ORIGINAL ARTICLE

VARIATIONS IN ROOT CANAL MORPHOLOGY OF MANDIBULAR FIRST MOLAR IN ASSIR POPULATION

MOHAMMED A AL QARNI

ABSTRACT

Knowledge of internal dental morphology is an extremely important step in planning and administering endodontic therapy. The numerous anatomical variations existing in the root canal system may contribute to the failure of root canal therapy. The mandibular first molar which is the earliest permanent posterior tooth to erupt, seems to be the tooth that most often requires root canal treatment. Anatomical Characteristics of permanent mandibular molars are generally described as a group of teeth with two roots. The usual canal distribution is two canals in the mesial root and one or two in the distal root. In 1974, Vertucci and Wiiliams as well as Barker et al.described the presence of a middle mesial canal. Additionally, Stoner etal. and Beatty and Iterian have reported on more obscure cases in which a third canal was located in the distal root. Martinez and Bandaneli showed two cases with six canals. Astonishingly, Reeh has even reported a case with seven canals, consisting of four canals in the mesial root and three in the distal root.

The role of advanced diagnostic tools cannot be overlooked in the diagnosis and management of such a complex canal system. This review presents first mandibular molar with varied root canal morphology.

INTRODUCTION

The goal of root canal treatment is to clean the root canal system as possible and to fill it in all its dimensions to eliminate or at least reduce the microbial load in the canals. Therefore, the details of unusual root canal morphology should be known thoroughly to ensure successful root canal treatment. The canals should be accurately located, cleaned, shaped, and obturated. Incompetence in locating, cleaning and shaping or obturating the complete root canal system causes primary and post-treatment infections which often lead to endodontic treatment failures.[1]

However, the most significant reason for the root canal treatment failure is insufficient knowledge about the root canal morphology and its variations. This is because such unexplored areas of root canal system remain unaffected by instruments and antimicrobial substances and form the seat for the persistent infection. Thus, it is critical to assess the numerous morphological variations of the root canal system before initiating the endodontic procedure.[2,3]

Mohammed A Al Qarni, Assistant Professor, Consultant in Restorative Dentistry, College of Dentistry, King Khalid University, Abha 61471, Saudi Arabia
Tel: +966172418047 Cell: +966-554155126
Email: maalqarny@kku.edu.sa

Received for Publication: March 15, 2016
Revised: April 24, 2016
Approved: April 25, 2016

The mandibular first molar which is the earliest permanent posterior tooth to erupt, seems to be the tooth that most often requires root canal treatment. Anatomical characteristics of permanent mandibular molars are generally described as a group of teeth with two roots. The usual canal distribution is two canals in the mesial root and one or two in the distal root. In 1974, Vertucci and Wiiliams as well as Barker et al described the presence of a middle mesial canal. Since then, several case reports of multiple canal systems in mandibular first molars have been investigated and described. It has been postulated that secondary dentin apposition during tooth maturation would form dentinal vertical partitions inside the root canal cavity, thus creating root canals. A third root canal may also be created inside the root canal cavity of mandibular molars by this process. Such third canals are situated centrally between the two main root canals, the buccal and lingual root canals. The diameter of those third middle canals is smaller than that of the other two. The probability of a mandibular first molar having a fifth canal is 1-15%.[4,5] The present study was conducted to evaluate the variation in root canal morphology of mandibular first molars in patients from Asir region.

METHODOLOGY

This study was conducted in Department of Restorative dental Science College of Dentistry King Khalid University, Abha Saudi Arabia. A total of 300 patients requiring Endodontic treatment of mandibular first

molar irrespective of canal morphology were included in this study. All patients were from asir region Saudi Arabia. Before initiating Endodontic treatment two periapical X-rays in different angulations were taken to assess the canal morphology. After the administration of local anesthesia and Rubber dam application, Access cavity was made and canal location was done using magnifying loupes. Working length X-rays were taken to confirm the presence of canals. After confirmation, each canal was cleaned and shaped followed by obturation.

RESULTS

A total of 271 patients were completed. 29 patients did not turn up for completion of their treatment. Out of 271 endodontically treated mandibular first molars, 190 had three canals (70%), 79 has 4 canals (29%) and only 2 cases with extra distolingual root (Radix Entomolaris) (1%). In the present study none of the mandibular first molars had a fifth or six canals.

