A Mandibular Third Molar with Three Mesial Roots: A Case Report

Gianluca Plotino, DDS

Abstract

Although its most common configuration is 2 roots and 3 root canals, mandibular molars might have many different combinations. A case of unusual root canal morphology is presented to demonstrate anatomic variations in mandibular molars. Endodontic therapy was performed in a mandibular third molar with 3 separate mesial roots. The appearance of the pulp chamber floor revealed 4 separate canal orifices. Radiographically the 4 root canals ended in their own distinct foramen. Many reports deal with 3 orifices or 3 independent canals in the mesial root, but none described 3 mesial canals in 3 separate mesial roots, indicating a rare anatomic configuration. This report points out the importance of looking for additional canals and unusual canal morphology, because knowledge of their existence might occasionally enable clinicians to treat a case successfully that otherwise might have ended in failure. *(J Endod 2008;34:224–226)*

Key Words

Mandibular molar, tooth anatomy

From the Department of Endodontics, Catholic University of Sacred Heart, Rome, Italy.

Address requests for reprints to Gianluca Plotino, DDS, Via Eleonora Duse, 22, 00197 Rome, Italy. E-mail address: gplotino@fastwebnet.it.

0099-2399/$0 - see front matter

Copyright © 2008 by the American Association of Endodontists.

doi:10.1016/j.joen.2007.11.014

The main objective of root canal therapy is the thorough mechanical and chemical cleansing of the entire pulp space and its complete obturation with an inert filling material and a coronal filling, preventing ingress of microorganisms (1). One of the main reasons associated with endodontic failure is the persistence of microbial infection in the root canal system (2). The complexity of the root canal system is the major challenge for any dentist undertaking root canal treatment from both a technical and a microbiologic point of view (1). It is therefore considered important to be familiar with variations in tooth/canal anatomy and characteristic features in various racial groups. Such knowledge can aid location and negotiation of canals as well as their subsequent management.

Over the years there have been numerous studies that described the morphology of teeth including mandibular molars (1). The major variant in this group is the mandibular first molar with 3 roots. The additional root is usually located on the lingual aspect (3). Such a variant has not been reported in the mandibular second molar, in which there is a higher prevalence of C-shaped root canals (4), but it is rarely found in the mandibular third molar (5). The mandibular third molar, being the last tooth in the molar series, has been associated with greater variation in root pattern and canal systems (6, 7).

The morphology of the mesial canals in mandibular molars is complex, with a high frequency of intercanal communications (8). Multiple case reports have described aberrant canals in the mesial root of the mandibular first molar (9). The presence of a third canal (middle mesial) in the mesial root of mandibular molars has been reported to have an incidence rate of 1%–15% (9). In virtually all cases this canal joined either the mesiolingual (ML) or mesiobuccal (MB) canal in the apical third (10); thus it has been argued that it was not an extra canal but rather the sequelae of instrumenting the isthmus between the ML and MB canals (11). The occurrence of 3 independent canals in the mesial root was frequently reported in literature, both in vitro and in vivo (9), but through an extended literature search, 3 mesial canals in 3 separate mesial roots have never been described, indicating a rare anatomic configuration.

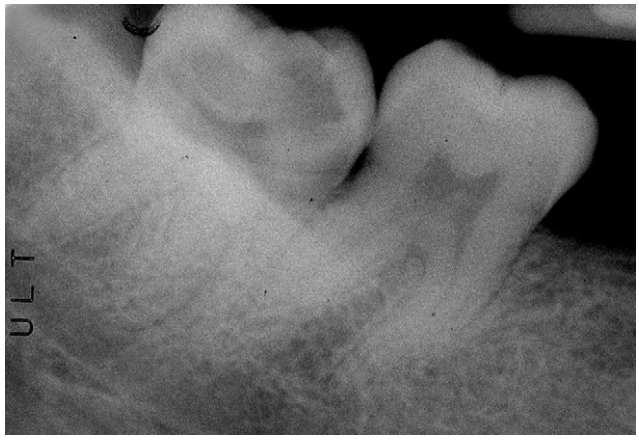

Figure 1. Preoperative radiograph of a right mandibular third molar with a deep, carious lesion approximating the pulp with no signs of periapical radiolucency.

