

A Maxillary Second Molar with an Unusual Positioning of Palato-Mesiobuccal Canal: A Case Report

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Abstract: Majority of the endodontic failures occurs because of undetected roots/canals. Hence, a clear understanding of the root canal anatomy and its possible variations is a requirement for successful root canal treatment. Maxillary molars has one of the most complex root and canal anatomy, resulting in diagnostic and treatment challenges. Maxillary molars are known to have a fourth canal (Mesiobuccal second canal) located in the Mesiobuccal root. An inability to detect and treat MB2 canal is a reason for endodontic failure in maxillary molars & an awareness and understanding of this root canal morphology can contribute to the successful outcome of root canal treatment. This case report presents the occurrence and successful endodontic treatment of a second Mesiobuccal canal in maxillary second molar. The case was diagnosed with careful exploration of the pulp chamber floor, routine radiographic examination and confirmed with the help of cone beam computed tomography which plays an important role in assessment of complex root canal morphologies. With advances in research and technology, we are now able to identify and treat many more of these complexities than in the past, leading to greater opportunities for successful endodontic outcomes.

Keywords: CBCT, Palatomesiobuccal canal, X – shaped anatomy, Root canal system, MB2 canal

1. Introduction

Thorough cleaning and shaping of the canal followed by three dimensional obturation of existing canal system are necessary prerequisites to accomplish success in endodontic therapy. A clinician's inability to recognize unusual root canal anatomy, consequentially resulting in undiagnosed and subsequently nontreated canals has often been described as one of the most common primary causes of endodontic failures[1]. To find out additional canal, clear operative field should be necessary that can be obtained by use of various new technologies like dental operative microscope or loupes, ultrasonic tips, various different angulation radiograph out of all confirmatory one is cone beam computed tomography. CBCT gives exact location of canal and aids in hunting additional unusual canals.

Maxillary molars have superior complex root canal anatomies. Six different variations of a second maxillary molar have been reported in a retrospective study by Peikoff et al. [2]. These variations include 1) three separate roots and canals (56%), 2) three separate roots and four canals (two canals in mesiobuccal) (22.7%), [3] Three roots and canals with union of mesiobuccal and distobuccal canals to form a common buccal canal (9%), [4] Two separate roots and canals (6.9%), [5] A single root and canal (3.1%) and [6] Four distinct roots and four canals including two palatal canals (1.4%).[2]

There are reports of maxillary second molar in fusion with a supernumerary tooth (3), 'C' shaped palatal canal [4], one [5], five [6] or even six root canals [7]. Other variations include one [5], four [8], five roots[9] and taurodontism[10]. However, the most common root canal variation in

maxillary molar is the presence of a second MB canal (P-MB) positioned mesial and palatal to the MB canal

The present case report was done under careful examination of pulp floor chamber, taken various different angulations of radiograph and confirm using cone beam computed tomography.

2. Case Report

A 31 year old female patients reported with a chief complain of pain in upper right back region of jaw since 5 days. Pain is aggravated on mastication. History of night pain since 3 days. No history of swelling or pus discharge. Medical history taken was non – contributory. On intraoral examination – deep mesial caries seen with 17, tender on vertical percussion was positive. Curiously destructed-16. History of RCT done with 16 2 years back.

Radiographic examination in relation with 17 revealed coronally radiolucency seen involving enamel dentin and pulp with periapical changes. Based on clinical and radiographic examination diagnosis of 17 showed symptomatic irreversible pulpitis with symptomatic apical periodontitis. Treatment plan for 17 is non-surgical endodontic therapy.



Figure 1: Pre – Operative IOPA revealing grossly decayed 16, pulpally involved 17

After administering 3 ml of local anaesthesia (Lignox 2%), the caries was excavated from the proximal walls. mesial wall reconstruction was done with composite so as to obtain a good isolation. The tooth was isolated with rubber dam and a conventional endodontic access cavity was prepared. After extirpating the pulp tissues, three principle orifices were located with DG 16 explorer (Hu - Friedy). An unusual pattern of developmental root fusion line (DRFL) was observed within the pulp chamber floor. The conventional triangular access was modified to a rectangular shape to uncover the dentine over the DRFL which revealed an additional canal in the mesio palatal aspect (Fig 2). The working length of each canal was estimated by means of Ingle’s method using K – files [Mani Inc. files] (Fig 3). Intra – Oral camera (VistaCam Digital) was used to properly visualize the orifices, which show an —X shape pulpal floor topographic appearance. Fig 4



