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A CLINICAL VARIANCE: RADIX ENTOMOLARIS

Dental Science

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ABSTRACT

Mandibular molars can have an additional root located lingually i.e. the radix entomolaris or buccally i.e. the radix paramolaris. Radix Entomolaris (RE) is a developmental variation occurring in mandibular molars associated with extra root and extra canal that is present lingually. An awareness and understanding of this variation and its root canal morphology is very important and play a very important role in having the treatment successful. Knowledge about its prevalence, diagnosis, morphology, canal configuration and clinical approach helps in achieving the endodontic success in clinical approach. This article presents a review of the clinical approach and a case series on the detection and endodontic management of radix entomolaris in mandibular first molars. Also added the modifications in the canal preparation, problems encountered during the treatment, common iatrogenic errors that occur during the treatment and factors which affect the prognosis. The prime failure to achieve success can be due to unusual tooth morphology.

KEYWORDS

Radix entomolaris, anatomical variations, endodontic treatment, mandibular molar, extra root

INTRODUCTION:-

The word **radix entomolaris** is of Latin origin, **radix** i.e. root, **ento** denotes inner or within and **molari**s is molar. Hence the definition i.e. it is a developmental variation occurring in mandibular molars associated with extra root and extra canal that is present lingually. The Latin term Radix Entomolaris (RE) was coined by Mihaly Lenhossek in 1922, and Carabelli in 1844 first described an anatomical variant of the mandibular first molar with the extra root present distolingually[1]. The external morphology of this anomaly with the additional lingual or buccal root, is described by Carlsen and Alexandersen[2]. Radix entomolaris can be found in the first, second, and third mandibular molars, occurring least frequently in the second molar[3]. According to Calberson *et al.* (2007), the etiology is related to external factors during odontogenesis[4]. Radix entomolaris has frequency of less than 5% in white Caucasian, African, Eurasian and Indian populations while it is commonly present in races of Mongoloid traits such as the Chinese, Eskimos, and Native American populations with a frequency of 5-30% [5-8]. The incidence of RE in the Indian population is found to be only 0.2%. However, few studies have shown with a range of 2.19-13.3%.[9-10]

AIM- To bring awareness and understanding of unusual root and it's root canal morphology that can contribute to the successful outcome of the root canal treatment. To deal with the anatomical variation in the radix entomolaris.

DIAGNOSIS:-

CLINICAL DIAGNOSIS	RADIOGRAPHICAL DIAGNOSIS
• Presence of an extra cusp or more prominent distoocclusal or distolingual lobe, in combination with a cervical prominence or convexity.[11] • -To locate the orifice of the extra roots, • Follow the law of symmetry and law of orifice location, tactile sensation with hand instruments, • Use instruments like endodontic explorer, pathfinder, DG 16 probe and micro opener • Use of fiber-optic illumination dental endoscopy, intraoral camera, using surgical loupes, using operating microscope, micro CT, and magnetic resonance microscopy.[9]	• Presence of certain characteristics i.e an unclear view or outline of the distal/mesial root contour or the root canal[11] . • Ingle *et al*[12] – the exposure from the standard buccal-to-lingual projection, one taken 20° from the mesial, and the third taken 20° from the • Loh[13] claimed that adjusting the exposure time and dose of the x-ray and angulating the main beam. • A 1985 study by Walker and Quackenbush[14] claimed that panoramic radiographs resulted in an accuracy rate of approximately 90%. CBCT imaging helps in the identification, exact location, curvature and angulation of the RE

CASE REPORT:-

Case 1: A 26-year-old male patient reported to the department of conservative dentistry and endodontics with the pain in his lower right back tooth region. A diagnostic x-ray revealed extensive caries approaching pulp. In IOPA, the extra root was evident with respect to 46 that is severely curved apically. In order to check if the root is present lingually or buccally, the SLOB technique was performed. **It is important because it helps preventing excessive cutting of the healthy tooth structure.** Inferior alveolar nerve block anesthesia (2% Lignocaine with 1:200000 epinephrines) was given and access cavity preparation was done with endo-access bur and canal orifices were found with a DG 16 endodontic explorer. All 4 orifices were located and glide path was attained with the help of ISO #10 stainless steel K file. The working length was determined with apex locator (4th generation; propex II) and was reconfirmed with radiograph. Biomechanical preparation was done with ISO #15 and ISO #20 K file subsequently along with the irrigation in between the instrumentation. There was a transportation of the canal while doing BMP with ISO #25 K file on the extra root because of its complex anatomy at the apex. Then BMP was done with universal protaper hand file till F1 on the transported path. Patient was kept under observation for 2 weeks to check if any pain persists. Obturation was done with the universal protaper gutta percha since the tooth was asymptomatic and post-endodontic restoration was done. The patient is still under follow up.

