

Mandibular Second Premolar with Four Canals

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Abstract

A mandibular second premolar with four canals is an interesting example of anatomic variations. This report describes a case of a mandibular second premolar with three roots and four canals (one mesiobuccal, two distobuccal and one lingual). The canals were prepared using K-files and irrigated with NaOCl (5.25%) and normal saline as the final irrigant. The canals were filled laterally with gutta percha and AH26 sealer (De Trey, Dentsply, Switzerland). This case shows a rare anatomic configuration and points out the importance of looking for additional canals.

Key words: Four root canals, mandibular second premolar, three roots.

Introduction

To achieve a successful root canal treatment, a thorough knowledge of root and root canal morphology as well as possible variation in anatomy of the root canal system is of utmost importance (1,2). This is followed by negotiation, cleaning and shaping, and obturation of the entire canal system in three Dimensions (3,4). Failure to recognize the presence of an additional root canal may result in unsuccessful treatment and may be the origin of acute flare-ups during and after treatment (5). Slowey (3) indicated that due to the variations in canal anatomy, mandibular premolars are the most difficult teeth to treat endodontically; they have a high flare-up and failure rate (1). In a classic anatomical study, Zillich and Dowson (6) showed that the occurrence of three canals in mandibular second premolars was 0.4%, while Vertucci (7) reported it as zero %. Clinically reported cases showing the presence of three separate roots for the same tooth are very few and far between (1, 8-13). Yadav et al (14) reported a mandibular second premolar with four separate canals. This report describes a case of a mandibular second premolar with three roots and four canals (one mesiobuccal, two distobuccal and one lingual).

Case Report

A 21-year-old female patient was referred to the Department of Endodontics of the Mashhad Dental Faculty, Iran, with severe spontaneous pain in tooth #20. Pretreatment examinations (thermal and electric pulp tests) revealed irreversible pulpitis in tooth #20. There was no evidence of swelling or sinus tract. Preoperative periapical radiograph revealed widening of

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the periodontal ligament space at the periapical area related to the mandibular second premolar and thickening of the lamina dura, with deep carious lesion in occlusodistal area reaching the pulp space area.

Initial radiographic X-rays also showed the presence of additional roots (Fig. 1). Local anesthesia (2% lidocaine with 1:80, 000 adrenaline) was performed. The tooth was isolated by a rubber dam, and then the access cavity was prepared. To gain sufficient access to the canals, conventional access opening was extended more mesiodistally. Tactile examination of the walls of major canals was implemented with a small precurved K-file (Maillefer, Dentsply, Switzerland) which was slowly pushed down the walls of the major canals, probing for a catch. A slight catch may signify the orifice of an additional canal especially in the case of the buccal and lingual walls because these are the unseen dimensions on the radiograph. One orifice with three separate canals was located: two buccally, and one lingually. Patency was ascertained with a small size 10 K-file (Maillefer, Dentsply, Switzerland). After finding

the canals, a radiographic x-ray was taken to determine the working length of the canals. The first initial file radiograph was taken with three instruments in the three roots.

Regarding this radiographic x-ray, we hypothesized that one more additional canal might be present in the distobuccal root because the canal located more laterally (Fig. 2). Gates Glidden drills were applied (Maillefer, Dentsply, Switzerland) with brushing motion in crown down technique to enlarge the orifice to achieve a straight line access. Instrumentation was performed in all of the canals using a K-file (Maillefer, Dentsply, Switzerland). The crown-down technique was used to prepare canals for a size #30 K-file, which was the master apical file. The canals were irrigated with 5.25% sodium hypochlorite during treatment and finally with normal saline. The canals were then dried with paper points and obturated with laterally condensed gutta percha and AH26 sealer (De Trey, Dentsply, Switzerland) (Fig. 3 and 4).



Figure 1. Preoperative radiograph, additional roots were presented.

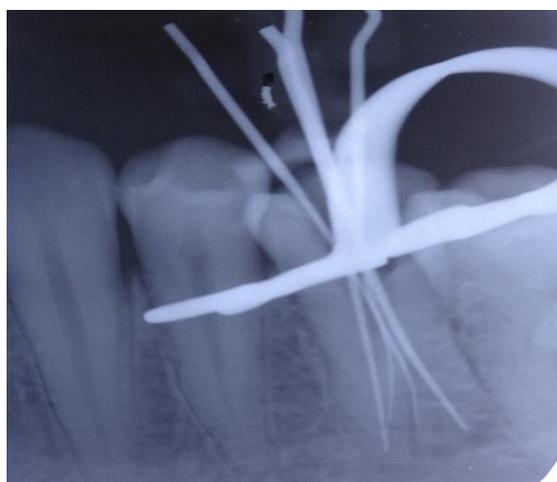


Figure 2. Radiograph for working length determination



Figure 3. Master cone radiograph



Figure 4. The final radiograph; 4 canals were obturated

Discussion

The anatomy of teeth is not always normal. A great number of variations could occur in formation, number of roots, and their shape. Most dentists get used to treating normal roots with similar traits; as a result, many failures can occur. However, it must be noticed that abnormalities are rare, but it is possible that some patients may have one of these rare anatomic variations. The complex nature of the root and root canal morphology of the mandibular premolars has been underestimated (1). Slowey (3) reported that root canals are frequently left untreated because clinicians often fail to identify their presence, particularly in teeth that have anatomical variations or additional root

Canals, before root canal treatment is performed. Therefore, clinicians should be aware of the configuration of pulp space of the tooth is to be treated (2, 15, 16). Incidence of number of roots and number of canals reported in anatomic studies greatly varies in literature. Root morphology and canal morphology of mandibular premolars can be extremely complex and highly variable (3).

The Washington study (17) which assessed the results of endodontic therapy of mandibular premolars showed that the failure rate in mandibular second premolar as 4.54% (18). This may be due to extreme variations in root canal morphology of mandibular premolar teeth compared with the standard description of one root and one canal and therefore poses an endodontic challenge to clinicians. Gulabivala and co-workers (19) concluded that broad, flat roots are much more likely to contain multiple Canals and intercanal ramifications. In such cases, and to obtain predictable results, high-quality pre-operative radiographs should be available at different horizontal angulations and carefully evaluated to detect the presence of extra root canal.

This case describes a mandibular second premolar with one orifice and three roots. One mesiobuccal, one distobuccal and one lingual.

The distobuccal root has two canals with separate apical foramina. They were separated from middle third of the canal. Totally, there were four canals in tooth.

Previous report have described mandibular second premolar with three root canals (20).

Yadav et al (14) reported a mandibular second premolar with four separate canals. It has 4 orifices, one mesiobuccal, one distobuccal, one mesiolingual and one distolingual but in our report it has only one orifice.

Case reports are valuable because they remind us the situation is not always normal, and, during each treatment, we must expect many variations. Hence, some changes in procedures may be necessary.

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