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ENDODONTIC MANAGEMENT OF 'THRONE MOLARS' – A CASE SERIES.

Dental Science

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ABSTRACT

Mandibular first molar usually comprises of two roots, but, sometimes, it can have three roots, rarely four roots are also evident. So, there may be significant variations in formation, number of roots, and their shape in mandibular molars. Hence it becomes a very challenging job for the clinician to predict the number of the roots and root canals. Proper knowledge of the root canal anatomy helps the clinician to pin-point the varied anatomy of roots and root canals. This enhances the clinician to refine the access cavity and properly complete the endodontic treatment.

KEYWORDS

4- rooted Mandibular first molar, CBCT, PDL line, radiograph.

INTRODUCTION:

Any tooth may have anatomical differences. The likelihood of a successful treatment may be increased by being able to notice these variances during root canal therapy by being aware of the typical morphology and its variants. A thorough examination of pre-operative and post-operative radiographs plays a critical role in endodontic success. Variations in the anatomy are an acknowledged characteristic feature of mandibular permanent molars [1]. Endodontic failure [2] could result from undetected additional roots and root canals. Hence, having a thorough understanding of root and root canal morphology as well as a strong understandig of their potential morphological differences will help to prevent endodontic failure. Ingle et al. stated that incomplete obturation of the root canal system, is the major cause for failure of the root canal treatments. Hence, the correct location, vigorous instrumentation and three dimensional obturation of all canals are important procedures.The mandibular first molar, is arguably the most treated and least understood posterior tooth. It is the largest tooth in volume and has the most complex root and canal anatomy [3].

In addition to discussing an odd observation of the pulpal floor, the current paper's goals are to describe the effective non-surgical endodontic therapy of a four-rooted permanent mandibular first molar with independent root canals in each of its four-roots. Keeping in mind the similar look of a throne henceforth we'll call the four rooted mandibular first molars as 'throne molars'.

CASE REPORTS:

Case report 1: The main complaint of a 20 years old female patient, who visited the under graduation section of the Department of Conservative Dentistry & Endodontics, was pain in the right lower back area of the tooth, which had been present for five days. History showed is the site of intermittent, throbbing discomfort. Right mandibular first molar was found to be grossly carious after a clinical examination. Moreover the height of contour of the tooth was at the level of CEJ. For that the tooth was similar to a deciduous molar. Vertical percussion reveals tenderness. The tooth's movement was within physiologic bounds. Testing the pulp of tooth 46 with cold and electric pulp tester had no positive result.

Following the administration of local anaesthesia and while using a rubber dam, conventional access cavity preparation was carried out by our intern. But the pain was persisting after 10 days as three canals were found and one was missed. After scouting the pulpal floor fourth canal was revealed: two mesial (mesio-buccal and mesio-lingual) and two distal (disto-buccal and disto-lingual). Lingual shoulder was compromised and floor gauging on the distal aspect was found. The patient was examined and sent for CBCT for further examination of four roots. A diagnostic cone-beam computed tomography (CBCT) revealed that all the four roots were fused and four unusual developmental root fusion lines were present. Four distinct roots were present at the apical-third region of the tooth.

The working length was measured using a radiograph. BMP was done up to F1 with protaper rotary files and use of 5.25 % sodium chloride and normal saline irrigation. After 15 days of application of calcium hydroxide as the intracanal medicament obturation was done with the bio-ceramic sealer.

Case report 2: A 19-year-old female patient presented to the Department of Conservative Dentistry & Endodontics complaining of pain in the bottom right back of her mouth that had been present for five days. On clinical examination, the teeth deep dentinal caries. Vertical percussion reveals tenderness. The tooth's movement is within physiologic bounds. The patient's medical history wasn't relevant. Pre-operative radiograph shows deep dentinal caries involving pulp with widening of the PDL space.With a diagnosis of symptomatic irreversible pulpitis and symptomatic apical periodontitis on the left mandibular first molar, a nonsurgical root canal procedure was scheduled. After the treatment plan was devised,a form of informed consent was acquired.

Following the administration of local anaesthesia and while using a rubber dam, conventional access cavity preparation was carried out, revealing four canals: two mesial (mesio-buccal and mesio-lingual) and two distal (disto-buccal and disto-lingual).

The working length was measured using a radiograph , which was angulated mesially and revealed four roots (two mesial and two mesial). BMP was done up to F1 with protaper rotary files and use of 5.25 % sodium chloride and normal saline irrigation. After 15 days of application of calcium hydroxide as the intracanal medicament obturation was done.

Analysis of cone beam computed tomography- Six months later; a diagnostic cone beam computed tomography (CBCT) scan of tooth 36 was required. The investigation at the same time supported the existence of four roots in tooth 36. The disto-buccal root and the two

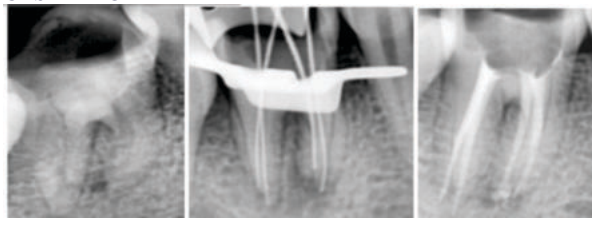
mesial roots both had mature roots that were of normal length. The disto-lingual root, on the other hand, was a short, conical root that faced distally.

Case report 3 : The main complaint of a 37-year old man was a food impaction in his right lower back tooth. Throughout mastication, the same tooth had experienced intermittent pain in the past. A substantially cariously exposed 45 and 46 were seen upon clinical examination. Vitality testing for 45 and 46 did not produce any results.

