A Rare Case of Mandibular Second Molar with Single Canal Obturated Using a New Polydimethylsiloxane – Based Root Canal Filling Material

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ABSTRACT

This case report shows an unusual internal anatomy of a mandibular second molar with a single root canal. Once thorough shaping and cleaning of the root canal was done, the canal was obturated with a non-heated flowable silicon based obturation material (Gutta-Flow). This obturating material was used since it has the advantage of easy handling, insolubility, good adaptability and sealing ability. This case report reinforces the fact that clinicians should have adequate knowledge of the root canal morphology and its variations to achieve a technically satisfactory endodontic outcome. (Manipal Odont.2009;1:92-94)

KEYWORDS: mandibular second molar, single canal, gutta-flow

INTRODUCTION

The variability of the root canal system of multirooted teeth represents a challenge to both endodontic diagnosis and treatment.1 Careful examination of radiographs and the internal anatomy of teeth are essential. The location and morphology of root canals should be identified radiologically before the root canal treatment.2 The root canal system of molars must be examined meticulously by the clinician, preferably under magnification. With the knowledge of the internal anatomy, the canals may be effectively cleaned, shaped and obturated.3

One of the major objectives of root canal therapy is the three dimensional obturation to prevent re-infection. According to the Washington study of endodontic success and failure, nearly 60% of the failures were caused by incomplete obliteration of the radicular space.4 Therefore, an adequate and 3-dimensional obturation of the root canal system is of prime clinical importance for the long term success of endodontic treatment. This seal is developed mainly in order to minimize the leakage along the root canal filling and to protect the periapical tissue from bacteria and their byproducts.5

Gutta-flow is a non-heated flowable obturation material for root canals which combines gutta-percha and sealer in one product. According to the manufacturer it consists of poly-dimethyl-siloxane matrix, finely ground gutta-percha, silicone oil, paraffin oil, platinum catalyst, zirconium dioxide, nano-silver(preservative) and coloring agents. Gutta-Flow is available in a capsule and can be injected directly into the canal. It is used in combination with master gutta-percha cone and does not require any form of manual compaction for placement. The material is believed to flow into lateral canals and completely fill the space between the root canal wall and the master cone. In addition, because no heat is used with placement of the material, no shrinkage is believed to occur, and the manufacturer reports that the material expands 0.2% upon curing.6

As with most of the posterior teeth, the mandibular second molar has several variants in its canal configuration. The C-shaped canal system is most commonly found in mandibular second molars.7,8 However, the configuration of one canal in a single rooted mandibular second molar has rarely been described in studies describing tooth anatomy and root canal anatomy on the basis of extracted teeth and/or using cross-sections. This report presents a rare case of a mandibular second molar with single root canal which was obturated with Gutta-Flow.

CASE REPORT

A 42 year old female patient presented to the department of Conservative dentistry and Endodontics with a chief complaint of pain in the right mandibular posterior region, which had duration of 4 days. Patient had sharp pain, intermittent in nature, which was aggravated on lying down. There was no relevant medical history. On examination, the right lower second molar had a fractured amalgam restoration. The tooth was tender on percussion. Intra oral peri-axial radiograph showed caries below the restoration approaching the pulp. In addition to the preoperative diagnostic radiograph, an additional radiographic view from a 20-degree mesial projection was taken to study the root canal morphology and anatomy. From this it was understood that right lower second molar was single rooted (Figure 1).

After adequate anesthesia and isolation with rubber dam, an endodontic access cavity was established. A single large
ovoid canal orifice which was lined up in the center of the occlusal surface was located. This access cavity suggested that the tooth was with single canal. The pulp was extirpated with the help of a barbed broach (Proditius Dentaries, Vevey, Switzerland). The root length was estimated using an apex locator (Root ZX, J. Morita Co., Tokyo, Japan) and then confirmed with a periapical radiograph. K-Files (Dentsply India Pvt. Ltd., India) starting from size 25 to size 50 was used, in sequential order till the working length, to create an apical matrix. Since the canal was wide, only circumferential filing was done for the coronal preparation. During the treatment, the root canal was irrigated with 2.5% sodium hypochlorite, chlorhexidine and 17% EDTA. After cleaning and shaping, the canal was dried, calcium hydroxide intracanal medicament (Calicur, Voco, Germany) was placed and the access cavity was temporized. The patient was recalled after a period of 5 days, the canal was cleaned with chlorhexidine, dried and the master cone was selected (Figure 2). The large oval shaped canal was then obturated using Gutta-Flow (Coltene/Whaledent, Langenau, Germany), according to the manufactures instructions (Figure 3). Coltosol F (Coltene/Whaledent, Langenau, Germany), was used as temporary restorative filling material and the patient was then recalled for a permanent restoration (Figure 4). The 6-month follow-up radiograph displayed normal periradicular appearance (Figure 5).

DISCUSSION
The root and canal anatomy of mandibular second molars has normally recurring features, as well as a great number of atypias. Normally, mandibular second molars have two roots, one is mesial and the other is distal, and at least three main canals. The roots of the second molar can change from one to three; the canals can change from one to even six. These unusual conditions may expose the clinician to a diagnostic problem before the onset of therapy, but the expert will be able to find the canals during access cavity preparation and treat them properly. An interesting variation of the internal anatomy is the so-called C-shaped canal, which has been described more frequently in the mandibular second molars. But, the root canal configuration of a single canal in a single rooted mandibular second molar has rarely been described. In a study conducted by Weine, only 1.3% of mandibular second molars had single canal.

Careful examination of radiographs and the exploration of the internal anatomy of tooth after the removal of roof of the pulp chamber are essential for identification of variations in the canal morphology. Once these variations are understood, cleaning, shaping, and obturation of the root canal system can effectively be performed.

Gutta-Flow was selected to obturate the large oval shaped canal because of its following advantages;

- Ease of handling: It is a cold flowable obturating material available in a capsule and can be injected directly into the canal, it is easy to manipulate. It is used in combination with a master gutta-percha cone and does not require any form of manual compaction for placement. Hence there is no risk for vertical fractures due to undue forces and is relatively easy to use compared to other systems. However, it should be noted that Gutta-Flow belongs to the category of root canal filling pastes, which has a high risk of over filling. But with proper preparation of apical matrix and correct master cone selection, over filling can be prevented.

- Better sealing ability: The material is believed to flow into lateral canals and completely fill the space between the root canal wall and the master cone. Good adaptability to root canal walls is because of its excellent flow and film thickness properties. It was reported that Gutta-Flow was fairly stable and expanded slightly during hardening. This could be beneficial in preventing gap formation and decreasing microleakage because Gutta-Flow does not show any chemical bonding to the canal wall. Since it is a cold flowable material, there is no need for rise in temperature of the material like thermo plasticized materials and hence there is no disadvantages like shrinkage on cooling. Insolubility and homogeneity of the Gutta-Flow material are also factors contributing to its long term seal ability.

CONCLUSION
The variability of the root canal system of multitrooted teeth should be always kept in mind. The root canals can be effectively cleaned, shaped and obturated only with a thorough knowledge of the root canal morphology. Gutta-Flow can be used in clinical endodontic practice, especially in very wide root canals with irregular canal walls successfully because of its advantage of ease of use, adaptability, insolubility and sealing ability.
REFERENCES


“The greatest glory in living lies not in never falling, but in rising every time we fall.”

Nelson Mandela

“When we have done our best, we can await the results in peace.”

Unknown

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