

Endodontic Management of Premolars with Extra Roots: A Case Series

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ABSTRACT

Background: Root canal morphology can be complex and often requires careful evaluation for its endodontic management. Premolars are known to have aberrant anatomy. Often considered as enigma to the endodontist, the mandibular first premolars have high flare-up and highest failure rates because of extreme variations in root canal morphology (1-3). The incidence of two roots in mandibular first premolar is quite rare (1.8%) (4). On the other hand the maxillary premolars are mostly bi-rooted but rarely has three roots. These complex and unexpected anatomies make endodontic treatment quite challenging. This paper reports cases of management of root canal treatment of maxillary and mandibular premolars with complex anatomies.

Keywords: Maxillary Premolars, Mandibular Premolars, Root Canal Morphology, Variations, Endodontic Treatment.

INTRODUCTION

A thorough and clear understanding of the anatomy of human teeth is a prerequisite to successful endodontic treatment. A proper study of preoperative diagnostic X ray also plays an important role in determining the anatomy of the roots and canal morphology. One of the major reasons for failure of root canal therapy is the inadequate knowledge about the anatomy of the pulp space in the root canals (5). Root canals are left untreated when the dentist fails to identify them particularly in teeth that have additional root canals (5,6). The maxillary first premolar has two cusps with the buccal cusp prominently larger than the palatal cusp. This tooth is said to exhibit the greatest variation in root anatomy and root canal morphology. (6,7,8) The incidence of one root varies from 22% to 49.9%; two roots, 50.6% to 72% and three roots, 0 to 6% (13,14). Several studies (13,15,16) dealing with the canal morphology of the first maxillary premolar have revealed that in most instances they have two canals, although teeth with one or three canals do exist (13,14-16) Mariusz et

al(16) found 9.2% of first maxillary premolars with three canals. Slowey has suggested that mandibular premolars, often called as “endodontist’s enigma”, may present the greatest difficulty of all teeth to perform successful endodontic treatment [2]. A higher incidence of two canals in mandibular first premolars was reported in several populations, upto 50% in Indian populations [9, 10]. They are more prone to bifurcation of canals (23-30%) and terminating in multiple apical foramina (15-20%) (11). The presence of two distinct roots in mandibular first premolars is quite rare and has been reported to be only 1.8% (12)

This article presents endodontic management of maxillary first premolar with three roots and mandibular premolar with two roots.

CASE REPORT 1

Twenty five year old patient came to the clinic with pain in the upper left back region since one

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week. Medical history was not relevant. On examination 24 revealed deep caries with radiographic evidence of pulpal involvement. The radiograph also showed unusual outline of an extra root (Fig 1). The clinical and radiographic examination led to a diagnosis of symptomatic irreversible pulpitis of 24. The tooth was anaesthetized and isolated using rubber dam. After access cavity preparation a sharp DG16 explorer was used to locate the mesiobuccal, distobuccal and palatal canal orifices, and the access was modified accordingly. The orifices were enlarged with Gates glidden drills # 1, 2, 3. Pulp extirpation was done and after confirming the canal patency, size 10k files were inserted and working length determined using radiograph and J morita dentaport apex locator (Fig 2). Cleaning and shaping was done using Hyflex CM and prepared till 6% 20 apical preparation and master cone placement was confirmed with radiograph (Fig 3). Cold lateral condensation method was used to obturate all the three canals with seal apex sealer (Fig 4). After 1 week tooth was asymptomatic hence restored with permanent restoration.

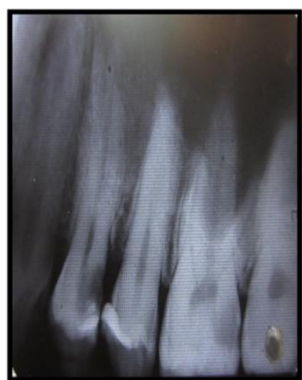


Fig 1: Preoperative radiograph.

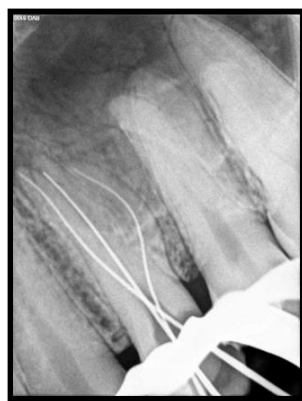


Fig 2: Working length determination.



Fig 3: Master cone selection radiograph.



Fig 4: Post obturation radiograph.

