Endodontic retreatment of mandibular second molar with C-shaped canal: case report

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ABSTRACT

Introduction: Knowing the anatomical complexity of the root canal system along with its variations, especially regarding the number of roots, conducts and curvatures, facilitates understanding of root canal location and negotiation. There might be C-shaped canals resembling a fissure. The number of these canals might range from one to three. **Objective:** To report a clinical case of endodontic retreatment of a right second mandibular molar, with anatomical variation in its type II C-shape, including diagnosis suggestive of periapical granuloma. **Methods:** A female Caucasian patient was referred to endodontic evaluation of the right second mandibular molar. Her chief complaint was discrete sensibility at palpation and esthetic dissatisfaction due to metal restorations. Clinical examination revealed a prosthetic piece with marginal percolation and positive response to palpation and percussion vertical test. Radiographic examination revealed poor endodontic treatment and radiolucency at the periapical area suggestive of periapical granuloma. Three sessions were performed, including procedures of removal of metal inlay, clearing of root canals, intracanal medication and root canal filling. **Conclusion:** The importance of knowing about the anatomical diversity of root canals and providing safe and reliable planning and endodontic prognosis was emphasized. The clinical case reported herein is currently on follow-up, with remission of symptoms and periapical repair being radiographically evaluated.

Keywords: Endodontics. Root canal filling. Anatomical variation

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Introduction

Knowing the anatomical complexity of the root canal system along with its variations, especially regarding the number of roots, conducts and curvatures, is of paramount importance, as such knowledge facilitates understanding of root canal location and negotiation.[1] There might be C-shaped canals resembling a fissure. The number of canals might range from one to three,[2] which oftentimes hinders endodontic therapy and interferes in planning, treatment and prognosis. This anatomical variation mainly occurs in mandibular second molars, but may also be found in first premolars, mandibular molars,[3,4,5] first and second maxillary molars[6-9] and maxillary lateral incisors.[10] There is a high incidence of C-shaped canals among Asians, especially in Chinese and Korean populations.[11,12] Treatment requires dental surgeons to carefully master endodontic techniques in order to reduce iatrogenic risks.[13]

Based on this assumption, complete sealing of the root canal system represents a great challenge for endodontic therapy, since filling quality is directly related to an effective chemical-mechanical preparation.

The action of chemical substances used in Endodontics should be primarily aimed at anatomical irregularities, curvatures, isthmuses, and ramifications because cleaning them is as difficult as filling them. The aim is to seal three-dimensionally the whole endodontic space and to reduce significantly the existing microbial load.[14]

The objective of the present study was to report a clinical case of endodontic retreatment of a right mandibular second molar with anatomical variation in its type II C-shaped root canals,[15] including diagnosis suggestive of periapical granuloma.

Case report

Caucasian female patient was referred to endodontic evaluation of her right mandibular second molar. Her chief complaint was discrete sensibility at palpation and esthetic dissatisfaction with the metal restoration. Clinical examination revealed prosthetic piece with marginal percolation and positive response to palpation and vertical percussion test. Radiographic examination revealed poor endodontic treatment and radiolucency at the periapical area suggestive of periapical granuloma (Fig 1).

The metal piece was removed by means of a KG #1558 drill (Medical Burs, Cotia, Brazil) during the first session, enabling gutta-percha and endodontic sealer to be visualized on the pulp chamber floor (Fig 2). The access cavity was refined by means of an ultrasonic device with Enac ST08 tip (Osada, Tokyo, Japan). Removal of gutta-percha was initially performed by means of Protaper retreatment D1, D2 and D3 rotary files (Maillefer, Ballaigues, Switzerland) and then manually completed with Type-K files (Maillefer, Ballaigues, Switzerland), natural solvent made from orange peel oil (Lenza Farmacêutica, Belo Horizonte, Brazil), and 5.25% sodium hypochlorite as irrigating solution (Lenza Farmacêutica, Belo Horizonte, Brazil). In the second session, gutta-percha removal was continued before asymmetric reciprocal instrumentation was performed by means of Reciproc R25 instrument (VDW, Munich, Germany), ultrasonic activation with Enac ST21 tip (Osada, Tokyo, Japan) and 17% EDTA (Fórmula & Ação, São Paulo, Brazil) (Fig 3), so it was possible to analyze, in details, the aspect of pulp chamber floor Subsequently, 5.25% sodium hypochlorite (Lenza Farmacêutica, Belo Horizonte, Brazil) was used for final irrigation and the root canals were dried with absorbent paper points (R25, VDW, Munich, Germany), followed by application of intracanal medication with PA calcium hydroxide (Lenza Farmacêutica, Belo Horizonte, Brazil) and propylene glycol (Lenza Farmacêutica, Belo Horizonte, Brazil) for 30 days. In the third session, the patient was found to be asymptomatic and her root canals were completely filled (Fig 4) by means of the thermoplastic technique—vertical hydraulic compression with accessory cones (advocated by De Deus)[29]—with natural gutta-percha cones (Odous Medium, Belo Horizonte, Brazil) and AHPlus endodontic sealer (Dentsply, DeTrey Gmbh, Germany).

The case was documented with an operating microscope (Alliance, São Paulo, Brazil) and the patient referred back to the original practitioner for prosthetic treatment completion. Clinical and radiographic examinations conducted 12 months later (Fig 5), which served as control, showed indication of repair at the periapical region as well as restoration of esthetics and masticatory function with a new fixed prosthesis.