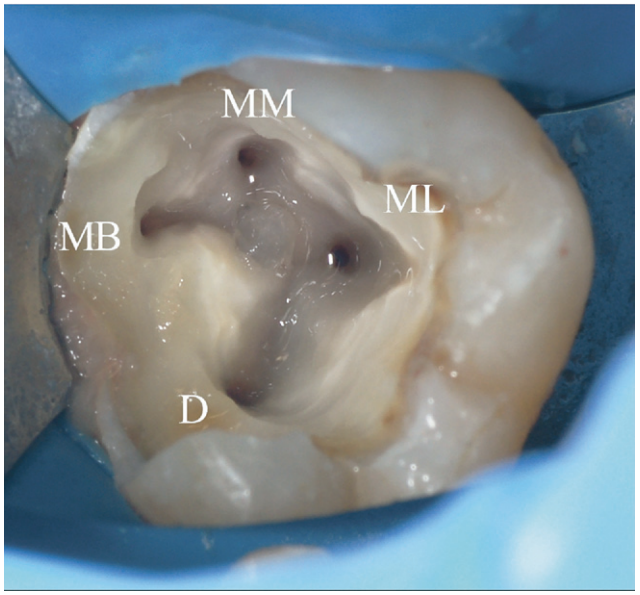

Figure 2. Intraoperative image of the pulp chamber floor revealing 3 separate mesial root canals (MM, middle mesial).

The purpose of this article was to report the successful treatment of a case of a mandibular third molar with 3 separate mesial roots.

Case Report

A 38-year-old female patient was referred to the dental office for endodontic treatment of the right mandibular third molar, with no history of pain. The general anamnesis contained no abnormal data. In the dental history no episodes of spontaneous pain were found. On examination the tooth showed a deep carious cavity on the buccal surface. The tooth was not painful to percussion and was not responsive to sensitivity tests (cold, hot, electric). The preoperative diagnostic radiograph of the right molar revealed a deep, carious lesion approximating the pulp with no signs of periapical radiolucency (Fig. 1). The clinical diagnosis of necrotic pulp without apical periodontitis was made, and endodontic treatment was scheduled.

After local anesthesia, rubber dam isolation, and disinfection of the field with 30% H_2O_2 and 5% tincture of iodine, all carious tissue was removed, and an adequate endodontic access was made. On inspection with 4.5× magnification prismatic loupes (Zeiss Eyemag Pro S; Carl Zeiss SpA, Arese, Italy), the pulp chamber floor showed 4 orifices corresponding to 4 root canals: MB, middle mesial, ML, and distal (Fig. 2). The working lengths were established with an electronic foramen locator, and 4 files were used to confirm them radiographically (Fig. 3). The working length measurement radiogram showed 3 independent mesial root canals in 3 separated mesial roots. The canals were instrumented with Mtwo (VDW GmbH, Munich, Germany) NiTi rotary instruments in a simultaneous technique (12). Irrigation was made with copious amounts of 5% sodium hypochlorite and 17% ethylenediaminetetraacetic acid. The canals were finally washed with sterile saline, dried with sterile paper points, and filled with Thermafil (Dentsply-Maillefer, Ballaigues, Switzerland) and AH-Plus cement (Dentsply DeTrey GmbH, Konstanz, Germany) (Fig. 4). To ensure adequate seal during interappointment time, an adhesive plug of resin composite flow (Estelite Sigma; Tokuyama Dental Corp, Tokyo, Japan) 2 mm in thickness was put on each root canal orifice, and intermediate restorative material was used. The patient experienced no postoperative sequelae, and an appropriate coronal restoration was performed in a subsequent appointment to ensure an adequate coronal seal. The follow-up radiogram taken 18 months later showed the maintenance of the normal status of the periradicular tissue (Fig. 5). The patient will be followed clinically every 6 months during the first 2 years and then yearly to monitor periradicular responses (Fig. 6).

