Case Report

Endodontic Treatment of a Mandibular 6 Years Molar with Three Roots: A Pedodontist Perspective

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Abstract

Nature has signified the importance of first permanent molar by giving it the first rank in eruption sequence of the permanent dentition. First permanent molar erupts at the age of 6–7 years and hence is also known as "6 years molar." The study of root and root canal anatomy of molars in children is important for a successful pediatric practice. Normally the permanent mandibular first molar has two roots, one mesial and one distal root. Rarely an additional third root is seen, which is found distolingually and is called as radix entomolaris (RE). This extra root is typically smaller than the distobuccal root and is usually curved, requiring special attention when root canal treatment is being considered for such a tooth. The most frequent cause of endodontic failure is a canal that is left untreated because a clinician fails to recognize it and subsequently leads to extraction of the fundamental 6 years molar. Hence, this paper reports an unusual case and clinical approach of RE in a mandibular 6 years molar.

Key words: 6-year molar, extra root, radix entomolaris

Introduction

From a functional and developmental point of view, over the years literature has highlighted the importance of first permanent molars in balanced occlusion. Intermolar relationship is the first of the six keys of occlusion by Andrew, and it depends a lot on the occlusal morphology of the first molars.[1] Loss of first permanent molars, because of dental diseases, results in tilting of neighboring teeth, supra-eruption of the teeth in the opposite arch, unilateral chewing, midline shift, dental malocclusion, periodontal problems, premature contact, horizontal mandibular displacement, and continuous displacement of the condyles during growth and development leads to asymmetric growth of the mandible.[1,2] Because of paramount importance of permanent first molars and to prevent the above-mentioned complications following the early loss of these teeth, a thorough knowledge of crown, and root anatomy which may be quite variable provides a basis for assessing, diagnosing, planning, implementing and evaluating the treatment outcome in the long run.

It is known that the permanent mandibular first molar can display several anatomical variations and like the number of root canals, the number of roots may also vary. A major anatomical variant of the two – rooted mandibular first molar is the third root known as radix entomolaris (RE), first mentioned in the literature by Carabelli.[3] This supernumerary root is located distolingually in mandibular molars, mainly the first molar. Sometimes if an extra root is seen at the mesiobuccal side of main mesial root, then it is called radix paramolaris.[3] The exact cause of RE is still not known. Some authors say that it may be due to disturbance during odontogenesis or may be due to an atavistic gene. In eumorphic roots, racial genetic factors influence more profound expression of a particular gene that results in the more pronounced phenotypic manifestation.[4] The incidence of RE in mandibular permanent first molar is <5% in white Caucasian (UK, Dutch, Finnish, German), African (Bantu Bushmen), Eurasian and Indian populations. In those with Mongoloid traits, such as the Chinese, Eskimos,

Access this article online

Quick Response Code:

Website: www.ijpedor.org

DOI: 10.4103/2468-8932.196485

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How to cite this article: Parsa A, Rapala H. Endodontic treatment of a mandibular 6 years molar with three roots: A pedodontist perspective. Int J Pedod Rehabil 2016;1:64-7.

and native American populations, it occurs with a frequency of 5% to more than 30%.[5] The identification and external morphology of these root complexes, containing a lingual or buccal supernumerary root, often create a problem in endodontic management resulting in an uncertain treatment outcome. Hence, in the present report, we discuss and illustrate the clinical approach and endodontic treatment of a three-rooted RE in a 13-year-old child.

Case Report

A 13-year-old male patient reported to the Department of Pedodontics and Preventive Dentistry with a complaint of pain in the left lower back teeth for 1 month. The medical history of the patient was noncontributory. On clinical examination, there was a carious mandibular left first molar. The tooth was tender on percussion. There was no mobility, and periodontal probing was within the physiological limits. Thermal and electrical pulp testing of the tooth elicited a negative response. The pretreatment radiograph showed radiolucency involving enamel, dentin, extending up to pulp and widening of the periodontal ligament space relative to the mesial and distal roots with an additional third root (RE) [Figure 1]. Periapical radiograph was taken from mesial angulation, which revealed the presence of an additional distolingual root, which was curved and shorter than the main distal root [Figure 2]. Based on the literature evidence this supernumerary distolingual root was diagnosed as RE. A final diagnosis was made as chronic apical periodontitis due to pulpal necrosis of the lower left first molar tooth. The pulp chamber was accessed, and two mesial canal orifices, and one distal canal orifice were located. When the floor of the pulp chamber was reached, three canals orifices were initially identified. On further exploration, a second distal canal was found which was located more lingually. To have proper location of orifice, and straight line access of this third root, access cavity was modified from conventional triangular to trapezoidal form with more extension to lingual side [Figure 3]. Initial negotiation of the root canals was performed with a K-file ISO 15. Although the coronal enlargement and relocation of the canal orifices allowed straight-line access in three (two mesial, one distal) canals, insertion of the file in the fourth, distolingual canal showed a more lingually oriented access inclination. Radiographic working length measurement was determined [Figure 4]. All canals were prepared in crown – down method with ProTaper hand instruments. After canal preparation, root canals were irrigated with 2.5% sodium hypochlorite solution. The gutta-percha cone fit was checked in all the root canals using radiograph [Figure 5]. The root canals were filled with gutta-percha which was revealed by radiographical exposure 30° from the mesial where the RE was cleary evident and after obturation the access cavity also showed four points of gutta-percha. Endodontic access cavity was then sealed with glass ionomer cement followed by placement of a stainless steel crown [Figure 6]. After 1 year follow up, there was no change in the root canal treated 36 both clinically and radiographically.

