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Non surgical endodontic management of pre molar with vertucci type v canal canal configuration: Two Cases

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Abstract
The predictable results of nonsurgical endodontic treatment depend on adequate knowledge of root canal variations and morphology. It is imperative to read the variation in root canal system preoperatively on radiograph for predictable successful endodontic treatment outcome. Mandibular first pre molar presents anatomical challenge due to variations in their root canal morphology. Most failures and flare are due to variation in internal anatomy and canal morphology and difficulty in negotiating and cleaning and shaping. This article root canal variation of mandibular premolars with vertucci type v root canal was managed successfully.

Keywords: Non-surgical endodontic treatment, premolar, vertucci type v canal configuration, root canal variations

Introduction
The roots are often highly variable and complex. The successful outcome of nonsurgical endodontic treatment depends on adequate knowledge of morphology and internal anatomy of root canal system [1, 2] and thorough cleaning and shaping and hermetically sealing the all the canals.
Mandibular first pre molar presents anatomical challenge due to variations in their root canal morphology [3]. And mandibular first pre molars are wider buccolingually than mesiodistally [4]. Sudden disappearance of radiolucency of root on radiograph indicates presence of variation in root canal, thus it is very important to evaluate pre-operative radiograph. Cone beam computer tomography is essential tool in identification of variation in root canals.
Most failures and flare are due to variation in internal anatomy and canal morphology and difficulty in negotiating and cleaning and shaping. Incidence of requirement of re treatment in missed canal is 42% [5]. And failure rate of nonsurgical endodontic treatment in mandibular pre molar is 11.45% [6]. This article describes successful nonsurgical endodontic management of mandibular first pre molars.

Case 1
A 32-year-old male patient reported to department of conservative dentistry and endodontics with chief complaint of pain in left lower region of the jaw. Pain was spontaneous on exposure to cold there was prolonged episode of pain. On radiographic examination proximal caries lower first pre molar very close to pulp without any change on periapical region (1a). Vitality testing was done using endo ice (Coltène/Whaledent Inc,OH ,USA),confirmed prolonged pain after removal of cold. Endodontic diagnosis of symptomatic irreversible pulpitis was made, patient informed about the treatment procedure.
2% lignocaine with 1; 2, 00,000 used to obtain local anesthesia nonsurgical endodontic procedure initiated under rubber dam application. Working length determined with apex locator (Guilin Woodpecker Medical Instrument Co., Ltd) (1b) and confirmed by digital radiography (Sirona, Bensheim, Germany. Under surgical operating microscope (Leica, Carl

Zeiss, Jena 16 X, Bensheim, Germany) both the canal enlarged up to 25/06 Twisted file (Sybron Endo Orange, CA, USA) in crown down technique (1c). 2.5% sodium hypochlorite used for disinfection of canal and Endo activator (DENTSPLY Tulsa Dental Specialties, Tulsa, OK) used for activation.17% EDTA and saline used as final rinse. All the canals are dried using absorbent paper points and using AH plus sealer (Dentsply, De Trey Konstanz, Germany) obturation was done (1d). Post obturation composite restoration done, on follow up patient was asymptomatic.

Case 2

A 21-year-old female patient with a noncontributory medical history reported to department of conservative dentistry and endodontics with chief complaint of pain in left lower region of the jaw. Clinical examination showed fractured mandibular first pre molar with pulp exposure (2a). The tooth was not sensitive to cold testing or electronic pulp testing (Vitality Scanner, Analytic Technology, Glendora, CA, USA) Pain was spontaneous on exposure to cold there was prolonged episode of pain. On radiographic examination proximal fractured mesial cusp with pulp exposure any change on periapical region. Endodontic diagnosis of pulpal necrosis was made, patient informed about the treatment procedure.

