THE RADIX ENTOMOLARIS – AN ENDODONTIC CHALLENGE : CASE REPORTS

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ABSTRACT

Mandibular molars can have an additional root located lingually (the radix entomolaris) or buccally (the radix paramolaris). If present, an awareness and understanding of this unusual root and its root canal morphology can contribute to the successful outcome of root canal treatment. This report discusses endodontic treatment of three mandibular molars with a radix entomolaris. The prevalence, the external morphological variations and internal anatomy of the radix entomolaris and paramolaris are described.

KEYWORDS: **Anatomical variations, endodontic treatment, mandibular molar, radix entomolaris, radix paramolaris**

INTRODUCTION

The prevention or healing of endodontic pathology depends on a thorough chemomechanical cleaning and shaping of the root canals before a dense root canal filling with a hermetic seal. An awareness and understanding of the presence of unusual root canal morphology can thus contribute to the successful outcome of root canal treatment. It is known that the mandibular first molar can display several anatomical variations.

The majority of first molars are two-rooted with two mesial and one distal canal[1,2]. Ghoddusi[3] reported the presence of 4 distal canals in mandibular first molar. A number of anatomical variations have been described in the mandibular first molar. Like the number of root canals, the number of roots may also vary. An additional third root, first mentioned in the literature by Carabelli [4] is called the radix entomolaris (RE) .This supernumerary root is located distolingually in mandibular molars, mainly first molars. An additional root at the mesiobuccal side is called the radix paramolaris (RP) (Fig.1).

Knowledge of their occurrence and location are important. In this report three such cases are presented. The prevalence, external morphological variations and internal anatomy of the radix entomolaris and paramolaris are described. The clinical approach to diagnosis and endodontic treatment are also discussed and illustrated.

Case report 1

A 37-year-old female was referred to the Department of Conservative Dentistry and Endodontics for replacement of dislodged restoration in relation to the right first mandibular molar. On examination recurrent caries was found beneath the fractured amalgam restoration involving the pulp and deep caries was seen on the adjacent premolar. The tooth was tender on percussion. Radiographic examination showed signs of apical periodontitis, and the presence of extra distal root. The pulp chamber was opened,and two distal and two mesial

Fig. 1. **Clinical images of extracted mandibular molars with a radix entomolaris or paramolaris.**
[Courtesy: J Endod 2007; 33; 59]

(A) First molar with a radix entomolaris [distolingual view (left), lingual view (right)].
(B) Radix entomolaris on a third molar (lingual view).
(C) First molar with a separate radix paramolaris (buccal view).
(D) First molar with a fused radix paramolaris (buccal view).

canal orifices were located using an endodontic explorer. The root canals were explored with a K-file #15 (Dentsply Maillefer, Switzerland) and radiographical length measurement was performed and verified using apex locator (Triauto ZX, J Morita). Root canals were shaped with ProTaper rotary instruments (Dentsply Maillefer). During preparation, Glyde (Dentsply Maillefer) was used as a lubricant and the root canals were disinfected with a sodium hypochlorite solution (5%). Obturation was performed with corresponding Protaper gutta percha points and AH Plus sealer. (Fig. 2)

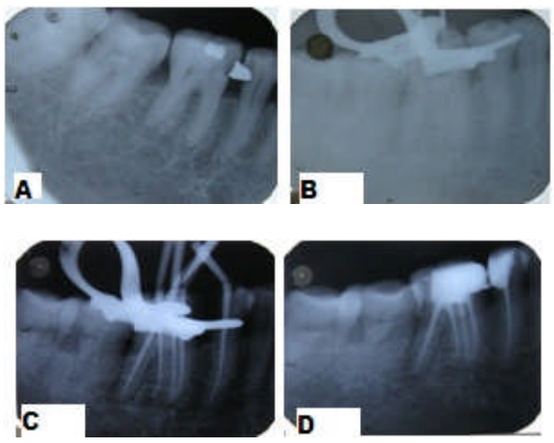

Fig. 2: A*) Pre operative radiograph, B) Working length determination, C) Master cone radiograph and D) Post operative radiograph.*