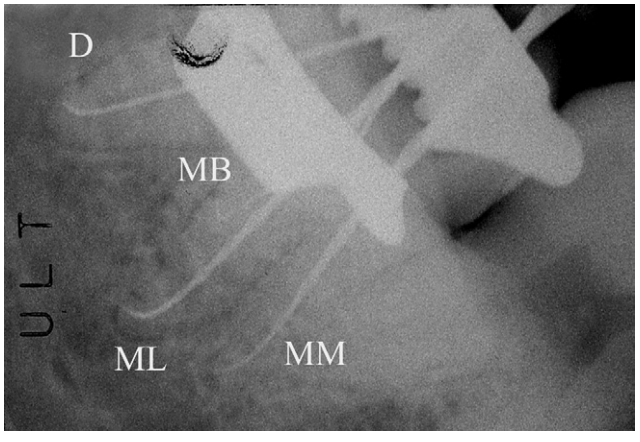

Figure 3. The root canals were successfully negotiated to the apex. The working lengths were established with an electronic foramen locator, and 4 files were used to confirm them radiographically.

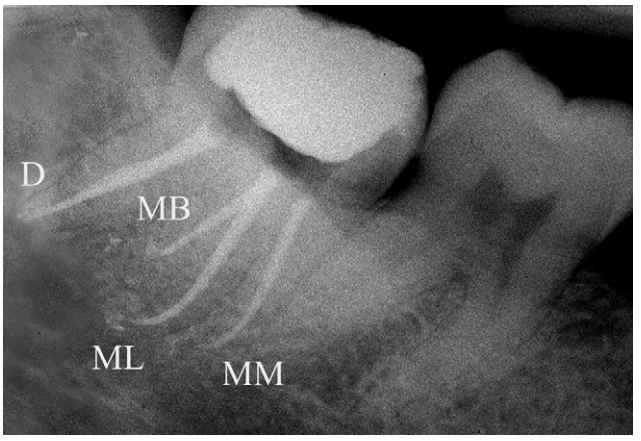

Figure 4. Postoperative radiographs. Root canals were filled with gutta-percha and sealer.

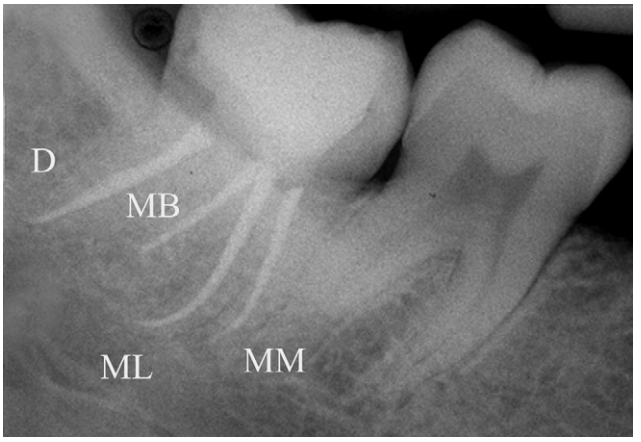

Figure 5. Eighteen-month recall radiograph showing the maintenance of the normal status of the periradicular tissue.

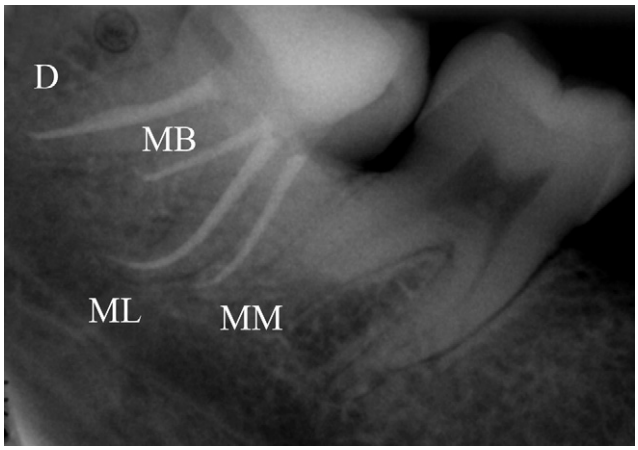

Figure 6. Two-year recall radiograph showing the maintenance of the normal status of the periradicular tissue.

