ENDODONTIC RETREATMENT – UNUSUAL ANATOMY OF A MAXILLARY SECOND AND MANDIBULAR FIRST PREMOLAR: REPORT OF TWO CASES

Nagesh B.*, Naik B. **, Kavuri S.R.*, Tanniru H.I.******

An accurate diagnosis of the morphology of the root canal system is a prerequisite for successful root canal treatment. A major cause of endodontic treatment failure in missed (or) untreated root canals is that they still harbour infection. Careful radiographic interpretation and examination of pulp chamber floors are helpful in locating root canal entrances. These case reports present anatomical variations in upper and lower premolars.

Key words: Root canal morphology, number of root canals, maxillary premolar, mandibular premolar.

A detailed knowledge of morphology of root canal system and thorough cleaning and shaping of root canals are required for successful management of infection in root canal system [1,2]. Studies on maxillary premolars show a low incidence of three root canals [3]. Maxillary second premolars usually have one root with one or two root canals. Vertucci reported the occurrence of one canal at the apex in them at 75% and two canals at the apex at 24%. In the same study Vertucci found maxillary second premolars with three canals at the apex to be only 1% [4].Maxillary premolars with three root canals were sometimes called small molars or **"radiculous"** because of their similar anatomy to that of adjacent maxillary molars [5].

Normally mandibular first and second premolar teeth have single roots with single canals. Sherman & Hasselgren reported a high incidence (18.1%) of multiple roots and canals in mandibular premolar teeth in a series of radiographic surveys with mandibular first premolars involved in 15.7% of patients and mandibular second premolars in 7% of the patients [6].

The root canals which are left untreated because of morphological variations are the source of infection. These case reports describe the successfull diagnosis and the treatment of missed canals.

** Professor*
*** Professor*
**** Reader*
*****Post graduate student, Dept. of Conservative Dentistry & Endodontics, Sibar Institute of Dental Sciences*

CASE REPORT: 1

Maxillary second premolar with three roots

A 28 year old male patient reported to the Department of Conservative Dentistry and Endodontics with the chief complaint of pain in upper left back tooth region with a previous history of root canal therapy done few months back in a private clinic. The tooth was symptomatic and tender on percussion. There was no swelling or fistula present, and the case was referred to the Post Graduate clinic. No relevant medical history was noted. The pre-operative radiograph was examined thoroughly, mesio-distal width of mid root was equal to that of crown and double periodontal ligament space was found (# 25), which gave evidence of presence of another root mesially (Fig. 1). The patient was informed about the future treatment modality and consent for the same was obtained. The patient was administered with 2% Lignocaine HCL in 1:80,000s Adrenaline, the tooth was isolated with rubber dam and the post endodontic restorative material was removed with high speed airotor. The two obturated root canal entrances were found, access cavity was extended mesiobuccally, a third canal was explored



Fig. 1 Pre-operative radiograph

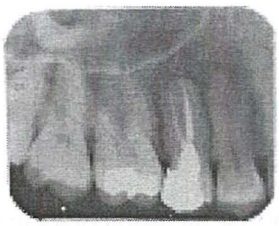


Fig.2 Radiograph showing Working Length determination and Files placed in mesiobuccal, distobuccal and palatal canals

carefully with DG 16 explorer in the mesiobuccal region. The endodontic map was similar to a maxillary first molar with a palatal, mesiobuccal and distobuccal canals. The gutta-percha was removed from the previously filled canals with the aid of H files and gates glidden drills and working length was determined (Fig .2).

Along with the cleaning and shaping of missed canal, the other two canals were also thoroughly instrumented, and cleaning and shaping done by step down preparation upto size F2 Protaper (DENTSPLY). The root canals were irrigated using 3% sodium hypochlorite and MTAD solutions during root canal treatment. The canals were then dried with sterilised paper points, dressed with calcium hydroxide paste and the access cavity was sealed with cavit (3M ESPE, Germany). At the second appointment the root canals were obturated with F2 gutta percha points using AH plus sealer (Fig. 3). Access cavity was restored with bonded amalgam. Final radiograph was then taken to confirm the quality of obturation. Patient was recalled after a week for evaluation and the tooth was found to be asymptomatic. Full coverage post-endodontic restoration was given. At 6 months review there was no radiographic evidence of apical periodontitis (Fig. 4).



