Abstract

Failure to recognise and treat aberrant canal anatomy can affect the prognosis of endodontic therapy. This case report shows a variation in conventional anatomy in mandibular first molars. A third mesial canal may be present between the mesio-lingual and mesio-buccal canal in Mandibular molars. A clinician should be aware of the possibility of this extra anatomy when treating mandibular molars.

Introduction

A comprehensive knowledge of canal anatomy and its variations is essential to ensure consistency in endodontic therapy. Variations from conventional anatomy are encountered occasionally in all teeth. Inability to recognise, detect and treat this additional anatomy can lead to failure of endodontic therapy.

In mandibular first molars, the normal anatomical pattern consists of two mesial canals and one or two distal canals. However, a third mesial canal may be occasionally present between the mesio-buccal and the mesio-lingual canals.

Canal anatomy

Siju Jacob says that if you don’t recognise and treat aberrant canal anatomy, it can affect the prognosis of endodontic therapy.

Evaluation

Different perspectives

Whether root canal treatment can be successful after just one or multiple sessions is a common topic of discussion.

Products

Table 1: Prevalence of a third canal in the mesial root of Mandibular Molars according to different authors. (Courtesy Navarro et al.)

<table>
<thead>
<tr>
<th>Authors</th>
<th>Year</th>
<th>No. of teeth</th>
<th>Method</th>
<th>Three Canals (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skidmore and Bjornsdol</td>
<td>1971</td>
<td>45</td>
<td>Vitro</td>
<td>0</td>
</tr>
<tr>
<td>Pineda and Kuttler</td>
<td>1972</td>
<td>500</td>
<td>Vitro</td>
<td>0</td>
</tr>
<tr>
<td>Vertucci</td>
<td>1974</td>
<td>100</td>
<td>Vitro</td>
<td>1</td>
</tr>
<tr>
<td>Pomeranz</td>
<td>1981</td>
<td>100</td>
<td>Vivo</td>
<td>12</td>
</tr>
<tr>
<td>Martinez-Berna and Badanelli</td>
<td>1985</td>
<td>1418</td>
<td>Vivo</td>
<td>1.5</td>
</tr>
<tr>
<td>Fabra-Campos</td>
<td>1985</td>
<td>145</td>
<td>Vivo</td>
<td>2.1</td>
</tr>
<tr>
<td>Fabra-Campos</td>
<td>1989</td>
<td>760</td>
<td>Vivo</td>
<td>2.6</td>
</tr>
<tr>
<td>Goel</td>
<td>1991</td>
<td>60</td>
<td>Vivo</td>
<td>15</td>
</tr>
</tbody>
</table>

Case report: Middle mesial canal

Siju Jacob shows why it pays to be aware of the possibility of a third mesial canal when treating mandibular molars.
Case report

A 27-year-old male patient reported to the clinic with chief complaint of food impaction in the right mandibular posterior tooth for the past four months. There was no history of pain. His past medical history was non-contributory.

Clinical examination revealed a large carious lesion in the right mandibular first molar tooth (see Fig. 1). The tooth was not tender to percussion but was not tender to percussion and rubber dam application, an access cavity was prepared. Initial access revealed two mesial canals and one distal canal (see Fig. 5). On closer examination with a surgical microscope (Zeiss Germany) a ledge of dentin was found between the mesio-buccal and mesio-lingual canals (see Fig. 1). The ledge was removed using ultrasonics (Proulutra, Maillefer, Switzerland) (see Fig. 5). Removal of the dentinal shelf revealed an isthmus (see Fig. 6). Troughing of this isthmus with ultrasonics under magnification revealed a middle mesial canal (see Fig. 7).

All canals were cleaned and shaped (see Fig. 8) using Pro taper (Dentsply Maillefer, Switzerland) and hand files. The Middle mesial canal was confluent with the Mesio-buccal canal. Canals were irrigated with warm 1.23 hypochlorite, 17 per cent EDTA and two per cent Chlorhexidine. Canals were dried using paper points and a calcium hydroxide paste (Apexcal, Ivoclar Vivadent, Switzerland) was placed in the canals (see Figs. 9 a and 9b). The access cavity was sealed with a layer of Gvita (SM ESPE, Germany) followed by glass ionomer cement (Fuji VII, GC, Japan).

The patient was recalled two weeks later. The calcium hydroxide was removed (see Fig. 10). The canals were obturated using gutta percha and All plus sealer (Dentsply De Trey, Germany) in warm vertical condensation. The access cavity was sealed and the core build-up done using a dual cured resin (Lavacure, DMG, Germany) (see Figs. 11 to 15).

Discussion

The biologic objectives of endodontic therapy include removal of all potential irritants from the root canal space and the control of infection and periapical inflammation. Complex root canal anatomy can prevent achievement of endodontic goals. It is important to debride, disinfect and obturate as much anatomy as possible. A missed canal can lead to failure of Endodontic therapy 1. Therefore every effort must be made to locate additional canals if any.

An extra mesial canal known as the middle-mesial canal has been documented by numerous researchers 15. The percentage varies from one to 15 per cent. The majority of middle mesial canals will merge with either the mesio-buccal or mesio-lingual canals. Rarely, they may have a separate apical portal of exit.

