

Prevalence of Two Rooted Mandibular First Premolars in Indian Population

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Abstract

Background: Knowledge regarding variation in number of roots occurrence in mandibular first premolars is utmost important for meticulous diagnosis and successful endodontic treatment.

Methodology: Using conventional orthopantomograph radiographs, number of roots present in 430 mandibular first premolars was examined.

Results: Out of 430 mandibular premolar teeth examined, only one tooth (0.23%) showed presence of two roots.

Conclusion: The presence of two rooted mandibular first premolars in Chitradurga, Karnataka, India very less. Hence, further studies including advanced imaging techniques are required.

Keywords: Double Root, two Roots, Dental Anomaly, Supernumerary Root, Mandibular First Premolar, Prevalence

Introduction

A thorough knowledge of occurrence of multiple roots or root canals in permanent mandibular premolars is essential for successful endodontic treatment. Mandibular first premolar is typically described in textbooks as single rooted tooth with a single root canal system. The ovoid-shaped root in cross section normally has developmental grooves or depressions on the mesial and distal surfaces [1].

However, mandibular premolars have always been regarded as an “enigma to Endodontist” as they have been amongst the most difficult teeth which exhibit variation in number of roots and canal morphology thereby challenging for endodontic treatment. A possible explanation for this factor is that these teeth show numerous variations even in crown morphology. Failure to diagnose and negotiate the root canal ultimately results in failure of the root canal treatment [3].

Comprehensive literature is available with reports of extra canals in mandibular first premolars, but reports about the incidence of extra roots in mandibular first premolars are rarely reported. Moreover, the incidence, location, and morphology of roots and root canal systems may vary in different ethnic or different races around the globe [3-5]. Although various studies have been conducted to study the prevalence of multi-rooted mandibular first premolars in other races, scarcity of literature was found in Indian population. Therefore, the purpose of this paper is to evaluate the total prevalence of two-rooted mandibular first premolars in the city of Chitradurga, Karnataka, South India [6,7].

Methodology

It was the purpose of this research investigation to study the prevalence of multi-rooted mandibular first premolars with

special emphasis on the prevalence of two roots in mandibular first premolars. Two hundred fifteen patients in a period of three months, who reported to Dental wing, Karnataka ENT Hospital and Research Centre, Chitradurga, Karnataka for seeking treatment for decayed mandibular posterior teeth were subjected to orthopantomograph radiographic examination with their prior written consent. Age of the patients ranged from 14 to 30 years. Detailed standard protocol to take orthopantomograph was strictly followed in all the patients who participated in the study. The radiographs were examined with a magnifying viewer by three examiners. The data obtained was tabulated and subjected to statistical analysis using software.

Results

Out of 430 mandibular first premolars examined, in only one patient i.e., only one first premolar showed (unilateral presence of) two roots (Figure 1). This showed the prevalence of 0.23% in Chitradurga city (South Indian population). The two rooted first premolar was observed on the left side and in the female patient. The bifurcation was observed from middle third of the root till the apex.



Figure 1: Orthopantomograph Showing two Rooted (Double Rooted) Mandibular Left First Premolar (Yellow Arrow).

Discussion

Mandibular premolars pose an endodontic challenge during root canal treatment due to presence of variation in root number or canal morphology thereby leading to high failure rate of the root canal treatment [1]. The difficulty encountered during treatment of mandibular premolars is often attributed to variable morphology of the root and root canal [2]. The literature focusing specifically on prevalence of extra root in mandibular first premolars are limited. However, there are some case reports showing occurrence of two or three roots in these teeth. Therefore, with the intention of evaluating the prevalence of two rooted first premolars in the mandibular arch of Indian ethnic group, the present study was carried out [8,9].

In this study, authors have used conventional orthopantomograph radiographs as they have been used as an important clinical diagnostic tool for evaluating number of roots or canal anatomy. Moreover, they are cost effective. We used this conventional orthopantomographs as a diagnostic tool in the present study. We found a prevalence of 0.23% two rooted mandibular first premolars in the city of Chitradurga (South India). The bifurcation or branching of the root was found at the middle one third of the root. This finding was found similar to the study done in Thai population [6]. Various studies have been undertaken to show the prevalence of double rooted first premolars in different population across the world [6].

Investigated 1159 Cone Beam Computed images (CBCT) and evaluated the prevalence of root canal anatomy in the mandibular first and second premolars in Thai population. They found the most common root canal configuration of Vertucci type I (63.1%) with respect to the mandibular first premolars. More than 98% of mandibular premolars exhibited single root with a prevalence of bifurcated root was 28.5% in the mandibular first premolars. In their investigation they found the level of branching in the root mostly at the middle 1/3 of the root. In 80.3% cases bilateral appearance of the same root canal configuration was identified and there was no gender wise predilection. In the present study the double rooted first premolar was recorded in female patient.

Did research in 349 first premolars using CBCT images and found a prevalence of 5.73% of multiple roots in mandibular first premolars but not in second premolars [7]. 19. 48% of first premolars showed multiple root canals. In addition to these studies, in 2017 investigated root anatomy and root canal morphology of mandibular first premolars in a Chinese population. In their investigation, 178 permanent mandibular first premolar teeth which were extracted from a native Chinese population were collected, scanned using micro-computed tomography and they were reconstructed in three-dimensional model. The number of roots and canals, canal configuration and radicular grooves were investigated. Authors categorized the root canal morphology based on Vertucci's criteria. The radicular grooves present in the premolars were scored using the Arizona State University dental anthropology scoring system (ASUDAS). They analyzed the statistical correlation between scores for radicular grooves and root canal morphology in those teeth. From this research they stated that almost all the samples had single-root (99.4%).

64.04% of teeth shoed type I canal systems, 34.27% had two canals and 1.69% had three canals. Based on ASUDAS, the scores for radicular grooves present in the premolars were recorded as 56.74%, 16.85%, 12.36%, 10.11%, 3.37% and 0.56% respectively from grade 0 to grade 5. Finally, they concluded from this study that complicated variation of the root anatomy and canal morphology of mandibular first premolars in southwestern Chinese population exists, and hence special attention and careful assessment for endodontic treatment is essential while treating these Chinese population.

Similar studies like Al-Zubaidi et al [11] using CBCT images, examined 507 first premolars for presence of two roots and found that 484 (95.5%) teeth having one root and 23 (4.5%) teeth having two roots [10,12]. evaluated in Saudi Arabian population for presence of multiple roots in first premolars and found that out of the 100 mandibular first premolars examined, 80% had a single root, 18% had two roots, whereas 2% were three rooted. The author of this paper, recently published three cases of bifurcated mandibular second premolars in Indian patient. [13] This emphasizes the requirement of some more prevalence studies on two rooted mandibular premolars in different ethnic groups around the globe in the future.

Conclusion

Knowledge on possibility of multi-rooted mandibular first premolars is essential among general dental practitioners in different ethnic group or population for meticulous diagnosis and to render proper treatment to the patient. Therefore, sophisticated clinical examination followed by radiographic assessment will reduce the failure of the endodontic treatment in mandibular first premolars [13].

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