

# Clinical Management of 3 Mandibular Incisors with 2 Separate Canals and Foramina : Case Report

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## A b s t r a c t

*This case report describes the root canal treatment of 3 mandibular incisors, each with 2 separate canals and foramina, in 1 patient. The case demonstrates an unusual morphological configuration of the root canal system and supplements previous reports of the existence of such configurations in mandibular incisors.*

**MeSH Key Words:** dental pulp cavity/anatomy & histology; incisor/anatomy & histology; root canal therapy

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It is generally accepted that many mandibular incisors have 2 canals, which may merge into 1 canal before reaching the apex.<sup>1-4</sup> In rare cases, separate foramina may form. In a radiographic study of 364 specimens, Benjamin and Dowson<sup>4</sup> reported that 41.4% of the mandibular incisors they studied had 2 separate canals; of these, only 1.3% had 2 separate foramina. In a study of 1,085 specimens, Miyashita and others<sup>5</sup> reported that only 3.1% of the samples had separate canals and foramina. In a study of mandibular incisors in which a surgical resection method was used to study canal anatomy, Mauger and others<sup>6</sup> demonstrated that, at the apical 1, 2 and 3 mm levels in the mandibular incisor, the canal is only rarely separated by hard tooth structure and that only 2% of the teeth they studied had 2 canals at the 1 mm resection level.

This case report describes the occurrence of 3 mandibular incisors, each with 2 separate canals and foramina, in 1 patient.

### Case Report

A 41-year-old man presented with a fractured left mandibular lateral incisor. The medical history was noncontributory, but the patient had experienced traumatic injury to the anterior mandibular region about 15 years previously, and there was a history of periodic tooth discomfort on biting. The clinical examination revealed pain on palpation and no response to thermal sensitivity tests. The mandibular central incisors and left lateral incisor felt unusual on percussion, and the right central incisor showed severe discolouration.

Preoperative radiographic examination revealed periapical radiolucent areas (Fig. 1). The right central incisor showed a radiolucent canal that stopped abruptly in the middle third of the root, indicating the presence of 2 canals (Fig. 1). The root canal, which had been partially treated, displayed a multicanal morphology (Fig. 1).

The diagnosis was pulpal necrosis with chronic apical periodontitis of the mandibular central incisors and the left lateral incisor. Root canal treatment was indicated.

After placement of a rubber dam, the deficient root canal filling material in the left lateral incisor was removed by means of Hedström files (Dentsply Maillefer, Ballaigues, Switzerland). The working lengths were estimated using an apex locator (Root ZX, Morita, Tokyo, Japan) and then confirmed by radiography (Fig. 2).

The root canals were prepared with Protaper rotary instruments (Dentsply Maillefer) and were copiously irrigated with 5.25% sodium hypochlorite. When the canal preparation was almost complete, the opening of a second root canal was noted in all 3 teeth. The working lengths were re-estimated with the apex locator and then confirmed by radiography to determine the anatomic relationship between the root canals of each tooth. The radiograph suggested that each canal was independent throughout its course and possessed its own apex opening (Fig. 3).

At the third visit, all of the canals were filled with a thermoplasticized gutta-percha. Temporary zinc oxydeugenol (ZOE) restorations were placed, and permanent restorations were advised. Postoperative radiographs showed



**Figure 1:** Preoperative radiograph showing periapical radiolucent areas.



**Figure 2:** Radiograph for determination of working length shows only 1 canal in each tooth.



**Figure 3:** A second radiograph for determination of working length shows 6 distinct and independent canals.



**Figure 4:** Postoperative radiograph of the left central incisor and the left lateral incisor.



**Figure 5:** Postoperative radiograph of the right central incisor.

2 separate canals and 2 separate foramina in each tooth (Figs. 4 and 5).

### Discussion

The main objective of root canal treatment is thorough mechanical and chemical cleansing of the entire pulp space and complete obturation with an inert filling material.<sup>7</sup> According to the endodontic literature, mandibular incisors with 2 canals are not unusual.<sup>1-4</sup> In most cases

in which 2 canals are present, however, they merge into a single canal short of the apex. The occurrence of 2 separate foramina in mandibular incisors with 2 canals has been described in only a limited number of reports.<sup>8</sup> Careful interpretation of the radiographic features is essential to ensure that additional root canals are not overlooked. This may necessitate imaging the tooth from a variety of angles so that the root canals may be distinguished in the resulting films. In addition, if an obvious canal ends abruptly, the clinician should be suspicious that there are in fact 2 canals.<sup>9</sup> Nevertheless, manual exploration of the root canal system with an endodontic file or explorer is a reliable way to identify the exact configuration of the root canal, especially the number of foramina.

This report has described the root canal treatment of 3 mandibular incisors, each with 2 separate canals having their own foramina, in 1 patient. The morphological pattern of separate apical terminations for 2 canals in multiple mandibular incisors, as manifested in this case, is very rare. ♦



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