

HELICAL CT ASSISTED MANAGEMENT OF AN ENIGMA: A CASE REPORT

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ABSTRACT

Mandibular premolars are enigma to endodontists because of presence of wide variety of anatomical variations. This clinical trial describes the retreatment of two rooted mandibular premolar containing three canals using spiral computed tomography as a diagnostic aid. Successful nonsurgical endodontic management of mandibular premolar was accomplished. The tooth was clinically asymptomatic and radiographically sound after 8 months.

Thorough use of anatomical knowledge along with the use of invaluable aids like endodontic microscope and 3-D radiographs can greatly aid in successful nonsurgical management of failed root canal cases due to unidentified causes.

INTRODUCTION

"Eyes don't see what mind doesn't know"

The treatment of the entire root canal system is essential to maximize the possibility of obtaining successful outcome in endodontic therapy. It is imperative that aberrant anatomy is identified prior to and during root canal treatment of the teeth. Anomalies associated with mandibular premolars include gemination, dens invaginatus, dens evaginatus, two roots, three roots, bifurcations, trifurcations, one or more canals in single



FIG 1

or multiple roots. These variations should always be kept in mind while doing endodontic therapy of mandibular premolars. The occurrence of three separate canals with three separate foramina at apex is rare in mandibular premolars (Sashi 2005). The use of Spiral Computed Tomography in such cases greatly contributed towards making a confirmatory diagnosis and successful nonsurgical endodontic treatment thereafter (Gurmeet et al 2008). Genetics and racial variations may play the significant role in the differences in the incidences of number of root canals in the human population (Blaine et al 2007).

CASE REPORT

A male aged 24 years reported to the department of Conservative dentistry And Endodontics Banaras Hindu University with the chief complaint of continuous dull non radiating type of pain in the left lower region since 1 week. His medical history was non-contributory. Extraoral examination showed no significant changes. Intraoral examination showed grossly destructed tooth #34 and #35 which



FIG 2

were tender on palpation. Periodontal, endodontic and occlusal evaluations of tooth #34 and 35 were done. Radiographic examination showed poorly obturated single root canal in tooth #34 which had 2 roots visible radiographically [fig 1].

Access was made under local anesthesia with 2% lignocaine solution with 1:80,000 adrenaline (Lignox 2% A; Indoco Remedies Ltd, Mumbai, India) and rubber dam isolation in tooth #34 and #35. Gutta percha was removed from tooth #34 using H files (Mani, Tochigi, Japan) and xylene. Copious irrigation was done using 2.5% sodium hypochlorite (Vensons India, Bangalore, India) and the access cavity was further extended and one more canal was located lingually in tooth #34. Biomechanical preparation was done using K files (Mani, Tochigi, Japan). The canals were dried with paper points (Dentsply Maillefer); calcium hydroxide dressing was done for 1 week. A dry cotton pellet was placed in the pulp chambers of tooth #34 and tooth #35 followed by a temporary seal with

➤ clinical section



FIG 3

Cavit G (3M ESPE, Seefeld, Germany). But patient continued to show symptoms in tooth #34 even after 1 week.

To ascertain this complex root canal anatomy of the tooth in a three-dimensional manner, dental imaging with the help of SCT was planned. Informed consent was obtained from the patient and a multislice helical or SCT imaging of the mandible was performed by using the dental software Dentascan (GE Healthcare, Milwaukee, USA). The involved tooth was focused, and the morphology was obtained in transverse, axial and sagittal sections of 0.5 mm thickness, along with three-dimensional reconstructed images. The SCT images revealed that the lower mandibular first premolar had two separated roots and 3 distinct root canals- two canals in buccal and one lingual [fig. 2,3]

Access cavity was further extended under endodontic microscope (Seiler Revelation Microscope, St Louis, MO) and it was modified from a conventional oval or slot shape to triangular one with the rounded ends using ultrasonic tips [X smart, dentsply, germany]. The pulp chamber floor was then explored with DG 16 explorer mesial to the line joining buccal and the lingual canal to locate the canal in the mesiobuccal direction. Hemorrhagic point was noted approximately 1 mm mesial to the orifice of the buccal and 2 mm mesial to the orifice of the lingual canal. [fig 4].

A canal was located mesiobuccally. The buccal (Vertucci's type IV) root

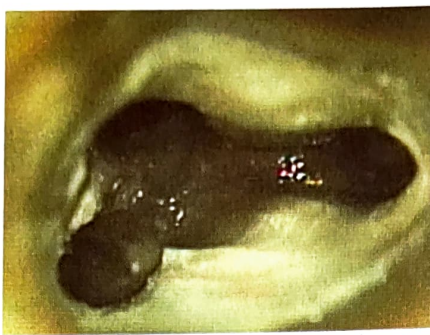


FIG 4

had two and lingual (Vertucci's type I) root had one orifice well-separated and exiting from the floor of the pulp chamber [fig 5].