2% lignocaine with 1; 2, 00,000 used to obtain local anesthesia nonsurgical endodontic procedure initiated under rubber dam application. Working length determined with apex locator (Guilin Woodpecker Medical Instrument Co., Ltd) (2b) and confirmed by digital radiography. Under surgical operating microscope both the canal enlarged up to 25/06 Hiflex (Coltène/Whaledent Inc, OH, USA) in crown down technique((2c). 5.25% sodium hypochlorite used for disinfection of canal and Endo activator (DENTSPLY Tulsa Dental Specialties, Tulsa, OK) used for activation. The canals were then dried with absorbent paper points, and calcium hydroxide (Prime Dental Product P Ltd, India.) dressing was given in the canals and the access was closed with Cavit. Patient was recalled after one week. Patient was totally comfortable when returned. 17% EDTA and saline used as final rinse. All the canals are dried using absorbent paper points and using AH plus sealer (DENTSPLY, De Trey Konstanz, Germany) obturation was done(2d). Post obturation composite restoration done, on follow up patient was asymptomatic.

Discussion

The mandibular first premolar presents a unique challenge to the Endodontist in terms of its varied anatomic presentations. An endodontist's enigma, Mandibular first premolars are known to sometimes have a single canal, but they can also have more than one, with the canals branching or dividing at various levels of the root [7]. This unique combination of anatomical diversity along with racial predilections makes, treating these teeth a challenge not only during the biomechanical preparation phase, the successful Obturation of such teeth is a herculean task.

The most the main reason for post-treatment disease or failure is the incomplete treatment due to missed canals or improper cleaning and sealing and hermetically sealing with three dimensionally obturatinga situation that commonly arises in mandibular first premolars [7, 8].

In vitro studies may give us ideal results however their application *in vivo* may not be possible at all, in this respect, staining the tooth and then clearing it to enhance the visibility of the internal structures however cannot be used *in vivo*, particularly the root canal system [9]. The complex anatomy of the canal system in mandibular premolars indeed presents significant challenges when using conventional radiography for clinical assessment [10]. Advanced technologies like cone beam computer tomography (CBCT) are considered the investigations of choice due to their advanced imaging capabilities, which allow for precise diagnosis and treatment planning. However, in our case conventional radiographs are used as diagnostic tool.

Mandibular first premolars are well-known in dental literature for their highly variable root canal systems**,** which can be challenging to treat. A typical presentation being a greater dimension of the root canal buccolingually rather than in the mesiodistal dimension.

The large, pointed buccal horn and small, rounded lingual horn are important features of the pulp chamber anatomy in the mandibular first premolar, and their detection is essential for successful endodontic treatment**.** At the cervical portion**,** the canal tends to be oval**,** becoming flat or round as it progresses toward the middle and apical portions of the root. However, if there are two canals, they maintain a circular shape, from the pulp cavity to the apical foramen of the root. The anatomical variation of a single, broad canal bifurcating into two separate canals towards the apical foramen is not uncommon in mandibular first premolars. Recognizing this variation during endodontic treatment is crucial for ensuring thorough cleaning, shaping, and obturation of the root canal system. The lingual canal in mandibular first premolars is often difficult to locate due to its sharp deviation from the buccal canal**,** making it essential for endodontists to employ a combination of techniques to ensure successful treatment. The lingual inclination of premolar crowns certainly presents challenges when trying to locate the lingual canal. However, with careful attention to access cavity preparation, the use of magnification and illumination, and the application of advanced imaging tools like CBCT, clinicians can overcome the natural deflection of instruments and successfully identify the lingual canal orifice (12).

