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Radix Entomolaris: An Enigma for Endodontist

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INTRODUCTION

Mandibular molars are the most frequent tooth type to be endodontically treated. Studies have shown several variations in the anatomy of mandibular molars that are thought to be determined by race and genetics. Traditionally, mandibular molars are described as 2-rooted teeth with 2 canals in the mesial root and 1 or 2 canals in the distal root. The aetiology behind the formation of radix entomolaris is still uncertain. It can be related to external factors during odontogenesis or to the penetration of an atavic gene or polygenic system. This article highlights on Radix Entomolaris, a developmental variation occuring in mandibular molars which is associated with an extra root and so the extra canal. Radix entomolaris (RE) is one of the anatomical variant found in a permanent mandibular molar and was first described by Carabelli in 1844 and termed by Bolk in 1915. Presence of an extra root on the lingual side of mandibular molar is known as Radix Entomolaris (RE).The other variant of Radix is Radix Paramolaris which indicates the presence of extra root on the buccal side.

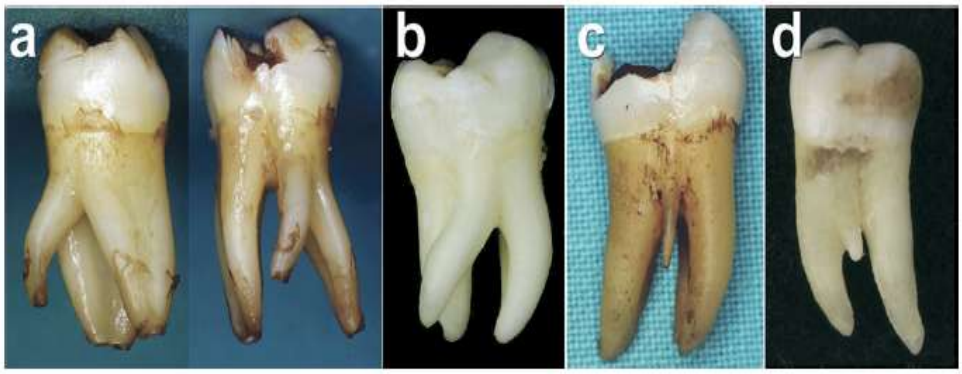
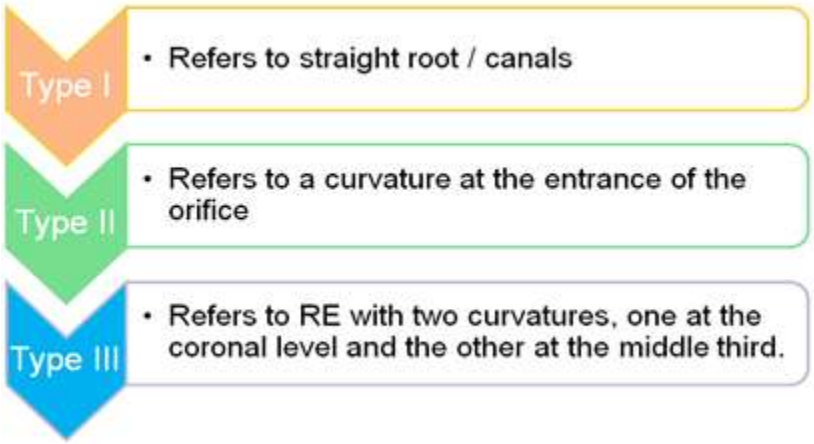
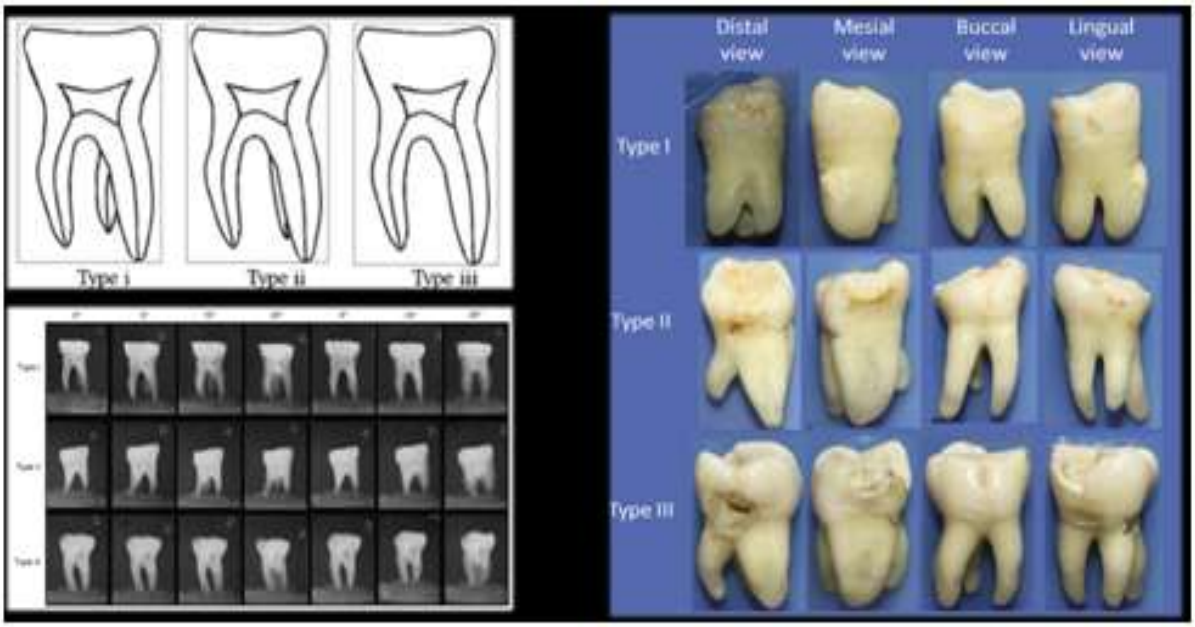