Numerous techniques enable the clinician to look for the middle-mesial canal. It is important to have an adequately flared access cavity to visualise the anatomy of the chamber. Constricted access can lead to missed anatomy 16.

The use of the surgical operating microscope has vastly enhanced the quality of Endodontic therapy 11,12. Magnification coupled with coaxial lighting greatly enhances visualisation and the potential to discover additional anatomy.

The use of ultrasonic tips for precise cutting has gained favour among clinicians in the last decade. Ultrasonics in conjunction with the surgical microscope (Microsonics) greatly enhances the clinician’s ability to locate extra canals 17.

Conclusion

Variations in conventional root canal anatomy can occur in any tooth. The middle mesial canal in Mandibular molars is one such variation. Knowledge of anatomical variations and the techniques to discover and manage these variations will significantly enhance the prognosis of endodontic therapy.

References available on request.
One versus multiple session endodontic treatment

It is one of the most discussed topics in modern endodontics. Prof. Dr. Liviu Steier explains the key factors for success

**Evidence**

Evidence shows that the number of sessions used to perform a successful root canal treatment does not differ between one or multiple sessions. The only possible post-operative complications with single session root canal treatments are:

1. Post-operative pain.
2. Flare up.

For a better understanding of successful single visit endodontic therapy the following factors are key:

1. Adequate working length control (using electric measurement devices and if necessary x-ray)
2. Mechanical root canal preparation (best results will combine the use of hand and rotary files)
3. Chemical root canal disinfection (using irrigants – advanced devices and technologies)
4. An optical root canal obturation to avoid apical leakage.
5. Coronal sealing to prevent coronal leakage.

Each one of these key factors are determined by other factors:

Determinant factors for an adequate working length control:

1. Straight line access
2. Establishing glide path
3. Use of adequate file to correctly bind.

Determinant factors for adequate mechanical root canal preparation:

1. Straight line access
2. Establishing glide path
3. Hand-file reshaping to size 25 or 20
4. Determination of the “first file to bind” – “Master apically file”
5. Shaping of the so called “apical capture zone”
6. Adequate use of sequential files protocol either hand or rotary
7. Adequate irrigation and smear layer removal protocol while mechanical shaping.

Determinant factors for adequate chemical root canal disinfection:

1. Coronal isolation (rubber dam)
2. Adequate coronal access
3. Adequate shaping protocol
4. Use of irrigation solutions in optimised sequences
5. Optimized irrigant delivery
6. Adequate energising of the irrigants
7. Satisfactory irrigant evacuation.

Determinant factors for inadequate root canal obturation (either under filling or incomplete filling):

1. Canals not dry prior to obturation
2. Inadequate straight-line access
3. Inadequate irrigation protocol
4. Excessive enlargement of a curved canal
5. Packing of debris in the apical portion of the canal
6. Skipping of sequential file sizes
7. Inadequate tug back
8. Inadequate master cone selection
9. Inadequate condensation procedures
10. Coronal seal.

**Conclusion**

A trained and experienced operator who follows a strict treatment protocol can manage to perform root canal treatments in one visit alone having in mind the management of postoperative complications. The author needs to acknowledge that not all root canal treatments can be executed as single session.

**Useful reading**


**About the author**

Dr. med. dent. Liviu Steier is a visiting professor at the School of Dental Medicine in Florence, visiting professor at Tufts School of Dental Medicine in New York on its endodontic postgraduate programme; and an honorary clinical associate professor at Warwick Medical School. He is also a registered specialist in endodontics (GDC) and Specialist fuer Prothetik (www.dgzpw.de).

He can be reached at

Lsteier@msdentistry.co.uk

www.suntecdental.com

Terms & Conditions Apply

Sun Dental Laboratories Ltd,
Simpson House, Stanley Road, Balsam, St. John's, SP9 3PG
Tel: 01226 786163

www.sunflexpartials.com
www.suntechdental.com
www.sundentallabs.com
Case report: Failure evaluation in endodontics

Dr Hank Willis and Dr Craig Barrington discuss how we can use failed treatments to help us learn from our mistakes

The patient was a 44-year-old female with non-con- 

Pulpitis, Periapical Periodontitis. Hypersensitive Dentine.

Root Master

Information about adverse event reporting can be found at www.yellowcard.gov.uk

Adverse events should also be reported to Blackwell Supplies, Medcare House, Centurion Close, Gillingham Business Park, Gillingham, Kent ME8 0SB or by telephone: 01634 877525

SIDE EFFECTS:

The possibility of systemic side-effects is extremely rare. A few cases of allergic reactions including anaphylaxis, urticaria, rash and pruritis have been reported. Pulpal necrosis may occur in cases of delayed or incomplete treatment of the apical periodontium. If a severe or life-threatening reaction occurs the filling should be removed and appropriate measures taken.

SIDE EFFECTS:

The possibility of systemic side-effects is extremely rare. A few cases of allergic reactions including anaphylaxis, urticaria, rash and pruritis have been reported. Pulpal necrosis may occur in cases of delayed or incomplete treatment of the apical periodontium. If a severe or life-threatening reaction occurs the filling should be removed and appropriate measures taken.

PRODUCT LICENCE/AUTHORIZATION NUMBERS: PL 27880/0002 PA1321/2/1

*Registered Trade Mark

BLAISED 14