Case report 2

A 35-year-old male was referred for endodontic treatment of the mandibular right first molar. An initial opening of the pulp chamber had already been performed by the referring dentist to relieve acute throbbing pain (acute pulpitis). Radiographical examination showed no signs of apical periodontitis. Distinct distal root was visible. On adjusting the access cavity, four distinct canal orifices were found and were coronally enlarged with Gates Glidden drills. Initial negotiation of the root canals was performed with a K-file #15. The different access inclinations between the two distal canals, indicated the presence of two separate distal roots. The lengths of these canals were measured radiographically and verified using apex locator (Triauto ZX, J Morita). The canals were cleaned with sodium hypochlorite solution (5.25%) and Glyde (Dentsply Maillefer), and shaped with ProTaper instruments (Dentsply Maillefer). All canals were filled with gutta-percha and AH plus sealer. (Fig. 3)

Case report 3

A 32-year-old female was referred for endodontic treatment of the mandibular right first molar with irreversible pulpitis. Radiographical examination showed no signs of apical periodontitis. Distinct distal root was visible. After opening access cavity, four distinct canal orifices were found and were coronally enlarged with Gates Glidden drills. Initial negotiation of the root canals was performed

Fig. 3. **A) Pre operative radiograph, B) Master cone radiograph and C) Post operative radiograph**.

with a K-file #15. The lengths of these canals were measured radiographically and verified using apex locator (Triauto ZX, J Morita). The canals were cleaned with sodium hypochlorite solution (5.25%) and Glyde (Dentsply Maillefer)), and shaped with ProTaper instruments .All canals were filled with gutta-percha and AH plus sealer.(Fig.4)

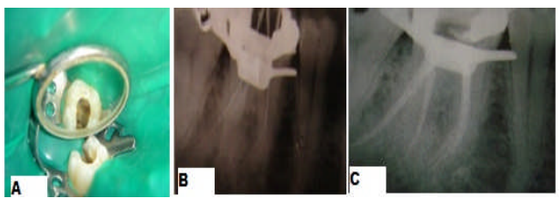

Fig. 4. A) *Clinical image of access cavity B) Working length determination, and C) Post operative radiograph.*

Discussion

The etiology behind the formation of the RE is still unclear. In dysmorphic, supernumerary roots, its formation could be related to external factors during odontogenesis, or to penetrance of an atavistic gene or polygenetic system [5,6] .The presence of an RE or an RP has clinical implications in endodontic treatment. An accurate diagnosis of these supernumerary roots can avoid complications or a 'missed canal' during root canal treatment.

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. To reveal the RE, a second radiograph should be taken from a more mesial or distal angle (20 degrees) [7-9] .This way anaccurate diagnosis can be made in the majority of cases.

A dark line on the pulp chamber floor can indicate the precise location of the RE canal orifice. Visual aids such as a loupe, intra-oral camera or dental microscope can, in this respect, be useful.

Predictably successful root canal treatment is dependent on following the basic principles: access, cleansing and shaping, and obturation of the entire root canal system. These principles have evolved from clinical concepts established through clinical practice and basic research. Of the three, perhaps the most important is the principle of 'straight-line' access[10]. It should be emphasized that the ultimate objective of endodontic access is to provide access to the apical foramen, and not merely to locate the canal orifice. With the distolingually located orifice of the RE a modification of the classical triangular opening cavity to a trapezoidal form in order to better locate and access the root canal is essential; straight line access must be established.

CONCLUSION

Clinicians should be aware of these unusual root morphologies in the mandibular first molars. The initial diagnosis of a radix entomolaris before root canal treatment is important to facilitate the endodontic procedure, and to avoid 'missed' canals. Preoperative periapical radiographs exposed at two different horizontal angles are required to identify these additional roots. Knowledge of the location of the additional root and its root canal orifice will result in a modified opening cavity with extension to the distolingual. The morphological variations of the RE in terms of root inclination and root canal curvature demand a careful and adapted clinical approach to avoid or overcome procedural errors during endodontic therapy.

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