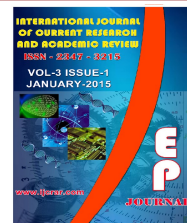




International Journal of Current Research and Academic Review

ISSN: 2347-3215 Volume 3 Number 1 (January-2015) pp. 200-203

www.ijcrar.com



Root and Root Canal Morphology of Endodontically Treated Mandibular First Molars- A Radiographic Study

MCN Fonseka^{1*} and RD Jayasinghe²

¹Department of Restorative Dentistry, Faculty of Dental Sciences, University of Peradeniya, Sri Lanka

²Department of Oral Medicine and Periodontology, Faculty of Dental Sciences, University of Peradeniya, Sri Lanka

*Corresponding author

KEYWORDS

Mandibular,
Radiographic
Study,
root canal
morphology of
endodontically

A B S T R A C T

The mandibular first molar is the first permanent tooth to erupt in the oral cavity and considered a vital tooth in establishing occlusion in the permanent dentition. As it is a tooth prone to caries its morphology is vital in Restorative, Endodontic and Surgical aspects in dentistry. Study of root and canal anatomy has endodontic, as well as anthropological significance. Clinical consequences of anatomical variations in roots are of paramount importance in Root Canal Treatment. This study was carried out to determine the root canal type, configuration, and variation of root and root canal morphology in permanent mandibular first molars. The objectives were to determine the frequencies of the number of roots, type of root canal, presence of pulp stones among the different races and genders. Working length radiographs of 97 consecutive patients comprising of 49 males and 48 females receiving root canal treatment for mandibular first molars were assessed using a standard radiograph viewer with extraneous light blocked under x2.5 magnification. All radiographs were assessed by a single experienced investigator. The race, age, gender, ethnicity, number of roots, canal configurations presence or absence of pulp stones were assessed and documented. The sample consisted of 85.6% Sinhalese, 10.3% Tamil and 4.1% Muslim patients. Of the radiographs 56.7% represented left lower molars whereas 43.3% were of right lower molars. 15.5% of teeth had a second distal root. The canal configuration of the mesial root represented a type IV configuration in 88.7% and a type II configuration in 11.3%. The configuration of the distal root showed a type I configuration in 51.5%, type II configuration in 21.6%, type III in 1% and type IV in 9.3%. When two distal roots were present the canal configuration was type I in both roots (100%). The incidence of 3 rooted lower first molars was 15.47%. Among Sinhalese the incidence was 15.66% (13 of 83 patients) whereas for Tamils the incidence was 10% (1 of 10 patients) Females had a higher incidence of 3 rooted molars (24.5%) compared to males (6.25%). According to the survey the incidence of 3 rooted lower third molars is 15% which is higher than the incidences shown in similar studies. The incidence of canal configurations in mesial and distal roots was similar to those shown in other studies.

Introduction

The mandibular first molar is the first permanent tooth to erupt in the oral cavity

and considered a vital tooth in establishing occlusion in the permanent dentition. As it is

a tooth prone to caries its morphology is vital in Restorative, Endodontic and Surgical aspects in dentistry. Study of root and canal anatomy has endodontic (Vertucci, 1984), as well as anthropological significance (Tratman, 1950). Clinical consequences of anatomical variations in roots are of paramount importance in Root Canal Treatment.

The mandibular molar commonly has two roots, mesial and distal though an accessory root may present as a disto-lingual root. Previous studies had done in this regard have shown a less than 5% incidence among Caucasians (Vertucci, 1984) However an incidence of 25-40% has been reported for mongaloids (Gulabivala, 2001). A study done in Sri Lanka has reported the incidence as 4% for Sinhalese and 8% for Tamils (Fonseka, 2008). The mandibular first molar generally has 3 root canals, a mesio-buccal, mesio-lingual and a distal. However in 45% of the cases the mesial root has only one apical foramen. The distal canal when single is large and emerges short of the anatomical apex (80%). Even in the presence of a single distal root, two distinct root canals could be observed in 20–40% of the cases and such canals could be of type II, IV or V. When two distal roots are present, two distinct distal canals are always evident.

