

THE FREQUENCY OF MESIO BUCCAL SECOND CANALS IN PERMANENT MAXILLARY FIRST MOLAR USING DIFFERENT METHODS A CROSS-SECTIONAL STUDY

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ABSTRACT

Objective: This study aimed to find out the frequency of the MB2 canal in maxillary first molars, using different diagnostic methods.

Materials & Methods: 106 patients, clinically diagnosed with irreversible pulpitis and exposed pulp, requiring endodontic treatment were selected via random non-probability purposive sampling technique for the study. This cross-sectional study was conducted for 12 weeks in the dentistry department of Ayub Medical College from August 2018 to October 2018. A detailed history was taken and documented in the pro-forma. After administration of Local anaesthesia and rubber dam application, the access cavity was prepared and floor of the pulp chamber visualized. MB2 Canal location was done with a naked eye and under magnification (x2.0 to x6.0) Magnification and confirmed by inserting size 08 K file. The data obtained were analyzed using SPSS version 20. Chi-square test was run to determine the association of the presence of the MB2 canal with other variables. P-value of 0.05 was considered to be significant.

Results: Out of 106 patients, MB2 canal was reported in 68(64.2%) patients ($\chi^2 = 8.491^a$, $p = 0.004$). Males were 67 (63.2%), and 39(36.8%) were female. There were no significant differences found between the male and female regarding the presence of MB2 canal ($p = 0.090$) and frequency of MB2 canal presence with age group ($p = 0.413$).

Conclusion: The second mesiobuccal canal was found in a significant number of patients (64.2%). Under magnifications, those canals were also identified which were missed on naked eye examination.

Key Words: Mesiobuccal canal, Maxillary Molars, Tooth morphology, Magnification

INTRODUCTION

Knowledge of structure and anatomy of the tooth is the primary pre-requisite to carry out clinical dental procedures. Comprehensive understanding of the morphology of the tooth guarantees the success of treatment and its outcomes¹. Maxillary first molars are more versatile concerning numbers and configuration of their root canals². These teeth comprise of 3 roots containing either³ or 4 canals; the fourth canal being a second canal in the mesiobuccal root (MB2) which is often missed, as canal orifice is quite small and present at variable positions^{3, 4}. Pomeranz and Fishelberg⁵ stated that clinicians know about the prevalence of two mesio-buccal roots, with one canal in each; but the MB2 canal is often undiagnosed. Treating maxillary 1st molar has often been a challenging task for the dentists, and one has to treat every tooth keeping in view its complex canal anatomy⁶.

The variations observed in root canal morphology is associated with diversity in age, ethnic background, gender and study design (laboratory versus clinical) in the subject population⁷⁻⁹. A study conducted by Smith and Gunduz used the factors above and observed 14 additional canals among their study subjects⁷. In vivo studies involved examination with or without magnification, using endo-explorer or radiographic analysis of canals. In vitro studies are done in the laboratory involving examination of canal anatomy of extracted teeth using magnification instruments, histological analysis or clearing studies using dyes/inks or chemical solutions. MB2 canals identified in vitro studies found to be much higher than reported in vivo studies^{10,11}. There is a paucity of local studies regarding this topic. This cross-sectional study aimed to evaluate the frequency and identification of the MB2 canal in maxillary first molars using different diagnostic methods, which included clinical visualization with the naked eye and then under magnification (x2.0 to x6.0).

MATERIALS AND METHODS

Total of 106 patients (67 male and 39 female), clinically diagnosed with irreversible pulpitis and exposed pulp, requiring endodontic treatment were selected via random non-probability

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purposive sampling technique for the study. Patients of 15 years old and above and with fully developed roots and mature apices of first molars were the part of the study. Patients who were not willing to undergo endodontic treatment, teeth with calcified canals (non-negotiable canals with initial patency file 08 K up to the working length) and teeth where caries is extending to the floor of the pulp chamber were excluded from the study.

Detailed medical and dental history was taken and documented in the pro-forma. Clinical examination was performed, the purpose of the study, procedures, risk and benefits were explained to the patients and informed written consent was taken. This cross-sectional study was conducted for 12 weeks in the dentistry department of Ayub Medical College from August 2018 to October 2018 Approval for the study was taken from the ethical committee of Ayub Medical Institute, Abbottabad.

Local anaesthesia was administered, and the rubber dam applied for isolation. Access cavity was prepared, and floor of the pulp chamber visualised and canals were located using an

Endodontic explorer with the naked eye. The canal was negotiated and confirmed with size 08 K file. Further efforts to locate canals were carried out under Magnification (x2.0 to x6.0) and confirmed by inserting size 08 K file. To rule out any perforation, this was followed by a radiograph.

Data were entered and analysed using SPSS version 20. Descriptive statistics were analysed for quantitative (age, MB1 and MB2 canals) and qualitative (gender) variables. Percentages and frequencies were calculated for both gender and presence of the MB2 canal. Chi-square test was run to determine the association of the presence of the MB2 canal with other variables. A p-value of ≤ 0.05 was considered to be significant.