Figure 1. Clinical images of extracted mandibular molars with a radix entomolaris or paramolaris. (*A*) first molar with a radix entomolaris [distolingual view (left), lingual view (right)]. (*B*) radix entomolaris on a third molar (lingual view). (*C*) first molar with a separate radix paramolaris (buccal view). (*D*) first molar with a fused radix paramolaris (buccal view).

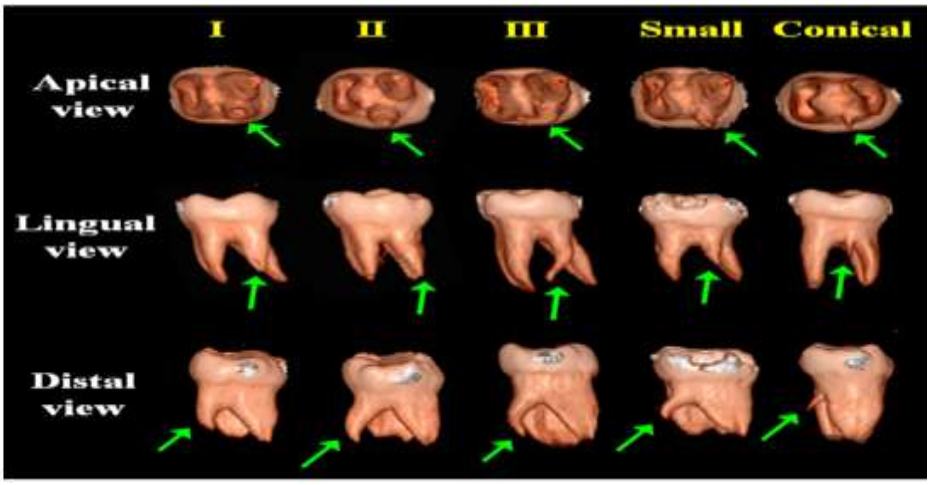
A classification was given by **Carlsen &** Andersen based on the location of the cervical part they are types A,B,C,AC.(Carlsen O, Alexandersen V.Radix Entomolaris :identification morphology-J Dent Res 1990;98:363-373

De Moor et al had given other classification based on the curvature RE variants in the buccolingual direction. They are: (De Moor RJ, Deroose CA, Calberson FL. The radix entomolaris in mandibular first molars: an endodontic challenge. Int Endod J 2004;37:789 –99.)