Mesiobuccal canal was also prepared and calcium hydroxide dressing was given. Patient was recalled after 1 week and patient symptoms were relieved. Canals were obturated by lateral condensation method using resin sealer (RC Seal; Prime Dental Products, Mumbai, India) and gutta-percha (Dentsply Maillefer) [fig 6].

Tooth #34 and #35 were postendodontically restored with core build ups with composite [3M, unitek



FIG 6

Germany] over the underlying light cure glass ionomer base. Patient was recalled after 1 week for coronal restoration of tooth no #34 and #35 and was evaluated radiographically and clinically after 1, 3 and 8 months and the expected healing of the periapical lesions was seen [fig 7].

DISCUSSION

Significant advances in the delivery of dental services have led to increased expectations pertaining to successful



FIG 5

management of endodontic problems and retention of the natural dentition. According to Figdor et al, the success rate of initial endodontic therapy is 83-100% but in spite of such a statistically significant data we are continuously dealing with the patients requiring retreatment and its success rate is 56-84% (Sundqvist and Figdor 1998 and Gorni and Gagilei 2004)

According to Nair and Sjogren there are 5 causes behind the retreatment of the root canals. These are

- 1] Continued intraradicular infection
- 2] Extraradicular infection like periapical actinomycosis

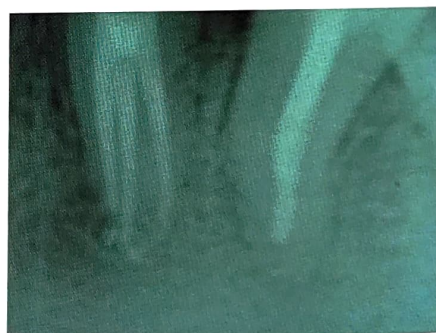


FIG 7

- 3] Foreign body reaction due to extrusion of endodontic material
- 4] Accumulation of endogenous cholesterol crystals that cause inflammation of the periapical tissues
- 5] True cysts with no connection to root canal system (Nair et al 1993 and Nair et al 1998)

Aggravation of periapical lesions mostly occurs due to focus of infection which was not removed during initial endodontic procedure. This persist-

ence of infection is basically due to the missed canals which contain tissue, bacteria and other irritants that inevitably contribute to clinical symptoms and lesions of endodontic origin (Hess *et al* 1983).

The various ways of assessing the missed canals are

Anatomical familiarity

Mandibular premolars are undoubtedly an endodontic challenge, because of the presence of extra roots / root canals which may occur far too often than one can expect.

According to vertucci, 74% of mandibular first premolars have one canal, 25.5% have two canals and less than 5% have three canals at apex. 97.5% of mandibular second premolars have one canal and less than 2.5% have two canals at apex. 78.5% of mandibular first premolars have radicular grooves on the mesiolingual surface of the root with the incidence of two canals being 21% and 80% in the middle and apical parts of root respectively (Bing *et al* 2008).

A thorough knowledge of the root canal anatomy, careful interpretation of the radiographs, proper modification of the conventional access cavity use of CT are the essentials for recognition and adequate treatment of these anatomical variations.

Radiographic analysis

Use of multislice helical CT with 3-D reconstructed images and conventional off angle radiographs are the essentials for recognition and adequate treatment of these canal variations (Bing *et al* 2008). The other methods are Piezoelectric ultrasonics, Endodontic Microscopes or magnifying loupes (Giorgos *et al* 2007), Staining the chamber with 1% methylene blue Dyes, Champagne or bubble test with Sodium hypochlorite, Transillumination. Explorer pressure [DG 16 probe], Restorative disassembly, Perio probing, Symmetry, Color.

After the proper endodontic management of tooth proper coronal seal

is required. If coronal portion of canal is left unsealed dissolution of cement will occur and bacterial products will migrate down the canal walls contributing to an endodontic failure (Britto *et al* 2003). Fabricating core buildups with a Glass ionomer base and overlying composite resin protects from salivary contamination over a long period of time (Kleitches *et al* 1995) all root canals filled with gutta percha but lack of seal are recontaminated in less than 30 days (Khayat *et al* 1993) so post endodontic tight coronal seal is mandatory.

CONCLUSION

Anatomical variation, missed canals, abnormal pathologies etc. can be easily diagnosed with use of 3-D radiograph like CT scan and managed successfully with use of endodontic microscope without the intervention of the invasive procedures.

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