Numerous methods could be utilized to assess the relative frequencies of the above occurrences. Assessment of extracted teeth (Gulabivala, 2001), analysis of periapical radiographs (Garg, 2010), spiral computed tomograms (Jayasinghe, 2007) and cone beam computed tomography (Ming-Gene Tu *et al.*, 2009) are some of the tools that have been employed in previous studies. This study was carried out to determine the root canal type, configuration, and variation of root and root canal morphology in permanent mandibular first molars. The objectives were to determine the frequencies

of the number of roots, type of root canal, presence of pulp stones among the different races and genders.

Materials and Method

In this prospective study, working length radiographs of 97 consecutive patients receiving root canal treatment at department of Restorative Dentistry, university Dental Hospital, Peradeniya for mandibular first molars were assessed using a standard radiograph viewer with extraneous light blocked under x2.5 magnification. The radiographs were obtained using a standard paralleling technique to achieve an accurate reproduction of the peri-radicular area. All the radiographs were good in quality. These radiographs were routinely taken as part of the standard treatment protocol of root canal treatment. All radiographs were assessed by a single experienced investigator. The race, age, gender, ethnicity, number of roots, canal configurations and presence or absence of pulp stones were assessed and documented. Data was analysed using SPSS. Ethical clearance for the study was obtained from the Ethical Reviews Committee, Faculty of Dental Sciences, University of Peradeniya.

Result and Discussion

Most radiographs assessed belonged to the 21-30 age group followed by the 31-40 and 41-50 age groups (Table 1).

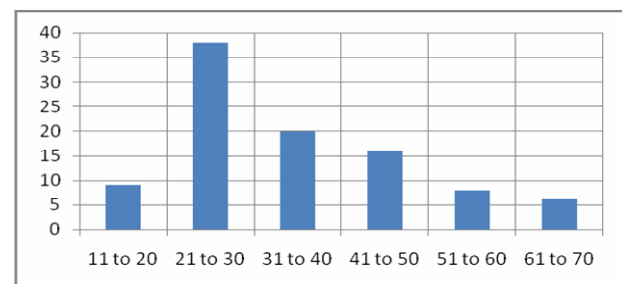


Table.1 Distribution of teeth according to age group

Of the 97 radiographs assessed 50.5% were of females and 49.5% were of male patients. The sample consisted of 85.6% Sinhalese, 10.3% Tamil and 4.1% Muslim patients. Of the radiographs 56.7% represented left lower molars whereas 43.3% were of right lower molars. 15.5% of teeth had a second distal root. The canal configuration of the mesial root represented a type IV configuration in 88.7% and a type II configuration in 11.3%. The configuration of the distal root showed a type I configuration in 51.5%, type II configuration in 21.6%, type III in 1% and type IV in 9.3%. When two distal roots were present the canal configuration was type I in both roots (100%). The incidences of 3 rooted lower first molars were 15.47%. Among Sinhalese the incidence was 15.66% (13 of 83 patients) whereas for Tamils the incidence was 10% (1 of 10 patients) Females had a significantly higher incidence of 3 rooted molars (24.5%) compared to males (6.25%) ($P < 0.05$). The frequency of a third root in left lower first molars was 14.55% whereas a higher frequency of third roots was evident in right lower first molars (20%).

Pulp stones were evident in 17 or 17.5% of the radiographs assessed with 12 cases seen in the 41-70 age groups. Of these the highest incidence was in the 61-70 age groups. Females had a higher incidence of pulp stones (20.4%) than males (14.6%) Right teeth had a more pulp stones (21.4%) than left teeth (14.5%).

Study of root and canal morphology is important clinically as well as anthropologically. Multiple methods have been used for this purpose. Root and canal morphology of permanent mandibular first molars of Sri Lankan people have been assessed by several researchers using extracted teeth (Fonseka, 2008) but radiological methods haven't been used up to now.

The prevalence of a second distal root is reported as around 4-6% for Indian and Caucasian populations with a higher incidence reported for mongaloids (25%) (Tratman, 1950; Grag 2010). However the current study reported an incidence of 15.47% which is higher than the norms of the population of study and is also higher than a similar study done in the Nuwara-eliya district (Fonseka, 2008). The study in Nuwara-eliya also showed a higher percentage of Tamils having 3 rooted lower first molars (8%) as opposed to Sinhalese (4%) which was the opposite in this study. Possible causes for this would be differences in population demographics, a smaller sample and the hospital acting as a referral centre for complex cases. This could also explain the reason of females having higher percentages of 3 rooted lower molars than males. And also the sample that we have used here is a biased sample as the patients who are seeking and receiving endodontic treatment may not be the same as the people who are getting the extractions. Third root was present more in the right side in the current study but the difference was not statistically significant. Even though some studies have identified the right side as the common side (Jayasinghe, 2007, Walker 1984); some has identified it to be the left whereas some has not seen any difference. Therefore it is reasonable to assume that there is no significant difference in the side of the jaw.