RESULTS

Out of 106 patients, 67 (63.2%) were male while remaining 39(36.8%) were female (Table-1). Most common age group was 20-30 years of age, and minimum patients were between 51-60 years old. Mean age of the patients was found to be 29.85 ± 10.94

Table 2 Distribution of cases by age

Gender	Number	Percentage
Male	67	63.2
Female	39	36.8

Table 2: Distribution of cases by age

Age (year)	Number	Percentage
15 -20	27	25.5
21 -30	32	30.2
31 -40	25	23.6
41 -50	15	14.2
51 -60	7	6.6
Total	106	100.0
Mean \pm SD	29.85 ± 10.94	

The second mesiobuccal canal was identified in 68(64.2%) patients ($\chi^2= 8.491^a$, $p=0.004$). While the association of frequency of MB2 canal presence with age group was found

insignificant ($p=0.413$) (Table 3). There were no significant differences found between the male and female regarding the presence of MB2 canal ($p=0.090$), (Table 4).

Table 3: Association of MB2 canal to total patients and age group

Variables	Mb2 Canal Number		P-Value
	Absent	Present	
Total Patients(106)	38	68	0.004
Age Group	15 -30	19	0.413
	31 -50	15	
	Above 50 Years	5	

a p-value of ≤ 0.05 was considered to be significant.

Table-4 Association of MB2 canal to gender

Gender	Mesiobuccal canals Identified		P - value
	MB 1 canal only	MB 2 canal only	
Male	26 (68.4%)	41 (60.3%)	0.090
Female	12 (31.6%)	27 (39.7%)	
Total (106)	38	68	

-a p-value of ≤ 0.05 was considered to be significant

(Table-2).

DISCUSSION

The second mesiobuccal canal was identified in 68(64.2%) patients ($\chi^2= 8.491^3$, $p=0.004$). A considerable variation for the presence of two mesiobuccal canals in maxillary first molar has been reported in the literature. Many researchers have stated the presence of MB2 canals in the wide range¹². The variability in results can be due to study type (in vitro/ in vivo) or methods used to detect the canal in the root (radiographic, clinical examination, using staining or magnifications). In this study, we have considered the frequency of the MB2 found in upper 1st molar teeth.

In the present study, the 2nd mesio-buccal canal was found in more than half of cases. The MB2 canal was identified in 38 teeth on clinical and radiographic examination whereas an additional 25 teeth presence of Mb2 was identified under magnification with magnifying glasses (x2.0 to x6.0). Wolcott, J et al. (2005)¹³ and Abuabara et al. (2012)¹⁴ reported 61.0% and 62% cases with second mesiobuccal canal found on clinical examination. The use of magnification increases the visibility of more smaller sized orifices, and hence, more MB2 are identifiable¹⁵⁻¹⁷. Iqbal et al. stated the presence of MB2 canal in more than half of maxillary first molars (42% with the naked eye and 60%with magnification)¹². The results of these studies support our results i.e; the number of MB2 are visible under magnification ($p=0.004$).

In a study conducted by Atif and his colleagues¹⁸, the presence of the MB2 canal was recorded in less than half of maxillary first molars cases, whereas the MB2 canal was identified in half of the cases by Hassan and Farhana in their study¹⁹. Buhrely et al. have found frequencies of MB2 canals in upper 1st molar teeth with the use of magnification were reported to be more as compared to the number found on clinical examination. In vitro studies, conducted to identify the presence of MB2 with and without the use of magnification device, also shown the results in accordance with our study (more number of MB2 are visible under magnification)²⁰⁻²². The least percentages were reported by Hassan and Nizar among the Sudanese population²³.

There was no significant gender difference found for the presence of the MB2 canal in maxillary 1st molar in this study. Similar results were reported by Pattanshetti and his co-workers⁸ and Aqwa et al¹⁸. On the contrary, a study conducted by Hasan and his colleague¹⁹ showed that the prevalence of MB2 was significantly higher in male patients than female.

The decrease in the percentages of the second canal in the mesiobuccal root of maxillary first molar is seen with the

advancing age. The reason can be increased calcification of canals with progressing age. The least number of MB2 canals were found in an older age group in our study. Studies done by Pattanshetti⁸, Iqbal and Eric²⁴ and by Atif and colleagues¹⁸ reported the same trend.

Besides the age of patient and use of magnification, some investigators have also stated that identification of canal is related to expertise and experience of the operator as well^{25, 26,28}. A study conducted by Ellen, Babak and Jeffrey²⁹, demonstrated that dental students were able to identify MB2 in only 15.8% of teeth as compared to postgraduate students, who were able to access MB2 canal in 54.7% of remaining sample teeth.

CONCLUSION

The second mesiobuccal canal was found in a significant number of patients. A higher count of MB2 canal was identifiable under magnifications which have been missed on clinical examination. Therefore the use of magnification instruments is related to the identification of a more accurate number of canals and ultimately increases in the success of endodontic treatment.

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