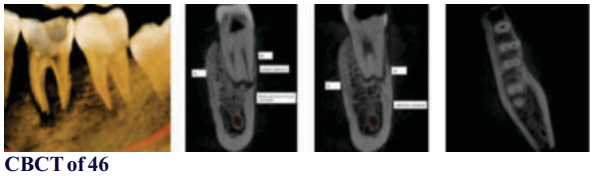
On radiographic inspection, deep dentinal caries were seen in 45 and the mesial root of 46.

Following the administration of local anaesthesia and while using a rubber dam, conventional access cavity preparation was performed, revealing 4 canals: 2mesial (mesio-buccal and mesiolingual) and 2 distal (disto-lingual and disto-buccal). The working length was determined using a radiograph , which was angulated mesially and revealed four roots (two mesial and two distal). BMP was done up to F1 with protaper rotary files and use of 5.25 % sodium chloride and normal saline irrigation. After 15 days of application of calcium hydroxide as the intracanal medicament, obturation was done with the bio-ceramic sealer.

CASE REPORT -1

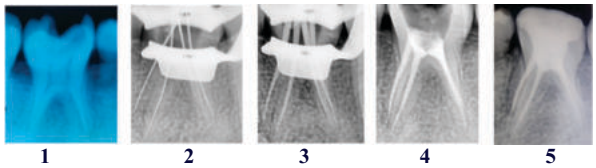


1. Pre-operative radiograph 2.Radiograph of working length determination 3.Obturation



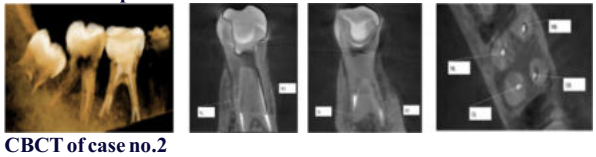
CBCT of 46

CASE REPORT -2



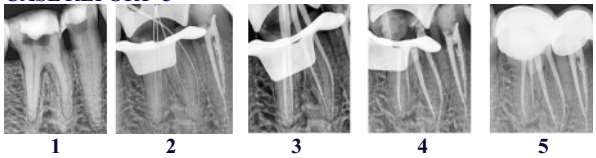
1 2 3 4 5

1.Pre-operative radiograph 2.Radiograph of working length determination 3.Placement of master-cone 4. Obturation 5.Tooth with post endodontic restoration



CBCT of case no.2

CASE REPORT -3



1 2 3 4 5

1. Pre-operative radiograph 2.Radiograph of working length determination 3.Placement of master-cone 4. Obturation 5.Tooth with post endodontic restoration

DISCUSSION:

Morita [4] looked at 2,164 removed mandibular first molars. He only documented one case of a four-rooted first molar in a male patient , representing 0.04% of the sampled Japanese population as a whole (Mongoloid race). There have not been any four –rooted mandibular first molars found in any other comprehensive laboratory research in various population and ethnic groups [5–7].

Fourrooted mandibular first molars have only ever been mentioned in two case studies [8.9]. Both, however, reported one mesial root and three distal roots. The four –rooted mandibular first molar described in this article has two mesial roots and two distal roots, each of which has a separate root canal.

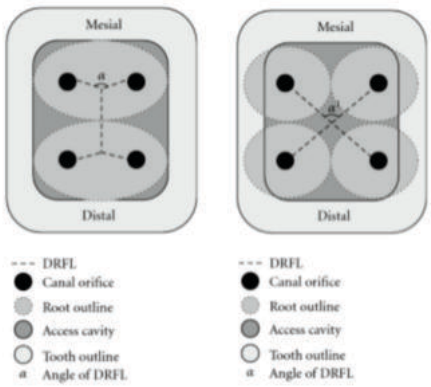
The Hertwig epithelial root sheath is created during the bell stage of odontogenesis when the inner and outer dental epithelium proliferate and converge at a location known as the cervical loop. The Hertwig epithelial root sheath's apical end curves to create a collar-like structure. A tooth with four roots has four collars as a result of the invagination of epithelial cells during the development of the roots[10,11] In this literature, various anatomical arrangements of the first mandibular molar have been described.

A thorough clinical examination of the crown and cervical morphology of the roots by walking probe can facilitate the identification of an extra root. Existence of an extra cusp (Tuberculum paramolare), bulbous crown or more pronounced occlusodistal or distolingual lobe, in concoction with the cervical prominence or convexity indicates the nearness of an additional root. Hence, a thorough clinical inspection also plays a major role in identifying the presence of supernumerary root.

The angle produced between the developmental root fusion lines (DRFLs) linking these canal orifices is more obtuce in mandibular first molars with two roots and each root having two unique canals, such as the mesiobuccal and mesiolingual canals in the mesial root [12]

These two-rooted mandibular first molars exhibit this in both the mesial and distal DRFLs.

In this instance, the angle produced by the DRFLs connecting the mesial and distal orifices was more acute, resembling a "X" (Figure).



[Image courtesy Jojo Kottoor et. al.]

This could mean that the angle between the DRFLs that connect the orifices changes to a more acute angle when a second root is present both mesially and distally. For these observations to be used as diagnostic criteria in cases of four rooted mandibular first molars, specific laboratory studies or other case reports would need to provide more explanation[13]. Locating these canals also benefits from the use of visual aids such as CBCT, intraoral cameras, dental microscopes, and loupes.

CONCLUSION

An accurate clinical and radiographic assessment is the first step in any successful endodontic therapy. The complexity of mandibular second molar discrepancies and the vast variety of these root canals' morphologies should be well known to clinicians. Based on careful clinical and radiographic interpretation, the diagnosis and endodontic treatment of a mandibular second molar with four roots were carried out in the current case series. CBCT is a crucial tool for assessing anatomical diversity, however it is currently more of a supplement than a replacement for 2D imaging in some applications. Endodontists must use caution while managing specially these types of 'thorn molars'.

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