This classification is further modified by adding two more newly defined variants of RE termed as: (Song JS et al. The prevalence and morphologic classification of distolingual rootsin the mandibular molars in a Korean population. J Endod 2010; 36:653-7.)



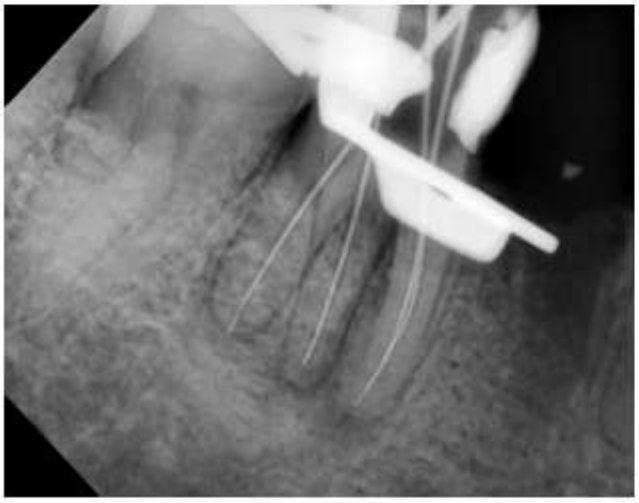
CASE REPORTS

Case 1

A 20 years old female patient reported to the department of conservative dentistry and endodontics with the chief complaint of pain in lower right back teeth region since one week. Pain was of intermittent type, aggravated on intake of cold beverages and persisted even after the removal of stimulus. On intraoral examination a deep carious lesion in 46 noted. Diagnostic radiograph was taken which revealed deep carious lesion involving the pulp with periapical changes, along with the presence of extra root distally noted. This showed that this was REof de moor's type I. Endodontic treatment was planned, access opening done, the fourth canal was in the distolingual aspect, which gave a trapezoidal form of access preparation. Root canals were located with DG 16 endodontic explorer. Patency of the canal was made with K-file no.15. Working length determined. Chemo mechanical preparation of the root canal done with rotary protaper instruments in crown down technique, irrigated with sodium hypo chloride and smear clear solution. Master cone selection done , obturation done using protaper F2 gutta-percha, access cavity restored with composite restorative materials and post obturation radiograph was taken.

