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Case Report

Management of mutilated mandibular second premolar with three distinct roots and root canals: A case report

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ABSTRACT

Success of root canal treatment (RCT) relies on operator's knowledge about anatomy and morphology of tooth and root canal system. While accessing the case one should always radiographically evaluate the suspected tooth through different angulations and various other radiographic advancements available. Mandibular 2nd premolar is relatively difficult tooth to treat endodontically because of its anatomic variations. In the literature there are very few publications documenting such variations. Present case report discusses successful endodontic treatment and post-endodontic rehabilitation of mutilated right mandibular second premolar with three distinct roots and root canals.

INTRODUCTION

Successful RCT requires thorough cleaning and shaping of root canals, three dimensional obturation and post-endodontic rehabilitation. Knowledge of possible morphological variations is useful for that.[1] Errors in canal location, instrumentation and obturation may invite flareups.[2]

Mostly mandibular second premolar is a tooth with single root and single root canal. Ovoid shaped root, usually hides developmental grooves or depressions on mesial and distal surfaces.[7] Literature shows that the gender and ethnicity affects such anatomical variations and complexities. Mandibular premolars with more than one canal is significantly common amongst black population,[8] **Serman** and **Hasselgren** stated that prevalence of mandibular premolars with multiple roots and canals is more frequent amongst men than in women.

The incidence of three canals up to the apex was found to be 0.0%.[6] In further studies 5.2% specimen showed more than one canals.[10] Whereas incidence of three individual roots was 0.01%[3] approximately 0.2% cases.[9] Three distinct roots for mandibular second premolar can be classified based on where the trifurcation begins at

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coronal/middle/apical third.[11] Many times, ample amount of crown structure is lost in the process of access cavity preparation and caries removal, demanding reinforcement to help withstanding masticatory forces. The present case report explains endodontic and post-endodontic treatment procedure followed to manage weakened and a rare anatomic variation of mandibular second premolar with three distinct roots and root canals.

CASE REPORT

A 38 year old female with no relevant systemic complications, reported to the department with a chief complaint of decayed right lower tooth. Clinical examination revealed grossly decayed mandibular right second premolar and deep proximal caries with first molar. There was no tooth mobility or sensitivity to percussion and patient gave no history of any intra/extra oral swelling. But, while performing sensitivity testing mild response to cold test (EndoFrost Coltene) and EPT (DentMark) was observed. On radiographic examination periapical radiolucency was seen and more than one roots were suspected hence further radiographs with different angulations were taken which revealed that the tooth was having 3 distinct roots (fig.1) trifurcating at coronal third.[11]

After thorough examination a diagnosis of chronic irreversible pulpitis was made and both the affected teeth were planned for RCT out of which single visit RCT of molar was done in the later phase. After inducing inferior alveolar nerve anesthesia (2% Lignocain with 1:100,000 epinephrine) careful soft caries removal was done with spoon excavator (manipal) because radiograph was showing that pulp chamber roof was lost in caries progression so, to avoid damage to pulp chamber floor the hand instruments were preferred over rotary diamond points. Afterwards canal orifices were located with DG16 (Maillefer) and enlarged with orifice opener #30/08% (NeoEndo)(fig.2). Pre-endo buildup was done with composite resin (filtek Z350) to simulate a pulp chamber and facilitate rubber dam placement (Hygenic-Coltene)(fig-2&3). Due to the risk of crushing remaining tooth structure and pre-endo buildup, rubber dam sheet was secured in place with the help of floss tied around and liquid dam(Prevest).

Electronic apex locator (Morita Root ZX Mini) was used to determine working length with a hand file (Canal Probe, DiaDent). Working length radiograph was taken (Fig.3). The canals were instrumented with stainless steel hand files (Mani), using EDTA (RC Help, Prime Dental) as lubricant. Aapical preparation till #25/2% file was done. The canals were irrigated using normal saline and 3% sodium hypochlorite (Prime Dental). Then BMP was finished using #25/04% rotary file (NeoEndo). After master cone selection (Dentsply, India) the canals were dried using paper points (Dentsply, India) and obturation was completed(fig.4), AH plus sealer was used. A temporary dressing (Cavit G,3M ESPE, Germany) was given.

