

PREVALENCE OF RADIX MOLARIS AND ITS CLINICAL SIGNIFICANCE- A MULTIDISCIPLINARY REVIEW.

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ABSTRACT

The mandibular molar is generally present with two roots of three canals, one being the mesial and other being the distal. Occasionally there is a third root present disto-lingually which is often referred to as “radix molar” or “radix entomolaris”. The present study reports about the clinical significance of a radix molar based on evidence reports. This will further avoid any future complication in diagnosing and treating while addressing a patient's chief complaint.

KEY WORDS: Etiology, Gender, Disto-lingual, Radix, Radiograph, Root canal, Extraction, Orthodontics.

INTRODUCTION

The mandibular molars has multiple variations in its root anatomy which can be witnessed in the form of taurodontism, c-shape canal, a middle mesial canal, fused root and one such includes the mandibular molars with an extra root which is often the reason for endodontic failure since it is not identified and missed during the biomechanical preparation. Learning all these variations is an important aspect for better clinical practice since a satisfying treatment outcome is when all the defective surfaces are identified and restored (1),(2). These changes can be due to environmental, physiologically, pathologically or genetic factors (3).

The mandibular molar is generally present with two roots of three canals, one being the mesial and other being the distal. Occasionally there is a third root present disto-lingually which is often referred to as “radix molar” or “radix entomolaris” which is associated with the extra occlusal dimension of the tooth or with an extra cusp (4).Our team has extensive knowledge and research experience that has translated into high quality publications(5–24).

MORPHOLOGY

It was in the year 1844 when the first case of a radix was reported and from then on this is a topic of discussion. The canal curvature of the distolingual root is very complex, short, curved and more buccally oriented when compared to the other roots of the molar. It is found to be more prevalent in the mandibular first molar and rarely in the second or the third molars (25).

The dimension of RE can vary from a short conical extension to a mature root with normal length and root canal. It is cross-sectionally more circular than the distal root, projected lingually about 45° to the long axis of the tooth, and has the type I canal system ((26).

The radix entomolaris is located distolingual, with its total or partial coronal third fixed to the distal root. In most of the cases, the pulp extension is radiographically visible. Generally, the radix entomolaris is smaller than the disto- and mesiobuccal roots and may be separated from the other roots, or partially fused to them ((27).

ETIOLOGY

There are studies suggesting that, in dysmorphic or an extra roots, its formation could be related to some external factors during the process of odontogenesis, or the case of penetrance of an atavistic gene or polygenetic system whereas in eumorphic roots, racial genetic factors plays a major role in profound expression of a particular gene that results in the more pronounced phenotypic manifestation ((28).

PREVALENCE

With this complex root anatomy it is almost impossible to diagnose this root under a routine check-up which can cause complications like periapical lesions, endo- perio lesions which can further lead to endodontic failure, endo surgeries and extraction of the tooth. To avoid these complications proper diagnosis and education on the root morphology is to be known (29).

Research showed that the prevalence of a disto- lingual root among the asian population was about 5%-40% (30) with females being about 43% among the reported cases or around the age group of 45 (31). This morphological difference in the root anatomy is very much associated with the racial form since the mongoloid people have the highest occurrence rate. Other factors including the disruption during the odontogenesis stage and involvement of genetic factors are also mentioned in some studies (32).

Various methods to study the radix molars were implemented to get the best possible way for its identification (33). As already mentioned earlier, the occurrence of radix among the Indians is less frequent in comparison to the mongoloid population (34), with almost 13% being the south Indian population; this plays a major role in identification or in forensic odontology (35,36). There is not much of gender correlation observed but it is considered as a part of Asiatic traits (37),(38).

DIAGNOSIS

As recommended a thorough radiographic study of the involved tooth, using exposure from the standard buccal-to-lingual projection, one taken 20° from the mesial, and the third taken 20° from the distal to obtain basic information regarding the anatomy of the tooth ((39).