Pre op radiograph

Acess cavity prepared



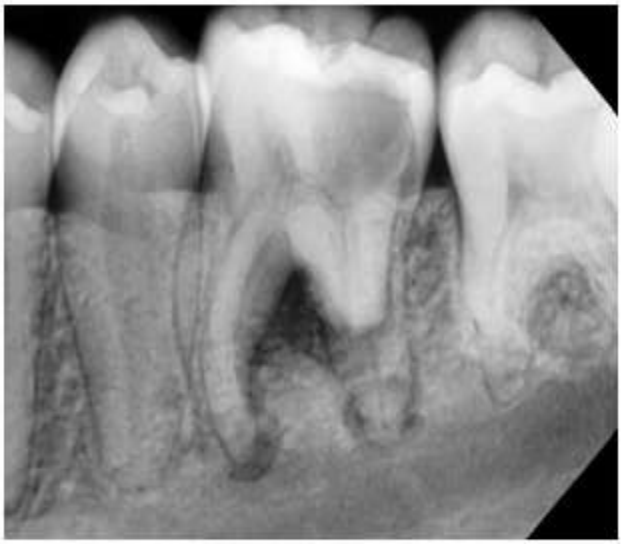
Working length

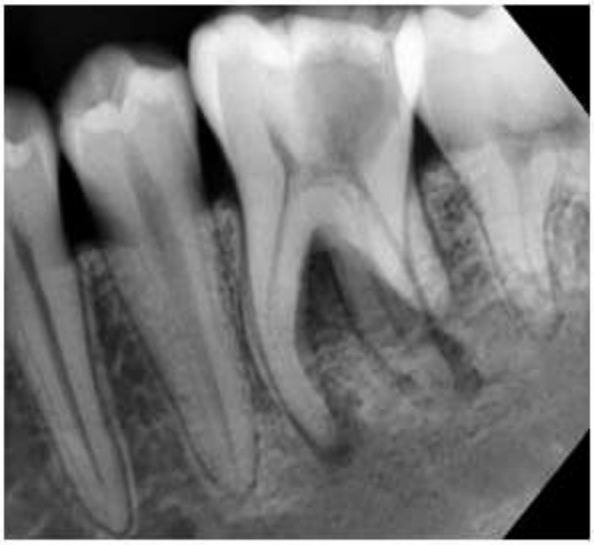
Master cone

Obturation

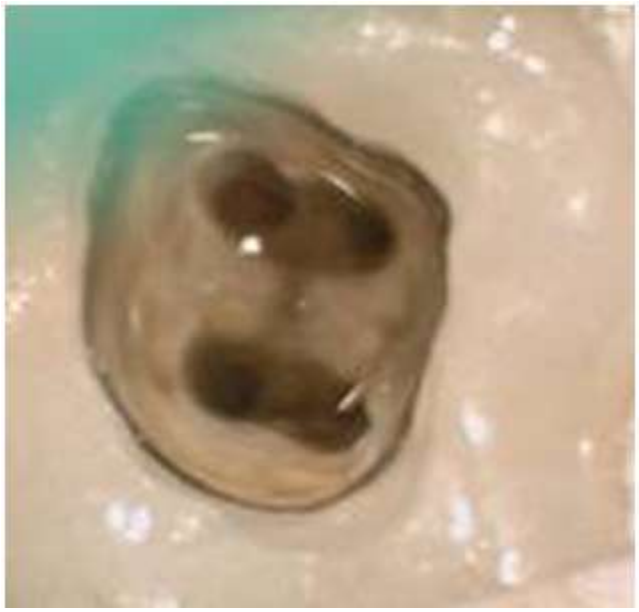
CASE 2

A 28 years old male patient reported to the department of conservative dentistry and endodontics with the chief complaint of pain in lower right back teeth region since one week. Pain was of intermittent type, aggravated on intake of cold beverages and persisted even after the removal of stimulus. On intraoral examination a deep carious lesion in 36 noted. Diagnostic radiograph was taken which revealed deep carious lesion involving the pulp with periapical changes, along with the presence of extra root distally noted and root resorbtionwas seen in other distal root. This showed that this was REof de moor's type II. Endodontic treatment was planned, access opening done, the fourth canal was in the distolingual aspect, which gave a trapezoidal form of access preparation. Root canals were located with DG 16 endodontic explorer. Patency of the canal was made with K-file no.15. Working length determined. Chemo mechanical preparation of the root canal done with rotary protaper instruments in crown down technique, irrigated with sodium hypo chloride and smear clear solution.Then one step apexification was done with MTA angelus then master cone selection done , obturation done using protaper F2 gutta-percha, access cavity restored with composite restorative materials and post obturation radiograph was taken.





