

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