Endodontic Management of Three Rooted, Four Canalled Mandibular First Molar (Radix Entomolaris): A Case Report

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Most mandibular first molars have two roots. The presence of third root in the permanent mandibular first molar is the major variant, a supernumerary root which can be found either distolingually (RADIX ENTOMOLARIS) or distobucally (RADIX PARAMOLARIS), both of which are rare macrostructures in the Caucasian population. Endodontic treatment of these molars may be challenging compared with two-rooted molars owing to the unusual coronal and root canal morphology and a need to modify the access cavity. This report describes the endodontic therapy on three rooted mandibular first molar.

Key words: Mandibular first molar, two distal roots, four canals

The basic objective of root canal treatment is thorough mechanical and chemical cleansing of the entire pulp cavity and its complete Obturation with an inert filling material. Endodontic therapy requires a thorough knowledge of root canal morphology to adequately shape and clean the canal system. Proper care and attention should be directed in identifying and negotiating extra roots and canals.

Mandibular first molar can display several anatomical variations. The majority of Caucasian Permanent mandibular first molars usually have 2 roots placed mesially and distally and 3 root canals[1,2], but variations in the number of roots and in canal morphology are not uncommon[3]. The additional third root (a supernumerary root) in those permanent mandibular first molar variants that have 3 roots is typically distributed distolingually .This additional root was first described in the literature by Carabelli[4], is called the radix entomolaris [RE].[5] This extra root is typically smaller than the distobuccal root and is usually curved, requiring special attention during cleaning and shaping procedures.[6] There have been several morphometric analyses of extracted permanent mandibular first molars that were based on micro-computed tomography[7-9]. The recent introduction of cone-beam computed tomography (CBCT) potentially provides dentistry with a practical tool for non-invasive and 3–dimensional (3D) reconstruction imaging for use in endodontic applications and morphologic analyses[10, 11-13]. The application of CBCT can determine the exact position of the distolingual root of the permanent mandibular first molars. The present report describes rare casewhichhave undergone root canal treatment in mandibular first molar with three roots (one mesial, two distal thatisdistobuccal and an additional distolingual (radixentomolaris) and four canals (two mesial and two distal).

CASE REPORT

A 35 year old male patient was reported with achief complaint of pain with moderate intensity in right lowerback tooth region from past 2 weeks. On

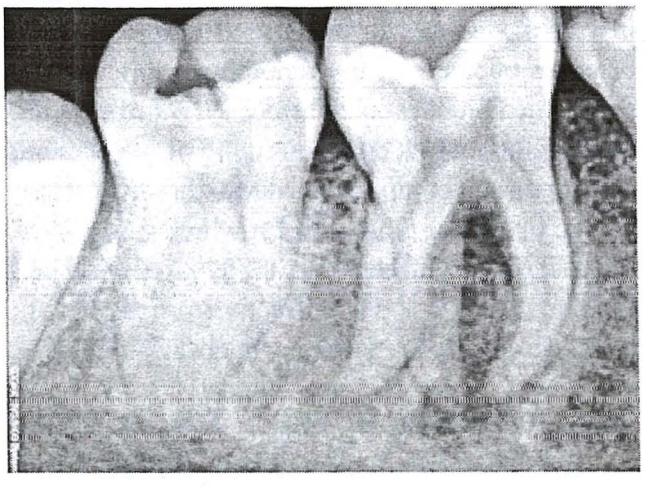


Fig 1-Pre-operative radiograph.

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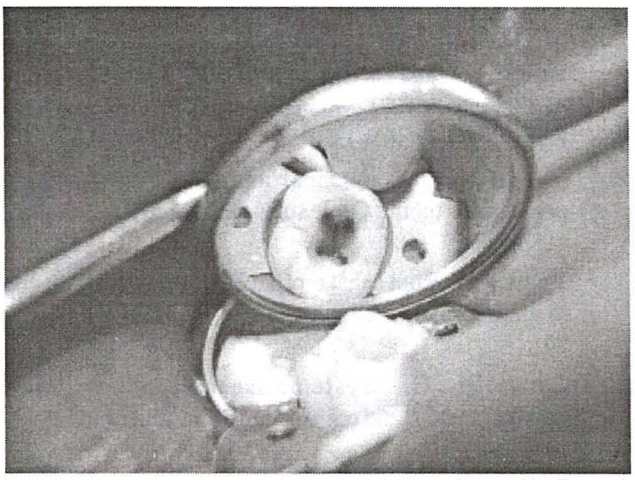


Fig 2-Occlusal view of canal orifices.

clinical examination there was a deep caries in mandibular right first permanent molar (#46).Tooth showed negative response on vitality testing,and was tender on percussion. Intra-oral peri-apicalradiograph revealed the involvement of pulp and presence of peri-apicalradiolucency around both mesial and distal roots (Fig1). This radiograph also showed that the tooth had an additional distolingual root. Diagnosis of chronic apical periodontitis was made and root canal treatmentwas recommended. Local anesthesia (inferior alveolarnerve block) was performed. The tooth was isolated bya rubber dam, and then the access cavity was preparedwith distolingual extension to provide proper access todistolingual canal. After locating orifices of the canals (Fig2), a radiograph was taken to determine the workinglength of the canals with two instruments in mesialroot and two instruments in the distal roots (Fig3). Cleaning and Shaping was performed using rotary Ni- Ti Protaper System along with GLYDE (DentsplyMaillefer Company, USA) in crown down manner. Apical preparationwas done till size F2 protaper file (master apicalfile). The canals were irrigated with 5.25% sodiumhypochlorite, during instrumentation and finally with normal saline. The canals were then driedwith paper points, master cone selection radiograph was taken, and obturated with gutta-percha (variable taper) and AH plus sealer (DENTSPLYMaillefer Company, USA) (Fig4). The access cavity was sealed with a temporary restorative material. The patient was recalled for the permanent restoration.