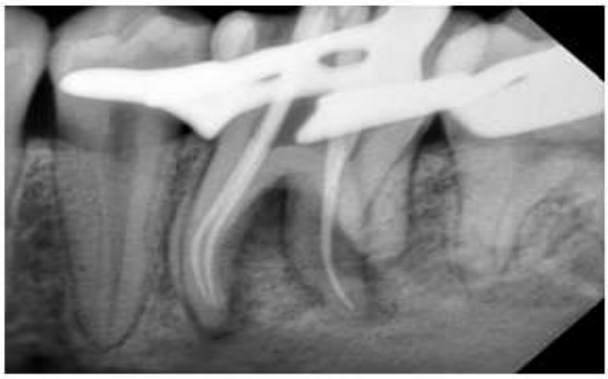
Pre op radiograph



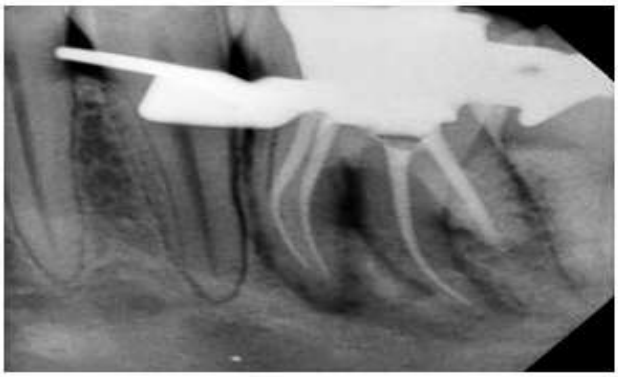
Acess cavity prepared

Working length

MTA apexification



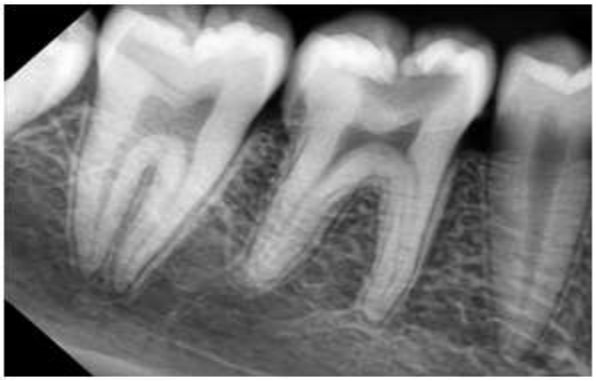
Master cone



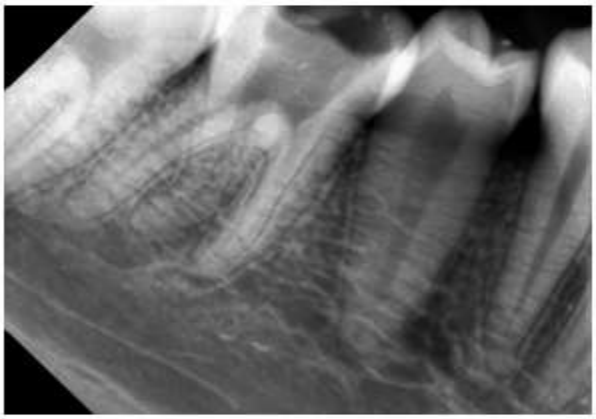
Obturation

CASE 3

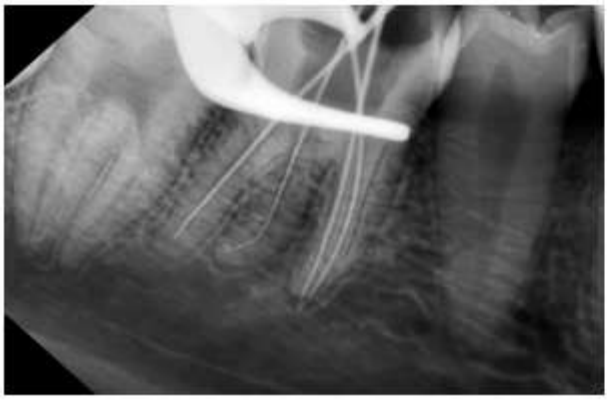
A 23 years old female patient reported to the department of conservative dentistry and endodontics with the chief complaint of pain in lower right back teeth region since one week. Pain was of intermittent type, aggravated on intake of cold beverages and persisted even after the removal of stimulus. On intraoral examination a deep carious lesion in 46 noted. Diagnostic radiograph was taken which revealed deep carious lesion involving the pulp with periapical changes, along with the presence of extra root distally noted and root resorbtionwas seen in other distal root. This showed that this was REof de moor's type III. Endodontic treatment was planned, access opening done, the fourth canal was in the distolingual aspect, which gave a trapezoidal form of access preparation. Root canals were located with DG 16 endodontic explorer. Patency of the canal was made with K-file no.15. Working length determined. Chemo mechanical preparation of the root canal done with rotary protaper instruments in crown down technique, irrigated with sodium hypo chloride and smear clear solution. Master cone selection done, obturation done using protaper F2 gutta-percha, access cavity restored with composite restorative materials and post obturation radiograph was taken.



