

Middle Mesial Canal of the Mandibular First Molar: A Case Report and Literature Review

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With the advent of magnification, either by loupes or microscope, the astute clinician must be aware of recent literature that states that the mandibular first molar has a 1–15% chance of a fifth canal. This is a case report accompanied by a review of the literature that shows the unusual anatomy of the mandibular first molar.

Review of the Literature

Over the years, there have been numerous studies that describe the morphology of teeth, including mandibular first molars. Skidmore and Bjorndal, Pineda and Kuttler, and Vertucci (1–3) have all reported on the morphology of the mandibular first molar. These reports have shown that mandibular first molars have three or four canals.

In 1974, Vertucci and William, as well as Barker et al. (4, 5) described the presence of an independent middle mesial canal. Since then, there have been multiple case reports of aberrant canal morphology of the mandibular first molar (6–14). These reports have described aberrant canals in the mesial root of the mandibular first molar. Additionally, Stroner et al. and Beatty and Iterian (15, 16) have reported on more obscure cases in which a third canal was located in the distal root. Martinez-Berna and Bandanelli (17) showed two cases with six canals. Astonishingly, Reeh (18) has even reported a case with seven canals, consisting of four canals in the mesial and three in the distal root.

To complement these individual cases, there have been comprehensive studies to show that there are mandibular first molars with more than four canals. In 1981, Pomeranz et al. (19) reported on 12 of 100 cases. In 1985, Martinez-Berna and Bandanelli (20) reported on 26 of 1418 cases. In 1985 and 1989, Fabra-Campos (21, 22) reported on 4 of 145 and 20 of 760 cases, respectively. Goel (23), as recently as 1991, reported on 9 of 60 cases. Table 1 lists the results of these comprehensive studies over the years.

With increasing reports of aberrant canal morphology, the clinician needs to be aware of this varied anatomy. The purpose of this article is to report the successful treatment of an additional case of a mandibular molar with three mesial and two distal canals.

CASE REPORT

A 42-yr-old Caucasian female patient presented to the dental clinic with a history of severe pain for 2 days. The pain kept her

TABLE 1. Mandibular first molar comprehensive studies

Investigator	Year	Teeth	Method	Roots	Three Canals
Skidmore and Bjorndol	1971	45	Vitro	Mesial	—
				Distal	—
Pineda and Kuttler	1972	300	Vitro	Mesial	—
				Distal	—
Vertucci	1984	100	Vitro	Mesial	1.0%
				Distal	—
Pomeranz et al.	1981	100	Vivo	Mesial	12%
				Distal	—
Martinez-Berna and Badanelli	1983	1418	Vivo	Mesial	1.5%
				Distal	—
Fabra-Campos	1985	145	Vivo	Mesial	2.1%
				Distal	0.6%
Fabra-Campos	1989	760	Vivo	Mesial	2.6%
				Distal	—
Goel et al.	1991	60	Vivo	Mesial	15.0%
				Distal	—

awake at night and was radiating up the side of her face. The clinical examination revealed a fractured restoration on tooth #30 with recurrent caries on the distal (Fig. 1). The tooth was very sensitive to percussion and was nonresponsive to Endo Ice



FIG 1. Preoperative radiograph of tooth #30 showing a fractured restoration with recurrent caries on the distal.

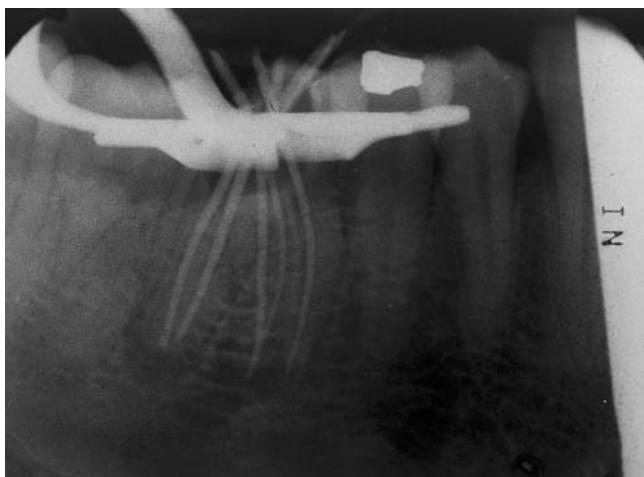


FIG 2. Gutta-percha cone fit radiograph confirming the middle mesial canal.



FIG 3. Obturated tooth with laterally condensed gutta-percha, Roth 801 sealer, cotton pellet and temporary restoration.

(Hygienic Corp., Akron, Ohio). A radiograph showed a deep, carious lesion approximating the pulp. A diagnosis of necrotic pulp with acute apical periodontitis was made. Emergency treatment involved instrumentation of three canals, and placement of calcium hydroxide was performed. The tooth was sealed with a cotton pellet and temporary material.

Two weeks later, the patient returned for completion of endodontic therapy. After removal of the temporary restoration, the mesial and distal canals were reexamined. It was determined that there was a second canal in the distal and a possible extra canal in the mesial. A gutta-percha cone fit radiograph was made for further confirmation of the middle mesial canal (Fig. 2). Thus, there were mesiolingual, middle mesial, and mesiobuccal canals. Accordingly, with regard to Pomeranz's classification, the middle mesial canal was classified as confluent. The middle mesial canal originated as a separate orifice but joined in the apical third of the canal. The canals were obturated (Fig. 3) with laterally condensed gutta-percha and Roth 801 Sealer (Roth International Drug Co.), and the access was closed with a cotton pellet and temporary restoration. The patient experienced no postoperative sequelae and was referred for appropriate coronal restoration. The patient will be followed clinically to monitor periradicular responses.

SUMMARY

There are numerous cases in the literature concerning the unusual anatomy of the mandibular first molar. The presence of a third canal in the mesial root of mandibular molars has been reported to have an incidence rate of 1 to 15%. This additional canal may be independent with a separate foramen, or the additional canal may have a separate foramen and join apically with either the mesiobuccal or mesiolingual canal.

Instrumentation is one of the key factors in the success of endodontic therapy; therefore, the clinician should be aware of the incidence of these extra canals in the mandibular first molar. The clinician can then perform a thorough examination of the pulp chamber to insure complete debridement of all canals. This increases the chance for long-term successful endodontic therapy.

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