Maxillary First Molars with 2 Distobuccal Canals: A Case Series

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Abstract

An appreciation of the anatomic complexity of the root canal system is essential at every step of endodontic treatment. Endodontic treatment of teeth with unusual root canal anatomy presents a unique challenge. Eight patients underwent nonsurgical root canal treatment of 3-rooted maxillary first molars in a specialty endodontic private practice. Four cases of Weine type II and 4 cases of Weine type III canal configurations in the distobuccal root of maxillary first molars were presented.This article highlighted an uncommon anatomic variation of 2 canals in the distobuccal root of the maxillary first molar. (*J Endod 2017;■:1–4*)

Key Words

Maxillary first molar, root canal anatomy, root canal morphology, second distobuccal canal

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Significance

Missed canals are one of the main causes of endodontic failure. This study reported 8 cases from the illumination in maxillary molars. Even though it is not common, clinicians should be aware of the existence of this second DB canal.

Endodontic treatment of teeth with unusual root canal anatomy is challenging. Knowledge of the most common 3-dimensional configurations of the root canal system as well as less frequent anatomic variations is essential for successful endodontic treatment. An appreciation of the anatomic complexity of the root canal system is essential at every treatment step including access preparation, cleaning, shaping, and 3-dimensional obturation. The clinician's experience and the use of technology such as the dental operating microscope and cone-beam computed tomographic (CBCT) imaging are helpful in avoiding missed canals.

The root canal anatomy of maxillary first molars has been described in the literature in both *ex vivo* and clinical studies. The most common form of the maxillary first permanent molar is 3 roots and 4 canals (1). Various methodologies have been used to study root canal anatomy including clinical studies (2, 3), sectioning teeth (4), canal staining and clearing teeth (5–7), microscopic examination (4), radiographic analysis including 2-dimensional imaging (8), CBCT imaging (9–11), and micro–computed tomographic imaging (12).

Weine et al (1) reported the first detailed description of maxillary first molar anatomy. These authors, like most who have followed, have focused on the canal configuration in the mesiobuccal root (2–4). Few studies have reported on the distobuccal (DB) root.

A low incidence of second distobuccal (DB2) canals in maxillary molars has been reported in the literature. In a review of the literature, Cleghorn et al (13) found 14 studies that reported on the DB root. The total number of teeth in these studies was 2576, and the incidence of 2 or more canals was 1.7%. Some additional studies that were not included in this literature review are found in Table 1.

A literature search showed that published clinical cases showing the treatment of maxillary molars with 2 distobuccal canals are rare (16–20). Therefore, the purpose of this case series was to present uncommon anatomic variations in the DB roots of maxillary first molars.

Case Series

Eight patients underwent nonsurgical root canal treatment of 1 maxillary first molar in a specialty endodontic private practice in Winnipeg, Canada (Figs. 1 and 2; Supplemental Figs. S1–S6 are available online at www.jendodon.com).

Careful radiographic examination was conducted; however, none of the DB2s in this case series were detected on 2-dimensional radiographs. A normal, rhomboidal access preparation was performed in all cases. All pulp stones were carefully removed, and thorough scrutiny of the pulp chamber floor was performed using a dental operating microscope in all cases. If a subpulpal groove was seen extending palatally from the DB orifice, it was judiciously troughed using small burs (Munce Discovery Burs; CJM Engineering, Inc, Santa Barbara, CA), Mueller burs (Brasseler USA, Savannah GA), or ultrasonic tips (ProUltra Endo 2 and Endo 3; Dentsply Sirona, York, PA)

TABLE 1. Literature Review regarding the Incidence of Second Distobuccal Canals in Maxillary First Molars

Reference	Number of teeth in study	Type of study	2 or more canal systems (%)
Briseno-Marroquın et al, 2015 (12)	179	mCT	1.2
Silva et al, 2014 (11)	314	CBCT	2.55
Kim et al, 2012 (10)	814	CBCT	1.23
Neelakantan et al, 2010 (9)	220	CBCT	6.3
Zheng et al, 2010 (14)	775	CBCT	1.12
Filho et al, 2009 (15)	140	*Ex vivo*	5.10
	291	Clinical	3.75
	54	CBCT	0
Weng et al, 2009 (7)	45	Clearing	11.1
Ng et al, 2001 (5)	90	Clearing	1.3

CBCT, cone-beam computed tomography; mCT, micro–computed tomography.

to explore for DB2 canals. Troughing was continued until either the subpulpal groove disappeared or a DB2 canal orifice was identified, sometimes to a depth of 4 mm.