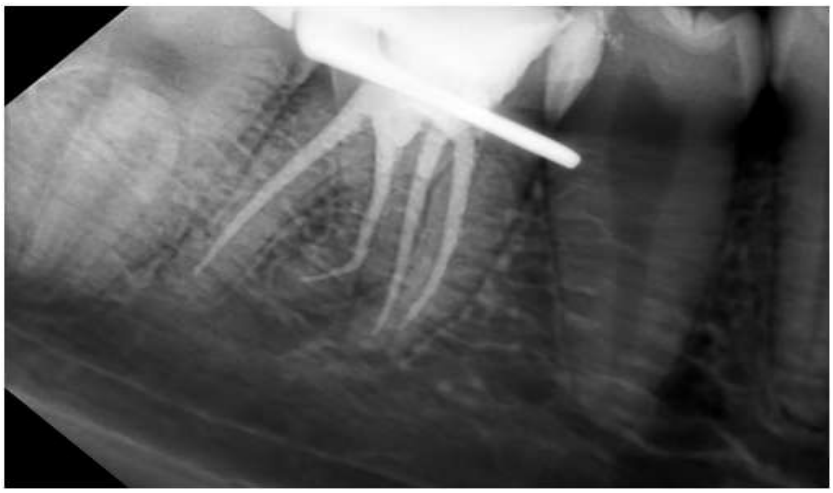
Pre operative radiograph

Access cavity prepared




Working length **Master cone**



Obturation

DISCUSSION

Endodontic success in the presence of RE depends on its diagnosis, anatomy or morphology, canal configuration and clinical approach employed. An accurate diagnosis of RE can avoid complications like missed canal which is a common reason for endodontic failure. Detection of RE can be based on clinical examination, radiographic and imaging techniques and other accessories. clinically apart from the awareness about the possible existence and the racial prevalence of RE,

factors such as an:Extra cusp, Prominent distolingual lobe, Cervical convexity & Complex external contour of the furcation can indicate the presence of an RE. Radiographically a double periodontal ligament images or an unclear view & Outline of the distal root contour or the root canal can hint to the presence of an RE. Three-dimensional imaging techniques based on computed tomography (CT) and cone beam computed tomography (CBCT) are useful for visualizing or studying the true morphology of an RE in a noninvasive manner using less radiation. However, cost and access to them are said to be the limiting factors. Modification of the conventional triangular access to obtain rectangular or trapezoidal outline form assists in locating the orifice of RE. Since canal entrances are equidistant from a line drawn in a mesio distal (MD) direction through the pulp chamber floor and lie on a line perpendicular to this MD line across the center of the floor of the pulp chamber. Following the laws of symmetry helps in both detecting and locating an RE. Following a dark line on the floor of the pulp chamber may act as a visual aid to indicate the position of an RE canal orifice. The prevalence of RE is reported to differ significantly with races and ranges from 0-33.1%. The prevalence of RE is said to be highest among the population of Mongolian origin such as Chinese, Taiwanese, and Koreans which considered to be an eumorphic root morphology among them. Radix entomolaris is not very common in African, Eurasian, Caucasian and Indian population and it is said to be a dysmorphic root morphology in them. Despite RE consideration as an Asiatic trait with a high prevalence and a eumorphic root morphology in certain races such as Chinese, Taiwanese, and Koreans.Few studies have reported higher prevalence of RE, with a range from 1-13.3%, among the Indian population. The bilateral occurrence of RE is reported to vary from 37.14 to 67%. However, since some studies have reported only unilateral occurrence of RE, further studies are required to clarify this aspect.

CONCLUSION

With the frequency of occurrence of 1-13.3% among the Indian population, every possible effort should be made for locating an extra root in mandibular first molars because it might be useful for successful endodontic treatment. Clinicians should be aware of the high racialprevalence of this unusual root morphology in mandibular first molars while treating Indian patients.

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