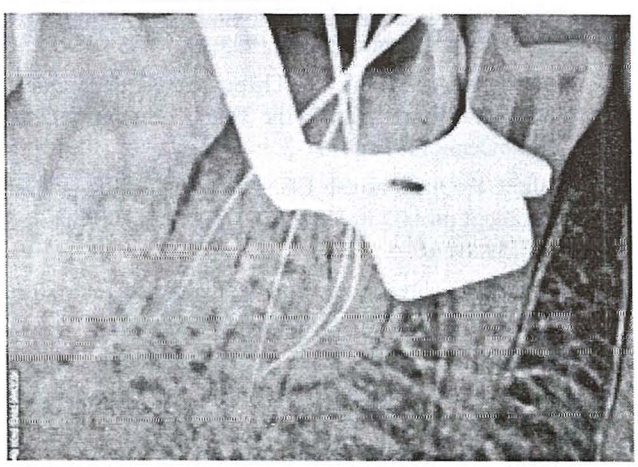


Fig 3-Working length determination radiograph.

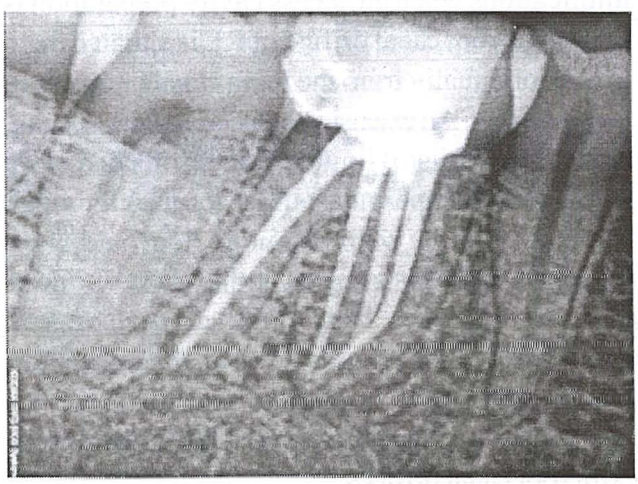


Fig 4-Post-operative obturation radiograph.

DISCUSSION

The presence of a third root (RE) in mandibular first molar is associated with certain ethnic groups. The maximum frequency of RE in African population is 3 %[7]. While in Eurasian and Indian populations the frequency is less than 5 %[8]. In populations with mongoloid traits (such as the Chinese, Eskimos and American Indians) reports have noted that RE occurs with a frequency that ranges from 5% to more than 30%[8-14]. In Caucasians, RE is not very common and occurs with a frequency of 3.4 to 4.2%[15,16], and is considered to be unusual or dysmorphic root morphology. The mechanism of formation of RE is still unclear. Radix Entomolaris can be found on the first, second and third mandibular molar, occurring least frequently on the second molar[17]. Radix Entomolaris may present the clinician with a lot of

difficulties during endodontic treatment. An accurate diagnosis of these extra roots can avoid a lot of procedural errors or a missed canal during root canal treatment. RE is mostly situated in the same bucco-lingual plane as the distobuccal root, a superimposition of both roots can appear on the preoperative radiograph, resulting in an inaccurate diagnosis. To reveal the RE, a second radiograph should be taken from a more mesial/distal angle (30 degree). This way an accurate diagnosis can be made in the majority of cases.

The presence of RE has a lot of clinical implications when an access cavity preparation is done. The root canal orifice of RE is situated disto to mesiolingually from the main canal or canals in the distal root. An extension of the triangular opening cavity to the (disto) lingual side results in a more rectangular or trapezoidal outline form . A thorough inspection of the pulp chamber floor and wall, especially in the distolingual region should be done to search for the root canal orifice of RE. Sophisticated visual aids such as magnification loupes, intra-oral camera or dental operating microscope can be valuable tool for finding these extra root canal orifices.

CONCLUSION

Clinicians should have a thorough knowledge of several anatomical variations seen in cases of mandibular first molars. An accurate diagnosis of a Radix Entomolaris before root canal treatment is important to facilitate the endodontic procedure, and to avoid missed canals. Pre-operative peri-apical radiographs, exposed at two different horizontal angles (mesial/distal) are required to identify these additional roots. A thorough knowledge about the anatomy and location of this additional root and its root canal orifice will result in a modified access cavity preparation with a distolingual extension. There should be proper understanding about the morphological variations seen in case of mandibular first molars and an adapted clinical approach to avoid/overcome procedural errors during endodontic treatment.

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