A literature has reported that clinical observation and analysis of the cervical morphology of the roots by means of periodontal probing facilitate identification of radix entomolaris. It has also been observed according to certain reports that the presence of an extra cusp also referred as tuberculum paramolare or a more prominent occlusal distal or distolingual lobe, along with a cervical prominence or convexity, can indicate the presence of an additional root (40).

PERIODONTAL SIGNIFICANCE

More articles on the relationship between root morphology and periodontal destruction have been reported which shows clear evidence of successful periodontal care in less complicated root features. There is increased probing depth and attachment loss in respect to the disto-lingual sites of molars roots and eventually the presence of a disto-lingual root may contribute to an aggravated risk of periodontal destruction ((41).

SURGICAL SIGNIFICANCE

A high risk factor incase of more curved and slender root with its fracture efficiency can be observed. These roots can easily fracture with extraction force. Some studies based on extracted teeth suggested that during extraction of primary molars with three roots, the clinician should make sure that the crown of the premolar is not trapped in the inter-radicular area of the primary molar as this could cause accidental removal of the developing permanent tooth bud (42).

Extraction of the permanent first molar with radix is difficult compared to the molar without radix. If rotational movements are applied during an extraction of an entomolaris, the risk of root fractures to occur is increased. It is expected that an extra distolingual root would fracture during extraction due to its divergent and curved form (29).

ORTHODONTICS

Orthodontic deals not just with the occlusal harmony and its function but in the first place tooth physiological eruption. Radix since being a multirooted tooth can cause clinical difficulties, where the extra root would render movement difficult. One such hypothesis also states that the presence of radix entomolaris adds to the stability of molars by providing an increased surface area of attachment to the alveolus (43) which further serves as a better anchorage for orthodontic therapy. Thus radix is boths boon or curse of an orthodontic therapy. Since it is not known whether abnormal root configurations like three-rooted molar affect, the normal exfoliation of the primary teeth, it is unclear whether these anomalous teeth present orthodontic problems (36),(44).

ENDODONTICS

Refinements or modification of endodontic access cavity preparation according to the radicular inclinations should be done as considering the teeth anatomical variations such as radix entomolaris. This would further prevent procedural error during any endodontic and restorative procedures (45).

It has also been reported that regardless of the type of root canal, the orifice of the radix can be located distolingual from the root canals in the main distal root (46). In cases of radix the access cavity plays a major role in the canal location. It's important to extend the access cavity preparation toward the mesiobuccal direction which includes the modification form of triangular to rectangular or trapezoidal so better location of the access canal of this root is made possible (43,46). Successful root canal

treatment it is necessary to locate all roots and canals as unfilled canals remain a nidus for infection and can compromise treatment outcome (47),(48).

PROSTHODONTICS

It's a clear factor that a tooth with adequate pericemental area acts as a strong abutment as mentioned for the rules for selection of an abutment. More than the crown area, multirooted teeth are focused more since they are more stable, firm with increased periodontal support ((49).

Longer, divergent and multiple root acts as a firm base for an abutment so are more consideration when compared to slender single rooted teeth which have a high chance of a prosthesis fracture (50).

Radix has its pros for being the best choice for support incase of partial replacement to being the worst choice since there is high chance of attachment loss, easy periodontal complication and destruction (51).

PEDODONTICS

There are several case reports on the existence of three-rooted primary mandibular molars but studies of the prevalence of extra roots are few in number (52),(53). Another study reported that three-rooted mandibular first molars are rare with a frequency of <1% in the primary dentition and common in the permanent dentition (36),(53).

CONCLUSION

While radix molars are one such dental anomalies which goes undiagnosed until a perfectly viewed under radiograph one must make sure while performing any treatment on the patient the the distolingual root is checked. Incase of rct treated left out distal root of radix or incase of extraction increased infection chance and failure treatment results can be observed (31),(54).

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