Case Report

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Endodontic Management of a Mandibular Third Molar with Three Roots-Five Canals with an Aid of Spiral CT Scan

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ABSTRACT

Background: The primary objective of endodontic therapy is to achieve a three-dimensional obturation of the root canal space after adequate preparation of the canal space to remove the tissue debris, microorganisms, and their byproducts. Missed roots and canals are a major reason for failure of root canal therapy. Technological advances have given the clinician ample opportunity to identify and treat these aberrations successfully . The present article discusses the successful treatment and preservation of a mandibular third molar with three separate roots and 5 root canals, which was confirmed with spiral CT and precisely located with the help of fluorescence dye.

Keywords: Mid mesial, spiral CT, fluorescence dye, ultrasonics tips, mandibular 3rd molar, molar, anatomy, extra canals.

INTRODUCTION

The pulp cavity is situated in the centre of the tooth, it is divided into the pulp chamber, and the radicular canals situated into the dental root. The radicular canal is a continuation of the pulp chamber. The openings of the radicular canal beside the tooth include the apical foramen and the accessory foramina, the latter being placed at the level of the pulp floor in a proportion of 8% and at the surface of the radicular furcations in a proportion of 64% [1].The success of the root canal treatment depends on the correct identification of the anatomy of the complex root canal system before cleaning, shaping and obturation. Radiographic examination using conventional intraoral periapical views is very important for the evaluation of the canal configuration . However, it has its inherent limitation to assess the root canal system completely[2]. Recently, CT and CBCT imaging has been shown to provide comparable images [3]. Gulabivala and others [4] recently reported that 13% of mandibular first molars in people of thai origin had a third distolingual root. The additional root is generally located on the lingual aspect and has a Vertucci type I canal configuration[5]. Such a variant has not been reported for the mandibular second molar, but it is found (rarely) in the mandibular third molar [4].

With increasing reports of aberrant canal morphology, the clinician needs to be aware of this varied anatomy of the root canal . The purpose of this article is to report successful treatment of mandibular 3rd molar with three mesial and two distal canals. Detection of additional canals might be aided with the use of dye and advanced radiographic techniques like computerised tomography which is proved in this cases.

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CASE REPORT

A 36 year old female patient reported to department of conservative dentistry, pacific dental college, Udaipur with pain which was sharp in nature related to lower right posterior region for last 10 days. Extra oral examination revealed no swelling, sinus tract or lymphadenopathy. Radiovisiography revealed carious left mandibular third molar involving pulp(fig 1a). Opposing third molar was in occlusion , so patient had given a choice of either to save or to extract the tooth chronic irreversible pulpitis was diagnosed with 38.

Fig 1a: Pre-Operative Radiographs.

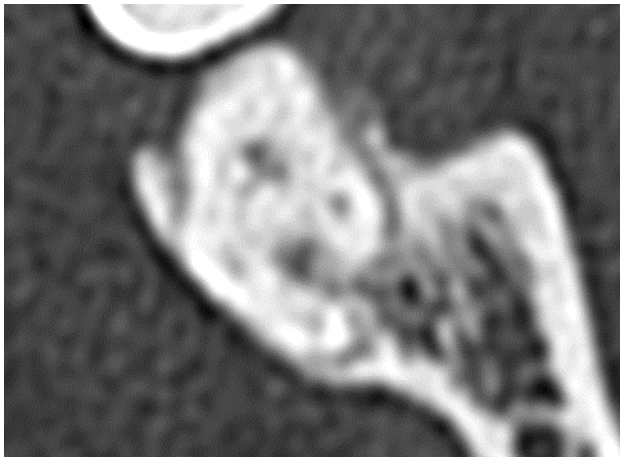

Fig 1b: spiral CT.

