

Research Article

Frequency of Root Canals in Maxillary Second Premolars of Patients reporting to Islamabad Dental Hospital

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A thorough knowledge of anatomy of the tooth and morphology of root canal is important for a good endodontic treatment. The aim of root canal treatment is complete cleaning and shaping of all pulp spaces and adequate obturation with an inert obturating material.¹

The success of endodontic treatment relies on various characteristics such as internal anatomy of the root canals, knowledge of instrumentation techniques, use of antiseptic solutions, filing of root canals and biocompatibility of material used. Magnification and illumination can be used to achieve success. The lack of mastery can lead to improper biomechanical instrumentation of root canal system and may cause failure of treatment.² One root with one or two root canals is frequently observed in maxillary second premolars however, three canals are rarely seen.

The objective of this study was to determine the frequency of single or multiple canals in maxillary second premolars in patients being treated endodontically in the Operative Dentistry Department at Islamabad Dental Hospital (IDH).

Materials and methods:

It was a retrospective descriptive study. After obtaining ethical approval from the institutional review board, records of patients who have undergone endodontic treatment of maxillary second premolars during a period of one year were retrieved. Incomplete records were excluded. Post-operative

records of cases were looked for the number of canals. Demographic data was also recorded.

Data analysis was done using statistical package for social sciences version 20.0 (SPSS 20.0). Frequencies and percentages were calculated for categorical variables such as gender and number of root canals. Mean and standard deviation was calculated for quantitative variables such as age. Data was illustrated in the form of tables.

Results

A total of 163 records of patients were retrieved. Age of the patients ranged from 15 to 79 years with a mean age of 34 and standard deviation 12. Among total patients, 72 were males and 91 were females.

The frequency distribution of maxillary premolars showed that out of 163 observed cases, 91 were maxillary right second premolars and 72 were maxillary left second premolars. Similarly, for canals, out of 163 observed cases one, two and three canals were found. On the right side, out of 91 maxillary second premolars, 54 cases had one canal, 36 cases had two canals and only one case had three canals. On the left side, out of 72 maxillary second premolars, one canal was found in 40 cases, two canals in 32 cases and no third canal case was found (Table 1).

Out of total 72 males, 45 had one canal, 26 had two canals and 1 was found to have three canals. Out of 91 females, 49 had one canal, 42 had two canals and no case of three canals was found in females (Table 2).

Table 1: Frequency of canals on right and left side

Side	Counts	Canal Number			Total
		1	2	3	
Right	Count	54	36	1	91
	% Within Side	59.3	39.6	1.1	100.0
	% Of Total	33.1	22.1	0.6	55.8
Left	Count	40	32	0	72
	% Within Side	55.6	44.4	0.0	100.0
	% Of Total	24.5	19.6	0.0	44.2
Total	Count	94	68	1	163
	% Within Side	57.7	41.7	0.6	100.0
	% Of Total	57.7	41.7	0.6	100.0

Table 2: Frequency of canals based on Gender

Gender		Canal number			Total
		1	2	3	
Male	Count	45	26	1	72
	% Within Gender	62.5	36.1	1.4	100.0
	% Of Total	27.6	16.0	0.6	44.2
Female	Count	49	42	0	91
	% Within Gender	53.8	46.2	0.0	100.0
	% Of Total	30.1	25.8	0.0	55.8
Total	Count	94	68	1	163
	% Within Gender	57.7	41.7	0.6	100.0
	% Of Total	57.7	41.7	0.6	100.0

Discussion

Endodontic treatment is considered a challenge due to the variations in root canals and complex morphology of roots. Clinicians should be careful when treating such teeth because of the risk of missing a canal and hence, failure of treatment. In the present study, the frequency of one canal was the highest followed by two and three canals.

Anatomy of pulp systems varies hugely in different races and in different individuals so various studies have been conducted. In 1992, the University of Sao Paulo Brazil conducted a study which was later published in Brazil dental journal. In this study, anatomy of 300 maxillary premolars was studied in vitro. For the study of internal anatomy, the teeth were decalcified and cleared. Frequency of second premolars with one canal was 67.3%, 32.4% had two canals and 0.3% had three canals.³ In 2005, Vertucci performed detailed research on the canal morphology of different teeth. In his study of 200 extracted maxillary second premolars, he found that 75% had one canal, 24% had two canals and 1% had three canals.⁴ In an Indian study of 200 extracted maxillary second premolars, 64.1% had one canal, 35.4% had two canals and 0.5% had three canals.⁵ Using CBCT, research conducted on Turkish population reported that 82.2% maxillary second premolars had one canal, and 17.8% had two canals.⁶ A similar study in Hyderabad district of Pakistan showed that out of 200 maxillary second premolars, 124 (62%) had one canal, 74 (37%) had two canals and 2 (1%) had three canals.⁷ The results of our study support the aforementioned studies. In 2014, research was conducted on 217 Jordanian subjects who received root canal treatment of maxillary second premolar. Percentage of one canal was found to be 13.8%, two canals 85.7% and 0.46% was found to have three canals.⁸ Case reports from Saudi Arabia and Brazil have also showed three root canals in maxillary second premolars.^{9 10} In 2014, in Iran a study was conducted with the help of Cone-beam computed tomography for assessing number of roots, number of root canals, curvature and morphology of all maxillary and mandibular teeth. In this study 66 patients were included; out of which 20 (30.3%) had one canal, 43 (65.1%) had two canals and 3 (4.6%) had three canals.¹¹ In 2016, an in vitro micro computed tomography study was done in Dammam, Saudi Arabia on 100 maxillary second premolars. Result showed that the frequency of two canals was 65%, one canal 30% and three canals was 5%.¹² In 2008, a Polish study showed that out of 56 second premolars

studied, 14.7% had one canal and 85.3% had two canals.¹³

Using CBCT, research on maxillary second premolar on Chinese subpopulation was conducted. A total of 392 teeth were studied, out of which 178 (45.4%) had one canal and 213 (54.3%) had two canals.¹⁴ This discrepancy is believed to be because of groups belonging to different ethnicities. In Karachi, a cross sectional study having 100 patients was conducted, out of which 43% were males and 57% were females. 63% (27) from those 43 males and 53% (30) of those females had two canals.¹⁵ The variability in the frequency of canals in maxillary second premolar can be appreciated from the aforementioned studies.

This study was based on the records of patients where the number of canals were explored only on clinical and radiographic evaluations. Canal morphology was not taken into account. Use of latest technologies using magnification and 3D imaging is recommended for further studies.

Conclusion

Frequency of one canal is the highest in the maxillary second premolars. However, two and three canals were also observed in some cases.

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