

Multirooted- Bilateral Maxillary and Mandibular First and Second Premolars- A Rare Anatomical Variation

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Abstract

Introduction: A thorough understanding of root canal anatomy and morphology is required for achieving high levels of success in endodontic treatment. The possible anatomic configurations of premolars are well documented in the literature, except for the small incidence of bilateral multi-rooted maxillary and mandibular premolars with three canals.

Objective: To report a rare case of bilateral morphological root aberrations in maxillary and mandibular first and second premolars in a female patient.

Case report: A 36 yrs old female patient was evaluated for painful maxillary left 1st and 2nd premolars. Physical examination revealed no alteration or apparent mental retardation. Panoramic and periapical X-rays revealed multiple roots and canals in maxillary and mandibular 1st and 2nd premolars. This article reports and discusses the treatment recommendations for an unusual occurrence of three canals in both the first and second maxillary premolars in the same patient drawing particular attention to radiographic interpretation and access management.

Conclusion: Findings emphasize the importance of radiographic assessment for diagnosing multiple roots which might present unusual characteristics such as multiple and bilateral appearance. The absence of a syndrome should not be used to rule out the possible manifestation of this morphologic variation.

Keywords: Maxillary premolars; Mandibular premolars; Multirooted; Bilateral; Root aberrations; Endodontic treatment

Introduction

To achieve endodontic success, the entire root canal system must be debrided, disinfected and obturated. Clinically, precise 3-dimensional determination of the internal structure of teeth, their form and no. of root canals is a challenge. The clinician must have a thorough understanding of normal anatomy, and of common variations from the normal anatomy. The clinician must also be able to identify those teeth that tend to vary greatly from the norm, e.g. premolars. There seems to be a racial predisposition for the presence of two or more canals in maxillary and mandibular premolars [1,2] as well as their bilateral occurrence [3].

In endodontic literature very few studies have shown the reasons for endodontic failures. Hoen and Pink found a 42% incidence of missed roots or canals in the teeth requiring retreatment in their investigations [4].

The reported frequency of maxillary first premolar varies from 0.5% to 6% [5]. Three rooted maxillary second premolars are very rare and frequency varies from 0% to 1% [5]. Zilich and Dawson [6] reported 11.7% occurrence of 2 canals and 0.4% of three canals. Ingle reported mandibular second premolars have only 12% chance of a second canal and 0.4% of a third canal and Wong has reported 11% possibility of second [7,8]. Vertucci [9] and Zilich [6] reported the occurrence of three canals in mandibular first premolar at 0.5% and 0.4% respectively and in second premolar at 0.0% and 0.4% respectively. A study at the University of Washington assessing the results of endodontic therapy, the mandibular premolar showed the highest failure rate of all types of teeth [2,3].

Clinicians have often noted that aberrant root morphology in a given tooth is also observed with varying degrees of frequency in the corresponding contra lateral tooth. Bifurcation of the canal in mandibular first premolar was the most common finding 22.8%, with 60% of there being bilateral. It was observed that unusual root

morphology is bilateral approximately 60% of the time. Therefore, the incidence of root or root canal abnormalities reported by the percentage of patients involved will always exceed the incidence of abnormalities reported by the type of tooth (e.g. mandibular canine) involved except for abnormalities which are found bilateral in 100% of patients studied. Radiographic interpretation appears to result in a lower incidence of anatomical aberrations than direct identification. The more rare the aberrations, the more likely it is to be bilateral in occurrence [10]. There are very few reported cases of such bilateral multi rooted presence of mandibular and maxillary premolars in the same patient.

So the purpose of this article is to report, as well as discusses, treatment recommendations for an unusual occurrence of multi rooted bilateral maxillary and mandibular premolars in the same patient.

Case Report

A 36 yrs old female patient with a non-contributory medical history referred to the department of conservative dentistry and endodontics of the Oxford dental college, Bangalore with a history of spontaneous, dull aching pain in left maxillary back region. Left maxillary first and second premolars showed temporary restoration with positive pain on percussion. Right maxillary first and second premolars, root stumps were seen. Right mandibular first molar showed mesial deeply carious lesion where as 2nd premolar showed distal carious lesion.

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An OPG was advised for multiple carious teeth. OPG examination showed pulp involvement of maxillary left I and II premolars which was confirmed with pulp vitality test. Both teeth were sensitive to cold test and EPT with responses indicating irreversible pulp involvement. So the endodontic treatment was planned for left maxillary I and II premolar and right mandibular I molar where as restorative treatment for right mandibular II premolar. The OPG showed (Figure 1) that nearly all the premolars had multiple roots, so IOPAs of maxillary right and left premolars, mandibular right and left premolars were taken at different angles which confirmed the presence of three roots in all premolars (Figures 2 and 3).

So the maxillary left I and II premolars were isolated under local anaesthesia and access cavity was modified with a cut at the bucco-proximo angle from the entrance of the buccal canals to the cavo-surface angle resulting in a cavity with a T-shaped outline as described by Balleri et al. [11].

After removing the coronal pulp, the buccal canals were explored with sizes no. 8 and 10 files and the palatal with a size 15 K file, resulting in clinical and radiographic confirmation of three canals (Figure 4). The root canal preparation of buccal canals was completed to size F1 ProTaper (Dentsply, Maillefer) & palatal canal to size F2 ProTaper with copious irrigation using 17% EDTA and 5.25% sodium hypochlorite. After drying, the canals were obturated with AH plus sealer and gutta percha using lateral condensation (Figure 5). The access cavity was sealed with GIC (Ketac fil, 3M ESPE, Seefeld, Germany) and the patient was appointed for permanent restoration. Recall visit after 2 yrs showed healing of periapical lesion (Figure 6).