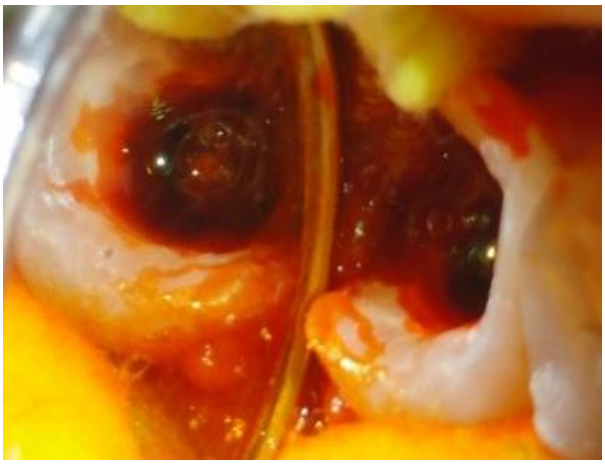

Fig 2a: Fluorescein sodium dye used to flood the access cavity.

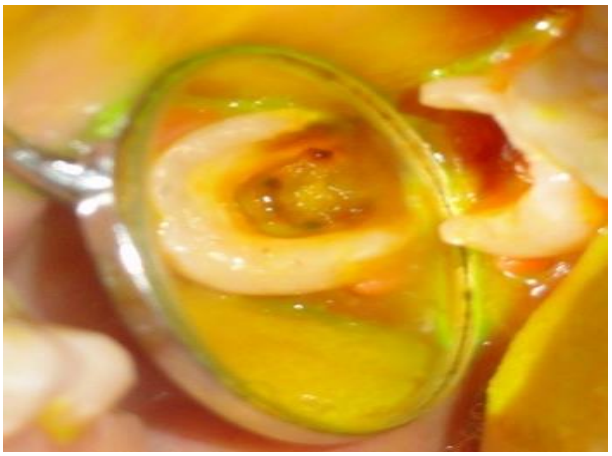

Fig.2b:dye uptake by tissue at orificies fluorescence green

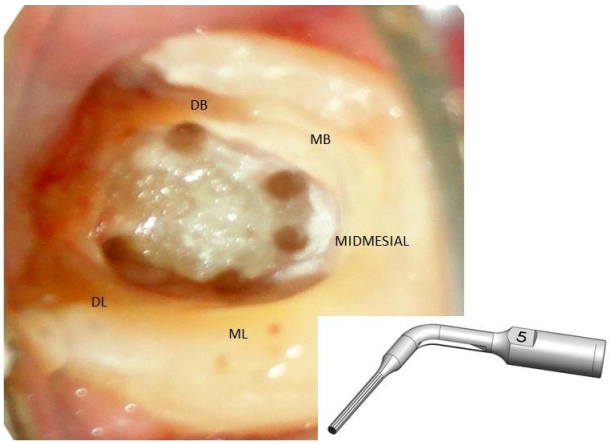

Fig 3a:canal orifice located by ultrasonic tips Start-X#5

Fig 3b:Working Length IOPA.

Fig 4a: Master cone.

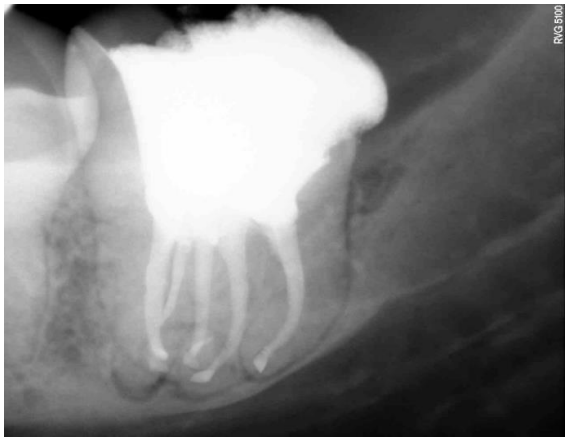

Fig 4b: Obturation.

