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RESEARCH ARTICLE

ENDODONTIC MANAGEMENT OF TWO ROOTED MANDIBULAR SECOND PREMOLAR WITH HYPERTAURODONTISM AND THREE CANALS

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Abstract

Mandibular second premolars have earned the status for having aberrant anatomy. The occurrence of two roots with hypertaurodontism in mandibular premolars is quite rare. The present case describes endodontic management of two rooted mandibular second premolar with hypertaurodontism and three canals with combined use of the SLF dental surgical loupe and CBCT aiding to locate the canal orifices and bifurcation of root.

Introduction:-

Dental procedures necessitate thorough understanding of human teeth, but this is especially true for root canal treatments.

According to studies, 8.7% of mandibular second premolars have more than one canal[1]. Taurodontism is one of the most significant abnormalities resulting from failure of Hertwig's epithelial sheath to invaginate at the correct horizontal level[2].

Careful analysis of periapical radiographs along with CBCT has proven to be very helpful for anatomic assessments[3]. To improve vision an extra overhead light source and an SLF dental surgical loupe was used.

This case report represents successful management of hyperdontic two rooted premolar.

Case Report

A 57-year-old male patient, with non-contributory medical history, reported to the Department of Conservative Dentistry and Endodontics, with the chief complaint of intermittent pain in the lower left back tooth region since one week.

Clinical examination revealed a distal proximal cavity on mandibular left second premolar tooth (#35). There was no evidence of either swelling or sinus tracts. The involved tooth was tender on percussion. No periodontal pockets were present. Vitality test elicited no response to both thermal and Electric Pulp Tester (EPT). Tooth #35 was focused in periapical radiograph using the DIGORA digital system (SOREDEX™ DIGORA™ Optime, intraoral digital X-ray). Periapical radiograph revealed unusual root canal anatomy of the involved tooth with sudden loss of

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canal continuity and a suspicion of canal aberration was noted. There was proximal radiolucency involving pulp with the loss of lamina dura and periapical radiolucency suggestive of apical periodontitis.

Based on the radiographic findings the patient was referred to The Department of Oral medicine and Radiology for a cone beam computed tomography. CBCT was performed with the FOV (6*6). CBCT confirmedtwo roots, showing three canal having closed apex with bifurcation which is situated apically suggestive of hypertaurodontism and subsequent to confirmatory diagnosis of apical periodontitis and it was decided to carry out endodontic treatment. [Figure 1]

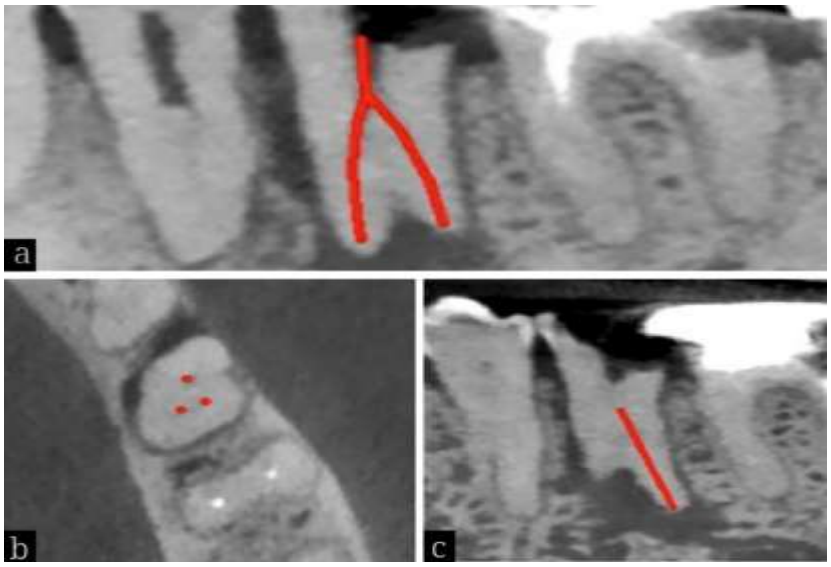

Figure 1:- CBCT images (a) Sagittal view – root canals of buccal roots (b) axial section showing the pulp canals (red points (c) sagittal view – lingual canal.

Local anaesthetic was administered using 2% lignocaine with epinephrine 1:100000. Rubber dam isolation was achieved for tooth #35 (HygenicColteneWhaledent). Following excavation of caries, a conventional access cavity was prepared with Endo Access bur (Dentsply Maillefer, Switzerland). Visual inspection of the pulp chamber was performed using the SLF dental magnification loupes (6X420, Zumax Medical Co. Ltd) with attached LED light that revealed oval-shaped single canal orifice at the cementoenamel Junction (CEJ) level. Clinical examination with a DG 16 explorer (Hu-Friedy, USA) revealed single orifice. The access cavity was modified using Glades Glidden drills (Premier Dental Co.) for coronal flaring. The canals were negotiated with ISO 10 K-files. The working length was registered with Root ZX Mini apex locater (J. Morita, Japan) which was confirmed with digital radiographs. Working length radiographs revealed three separate canals with two separate roots.

After confirmation of the root length and initial canal preparation till ISO 25K-files (K-FILES, MANI, Tochigi, Japan). The cleaning and shaping was done with crown down technique with Protaper Rotary instruments (Dentsply Maillefer) upto #F2(25/.04) as per the manufacturer's instructions using 17% of ethylene diamine tetra acetic acid (Glyde, Dentsply) as lubricant and 3% of sodium hypochlorite as irrigant followed by final saline rinsing. Canals were dried using paper points and calcium hydroxide intracanal medicament was placed. The access chamber was sealed with Cavit (3M ESPE) for one week.

