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## Apical limit of root canal filling and its relationship with success on endodontic treatment of a mandibular molar: 11-year follow-up

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**Objective.** This article discusses the relationship between apical limit of root canal filling and success on endodontic treatment of a mandibular molar.

**Study design.** A mandibular right first molar with vital pulp was endodontically treated, and 3 years later periapical lesions on mesial and distal roots were detected. The canals were retreated and obturated to the same levels as in the previous treatment.

**Results.** An 8-year radiographic follow-up showed repair of the periapical lesions on both roots.

**Conclusions.** Results suggest that the apical limit of obturation seems to have no influence in the repair of periapical tissues in mandibular molars. (*Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2011;112:e48-e50)

Since Ingle<sup>1</sup> established that nearly 60% of endodontic treatment failures are due to incomplete obturation of the root canal, the majority of authors have defended the theory that success in endodontics is greatly dependent on the obturation.<sup>2</sup>

This theory is supported by the belief that tissue fluids can seep into empty spaces in the apical third of the canal, becoming stagnant and releasing substances that are toxic to the periapical tissues.<sup>2</sup> Therefore, the general consensus is that the apical limit of obturation plays a major role in the outcome of therapy.<sup>3</sup>

Regarding the treatment of teeth with periapical lesions, even greater importance has been attributed to the apical limit of the obturation, owing to the presence of microorganisms in the root canal system and to the lower probability of success.<sup>4</sup>

The present article describes the treatment of a mandibular right first molar with vital pulp which developed periapical lesions 3 years after endodontic treatment. Endodontic retreatment was done and the canals were obturated at the same apical levels. An 8-year radiographic follow-up showed repair of the periapical lesions.

### CLINICAL CASE

An adult male patient was referred for endodontic treatment of the mandibular right first molar, which presented a deep occlusal cavity. After anesthesia, rubber dam placement and removal of decay, the pulp chamber was accessed and prepared.

During determination of the working length, it was observed that the mesiobuccal and the mesiolingual canals ended in a single foramen (Fig. 1, A). The canals were prepared by using hand-held Flexofiles (Maillefer, Ballaigues, Switzerland) with reciprocating movements and Gates-Glidden drills (Maillefer).

At each instrument change, canals were irrigated with 2 mL 1% sodium hypochlorite. After instrumentation, the canals were irrigated with 5 mL sterile saline and dried with sterile paper points of diameter equivalent to the last instrument used up to the working length. Following that, a corticosteroid-antibiotic intracanal dressing (Rifocort-Medley; Indústria Farmacêutica, Campinas, Brazil) was placed.

Obturation was carried out by lateral condensation technique with gutta-percha cones and Fill Canal sealer cement (DG Ligas Odontológicas, Rio de Janeiro, Brazil) up to 0.5 mm and 2.0 mm short of the apex in the mesial and distal canals, respectively (Fig. 1, B).

A 3-year radiographic follow-up showed the development of periapical lesions on both roots (Fig. 1, C), and the patient was referred for endodontic retreatment.

After removal of the root canal filling (Fig. 1, D), canals were instrumented using handheld Flexofiles (Maillefer) with reciprocating movements and Gates-Glidden drills (Maillefer). At each instrument change,

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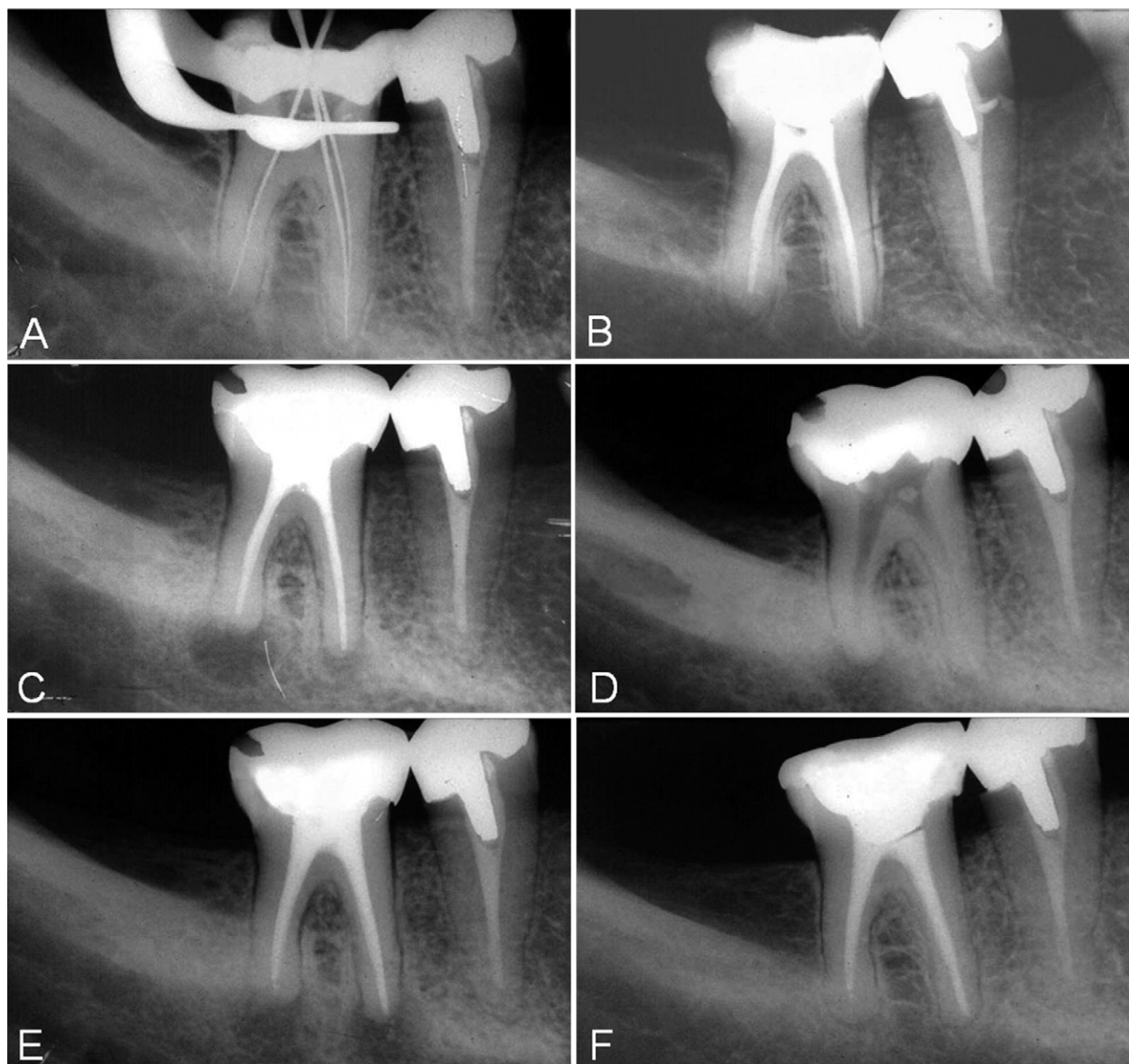