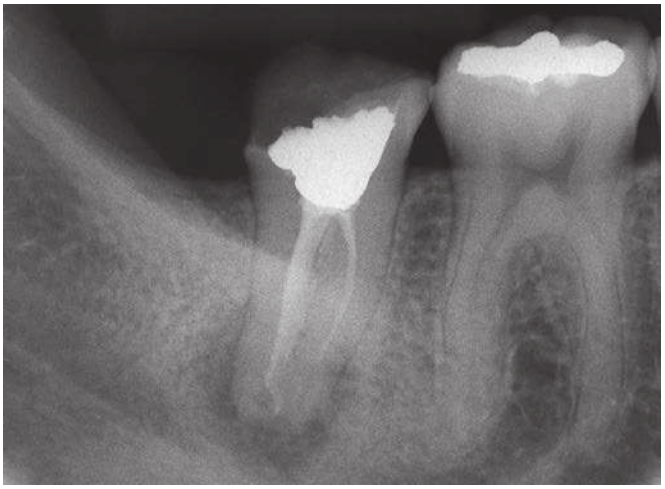

Figure 1. Preoperative periapical radiograph.

Figure 2. Access cavity.

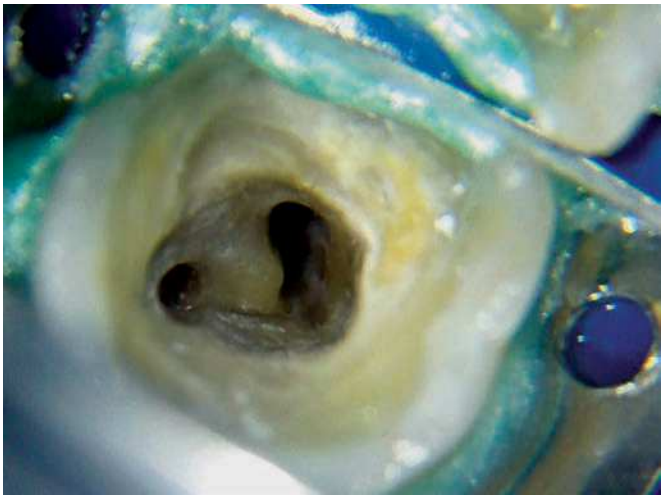

Figure 3. Anatomical view of the pulp chamber floor.

Figure 4. View of pulp chamber floor final filling.

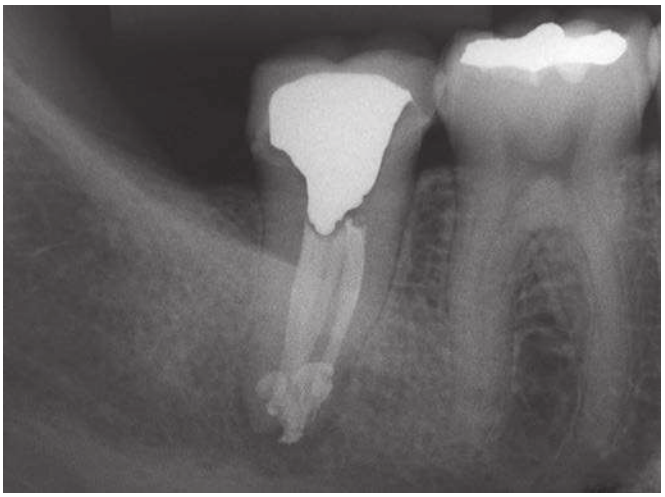

Figure 5. 12-month follow-up.

Discussion

Diagnosis based on clinical examination does not provide all information needed, since the coronal morphology of teeth remains the same. On the other hand, radiographic examination can in some situations draw the dental surgeon's attention to a suspected C-shaped canal, such as root fusion and/or proximity, large distal canal, or blurred image of a third canal,[16,17] although there are authors stating that such a diagnosis cannot be made based on radiographic findings.[18] Other studies also report that the diagnosis of C-shaped canal can only be confirmed by entering the pulp chamber.[19,20] In the present case report, it was noted that radiographic evaluation alone was not able to demonstrate anatomical variation in the C-shaped canal, since diagnostic confirmation was made after endodontic access and removal of gutta-percha from the pulp chamber floor.

The most frequent cause of apical periodontitis is infiltration of bacteria from caries and/or crown-root fractures, since they can establish in the root canal system and dentinal tubules. Microorganisms and their by-products are accounted for the development of inflammatory process at the periapical region.[19] Therefore, anatomical variations, such as C-shaped canals, can represent a major hurdle for a more precise prognosis, mainly due to difficulty in cleaning and shaping a root canal system consisting of many ramifications, such as accessory, lateral canals and apical deltas.[22,23] In the present clinical case, the aim was to seal the root canal system three-dimensionally in order to ensure better antisepsis of the root canals and consequently recovery of periapical tissues.

The cleaning of the isthmus area at the mesial region (mesiolingual extension), where fissure was present, was aided by ultrasonic activation which enhanced the action of the chemicals[24] used in the present clinical case. Distal canal was prepared separately.

Initially, instrumentation of the C-shaped canal was performed as if it was a flattened root canal, whereas the distal canal was conventionally instrumented according to a similar study.[25]

During the filling phase, two gutta-percha cones were used for the fissure in order to allow a greater area of contact between gutta-percha and dentinal walls, whereas the distal canal was filled with only one cone according to other studies.[26,27] With regard to the filling technique, the thermoplastic technique with heated gutta-percha was chosen because it allows better adaptation of this material as well as penetration of the endodontic sealer into the root canal system, which corroborates a similar study.[28]

Conclusion

The importance of knowing about the anatomical diversity of root canals and providing safe and reliable planning and endodontic prognosis was emphasized. The use of optical microscopy made it easier to document the clinical case and guided the good progress of treatment. The patient reported herein is currently on follow-up, with remission of symptoms and periapical repair being radiographically evaluated.

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