The patient gave no significant medical history. Local anesthesia was obtained by inferior alveolar nerve block . Once a treatment plan was in place, a spiral CT scan(fig 1b) was very helpful in determining the exact position of the canals and in designing the access cavity according to the exact anatomy, which was different from that of a normal single tooth. Straight line access was established and access cavity was prepared and 5 different canals were located using fluorescence sodium dye(fig 2a &2b) . Canal orifice was located with the help of ultrasonic tips Start-X#5 (Fig 3).Working length determined and IOPA taken(fig 4).

Cleaning & shaping completed with S1, S2 & F1 sequence. Every preparation step were followed with warm sodium hypochlorite irrigation and followed up with EDTA. The patient returned asymptomatic for the recall visit after 5 days. A gutta-percha cone fit radiograph was made for further confirmation of the length of all canals(fig 4a) & the canals were dried using paper points and obturated with laterally condensed gutta - percha points using AH plus sealer (De Trey, Dentsply, Switzerland) and the access opening was sealed with a cotton pellet and temporary restoration. Obturation was done using AH plus sealer and final post obturation radiograph was then taken(Fig 4b).Clinical follow up was performed to monitor periradicular healing after one month. As the patient experienced no postoperative discomfort and was referred for appropriate coronal restoration.

DISCUSSION

Prosthetic, restorative, and orthodontic considerations often require endodontic treatment of third molars for them to be retained as functional components of the dental arch. As a result, endodontic treatment of third molars often becomes part of comprehensive treatment plans, as it represents a more conservative and less invasive approach than its therapeutic alternatives. However, third molars have been associated with greater anatomic variations in root configuration. Sidow et al described the root canal morphology of third molars and found that 17% of mandibular third molars had 1 root, 77% 2 roots, 5% 3 roots, and 1% 4 roots[6].To determine the presence of additional roots, there should be slight different approach besides normal procedural protocol and the clinicians should look for the following signs ,such as

a) cervical prominence, where it should be detected through periodontal probing.

b) Extra cusp, which is present in combination with cervical prominence.

c) Multiple radiographs should be taken at different angulations.

d) Coronal flaring should be done for better visualization of canal orifice.

e) Troughing of grooves with ultrasonic tips.

Prashant.et.al[7] detected extra canals with the help of dental operating microscope in maxillary first molar.Recently, various attempts have been made to use CT imaging for the confirmatory diagnosis of morphologic aberrations in the endodontic field , evaluation of root canal preparation/ obturation, detection of bone lesions [8] and vertical root fractures[8] . The use of dyes for extra canals detection is a well known method. Fluorescein sodium (Ful Glo®, Akorn Inc, Somerset, NJ) dye is available in pharmacies as a clear, orange-red Solution . Once straight-line access is achieved, the pulp chamber is flooded with fluorescein sodium and allowed in contact with all the walls for a couple of minutes and the excess is then suctioned away. Blue light (dental curing light) is used to illuminate the chamber and the bright green fluorescence emitted by the pulp tissue that has absorbed the dye[9] and can be visualized. In the case Ultrasonic tips Start-X #2 although used for exploration of second mesiobuccal canal, are a very useful tool for locating extra canals in mandibular molar[10] as the hidden orifices can be negotiated directly from the floor. Start-X#5 is used in the removal of calcification and smoothening of floor are useful to localize the root canal orifices[11].

The scouters used were stainless steel K-files no. 8 and after length was determined by apex locator and confirmed with radiographs then glide path was prepared by path files[12]. The final preparation was done using rotary protaper till F1. EndoActivator (Dentsply, Maillefer) was used for disinfecting the canal. It is based on sonic vibration (up to 10,000 cpm) facilitates the penetration and renewal of the irrigant in the canal [13,14] for deeper cleaning.

CONCLUSION

The variation in root or root canal morphology, especially in multirooted teeth is challenging for diagnosis and success of endodontic therapy. Evaluation of the literature shows deviations from the norm in that tooth morphology is not uncommon and a sound knowledge of dental anatomy and its variations and with the use of dyes, CT, and ultrasonic tips kit ,detection of extra canals have become much more easier for successful endodontic treatment.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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