Fig. 1. **A**, Radiograph to determine the working length. **B**, Radiograph taken immediately after endodontic treatment. Note the difference in the apical limits of obturation for the mesial and distal canals. **C**, Recall radiograph taken 3 years after treatment, showing periapical lesions in mesial and distal roots. **D**, Root canals after removal of obturating material for retreatment. **E**, Radiograph taken immediately after endodontic retreatment and obturation by lateral condensation. Note the difference in the apical limits of obturation for the mesial and distal canals, which are the same as in **B**. **F**, Recall radiograph 8 years after retreatment showing repair of the periapical lesions.

canals were irrigated with 2 mL 1% sodium hypochlorite and then with 5 mL sterile saline. They were dried with sterile paper points of diameter equivalent to the last instrument used up to the working length and dressed with calcium hydroxide mixed with sterile saline for 30 days.

As in the earlier treatment, root canals were filled up to 0.5 mm short of the apex for the mesial canals and 2.0 mm for the distal canal. Fill Canal sealer (DG

Ligas Odontológicas) and gutta-percha cones were used to obturate the canals by lateral condensation technique (Fig. 1, **E**). An 8-year radiographic follow-up showed repair of the periapical lesions on both roots (Fig. 1, **F**).

#### DISCUSSION

The theory that the apical limit of obturation is a determinant factor for the success of endodontic treat-

ment<sup>2</sup> was not corroborated by the outcome of this clinical case.

Because the mesial canals were obturated at limits compatible with those recommended by the literature (Fig. 1, B), they should have been successful, though maybe not the distal one. However, both developed periapical lesions (Fig. 1, C).

During retreatment, the same apical limits as in the previous treatment were observed (Fig. 1, E). Because the mesial and distal canals had different obturation limits, according to the previously mentioned reasons, one could expect the periapical lesion from the mesial root to undergo repair, but not the distal lesion. However, both showed repair after retreatment (Fig. 1, F).

Studies have demonstrated that no obturation technique is able to hermetically seal the root canal system,<sup>5-8</sup> so it is unlikely that absolutely no fluid leakage would occur into the obturated canals.

Without bacteria and their products, periapical lesions of endodontic origin do not occur.<sup>8-12</sup> Therefore, we consider that fluid leakage into eventual voids left by incomplete obturation can not be the culprits for endodontic failures.<sup>7,9-11,13-15</sup> Most likely, failure would be a result of poorly conducted treatment, in which tissue remains and debris are left in the canal and act as substrate for existing bacteria.<sup>7,14-16</sup>

With this in mind, it is clear that the outcome of endodontic therapy in both vital and necrotic pulp in canals with periapical lesions is dependent on one main factor: infection control. When treating vital pulp, infection controls aims to prevent infection from occurring, whereas for teeth with necrotic pulp the goal is to eliminate infection, or at least bring it to levels that allow the body to promote repair.

In the present case, the root canals were probably contaminated at some point during the first endodontic treatment, resulting in development of periapical lesions. Retreatment was able to control the infection, leading to resolution of the lesions.

## CONCLUSIONS

Results suggest that the apical limit of obturation seem to have no influence in the repair of periapical tissues in mandibular molars. Clinical studies focusing this question should be done on molars and other groups of teeth.

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