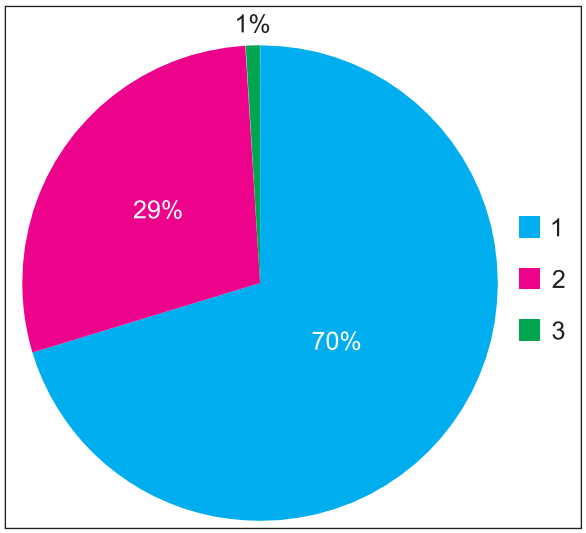

Fig 1: Evaluation of root canals

DISCUSSION

A thorough knowledge of root canal morphology and the configuration of the teeth play an important role in the success of endodontic therapy. The clinician is confronted daily with a highly complex and variable root canal system.[6] Prior to beginning treatment, the dentist cannot precisely determine the actual number of root canals present. The idea that the tooth has fixed number of roots and root canals in now obscure and it's the responsibility of an endodontist to locate and treat the extra canals.[7,8] Anatomical variations are an acknowledged characteristic of mandibular permanent molars. Although a majority of the mandibular molars are two rooted with a mesial and distal root, an extra disto-lingual root may occasionally be encountered. Some authors consider a radix entomolaris as a genetic trait rather than a developmental anomaly.

Straight and angled preoperative are essential before commencing the treatment. Apart from preoperative radiographs, various intraoperative methods for locating extra canals are[9]:

- Adequate access modification for enhance visualization
- Careful observation of dentinal map
- Uncovering calcification from chamber floor may also help detect extra canals.
- Careful exploration with a sharp explorer of the floor.
- Fiberoptic illumination.
- Champagne bubble test under magnification.
- Magnifying loupes and Dental operating microscope.

CONCLUSION

The concept that each tooth has a fixed number of root and root canals is now obsolete and it is the responsibility of dentist to look for those Elusive canals that might get missed leading to poor prognosis of treatment. In past decade or so dentistry especially the specialty of endodontics has witnessed a sea of change with the introduction of newer and improved armamentarium that has made the treatment more predictable.

REFERENCE

1 Srinidhi V Ballullaya, Sayesh Vemuri, and Pabbati Ravi Kumar: Variable permanent mandibular first molar: Review of literature: J Conserv Dent. 2013 Mar-Apr; 16(2): 99-110.

2 OV de Pablo, R. Estevez, M. Peix Sanchez, C. Heilborn, and N. Cohenca: "Root anatomy and canal configuration of the permanent mandibular first molar: a systematic review," Journal of Endodontics, 2010 vol. 36, No. 12, pp. 1919-31.

3 Navarro LF, Luzi A, Garcia AA, Garcia AH. Third canal in the mesial root of permanent mandibular first molars: Review of literature and presentation of 3 clinical reports and 2 in vitro studies. Med Oral Patol Oral Cir Bucal. 2007; 12: 605-9.

4 Bilge Gulsum Nur et al. Evaluation of the root and canal morphology of mandibular permanent molars in a south-eastern Turkish population using cone-beam computed tomography: Eur J Dent. 2014 Apr-Jun; 8(2): 154-59.

5 Adanir N. An unusual maxillary first molar with four roots and six canals: A case report. Aust D J. 2007; 52: 333-35.

6 H.R.D. Peiris, T.N. Pitakotuwage, M. Takahashi , K. Sasak: Root canal morphology of mandibular permanent molars at different ages: International Endodontic Journal, 41, 828-35, 2008.

7 Walker R, Gulabivala K. Endodontics. 3rd ed. Edinburgh: Elsevier Mosby; 2004.

8 Fabra-Campos H. Three canals in the mesial root of mandibular first permanent molars: A clinical study. Int Endod J. 1989; 22: 39-43.

9 Singhal, Anurag; Gurtu, Anuraag; Guha, Chandrawati; Mohan, Sumit: Elusive Canals - "An Endodontic Enigma" : Indian Journal of Dental Sciences. Oct 2012, Vol. 4 Issue Supp 1, p 141-46.