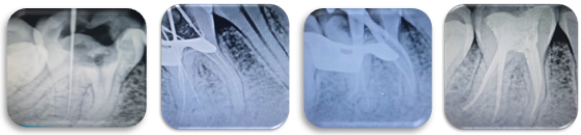

Fig 1:- access opening with working length, fig 2:- patency of the extra root(curved), fig 3:- transportation of canal of extra root, fig 4:- master cone radiograph and fig 5:- obturation

Case 2:- A male patient reported to the department of conservative dentistry and endodontics with the pain in the lower left back tooth region. A diagnostic x-ray revealed caries approaching pulp. Radiograph detected the extra root distally with respect to 36. SLOB technique confirmed the presence of root distolingually**.** Access opening was done under local anesthesia and the triangular access cavity outline was extended distolingually as directed by IOPA. All 4

orifices were located and glide path was attained with the help of ISO #10 stainless steel k fine. The working length was determined with apex locator (4th generation; propex II) and was reconfirmed with radiograph. Biomechanical preparation was done with the combination of the conventional and rotary file systems.Conventionally done with ISO #15,#20 and #25 K file and then with HEROshaper file system till ISO #25 4% taper along with the irrigation in between the instrumentation. Subsequently, obturation was done with cold lateral compaction method followed by coronal seal with composite restoration.

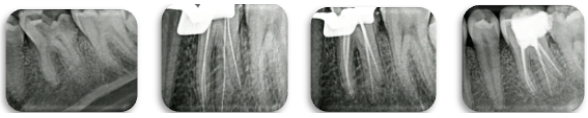

fig:-1 diagnostic radiograph, fig:-2 working length determination, fig:-3 master cone, fig:-4 obturation

DISCUSSION:-

Radix entomolaris, first described by Carebelli, is an anatomical variant in the first permanent mandibular molar characterized by an additional third root located lingually. RE is found is all three molars with the least incidence in second molar i.e 2%[12].

A successful root canal treatment involves mechanical and chemical debridement of the entire pulp cavity and 3 dimensional hermetic sealed obturation. In the case of RE, it poses a great endodontic challenge, the missed canal can lead to incomplete cleaning of the canal system resulting in the endodontic failure. De Moor et al. (2004) classified radix entomolaris based on the curvature of the root or root canal[16] :-Type 1: a straight root or a root canal, Type 2: a curved coronal third that becomes straighter in the middle and apical third, Type 3: an initial curve in the coronal third with a second buccally oriented curve that begins in the middle or apical third.

In type 3 RE where the canal at apical 3rd is curved, can cause shaping aberrations such as straightening of the root canal or a ledge that displays a loss of working length in the ledge canal. Calberson *et al*[11] recommend using flexible nickel-titanium rotary files in order to overcome the aberrations and also suggested initial root canal exploration with small files (size 10 or less), determining the working length of the curved root, and creating a glide path before preparation to avoid procedural errors.

Presence of particular marks and characteristics like unclear view or outline of distal root contour or root canal depicting the presence of hidden RE. Clinical inspection of the crown, analysis of cervical morphology of roots by means of periodontal probing to identify the presence of additional root can be done.

To locate the orifice of the root canal of RE, the triangular opening cavity is modified resulting in rectangular or trapezoidal outline cavity form. A dark line (dentinal map) on the pulp chamber, "**champagne effect**" by the use of sodium hypochlorite, staining the chamber floor with **1% methylene blue** dye is also helpful. Some other tests to locate the orifice is **red line test** and **white line test**.

In the case reports above, diagnostic aids such as magnifying loupes, endodontic explorer, DG 16 probe were used for better identification and visualization of all the canals. Thorough chemomechanical cleaning of the canals was done subsequently and then obturated by cold lateral compaction technique. Similar case report has been published and the management followed is the use of small no. files ISO #10 and #15 and preparation till size F2 along with irrigation with 3% sodium hypochlorite followed by single cone obturation technique[17].

CONCLUSION:-

The morphological variations of the RE in terms of root inclination and root canal curvature demands a careful and adapted clinical approach to avoid or overcome procedural errors during endodontic therapy. Even though radix entomolaris being the rare entity, with proper diagnostic aid and thorough knowledge of root canal anatomy, successful treatment can easily be carried out.

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