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FREQUENCY OF SECOND MESIOBUCCAL CANAL IN MAXILLARY FIRST MOLAR DETECTED THROUGH CONE BEAM COMPUTED TOMOGRAPHY

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ABSTRACT

The mesio-buccal root of the maxillary first molar is considered to be one of the most researched areas as compared to the other roots in the maxillary region.Failure to treat a secondary canal in permanent maxillary molar teeth is considered to be the most predominant reason leading to post treatment disease. Newer advanced techniques for assessing the MB2 canal have helped in effectively locating the secondary canal and hence its treatment.[1]

The objective of this study was to determine the frequency of the second mesio-buccal canal in permanent upper first molars in patients attending CMH Medical College Lahore. In total 100 teeth were examined using CBCT. Analysis of data was done by SPSS 20.0. The significance level was taken as 0.05.The mean and standard deviation were calculated for numeric variables like age. Percentage and frequency were calculated for categorical variable, like gender and number of canals. Fisher's exact test was applied to assess the association between the presence of MB-2 canal and gender.

The frequency of 2nd MB2 canal was found to be 56%.Out of 100 patients the frequency for females was 19% and 37% for males.

The frequency of MB2 canal in maxillary 1st molar was high in examined patients (56%). No significant association was recorded for age, gender and the presence of MB2 canal

Keywords: *Accessory 2nd mesiobuccal canal, CBCT, MB1, MB2.*

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INTRODUCTION

The success of endodontic treatment depends on how meticulously the root canal system is cleaned, shaped and prepared. This can be achieved once the clinician knows about canal morphology and configuration.The most common reason leading to failure of endodontic treatment is difficulty in establishing an apical seal which leads to percolation and leakage.[1]

In tooth morphology maxillary permanent tooth is considered to be one of the tooth with most variations and commonest of all being the presence of a 2nd accessory canal in the mesiobuccal root. Ethnic / racial background ,age and gender of the patient are considered to be the few factors responsible for these morphological variations.[3]

Recent literature search have highlighted the presence of MB2 canal with the help of CBCT scan in different populations. In Caucasian population, the prevalence was found to be 28-62% followed[4] by the Asiatic population in which it was found to be higher. The prevalence of MB2 in Thai and Spanish population was 73.6% and 87.2% repectively.[5] There is a difference in the presence of MB2 canal amongst Americans and Europeans.[6] The prevalence of MB2 amongst the Americans were ranging from 28%-33% and in later it was from 78%-80%.The low prevalence in American population is attributed to their racial variation[6].

Different methodologies are being used, some involve in vivo application, and others incorporate in vitro methods to investigate anatomical variations in roots. The in vivo techniques include methods such as evaluation of tooth root while performing endodontic treatment, retrospective evaluation of patient records, periapical and bitewing radiograph ,and modern radiographic techniques such as cone-beam computed radiography (CBCT).The in vitro methods include staining of the canal with a dye and tooth clearing, tooth root sectioning, examining the root under a microscope , evaluation of conventional radiograph in combination with 3-D modalities such as micro-computed tomog-

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raphy (µ-CT).[2]When CBCT was compared to previous conventional methods like staining of root and clearing techniques, the results were similar in terms of precision in identifying the 2nd accessory canal because CBCT provides a 3-D picture and complete morphological details.[7]

The rationale of this study was difficulty in locating this second accessory canal in mesiobuccal root.It is most of the times not visible on a conventional periapical radiograph because of excess dentin deposition at the canal.The diagnostic aid used in this study was 3D imaging known as Cone beam computed tomography CBCT.

This radiographic study aim to evaluate the frequency of 2nd accessory canal in maxillary 1st molar in Pakistani population .The diagnostic aid used in this study was 3D imaging known as Cone beam computed tomography (CBCT). The objective of this study was to investigate the frequency of MB2 canal in maxillary first molar in both male and female and its frequency in different age groups.

MATERIAL AND METHODS

This Cross-sectional descriptive study was done in CMH Lahore Medical College from January 2017 to March 2019.In this study CBCT images of 100 maxillary first molar teeth were taken .Convenience sampling technique was used for the collection of data. The sample size was calculated by the WHO sample size calculator. Normality of the data was evaluated by Shapiro –well test.

The gender distribution was not equal, as the patients were selected randomly in outdoor dental clinic. Only those patients were selected who require a CBCT image as part of their dental procedure. Their informed consent was taken before taking their radiograph and were requested regarding use of their image for the above study .The written consent form is attached and only those patients who signed and allowed their data to be used for any research study was being used in this study. Apart from the written consent, informed verbal consent was taken from the patients and those who didn't want their radiographic information to be used in the study, were excluded.

