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Letter to the editor

Managing the second mesiobuccal canal of maxillary first molars

The root canal treatment failure rate in the maxillary first molars is relatively high due to the complex root canal morphology, posterior position in the dental arch, accessibility, locating, and preparation of the additional mesiobuccal canals, particularly the second mesiobuccal canal (MB2). Age, gender, and race have also been reported as potential factors influencing the occurrence of additional canals. Therefore, an appropriate technique and treatment plan play an essential role in optimizing root canal treatment.[1–3] This brief letter focused on the management of the second mesiobuccal canal of the maxillary first molars in routine root canal therapy.

Locating the MB2 canal is a challenge for clinicians. In this perspective, the location of the MB2 canal in relation to the MB1 canal in the maxillary first molars was investigated. To achieve this goal, 2400 patients were screened using cone-beam computed tomography (CBCT), of which 346 patients with MB2 were included. The position of MB2 was analyzed in relation to MB1 and the palatal canal. The result revealed that the orifice of MB2 was located 2.06 mm palatally to MB1 and 1.03 mm mesially to the line drawn from MB1 to the palatal canal. Furthermore, the distances from MB1 to MB2 were 2.22 mm and 1.92 mm in male and female patients, respectively. Therefore, the obtained data can be used as a guide for clinicians to gain insight into the location of MB2 in the maxillary first molars.[2]

In accordance with the previous study, Mufadhal and Madfa evaluated the root shape and canal morphology for each root based on Vertucci's classification of maxillary first molars using CBCT. In this research, 373 patients (i.e., 162 male and 211 female) were included. The distribution of the occurrence of MB2 was then investigated. The results showed that the prevalence of MB2 in 139 male and 167 female patients was 85.8% and 79.5%, respectively. The high prevalence of MB2 (i.e., 82.3%) among participants emphasizes that clinicians should consider MB2 using cutting-edge techniques. Accordingly, it can be inferred that high distances from MB1 to MB2 in males compared to females may correlate to the high prevalence of MB2 in males.[4]

In a clinical study with 84 patients, three different techniques were investigated to locate MB2 in the maxillary first molars. The CBCT was used as a gold standard to identify MB2. After access cavity preparation, the following three techniques were applied: 1) direct vision (i.e., endodontic explorer (DG-16) + K-Files No. 8 or 10 + endodontic mirror), 2) additional exploration using a dental operating microscope, and 3) dental operating microscope + selective dentine removal + ultrasonic tips, i.e., NSK E7D (Nakanishi Inc., Kanuma, Japan). The sensitivity of locating MB2 was 79%, 82%, and 86% for the first, second, and third techniques, respectively. Hence, to localize MB2, it is recommended to use a dental microscope in combination with appropriate dentine removal and ultrasonic tips.[5]

Another relevant study assessed the accuracy of dental microscope and CBCT compared to micro-computed tomography (micro-CT) for the detection of MB2. For this purpose, 71 extracted maxillary first molars were selected for MB2 assessment using three techniques. MB2 was detected in 54, 50, and 42 teeth by micro-CT, CBCT, and dental microscope, respectively. CBCT and micro-CT showed satisfactory results in detecting MB2. Hence, applying CBCT is recommended to improve the success rate of root canal therapy in detecting additional canals.[1]

The calcified MB2 canal is a major challenge in maxillary first molars. In this respect, Keles et al. evaluated the radicular pulp calcifications of 203 extracted maxillary first molars using micro-CT. The samples were examined for discontinuity in the canal path. The positions and lengths of the calcified root canals were then recorded. Based on the obtained results, calcified root canals in MB2 and MB3 were mostly detected at the orifice level and along the canal, while the distribution of occurrence of calcifications in the other canals was in the apical third. Therefore, it is necessary to incorporate pre-access analysis of root canals by micro-CT and the time required to locate and negotiate the MB2, especially in the orifice and along the canal.[6]

Negotiating MB2 is another challenge in root canal therapy. In this regard, Gharechahi et al. investigated the

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negotiability of MB canals in 125 extracted maxillary first molars with four systems. CBCT was applied to ensure the MB canals have two separate canals. After access cavity preparation, MB2 canals were explored with K-Files Nos. 6 and 10. The samples were divided into 5 groups (n = 25), and the following glide path systems were applied: 1) R-pilot 12.5/.04, 2) ProGlider 16/.02, 3) WaveOne Gold Glider 15/.02, 4) HyFlex EDM 10/.05, and 5) C-Pilot 6–15/.02 as a control group. The results showed that all systems, except HyFlex, are effective for negotiating MB2. The high taper (>.04) of the instrument can lead to fracture of the instrument or reduce the dentin thickness in the danger zone. Therefore, it is not recommended for the negotiation of MB2. Although R-pilot, ProGlider, Gold Glider, and C-Pilot are recommended in the case of MB2, the anatomical conditions of the root canals (i.e., curvature, calcification, and isthmus) play a decisive role in choosing the instrument.[7]

It has also been reported that a missed MB2 canal during root canal therapy can lead to apical periodontitis. A poor long-term endodontic prognosis is associated with an untreated MB2 canal.[5] To preserve the teeth, orthograde retreatment has priority in the case of a missed canal. In this context, in a case report, symptomatic apical periodontitis was diagnosed on tooth No. 16. The CBCT examination revealed the missing MB2 and bifurcated palatal canal. The following points were considered in the treatment of MB2: 1) using dental magnification, 2) using Endo Z bur with a non-working end to expand the access cavity to a rhomboid shape, 3) removing the dentin layer covering MB2, 4) using DG16 explorer (Hu-Friedy, Chicago, IL, USA) for detecting MB2, and 5) path file rotary (Dentsply Maillefer, Ballaiges, Switzerland) preparation with low taper (13/.02, 16/.02, and 19/.02). Removing the filling material, preparing, and filling the other canals were also performed. The follow-up results after 6 months showed complete healing of the tooth.[8]

Regarding the points mentioned in this brief letter, the following procedures should be considered in the case of the MB2 canal: 1) using CBCT for exact evaluation and detection of MB2, particularly in male patients, 2) appropriate access cavity (i.e., modifying from a triangular shape to a rhomboid shape with Endo Z), 3) applying a dental operating microscope and ultrasonic tips for detecting MB2, 4) using DG 16 explorer, and 5) glide path preparation with a low taper >.04. Therefore, clinicians' ability to have perfect knowledge of endodontic anatomy and precise diagnosis of the location of the MB2 canal increases the success rate of endodontic treatment.

Declaration of competing interest

The authors have no conflicts of interest relevant to this article.

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