On the second appointment, clinical examination showed the tooth was completely asymptomatic. The access cavity was carefully inspected and calcium hydroxide was removed using SS file #25 and 3% sodium hypochlorite irrigation solution. Canals were dried using paper point. After confirming the mastercone (Dentsply,India) by radiographs the canals obturated by lateral condensation technique using MTA fill apex bioceramic sealer and post obturation radiograph was taken. The orifice was then sealed with composite. The patient was recalled after 2 weeks for review. [Figure 2]

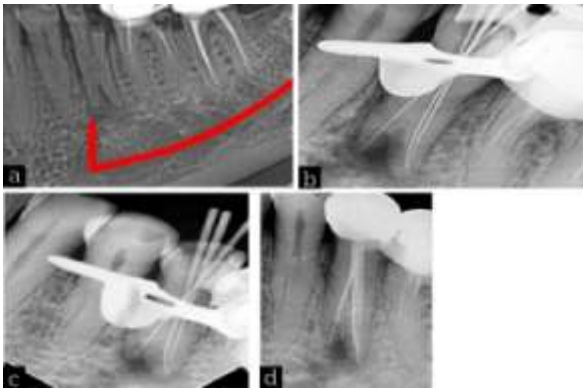

Figure 2:- (a) Pre-operative radiograph (b) Working length radiograph (c) Mastercone radiograph (d) Post obturation radiograph.

Discussion:-

For successful nonsurgical root canal therapy, it is crucial to understand root canal configuration and its variations. Mandibular premolars are referred to as "enigma" teeth by endodontists because of their unusual morphology.

Root canal configurations have been categorized by several authors. The classification of root canal morphology within a single root was initially done by Weine et al. In 1974, Vertucci et al. identified further complex root canal systems and reported eight different configurations based on the main root canal's pattern of division from leaving the pulp chamber to the root's apex. In 2004, Sert and Bayirli expanded Vertucci's classification system by including an additional fourteen supplementary categories. Ahmed et al. introduced a new categorization in 2017, which is transparent, understandable, and more accurate at categorizing root canal configurations than older approaches[4].

The cervical part of the root is broader than typical and has little to no taper in mandibular premolars with three canals[5]. "The quick break phenomenon"—a sudden narrowing of the root canal spaceindicates the canal's separation into two or more canals[6]. Premolars with three root canals typically have one major lingual or palatal canal and two smaller canals in the mesiobuccal and distobuccal roots[7]. If the pulp chamber does not lay in the anticipated buccal-lingual relation, a third canal should be suspected. If just one eccentric orifice is discovered, at least one more canal should be hypothesized and looked for on the other side[8]. Additionally, the pulp chamber's dentinal map directs the operator to the exact location of the orifices for root canals. Mandibular premolars' diminutive stature restricts coronal access to their intricate root canal system. A dental anomaly known as taurodontism is characterized by the expansion of the pulp chamber, which may almost approach the root apex. Sir Arthur Keith introduced the phrase in 1913[9]. Shaw further divided teeth into three categories in 1928 according to ascending severity: hypotaurodont, mesotaurodont, and hypertaurodont[10]. It was challenging to navigate the canals in this situation because of the canal orifice's extreme narrowness. As a result, the instrumentation took a long time.

Preoperative and intraoperative radiographs taken at various angles are necessary to rule out additional roots and root canals. To accurately diagnose multiple roots or root canal systems, at least two radiographs must be taken, the first at a straight angle and the second at a 15° to 20° angle mesial or distal from the horizontal long axis of the root[11]. Root canal multiplicity could be assessed by the sudden narrowing of the main canal on a parallel radiograph[12]. In this case, the use of CBCT as a supplementary diagnostic tool helped to identify the premolar's atypical anatomy. The CBCT images used in this investigation showed three different root canals on each of the two distinct taurodont roots (one mesial and one distal). The apical orifices were distinct in each root canal. Even though the radiograph revealed the indistinct shapes of the two roots, only CBCT was able to provide a conclusive diagnosis for the three root canals (mesiobuccal, distobuccal, and lingual).

Proper root canal preparation, thorough disinfection, three-dimensional hermetic obturation of the canal, and high-quality coronal restoration are all essential for the success of endodontic treatment in teeth with aberrant root canal anatomy. It is essential to prepare the cavity for optimal access. When inserting scouting files in the main canal for the first time, one may run into an impediment, causing the file to deflect to the buccal or lingual before continuing. Therefore, having high tactile perception is essential, and before navigating the canals, the files can be precurvedappropriately. The mesiobuccal and distobuccal canal orifices in this instance were extremely small,

making it challenging to navigate through these canals. Attempts were made to locate the point at which the root or root canals separate. The crucial phase of such negotiations is precurving the file at the apical third. To avoid file separation, the precurved file was advanced slowly and a chelating agent was used. Magnification and illumination become crucial tools for recognizing and treating additional canals when aberrant root anatomy is radiographically visible and there is a likelihood of discovering them. The failure of endodontic therapy can frequently result from failing to notice the presence of additional roots or canals, which can cause severe flare-ups during treatment.

Conclusion:-

This case study adds to our understanding of the variations in the mandibular premolar tooth's root canal anatomical structure. Knowing the architecture of the root canals in detail is necessary for successful endodontic treatment. Every tooth having endodontic therapy should be evaluated for the possibility of additional canals. As a result, the risk of endodontic failure from insufficient obturation would be reduced.

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