Drying of the floor of the pulp chamber with a fine (1 mm) suction tip (Quality Aspirators, Duncanville, TX) and Neo Clear Disposable tips (Neo Dental Chemical Products Co, Tokyo, Japan) aided in visualization. In addition, a sharp endodontic explorer (DG16) was used to locate the canal's orifice.

The DB root was determined to have 2 treatable canals with 2 separate apical foramina (Weine type III) when 2 separate files or gutta-percha points could be placed and could be seen at the radiographic working length. The DB root was said to have 2 treatable canals that joined together (Weine type II) when 2 files or gutta-percha points could be seen to join together on the radiograph (1). This was confirmed clinically when a file in 1 canal impeded the placement of a file in the other canal or when a gutta-percha point placed at the working length in one canal could be scored by a file placed in the other canal.

An electronic apex locator (Root ZX; J Morita Corp, Tustin, CA) was generally used to establish the working length. All canals were filled with vertically compacted warm gutta-percha and backfilled using a warm gutta-percha gun (Obtura Corp, St Louis, MO) after lightly coating the walls with Kerr Pulp Canal Sealer EWT (SybronEndo Endodontics, Orange, CA).

Four cases of Weine type II and 4 cases of Weine type III canal configurations in the DB root of maxillary first molars were treated (Table 2) (Figs. 1 and 2; Supplemental Figs. S1–S6 are available online at www.jendodon.com). The patients were comparatively young with an average age of 31.5 years.

Discussion

Maxillary first molars usually have 3 roots and 4 canals (1) with 2 canals in the mesiobuccal root. In contrast, DB roots of maxillary molars are usually not broad in their buccolingual dimension and usually contain only 1 canal.

The low incidence of DB2 canals in maxillary molars reported in the literature is supported by both the low number of published clinical cases and clinical experience.

The clinical search for canals may be aided by magnification, proper illumination, and an access preparation that allows optimal visibility. The use of a dental operating microscope improves canal

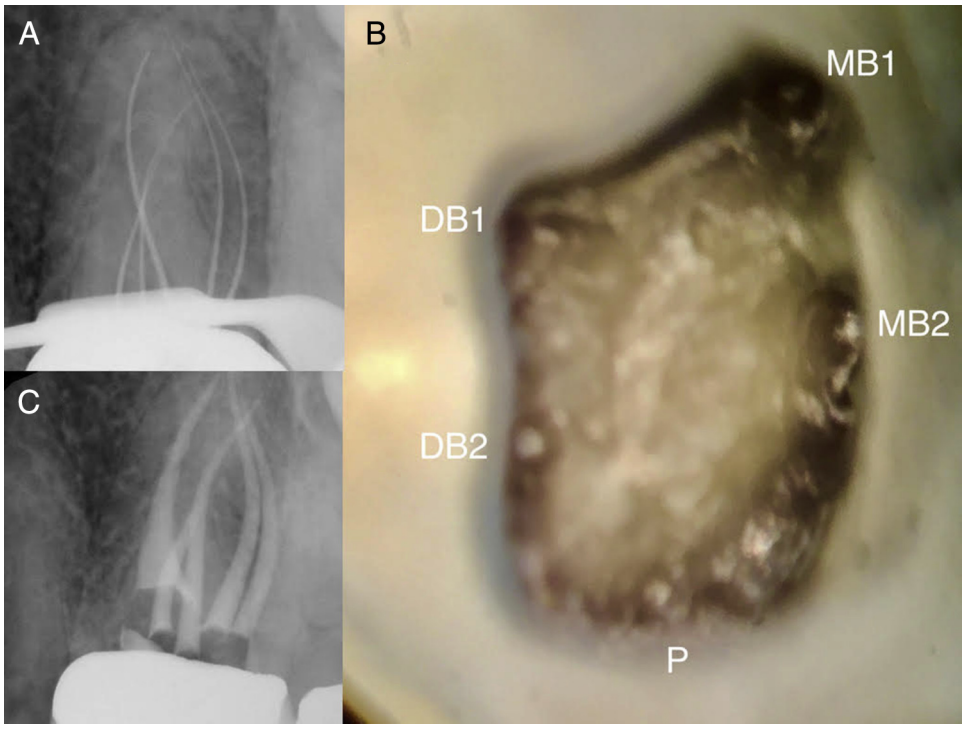

Figure 1. Case 1: (*A*) the working length image showing 2 separate canals in the DB root (Weine type III), (*B*) the intraoral photograph showing 5 canal orifices, and (*C*) the postoperative image.