Figure 1: Preoperative radiograph.

Figure 2: Preoperative radiograph taken at 20° angulation showing radix entomolaris.

Figure 3: Modified access cavity form.

Discussion

The permanent mandibular first molar plays a vital role in occlusion, hence thorough knowledge of the configuration of the teeth, variations of the number and anatomy of the roots and

Figure 4: Working length determination.

Figure 5: Master cone radiograph.

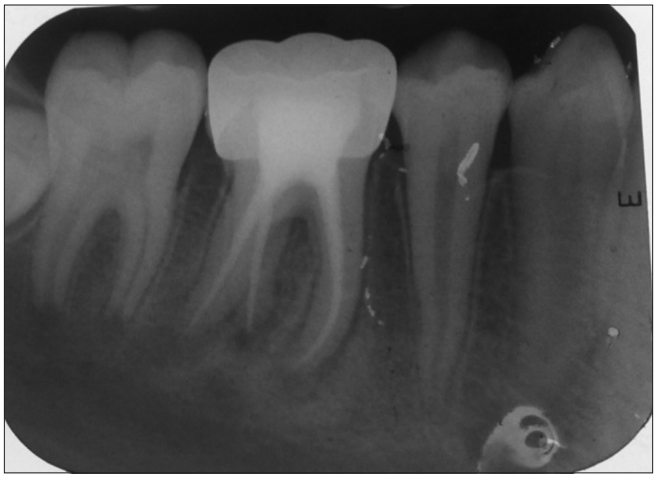

Figure 6: Obturation and stainless steel crown placement.

the root canal morphology have to be well-appreciated by the pediatric dentist along with the endodontist. It is imperative that the clinician be well informed and alerted to the commonest possible variations during endodontic procedure. The initial diagnosis of the third root before root canal treatment is important, to facilitate the endodontic procedure, and to avoid "missed canals" and treatment failure. Proper angulations and interpretation of radiographs help to identify number of roots and morphology.

A thorough inspection of the preoperative radiograph and interpretation of particular marks or characteristics such as an unclear view or outline of the distal root contour or the root canal can indicate the presence of a hidden RE. The proper application of the Clarks rule facilitates locating additional canals or roots and distinguish between the superimposed roots. Hence, radiographs should be taken from a more mesial or distal angle at 20°.[6] Panoramic radiographs reveal 90% accuracy in diagnosing three roots. Recently, advanced techniques like spiral computed tomography, cone beam computed tomography clearly shows the entire anatomy of the extra roots or canals.[7]

Apart from a radiographic diagnosis, clinical inspection of the tooth crown and analysis of the cervical morphology of the roots by means of periodontal probing can facilitate identification of an additional root. An extra cusp (tuberculum paramolare) or more prominent occlusal distal or distolingual lobe, in combination with a cervical prominence or convexity, can indicate the presence of an additional root.[8]

The location of the orifice of the root canal of an RE has implications on the opening of the cavity. An extension of the triangular opening cavity to the (disto) lingual results in a more rectangular or trapezoidal outline form. Visual aids such as a loupe, intra-oral camera, or dental microscope can in this respect are useful. A dark line (dentine map) on the pulp chamber floor can indicate the precise location of the RE canal orifice. The distal and lingual pulp chamber wall can be explored with an angled probe to reveal overlying dentin or pulp roof remnants masking the root canal entrance. The calcification which is often situated above the orifice of the RE has to be removed for a better view and access to the RE. Champagne effect – bubbles produced by remaining pulp tissue in the canal while using sodium hypochlorite in pulp chamber helps in identification of any extra canal.[9,10]

A severe root inclination or canal curvature, particularly in the apical third of the root can cause shaping aberrations such as straightening of the root canal or a ledge, with root canal transportation, and loss of working length resulting. The use of flexible nickel-titanium rotary files allows a more centered preparation shape with restricted enlargement of the coronal canal third and orifice relocation.[10]

After relocation and enlargement of the orifice of the RE, initial root canal exploration with small files (size 10 or less) together with radiographical root canal length and curvature determination, and the creation of a glide path before preparation, are step-by-step actions that should be taken to avoid procedural errors. Finally, use of nickel-titanium rotary files having a taper of not more than 0.04 taper and crown

down technique is said to allow a more centered, rounder and conservative canal preparation than the use of stainless steel instruments in RE.[11]

Conclusion

The initial diagnosis of an RE before root canal treatment is important to facilitate the endodontic procedure and to avoid "missed" canals. Clinicians should be aware of these unusual root morphological variations in terms of root inclination and root canal curvature. Preoperative periapical radiographs exposed at two different horizontal angles and clinical diagnosis are required to identify these additional roots.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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