Discussion

Before root canal treatment is performed, the dentist ideally should know the morphology of the pulp chamber of the teeth he will treat. All root canals should be accessed, cleaned, and shaped to receive a hermetic filling of the entire root canal space. Incomplete cleaning, shaping, and obturation of any root canal will lead to almost certain root canal treatment failure.

Because of the frequency in the literature of reports dealing with anatomic variations of mandibular molars, the clinician should give particular attention to thoroughly observing the pulp chamber floor to locate possible accessory canal orifices. This will increase the chance for long-term successful endodontic therapy.

This case report points out the importance of keeping a third molar with a complete endodontic treatment. Third molars are often extracted, but if they are well-positioned in the arch, the maintenance of a third molar in function might be of some importance as distal abutment for a future prosthetic restoration. Root canal treatment has been completed in a single visit because there is evidence in literature that single visit root canal treatment might be as effective as multiple visit root canal treatment (13, 14).

The case reported in this article was a rare case showing 3 mesial root canals in a mandibular third molar where the middle mesial fell within a separate root rather than between the MB and ML in the same root. However, because of the distribution of the 4 openings, one might suspect it was from a rotated third molar that showed 2 mesial canals and 2 distal canals. The latter is a more common and likely configuration as opposed to 3 mesial roots. The only tangible proof that the treated tooth was a mandibular third molar with 3 mesial roots would be examination after extraction, but from an occlusal view of the clinical image, it was evident that major diameter of the third molar was the mesiodistal one, as expected from anatomic consideration. Furthermore, even if the anatomy of the crown might be so various in third molars, it might be recognized by the presence of 3 lingual cusps, with the small accessory distolingual cusp, which is frequent in lower molars. In addition, it is evident in Fig. 2 that the presence of a depression on the buccal surface of the tooth might represent the furcal depression that divides the mesial roots from the distal one.

References

1. Vertucci FJ. Root canal morphology and its relationship to endodontic procedures. Endodontic Topics 2005;10:3–29.
2. Nair PN. On the causes of persistent apical periodontitis: a review. Int Endod J 2006;39:249–81.
3. Sperber GH, Moreau JL. Study of the number of roots and canals in Senegalese first permanent mandibular molars. Int Endod J 1998;31:117–22.
4. Weine FS. The C-shaped mandibular second molar: incidence and other considerations. J Endod 1998;24:372–5.
5. Gulabivala K, Aung TH, Alavi A, Ng Y-L. Root and canal morphology of Burmese mandibular molars. Int Endod J 2001;34:359–70.
6. Pineda F, Kuttler Y. Mesiodistal and buccolingual roentgenographic investigation of 7,275 root canals. Oral Surg Oral Med Oral Pathol 1972;33:101–10.
7. Green D. Double canals in single roots. Oral Surg Oral Med Oral Pathol 1973;35:689–96.
8. Mannocci F, Peru M, Sherriff M, Cook R, Pitt Ford TR. The isthmuses of the mesial root of mandibular molars: a micro-computed tomographic study. Int Endod J 2005;38:558–63.
9. Baugh D, Wallace J. Middle mesial canal of the mandibular first molar: a case report and literature review. J Endod 2004;30:185–6.
10. Fabra-Campos H. Three canals in the mesial root of mandibular first permanent molars: a clinical study. Int Endod J 1989;22:39–43.
11. Mortman RE, Ahn S. Mandibular first molars with three mesial canals. Gen Dent 2003;51:549–51.
12. Plotino G, Grande NM, Sorci E, Malagnino VA, Somma F. A comparison of cyclic fatigue between used and new Mtwo Ni-Ti rotary instruments. Int Endod J 2006;39:716–23.
13. Peters LB, Wesselink PR. Periapical healing of endodontically treated teeth in one and two visits obturated in the presence or absence of detectable microorganisms. Int Endod J 2002;35:660–7.
14. Figini L, Lodi G, Gorni F, Gagliani M. Single versus multiple visits for endodontic treatment of permanent teeth. Cochrane Database Syst Rev 2007;17:CD005296.