Figure 2: Intra – Oral picture of access cavity in relation to 17 showing 3 canals along with an unusual location of Palato – MesioBuccal Canal

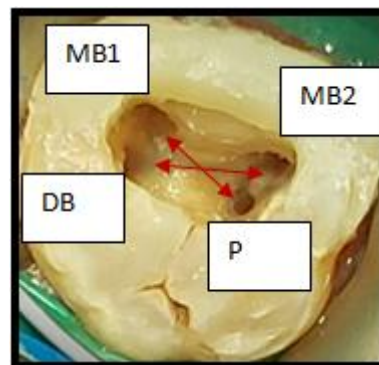


Figure 3: Intra – Oral picture showing an —X shape pulpal floor topography.

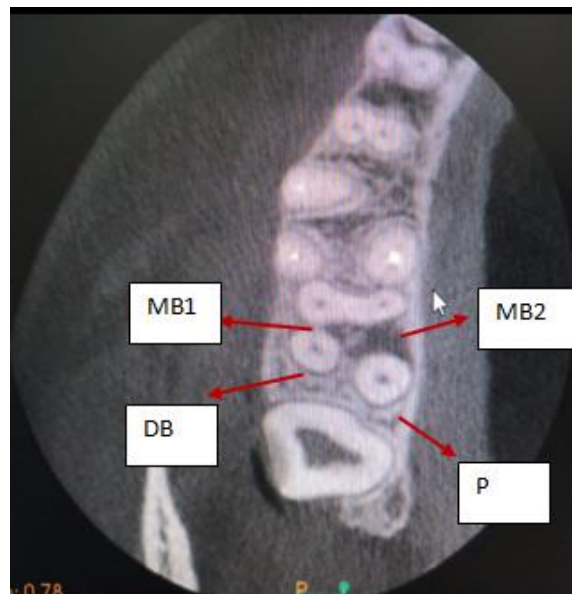


Figure 4: CBCT analysis. CBCT picture reveals Palatal, MesioBuccal, DistoBuccal and Palato – MesioBuccal canal of 17



Figure 5: IOPA revealing the working length determination

In the next appointment, the canals were initially instrumented with #15 K file [Mani Inc. Files] under copious irrigation with 3% sodium hypochlorite and 17% EDTA. Cleaning and shaping of the canals was done by using Protaper Gold rotary files. The canals were obturated with F1 protaper gutta- percha using single cone obturating technique. The access cavity was then restored with posterior composites.



Figure 6: Post – Obturation IOPA

3. Discussion

Diagnostic radiograph and cone beam computed tomography aids in detection of extra canal. Additional canals negotiation is challenging only after looking at conventional radiograph because of this through knowledge of pulp chamber and root canal is necessary. [11]

There are Various possible location of MB2 canal in maxillary molar[13]

- 1) Developmental line that connects MB-1 and palatal canal
- 2) Mesial to the developmental line that connect MB-1 and palatal canal
- 3) As a groove on the palatal wall of the MB-1 canal
- 4) Splits of the MB-1 canal in apical 3rd of the canal
- 5) Comes off the buccal wall of the palatal canal

Gilles & Reader described the MB2 canal according to the main mesiobuccal canal and found the mean distance of the mesiolingual orifice from the mesiobuccal orifice 2.31 and 1.82 mm, respectively[13]. Zhang et al reported that the MB2 canal was located less than 1 mm mesially to the MB-P line and 2 mm palatally from the MB orifice[14]. GÖRDUYSUS et al determined the location of the MB2 canal in 45 extracted maxillary molars and found these measurements 0.69 mm mesially and 1.65 mm palatally[15]. Shetty et.al found maxillary first molar with two palatal roots located under dental operating microscope [16]. However, in the present case the MB2 canal was located much closer to the palatal root canal orifice. Through clinical examination PMB2 canal was misunderstood as second palatal canal. After CBCT examination it is confirmed that it is a broad Mesiobuccal root extending bucco-palatally, having MB2 orifice very close to main palatal canal because of this it is also cited as second palatal canal or palato-mesiobuccal canal.

4. Conclusion

Maxillary molar represents complex root canal anatomy in dental arch. Through knowledge of pulp chamber, CBCT, magnification and ultrasonic devices aids in detection of hidden canals in endodontics. Good documentation provides awareness within clinician about various different anatomy and guide for proper treatment outcome.

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