CASE REPORT 2

A 35 year old woman came a chief complaint of pain in lower left back region. Medical history revealed asthma since 6 years. On clinical examination a porcelain fused to metal bridge extending from 34 to 36 was seen and 34 was positive to percussion test. Radiographically 34 showed a periapical lesion and revealed a outline of an extra root (Fig 5). We arrived to a diagnosis of pulp necrosis with chronic periapical abscess and a root canal treatment was planned for her. The three unit bridge was removed and access opening done with Endo Access bur. Patient was non compliant with placement of rubber dam owing to her medical history. On opening, one orifice was seen coronally splitting into two midroot (Vertuccis type V canal configuration). The coronal orifice was widened with Start X ultrasonic tip 3 to gain access to the mesial and distal canals (Fig 6). Cleaning and shaping was done with protaper gold files and apical preparation done till F2. After a calcium hydroxide dressing for 28 days obturation was done

with lateral condensation technique (Fig 7, Fig 8). A permanent restoration was done two days later.



Fig 5: Preoperative radiograph working length determination.

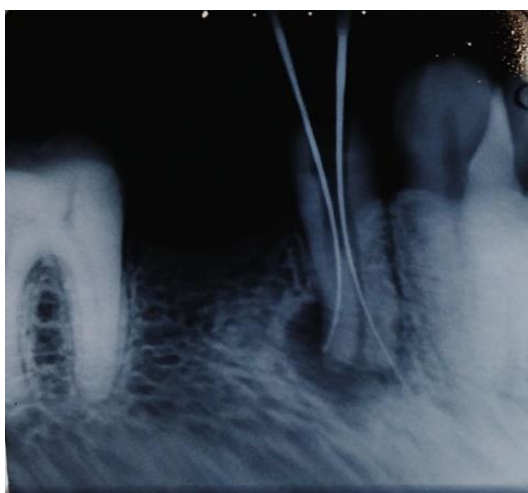


Fig 6: Working Length radiograph.



Fig 7: Master cone radiograph.



Fig 8: Post operative radiograph.

DISCUSSION

Anatomical variations should always be kept in mind during any endodontic management. The primary cause of endodontic failure is overlooked root canals (17,18). Incomplete cleaning and shaping of canals can also lead to treatment failure. The first step for successful root canal treatment is accurate diagnosis of the canal system and recognition of any variation. Anatomic abnormality is an additional challenge, which begins at case assessment and involves all operative stages, including access cavity design, localisation, cleaning and shaping of the root canal system.

The reported frequency of three root canals in a maxillary premolar varies from 0.5% to 6%(19-22). In case 1 three canal orifices were found resembling molar canal orifices (mesiobuccal distobuccal and palatal canal orifices). In the maxillary first premolar an ovoid outline form is recommended⁵. This figure 8-shaped access suggested as outline form restricts the expectation of the clinician to one or two root canal orifices. A third canal orifice should be considered, making a cut at the bucco proximal angle, from the entrance of the buccal canals to the cavo surface angle, as suggested by Balleri et al(1997)(23). In case 1 finding the extra disto buccal canal was done with careful tactile examination of the floor of the pulp cavity at the buccal aspect. After canal location, coronal enlargement was achieved by using orifice shaping file; followed by cleaning and shaping and obturation.

Similarly the presence of extra roots or canals in mandibular premolars is undoubtedly an endodontic challenge. Scott and Turner describe the accessory root of mandibular first premolar as TOME'S ROOT (24). A study by Trope et al. indicate that 10.9% of the patients had at least one mandibular premolar with two roots (4). In case 2, the preoperative x ray of 34 revealed two roots mesial and distal. The access cavity was prepared slightly ovoid mesiodistally. Since it was a type V canal configuration the coronal orifice was widened with ultrasonic start X tip 3 to gain access to the bifurcated canals. After localisation and accessibility to the both the canals a thorough cleaning shaping was done followed by a 28 day follow up of calcium hydroxide dressing. After which obturation was done using lateral compaction technique.

In both the above cases careful examination of preoperative radiographs was done which is an important prerequisite before proceeding with the access cavity. Advanced technology like CBCT can be a useful tool to identify the number and shape of canals and roots in different planes. Ultrasonics, Dyes, Micro openers, champagne test provide a breakthrough in identifying and exploring the missed hidden canals. Additionally use of dental operating microscope and ocular loupes with good illumination make the treatment easier and efficient. It is recommended that the clinicians should consider using various diagnostic tools in diagnosing and treating mandibular first premolars as it deserves more emphasis because of the complexity in root and root canal morphology. (25)

CONCLUSION

Besides having a thorough knowledge about the anatomy the clinician should always expect the possibility of extra roots or extra canals in premolars. The above two cases of the endodontic management of maxillary first premolar and mandibular first premolar with extra roots enhances our knowledge about the possible variations and can continue to baffle the clinician with more possible variations. Although no advanced technology can replace the knowledge and experience of the clinician, the newer diagnostic and magnification tools and canal locators can definitely prove to be a boon to make root canal treatment efficient and successful.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

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