Fig. 3 Post-obturative radiograph

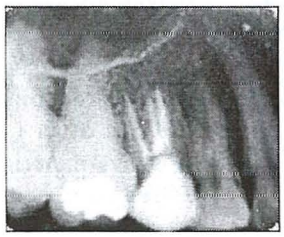


Fig No: 4 Follow up radiograph after 6 months

CASE REPORT: 2

Mandibular premolar with two root canals

A 34 year old female patient came to the Department of Endodontics with the chief complaint of pain and mild intraoral swelling in mandibular right first premolar region (# 44) which was root canal treated one week back. Post-operative radiograph was normal (# 44) (Fig. 5). On clinical examination, the mandibular first premolar was tender to percussion. A radiograph was taken with cone shift technique; there was a bifurcation in the middle third of the root which hinted the presence of untreated canal (Fig. 6) It was found to be Type V root canal configuration according to Vertucci. The patient was informed about the future treatment modality and consent for the same was obtained. The patient was administered with 2% Lignocaine, the tooth was isolated with rubber dam and the post endodontic temporary restorative material was removed. Gutta percha was removed from the previously filled canal upto the bifurcation area. Coronal and middle third was enlarged with Gates Glidden drills. The bifurcated canal was explored carefully lingual to the filled canal and working length was determined (Fig. 7). The cleaning and shaping, irrigation and the intracanal dressing regimen were followed as in the



Fig. 5 Pre-operative radiograph



Fig. 6 Radiograph showing bifurcation in the middle third

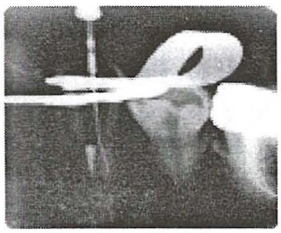


Fig. 7 Radiograph showing working length

above said case report: 1. At the second appointment the canal was irrigated with saline and obturated with Protaper gutta-percha (Fig. 8). Gutta percha was removed till bifurcation and the remaining canal was filled with thermo-plasticized gutta percha (Obtura) Patient was recalled after one week and the symptoms were found to be subsided and full coverage post endodontic restoration was given. Six months later post operative radiograph was taken and no pathology was detected (Fig. 9).

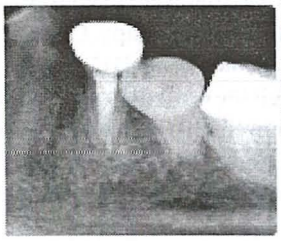


Fig. 9 Follow up radiograph after 6 Months



Fig. 8 Post obturative radiograph determination and file placed distal to the main canal

Discussion

The possible anatomic configurations of maxillary and mandibular premolars are well documented in the literature. High quality pre-operative radiographs and careful examination are essential for the detection of additional root canals[7]. Many of the difficulties found in the root canal treatment are due to variations in root canal morphology. But, the literature shows only a few cases related to three rooted maxillary second premolar[8,9], and two rooted mandibular first premolar[10].

Visualization of three-canalled maxillary premolars on preoperative radiographs can often be difficult. In straight-on radiographs of maxillary premolars, Sieraski et al found that whenever the mesio-distal width of the mid root image was equal to or greater than the mesio-distal width of the crown, the tooth most likely had three roots[11]. In the treatment of three rooted maxillary first premolars, Balleri *et al.* suggested a T-shaped access outline which is helpful for locating all the canals. Based on this and double periodontal ligament space observed in the radiograph we proceeded for the treatment.

Vertucci described five different types of canal configuration for mandibular first premolar. Muller reported that root canals in the mandibular first premolars were usually round and conical, but inclined to be ribbonlike in the cervical third of the root. He also reported that if the canal is very wide buccolingually, it can suddenly narrow into bifurcation, making two very small canals[12]. In this case the root canal system was characterized by a complete mid root separation of the canals into buccal and lingual root canal system. Utilizing the advanced technology like microscopes and computerized tomography makes easier for clinician to treat and identify missed canals

Conclusion

Knowledge of dental anatomy is fundamental for good endodontic practice. Though variations in root canal configurations are not come across regularly, an adept clinician should very carefully investigate each case clinically and radiographically, to avoid postendodontic flare-ups.

