

Case Report

Radicular Malformation; a Radiographic View

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Abstract: Dental hard tissue during its developmental stages can undergo various changes leading to malformations either in the coronal or radicular aspect. These changes even though not very evident clinically if overlooked can be detrimental. In this article we aim to highlight various radicular malformations along with a report of a case.

Keywords: Radicular malformation, radiographs, endodontic therapy.

INTRODUCTION

An awareness of root canal morphology and a careful interpretation of preoperative radiographs lay the foundation for a successful endodontic therapy. Being aware of the fact that radiographs are two-dimensional images of a three-dimensional object, one should be careful while visualizing and interpreting pre-operative radiograph.

Maxillary second premolar is among the most commonly endodontically treated teeth [1]. Hull and co-workers in 2003 found its frequency to be 10.3% [2]. Morphological variations in pulpal anatomy must be always considered before beginning endodontic treatment [3].

Visualization of three-rooted maxillary premolars on preoperative radiographs can often be difficult and hence a high quality preoperative radiographs and their careful examination are essential for the detection of additional roots and root canals [4]. Walton [5] recommended the use of two diagnostic radiographs. The earlier these complex root canal configurations are anticipated, the more likely one can properly manage intracanal preparation and filling procedures.

We report a case of maxillary second premolar with three roots and a review on the various radicular malformations that can be of diagnostic dilemma and possible culprit for an unsuccessful dental treatment.

CASE REPORT

A 37-year-old lady visited the department of Oral medicine and radiology with the chief complaint of pain in relation to the upper right posterior teeth region. The

medical history was found to be noncontributory. Clinical examination showed deep caries in maxillary right second premolar (#15) with no evidence of sinus tract or fistula. Tooth was tender both on palpation and percussion. Radiographic examination, using bisecting angle technique, revealed coronal radiolucency approximating the pulp with evidence of periodontal ligament widening. On close examination of the radiograph, a different root morphology was detected (Fig. 1), with multiple radiolucent vertical lines within the root parallel to the periodontal ligament and hence inferred to have three roots. Patient was later referred to the department of conservative and endodontics as she required a root canal treatment of the offending tooth.

DISCUSSION

Disorders of development of teeth may be prenatal or postnatal in origin and, may be inherited or acquired. Their recognition and evaluation require a thorough knowledge of the normal chronology of the human dentition and of the normal development and structure of the teeth.

Disturbances in tooth formation may involve the root leading to variations in the number, course, form, and size of roots.

Though the implications of root form and root canal morphology on clinical endodontic have been fully established in western literature, the features of root canal morphology in Asian settings have not been documented [6]. Slowey RR stated that radiographically, it is easier to detect teeth with extra roots than teeth with the usual number of roots and extra canals [7]. Ingle stated that the variations in the

canal anatomy might account for greater increase in the endodontic failure of such tooth [8].

Vertucci *et al.* [9] found only 2 of 200 maxillary second premolars to contain three canals. Pecora JD *et al.* [10] in their study compared the external and internal anatomy of 300 premolars and concluded that 90.3% of maxillary second premolars had one root and only 9.7% had two roots, they did not report of a single case of maxillary second premolar with three roots. An extra root may manifest as a radiolucent longitudinal line within the root parallel to the periodontal ligament, or just produce an increased density in the distal third of the affected root canal [11].

Maxillary premolars with three root canals were sometimes called small molars or 'radiculous' because of their similar anatomy to that of adjacent maxillary molars [12]. Careful clinical and radiographical examination is essential for successful endodontic treatment.



Fig. 1: Intra oral periapical radiograph reveals maxillary first premolar showing three roots

A radiograph taken at a normal angulation may not reveal an extra root hence a modified radiograph with a different angulation should be taken (Fig. 2). If the mesio-distal width of the midroot image is equal to or greater than the mesio-distal width of the crown, the tooth will most likely have three roots [13]. Even a slight variation in the root morphology should be viewed with suspicion.

Kaufmann advocated the use of shift cone angle radiographic technique, in addition to routinely taken periapical radiograph with parallel angle technique, to identify the superimposed roots, overlapping and unidentified canals [6].

Certain alterations in the radicular aspect cannot be called as pathology, rather called as variations. But these variations can cause diagnostic dilemma to an inexperienced endodontist and hence should be ruled out for a successful management.

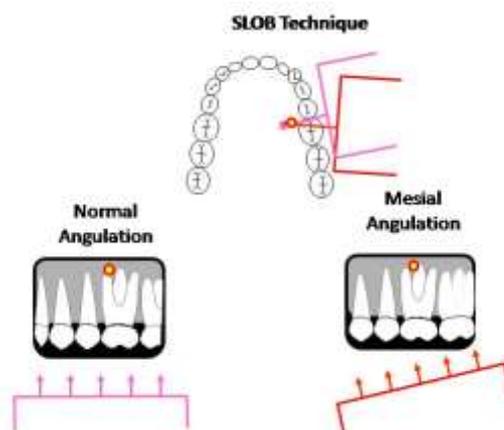


Fig. 2: Schematic diagram of SLOB technique

Table 1: Other Radicular Malformations

Condition	Abnormality	Etiology	Teeth affected
Dilaceration	Deformity in which the crown of the tooth is displaced from its normal alignment with the root, so that the tooth is severely bent along its long axis	Acute mechanical trauma	Maxillary incisors
Concrescence	Roots of one or more teeth are united by cementum alone after formation of the crowns	Chronic inflammation	Permanent dentition
Taurodontism	Pulp chamber shows an increased vertical dimension, thus extending far into the root area	Developmental	Multi rooted teeth
Enamel pearls	Deposits of enamel in an abnormal position, mostly the outer root surface	Developmental	Any teeth can be affected
Hypercementosis	Continuous apposition of cementum on the root surface causes a gradual increase of its thickness	Chronic irritation	Posteriors in the form of premolars and molars
Ankylosis	Fusion of either enamel, dentin, or root cementum with adjacent alveolar bone	When vitality of the periodontal ligament has been jeopardized.	Impacted as well as in normally erupted teeth
Radicular Dens Invaginatus	Infolding of outer surface into interior of tooth.	Developmental	Maxillary lateral incisors predominance
Rhizomegaly	Extremely large roots	Developmental	Canines
Fused roots	No separation between the various roots	Developmental	Maxillary and Mandibular Second

			molars
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CONCLUSION

Although the frequency of 3 roots and root canals in maxillary premolars is low, each case should be investigated carefully, clinically and radio graphically to detect any alteration from the normal for a successful dental treatment.

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