According to Vertucci's classification of canal configurations eight types have been described. When the mesial root is considered, similar studies done have put the prevalence of type IV canals at 91% which is comparable to our study (88.7%). Thus a type IV canal is the most common presentation of the mesial root. However the present study showed a higher incidence of type IV canals in the distal root (24.77% i.e. 9.3% type IV and 15.47% two distal roots)

which is normally put at around 15% (Vertucci, 1984).

Radiographic survey may underestimate the figures of third root as very slender roots may not appear clearly in the radiographs due to the angulation. Reliability of identifying a third root from a radiograph is considered to be around 90% (Walker 1984). Findings in radiographs have a better clinical significance in endodontic practice than extracted teeth because use of radiographs, pre operative as well as peri-operative, is a standard practice.

Calcifications can occur within the dental pulp and are called as pulp stones. Even though exact aetiology of pulp stone formation is unclear (Goga *et al.*, 2008), they are considered an age change in most teeth and this was confirmed by the higher incidence of pulp stones in the older age groups of the study with the 61-70 age groups having the highest incidence of pulp stones. In a study done by Ranjitkar *et al* in 2002 using undergraduate dental students found 20.3% of the mandibular first molars had pulp stones which are much higher than the value for the similar age group found in this study. This finding may be due to the fact that the teeth used in our study were grossly carious needing endodontic treatment and possibility of destruction/removal of pulp stones due to the tissue damage associated with carries. Although there were more right lower first molars having 3 roots and pulp stones this was not a statistically significant finding.

Conclusion

According to this radiographic study, the incidence of 3 rooted lower third molars is 15% which is higher than the incidences shown in similar studies. The incidence of canal configurations in mesial and distal roots was similar to those shown in other studies.

References

- Fonseka, M.C.N., Jayasinghe, R.M., Perera, U.U.K.P.C., Wickremasinghe, Y., Wettasinghe, K.A. (2008). Variation in root morphology of human mandibular first molars collected at a general dental practice in Nuwara-Eliya, Sri Lanka. *Sri Lanka J. Med.*, 17(1): 10–14.
- Gulabivala, K., Aung, T.H., Alawi, A., Ng, Y.L. (2001). Root and Canal morphology of Burmese mandibular molars. *Int. Endodon. J.*, 34(5): 359–70.
- Jayasinghe, R.D., Li, T.K. (2007). Three-rooted first permanent mandibular molars in a Hong Kong Chinese population: a computed tomographic study. *Hong-Kong Dent. J.*, 4: 90–93.
- Tratman, E.K. (1950). A comparison of the teeth of people Indo-European racial stock with mongaloid racial stock. *Dental Record*, 70: 31–53.
- Vertucci, F.J. (1984). Root canal anatomy of the human permanent teeth. *Oral Surg. Oral Med. Oral Pathol.*, 58: 589–99.
- Goga, R., Chandler, N.P., Oginni, A.O. (2008). Pulp stones: a review. *Int. Endodon. J.*, 41: 457–468
- Ranjitkar, S., Taylor, J.A., Townsend, G.C. 2002. A radiographic assessment of the prevalence of pulp stones in Australians. *Aust. Dent. J.*, 47(1): 36–40.
- Garg, A.K., Rajendra K. Tewari, Ashok Kumar, Sarwat H. Hashmi, Neha Agrawal, Surendra K. Mishra, (2010). Prevalence of three-rooted mandibular permanent first molars among the Indian population. *J. Endod.*, 36: 1302–1306.
- Ming-Gene, Tu, Heng-Li Huang, Shui-Sang Hsue, Jui-Ting Hsu, San-Yue Chen, Ming-Jia Jou, Chi-Cheng Tsai (2009). Detection of Permanent Three-rooted Mandibular First Molars by Cone-Beam Computed Tomography Imaging in Taiwanese Individuals. *J. Endod.*, 35 (4):503–507.
- Walker, R.T., Quackenbush, L.E. (1985). Three-rooted lower first permanent molars in Hong Kong Chinese. *Br. Dent. J.*, 159: 298–9.