References

1. De Deus Q D. Frequency, location and direction of the lateral, secondary and accessory canals. J Endod 1975; 1: 361-6.
2. Baisden MK, Kulild JC. Root canal configuration of mandibular first premolar. J Endod 1992;18: 505-508.
3. Woodmansry KF. Endodontic treatment of a three rooted maxillary first premolar: A case report. Gen Dent 2006;54:420-4.
4. Vertucci FJ. Root canal anatomy of the human permanent teeth. Oral Surg Oral Med Oral Pathol 1984; 58:589-99.

(Continued on Page 216)

Microleakage especially at the gingival margin of Class V restoration can be the "Achilles Heel" of restorative dentistry. So, further investigations are needed to explore the sealing ability of flowable restorative materials and light-cure glass ionomer in Class V situations under in-vivo conditions.

CONCLUSION

Flowable ormocers showed least microleakage and best sealing ability at both occlusal and gingival margin as compared to different flowable restorative materials and light-cure glass ionomer cement in class V cavities after 24hrs of dye immersion.

References

1. Sensi LG, Monteiro S, Baratieri LN et al. Flowable Composites as 'Filled Adhesives:" A Microleakage Study, The journal of contemporary dental practice. 2004; 5(4):1-5.
2. Kidd Microleakage in amalgam restorations: A laboratory research, British Dental Journal 1976; 4:502-518.
3. Browning WD, Brackett WW, Gilpatrick R O Retention of Microfilled and Hybrid Resin Based Composite in Noncarious class 5 Lesions: A Double blind, Randomized Clinical Trail Operative Dentistry 1999; 24:26-30.
4. Condon JR, Ferracane JL Assessing the effect of composite formulation on polymerization stress, Journal of the American Dental Association 2000; 131(4):497-503.
5. Douglas MB, Lawrence WB, Gingell JC et al A Clinical Evaluation of a Resin – Modified Glass Ionomer restorative Material, JADA 1995; 126:1245-1253.
6. Yazici AR, Ozgunaltay G, Dayangac B. The Effect of Different types of Flowable Restorative Resins on Microleakage of Class V cavities, Operative Dentistry 2003; 28-6:773-778.
7. Awliya WY, El-Sahn AM Leakage Pathway of Class V Cavities Restored With Different Flowable Resin Composite Restorations Operative Dentistry 2008; 33: 31-36.
8. Xavier JC; Monteiro GQ, Montes MA Polymerization Shrinkage and Flexural Modulus of Flowable Dental Composites Mat. Res. 2010; 13:113-118.
9. Stavridakis MM, Diietschi D, Krejci I Polymerization shrinkage of Flowable Resin-based Restorative Materials Operative Dentistry 2005; 30:118-128.
10. David AG, Mortier E, Dominique D Microleakage and Polymerization Shrinkage of Various Polymer Restorative Materials J Dent Child 2008; 75:125-33.
11. Rosin M, Schwahn C, Korda B et al A multipurpose clinical evaluation of an ormocer restorative- 2 year interval Quintessence Int 2007;38:306-315
12. Qingchan Li, Jepsen S, Albers H et al Flowable materials as an intermediate layer could improve the marginal and internal adaptation of composite restorations in Class V-cavities, Dental Materials 2006; 22:250-257
13. Xie H, Zhang F, Wu Y et al. Dentine bond strength and microleakage of flowable composite, compomer and glass ionomer cement. Australian Dental Journal, 2008; 53: 325–331.

(Continued from Page 211)

5. Malibaum WW. Endodontic treatment of a ridiculous maxillary premolar: A case Report. Gen Dent 1989; 37: 340-341.
6. Serman NJ, Hasselgren G. The radiographic incidence of multiple roots and canals in human mandibular premolars. International Endodontic Journal 1992; 25: 234-7
7. Slowely RR. Radiographic aids in the detection of extra canals. Oral Surg Oral Med Oral Pathol 1971, 37. 762 772.
8. Atiech MA. Root and canal morphology of maxillary first premolrs in a Saudi population 2008;9:46-53.(PubMed)
9. Ferreira CM, Moraes IG, Bernardineli N. Three-rooted maxillary second premolars. (PubMed)
10. Sert S, Aslanalp, Tanalp J, Investigation of root canal configurations of mandibular permanent teeth in Turkish population. International Endodontic Journal 2004; 37: 494-99
11. Sieraski SM, Taylor GT, Kohn RA. Identification and endodontic management of three-canalled maxillary premolars. J Endod 1989,15:29-32
12. Baisden MK, Kulild JC, Root canal configuration of mandibular first premolar, J. Endod. 1992; 18:505-508