In next appointment on clinical examination, pre-endo buildup was found to be dislodged so post and core treatment was carried out in which disto-buccal(DB) and lingual(L) canal post spaces were prepared with #2 peeso reamer and appropriate size fiber post was selected, further luting and cure core buildup was done with dual cure resin(Prevest Fusion)(fig.5). Later full metal coronal coverage was carried out (fig.6).

Fig. 1: Preoperative radiograph

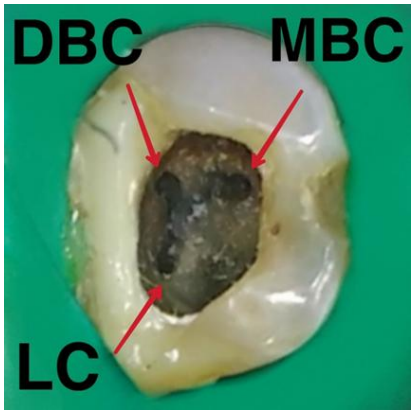

Fig. 2: Canal orifices

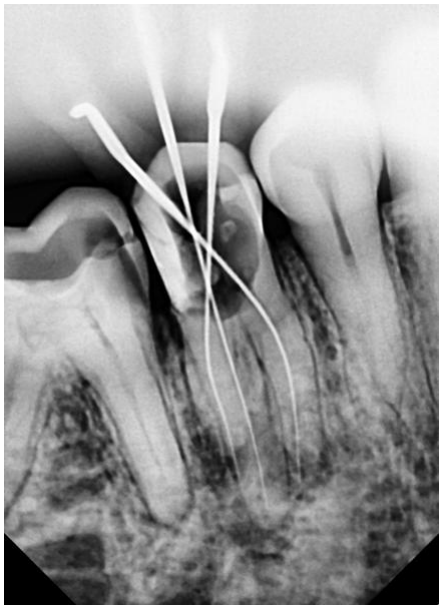

Fig. 3: Working length radiograph

Fig. 4: Obturation radiograph

Fig. 5: Post and core treatment radiograph

Fig. 6: Full metal crown radiograph

DISCUSSION

Complex nature of root and root canal morphology of mandibular second premolar must be understood. Preoperative radiographs with different angulations and analysis of the dentin map on pulp chamber floor helps identifying variations thus, facilitates locating all canals.[12] Mandibular second premolars present with a higher incidence of one root (99.6%) and one canal (91.0%), the incidence of two roots (0.3%) and three roots (0.1%) is extremely rare.[13]

The root canal system of premolars with three root canals is characterized by one large lingual and two small buccal canals.[3] In the present case, radiographic examination revealed the presence of two buccal roots and a lingual root (Fig 1). Uninterrupted linear radiolucent spaces extending from the pulp chamber into the roots, suggesting root canals. Magnification illumination are helpful also, tactile exploration of walls of the canal using pre-curved diagnostic file is mandatory, even if we see single canal radiographically.[7] K files of size #6, #8, #10 were initially used for canal negotiation. Electronic apex locator (J. Morita, Tokyo Japan) helps in determining the correct working length.[14] Area where root trunk trifurcates should be noted,[12] in the present case roots trifurcated from the coronal third of the trunk. Once RCT got completed, in present case tooth reinforcement with the help of fiber post was done. Reason being lower displacement is achieved when fiber post is used.[4] The 4-6mm of gutta percha was retained.[5] ISO 90 or 1.25mm post diameter and #2 pesso is ideal**(QI-2005-LIT REV)** adapted in present case.

CONCLUSION

The incidence of more than one root and root canal is less frequent in mandibular second premolar so, one may miss additional canal leading to treatment failure. Operator should have a habit of looking for canals while examining.

The existence of complex variations of root anatomy makes RCT a challenging situation for clinician. Use of

diagnostic aids like dyes, computed tomography and MRI should be considered in such situations.

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