

Root canal morphology of Mandibular premolars in Patients from Asir Region in Saudi Arabian Population

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Abstract: Knowledge of the root canal morphology and the possible anatomical variations of mandibular premolars are important for the successful endodontic treatment. The aim of this study was to evaluate the variation in morphology of root canals in mandibular premolars in patients from asir region of Saudi Arabia. **Methodology:** One hundred and ten human mandibular premolars (36 first premolars and 74 second premolars) from patients requiring endodontic treatment were involved in this study. After access the cavity of the teeth, the root canals were explored and radiographs were taken. **Results:** Premolars with one canal were found in 91% of cases (30% first premolar and 61% second premolar) and premolars with two canals were found in 8% of cases (3% first premolar and 5% second premolar). There was just one case (1%) where a first premolar had three canals. These differences were statistically significant with $P < 0.05$. **Conclusion:** Clinicians should be aware of the root canal variation in the mandibular premolars and be able to apply this knowledge in radiographical and clinical interpretation.

Keywords: Morphology, endodontic, premolars, Radiographs.

1. Introduction

The main objectives of root canal treatment are thorough shaping and cleaning of all pulp spaces and its complete obturation with an inert filling material. The presence of untreated canals may be a reason for failure of endodontic therapy.

Therefore, it is essential for clinicians to have knowledge about root canal configurations although its morphology varies largely in different ethnicities and even in different individuals with the same ethnic¹. The root canal configuration is usually complicated. Based on the literature in addition to ethnicity, age and gender also can influence these diversities^{2,3}.

Mandibular first and second premolars are typically described as single rooted teeth with ovoid roots in cross sections and developmental concavities on mesial and distal aspects of the roots surfaces. Several studies indicated high level of endodontic failures and flare-ups due to complexity and diversity of root canal configurations in mandibular premolars^{3,4}

The mandibular first premolar with dual canals dividing at various levels of the root can generate complex mechanical problems. The canals may divide almost anywhere down the root. Because of the absence of direct access, cleaning, shaping, and filling of these teeth can be extremely difficult⁵.

A study by Vertucci and Francois 1986 revealed that the mandibular first premolar had one canal at the apex in 74.0% of the teeth studied, two canals at the apex in 25.5%, and three canals at the apex in the remaining 0.5% of the teeth. Only 12% of mandibular second premolars studied had a second or third canal. They also showed that the

second premolar had one canal at the apex in 97.5% and two canals at the apex in only 2.5% of the teeth studied².

This study aimed to investigate the difference in the number of root canals in first and second mandibular premolars in patients from Asir region

2. Methodology

This study was conducted in college of dentistry king khalid university abha Saudi Arabia. A total of 110 mandibular premolars (36 first and 74 second premolars) requiring Endodontic treatment from patients in asir region were included in the study. 2 radiographs in different angulation were taken to access the morphology of each tooth. Two independent Endodontists assessed the number of roots and canals, the position where canal bifurcation occurred and the canal configuration to reach consensus on the interpretation of radiographic findings. After rubber dam application an endodontic access cavity was made with round bur. Oval shaped access cavity was prepared which extended buccally up to the tip of buccal cusp, lingually up to lingual cusp inclination, walls were diverged occlusally with No. 2 Endo Access bur (Maillefer, Dentsply, Switzerland) for better visualization of the orifices Working length were confirmed with both an x ray and apex locators. Canals were instrumented and obturated with gutta-percha. A post operative x-ray was taken to assess the quality of obturation.

3. Results

There were differences in the shape of the canals and in the number of these canals of the mandibular premolars investigated. Premolars with one canal were found in 91% of cases and premolars with two canals were found in 8% of cases. There was just one case (1%) where a first premolar had three canals.

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Number of canals	First premolar (n=36)	Second premolar (n=74)
One canal	32	68
Two canals	3	6
Three canals	1	0



4. Discussion

Knowledge of basic root and root canal morphology as well as possible variation in anatomy of the root canal system is important in achieving successful nonsurgical root canal treatment. This is followed by negotiation, cleaning and shaping, and obturation of the entire canal system in 3 dimensions. Variation in root canal morphology was suggested as the most likely reason for the high frequency of endodontic flare-ups and failures.^{5,6}

Many studies of the root and canal morphologies of mandibular premolars have been conducted because these teeth can present with complex morphologies that often complicate treatment. The majority of these studies have involved complete destruction of the tooth during examination (e.g., hard tissue sectioning). This study was done on patients requiring endodontic treatment of mandibular premolars.^{6,7,8}

The results of this study revealed that 88.89% of the mandibular first premolars exhibited single canals (Type I). This proportion is higher than those reported in many previous studies.^{7,8} The results of this study revealed that 91.89% of the mandibular second premolars exhibited single canals. This proportion is lower than those that have been reported in many previous studies, but this proportion is greater than that reported by Sert and Bayirli.^{6,7,8,9}

Mandibular first premolar with 2 canals was found in 8.33 cases and mandibular second premolars with 2 canals were found in 8.11% cases. There was only one case in mandibular first premolar which had 3 canals.

A great deal of variation has been reported in the literature with respect to the root and root canal morphologies of teeth, and the human mandibular premolar is no exception. This variation in the internal canal morphology of the human mandibular premolar might be attributed to hereditary and ethnic differences.^{8,9}

5. Conclusion

Within the limitations of this study, the root canal morphology of mandibular premolars in Saudi Arabian population was, in general, comparable to that of other populations. The dental practitioners should have a sound knowledge of common anatomy of permanent teeth and its possible variations and use the available tools to locate and treat the whole root canal system to ensure a successful treatment outcome.

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