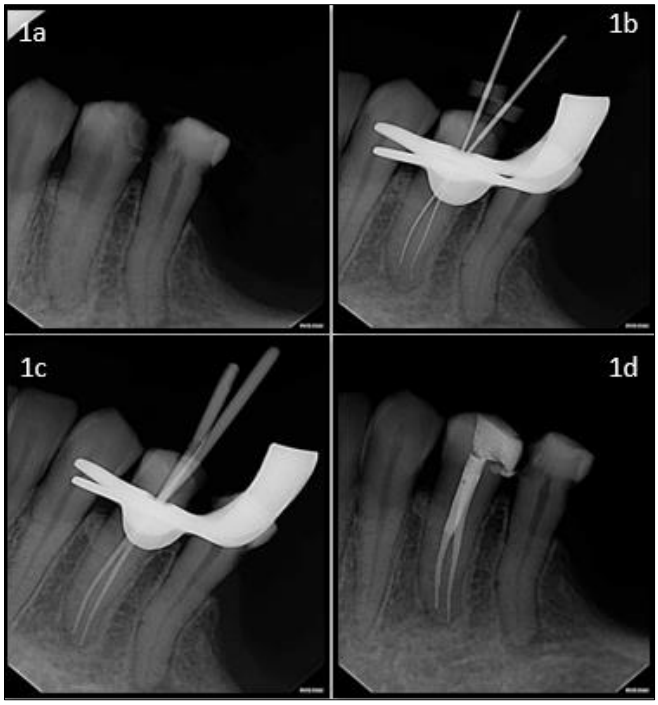

Fig 1: a- Pre-operative radiograph showing caries involving pulp
b- Working length determined
c- Master cone
d- post obturation

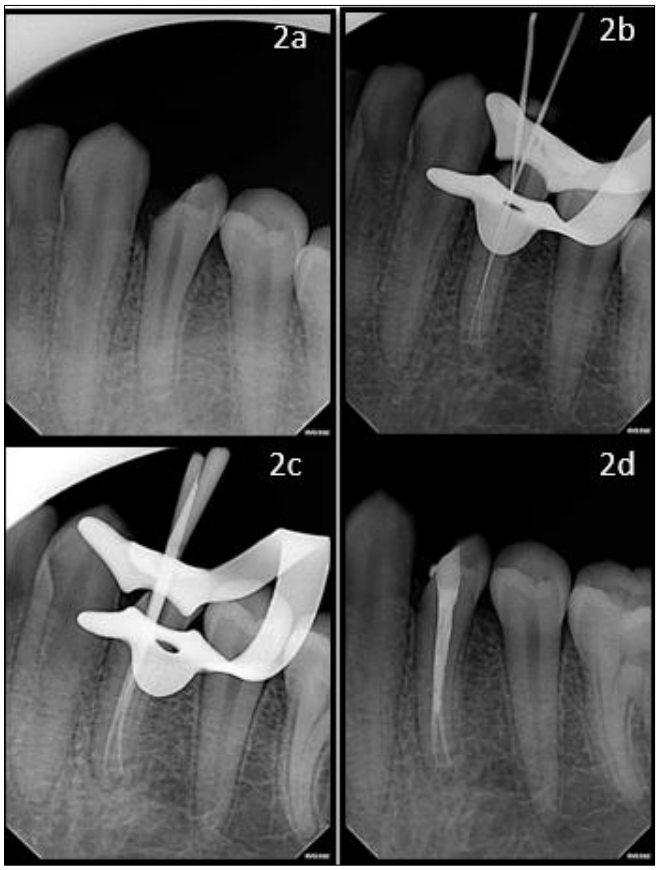

Fig2: a- Pre-operative radiograph showing fracture cusp
b- Working length determined
c- Master cone
d- Post obturation

Conclusion

The root canal anatomy of mandibular first premolars can vary significantly, with potential for multiple canals**,** fused or separate systems, and lingual canal challenges. Understanding these variations is essential for successful endodontic treatment, allowing the clinician to recognize

potential obstacles, take appropriate diagnostic steps, and select the best approach for each case.

By staying aware of these anatomical variations and using advanced diagnostic tools, clinicians can achieve better outcomes by ensuring that all aspects of the canal system are thoroughly cleaned, shaped, and sealed, leading to predictable and successful treatment.

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