ISSN: 2395-6429

INTERNATIONAL JOURNAL OF CURRENT MEDICAL AND PHARMACEUTICAL RESEARCH

IJCMPR

Available Online at http://www.journalcmpr.com

DOI: http://dx.doi.org/10.24327/23956429.ijcmpr20170052

RESEARCH ARTICLE

RADIX ENTOMOLARIS, A PARADOX

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ARTICLE INFO

Article History:

Received 19th January, 2017
Received in revised form 28th February, 2017
Accepted 15th March, 2017
Published online 28th April, 2017

Key words:

Dental pulp, root canals, supernumery teeth.

ABSTRACT

It is an established fact that genetic and environmental factors result in variations in the morphology of the dental pulp of human teeth. So, unless the clinician is familiar with the morphology of the roots of all teeth, and the associated intricate root canal anatomy, effective debridement and obturation may be difficult to achieve. Among all the teeth, mandibular first molar is a frequent candidate for root canal treatment and presents many variations. The major variant is the presence of a supernumerary root that can be found distolingually and has a curve at the apex. It is called radix entomolaris, and is found smaller than distobuccal and mesial roots which can be separated or partially fused with these other roots.

INTRODUCTION

Many people believe that a root canal is essential to good oral health, but the truth is that this dental procedure can be the root of many diseases. The permanent mandibular first molar is one of the earliest tooth to erupt. It is responsible for development of occlusion and important for physiologic functions. Commonly, it is one of the most frequently in need of endodontic treatment. Thus, it is of utmost importance that the clinician should be familiar with variations in its root and root canal anatomy for thorough mechanical and chemical cleaning before obturating with an inert filling material. One such variety is radix entomolaris, first mentioned by Carabelli[1] and can be found in the first, second, and third mandibular molars, occurring the least frequently in the second molars[2,3,4] The majority of the Radices Entomolaris are smaller than the distobuccal root [5]and curved.[6] A pronounced curvature is very common in the middle part of the root canal of the RE: it is greater in a buccal-lingual orientation than in a mesial-distal orientation.

Prevalence

The prevalence of a supernumerary root in mandibular molars has a racial predilection. It occurs with a frequency of 0.2–32% in different traits with 3% in the Africans and is highest in the Mongolian population with a frequency of more than 30%[7,8,9,10]. However, it is very low ranging from 2.19-13.3%, among the Indians[11,1,13,14]

The extra root is dysmorphic, its formation could be due to an atavistic gene or polygenetic system during odontogenesis. The more noticeable phenotypic expression is because of the effect of racial genetic elements on the deeper setting of certain genes in eumorphic roots.

Radix has been classified as follows

A. Carlsen & Andersen[15] classified it based on the location of the cervical part.

1. Type A & B refers to a distally located cervical part
2. Type C refers to a mesially located cervical part
3. Type AC refers to the location of the cervical part in the central location in between the mesial and distal components.

B. De Moor *et al* [16,17] had given other classification based on the curvature of radix in the buccolingual direction.

1. Type I refers to straight root / canals
2. Type II refers to a curvature at the entrance of the orifice and
3. Type III refers to RE with two curvatures, one at the coronal level and the other at the middle third.

This classification is further modified by adding two more newly defined variants of RE termed as small type, having the length shorter than half of the length of the distobuccal root, and conical type, looking even smaller than the small type and having no root canal in it.[18]

C. New classification of RE[18]

Types	Features
Type I	no curvature
Type II	curvature in the coronal third and straight continuation to the apex
Type III	curvature in the coronal third and additional buccal curvature from the middle to the apical third of the root.
Small type	root length less than half that of the distobuccal root.
Conical type	Cone shaped extention with no root canal.

D. **Wang *et al.*** gave another classification for RE depending on its radiographic appearance.[20]

Type 1: Presents the most identifiable radiographic image
Type 2: A large beam angulation is necessary mesially or distally for their identification
Type 3: Identification becomes extremely difficult because of the overlap of the adjacent distobuccal root.

Case report

Case 1

A 30-year-old male patient with a history of severe, throbbing, constant pain in the lower mandibular molars was referred to the department of Endodontics of Regional dental college, guwahati. The patient's medical history was noncontributory. The buccal object rule (same-lingual opposite-buccal technique) confirmed the additional root as a distolingual root (radix entomolaris). Following the evaluation of vitality tests, we began endodontic treatment for this patient, after administration of local anaesthetic. The working length was determined by a Root ZX apex locator (Dentaport ZX, J Morita) and later confirmed by parallel periapical radiograph. Canals were shaped in a crown down fashion with Protaper Nickel Titanium rotary and EDTA gel (avue-prep). After drying the canals with paper points, the master gutta-percha points were fitted within the canals and confirmatory radiograph was taken. The root canal system was obturated with the cold lateral compaction technique.

Preoperative view

Working length determination

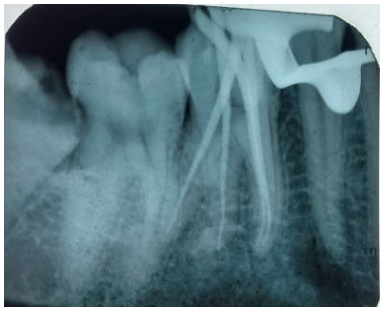
Postoperative view

Case 2

A 25-year-old female patient reported with a chief complaint of pain in the lower left back teeth region since 5 days. On clinical examination, there was deep Class I cavity in relation to 36 which was tender on percussion and it elicited negative response on vitality testing. Diagnosis of irreversible pulpitis was made and RCT was recommended. The procedure was started as per the standard protocol and SLOB rule confirmed the presence of additional distal root. Canals were instrumented and shaped .Following drying the canals with paper points, the master gutta-percha points were fitted and apical seal was confirmed by radiographs. Finally the root canal system was obturated with cold lateral compaction technique.

Preoperative view

Working Length Determination



Mastercone IOPA view

Postoperative view

Management of a radix needs utmost care and attention .The following are the guidelines which can be helpful in this regard:

Clinical features	Radiographical features
bulbous outline of the crown,	double periodontal ligament images or an unclear view or outline of the distal root contour or the root canal can hint to the presence of an RE
an extra cusp (tuberculum paramolare), or a more prominent occlusodistal or distolingual lobe.	the standard buccal-to-lingual projection, 20 degrees from the mesial and 20 degrees from the distal reveals all the basic information regarding the anatomy of the tooth
cervical prominence or convexity	CT, CBCT images can reveal the location and direction of the curvature
Maintaining a rectangular or trapezoidal outline form assists in locating the orifice of RE.	angled probe, ultrasonics cutting tips along with good illumination and visual aids such as loupes or surgical operating microscopes is said to facilitate the locating of an RE

Endodontic implications

Radix may pose a problem in radiographic interpretation, inability in accurate working length determination and incomplete obturation.

With RE, calcification of the pulp chamber may obscure the location of distal orifice. So, conventional triangular access cavity opening must be modified to trapezoidal or rectangular in shape. Following that, working length determination may pose a problem as one should anticipate canal curvature, particularly in the apical third of the root (in type III RE), which can cause shaping aberrations or a ledge, zip and root perforations. So, initially, a guide path should be prepared to negotiate any sharp bend and thereby avoid procedural mishaps.

CONCLUSION

The prevention or healing of endodontic disease depends on a thorough chemo-mechanical cleaning and shaping of the root canal system before a root canal filling. The awareness and understanding of the presence of unusual canal morphology can thus contribute to the successful outcome of endodontic treatment.

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