All patients in this study were in the age group of 18 to 50 years .For the convenience of data collection and later interpretation we divided the patients in to 2 groups.The age of group 1 ranged from 18 to 38 years and that of group-2 from 39 to 50 years. The maximum age limit was kept at 50 years to reduce the chances of calcifications and obliterations in MB2 canal and hence its absence.

In CBCT imaging, the maxillary 1st molars were divided in to coronal, saggital and axial planes and numbers of canals in each root were recorded. Statistical analysis was done in SPSS 20.0.Mean and standard deviation was calculated for numerical variables like age. Percentage and frequency were calculated for categorical variables like gender and number of canals .Stratification was done for number of canals in maxillary 1st molar among gender and age group .P value <0.5 was considered significant.

RESULTS

The mean age of the patient was 36.24 years.. The sample size comprised of 100 patients with 64 male and 36 female. The frequency of 2nd MB2 canal was found to be 56%.The frequency of 2nd MB-2 canal in females is 19%and in males it is found to be 37%. In terms of frequency of MB-2 canal in different age groups, the results are as follows. The 1st age group is from 18-38 years, the frequency is 34%.The 2nd group was from 39 -50, the frequency is 22%. No association was found between gender and the presence of MB2 canal in maxillary 1st molar. (Table 1 & 2).

DISCUSSION

TABLE 1: PRESENCE OF MB2 IN DIFFERENT AGE GROUPS

Age groups	Presence of MB2 canal		Total
	Present	Absent	
18-38	34	26	60
39-50	22	18	40
Total	56	44	100

TABLE 2: ASSOCIATION OF MB2 CANAL WITH GENDER

Gender	MB2 canal present	MB2 canal absent	Total	P-value
Female	19	17	36	.390
Male	37	27	64	
Total	56	44	100	

The literature reveals that missed accessory canal (most commonly MB2) is one of the major reasons for failure of endodontic treatment. Mesiobuccal root of maxillary 1ST molar is considered as the most complex root in entire root canal system.A high prevalence (44%) of failed root canal treatment is found in maxillary molars .The major reason for failed root canal treatment cases has been reported in maxillary molars and the major reason being unidentified MB2 in 93% of the failed cases.[9]Muhammad</author><author>Khan, Farhan Raza</author></authors></contributors><titles><title>Determination of frequency of the second mesiobuccal canal in the permanent maxillary first molar teeth with magnification loupes (× 3.5

Review of the literature shows variations in presence/absence of MB2 canal in different populations worldwide. Researchers concluded a strong correlation between MB2 canal and ethnicity . A high prevalence was observed in Saudi and Chinese population[10] Another

study on Saudi population concluded a high incidence of a second accessory canal in maxillary posterior molars.[11] A study by Tian et al reported accessory root canals in Chinese population in roots of maxillary molars to be 67.8% and 29.7% respectively. [12] A high prevalence of MB2 canal was also found in our study. The prevalence of MB2 canal was found to be higher in Chinese, Pakistani and Indian population when compared to other population groups .[13] Many studies have reported that CBCT and micro-CT are sensitive tools for the detection of accessory canals like MB2.[15,16]

The results of this study showed no correlation of gender with presence of MB2 canal. Similar results were obtained in other studies. [18,19]However in some studies a strong correlation was found between gender and MB2 canal. [20,21]It is still not evident to what extend gender is responsible for the detection of MB2 canal however, some factors were discussed in the literature. For instance as females are more prone to demineralization and loss of bone mass .This is the physiological phenomenon associated with aging .This enhanced demineralization also decrease the appearance of boundary of an additional canal in MB root during image analysis. This results in a lower prevalence of MB2 canal in females comparison to male cases. Another factor is the hypothetical view that specific genetic makeup of the X chromosome is involved in the synthesis of root formation. This needs further investigation to justify if gender could be considered as a factor that affects the prevalence of the MB2 canal.[22]

Another factor investigated in the study was the correlation of MB2 canal with age. In this study no significant association was found between different age groups and the presence of MB2 canal. However there was trend of increased frequency of MB2 canal in younger age group i.e. group 1.This may be attributed to the consideration that in young teeth the roots have wider canals due to less deposition of secondary dentin.[4]

CONCLUSION

The frequency of MB2 canal in maxillary 1st molar is high in Pakistani population (56%). No significant association was recorded for age, gender and the presence of MB2 canal.

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