Discussion

The precise three-dimensional determination of the internal structure of teeth, their form and number of root canals is a challenge clinically. Because of the complex, varied morphology of the premolars, endodontic treatment in the premolar is a challenging task. The anatomy of maxillary premolars with three root canals, mesio-buccal, disto-buccal and palatal, is similar to that of adjacent maxillary molars, and they are therefore sometimes called molars or 'radiculous' [12,13]. Accurate preoperative radiographs, straight and angled, using parallel



Figure 1: An OPG showing bilateral multirooted maxillary and premolars.

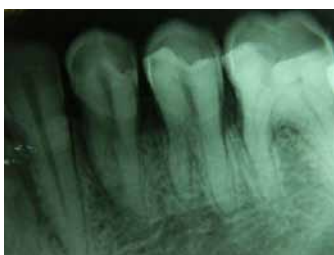


Figure 2: IOPA showing multirooted mandibular left premolars.



Figure 3: IOPA showing multirooted mandibular right premolars.



Figure 4: Pre obturation IOPA of maxillary premolars with three canals.



Figure 5: IOPA showing obturated canals.



Figure 6: 2 year recall showing complete healing

technique is essential in providing clues as to the number of roots that exist [14]. Abrupt straightening or loss of a radiolucent canal in the pulp cavity, an extra canal should be suspected that could be in the same root or independent root. Sieraski et al. [15] found that whenever the mesio-distal width of the mid-root image was equal to or greater than the mesio-distal width of the crown, the tooth most likely had three roots. Sabala et al. [10] studied 501 patient records for aberrant root and root canal morphology. In the study, occurrence of the same aberration on the contralateral tooth varied according to the type of anomaly. Out of 501 patients, four patients found to have three-rooted maxillary first premolars, all were bilateral. Their study found that the rarer the anomaly, the greater the incidence of the anomaly occurring bilaterally. Those anomalies occurring less than 1% found to

occur bilaterally up to 90% of the time. The bilateral symmetry of the three-rooted premolars expected in many patients, as this anomaly is quite rare. Keeping this fact in mind, we could successfully detect the multiple roots in nearly all premolars of the patient.

Diagnostic measures such as multiple pre-operative radiographs, examination of pulp chamber floor with a sharp explorer, troughing of grooves with ultrasonic tips, staining the chamber floor with 1% methylene blue dye, performing the NaOCl 'champagne bubble' test and visualizing canal bleeding points are important aids in locating root canal orifices. Yoshioka et al. [16] have indicated that sudden narrowing of canal system (fast break rule) on a parallel radiograph suggests canal system multiplicity. Martínez-Lozano et al. have suggested a 40 degree mesial angulation of X-ray beam to identify additional canals [17]. Clinicians should be aware of anatomical variations in maxillary and mandibular premolars and be able to apply this knowledge in radiographic and clinical interpretation. Findings emphasize the importance of radiographic assessment for diagnosing multiple roots which might present unusual characteristics such as multiple and bilateral appearance. The absence of a syndrome should not be used to rule out the possible manifestation of this morphologic variation.

References

1. Seltzer S, Bender IB, Smith J, Freedman I, Nazimov H (1967) Endodontic failures--an analysis based on clinical, roentgenographic, and histologic findings. II. Oral Surg Oral Med Oral Pathol 23: 517-530.
2. Swartz DB, Skidmore AE, Griffin JA Jr (1983) Twenty years of endodontic success and failure. J Endod 9: 198-202.
3. Vire DE (1991) Failure of endodontically treated teeth: classification and evaluation. J Endod 17: 338-342.
4. Hoen MM, Pink FE (2002) Contemporary endodontic retreatments: an analysis based on clinical treatment findings. J Endod 28: 834-836.
5. Ingle JI, Bakland LK, Baumgartner JC (2008) Ingle's Endodontics 6e, (6th edn.) BC Decker Inc, Hamilton.
6. Zilich R, Dowson J (1973) Root canal morphology of mandibular first and second premolars. Oral Surg Oral Med Oral Pathol 36: 738-744.
7. Trope M, Eifenbein L, Tronstad L (1986) Mandibular premolars with more than one root canal in different race groups. J Endod 12: 343-345.
8. Wong M (1991) Four root canals in a mandibular second premolar. J Endod 17: 125-126.
9. Vertucci FJ (1978) Root Canal morphology of mandibular premolars. J Am Dent Assoc 97: 47-50.
10. Sabala CL, Benenati FW, Neas BR (1994) Bilateral root or root canal aberrations in a dental school patient population. J Endod 20: 38-42.
11. Balleri P, Gesi A, Ferrari M (1997) Primer premolar superior com tres raices. Endod Pract 3: 13-15.
12. Maibaum WW (1989) Endodontic treatment of a "ridiculous" maxillary premolar: a case report. Gen Dent 37: 340-341.
13. Goon WW (1993) The "radiculous" maxillary premolar: recognition, diagnosis, and case report of surgical intervention. Northwest Dent 72: 31-33.
14. Silha RE (1968) Paralleling long cone technic. Dent Radiogr Photogr 41: 3-19.
15. Sieraski SM, Taylor GN, Kohn RA (1989) Identification and endodontic management of three-canal maxillary premolars. J Endod 15: 29-32.
16. Yoshioka T, Villegas JC, Kobayashi C, Suda H (2004) Radiographic evaluation of root canal multiplicity in mandibular first premolar. J Endod 30: 73-74.
17. Martínez-Lozano MA, Forner-Navarro L, Sánchez-Cortés JL (1999) Analysis of radiologic factors in determining premolar root canal systems. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 88: 719-722.