

# Maxillary Central Incisor with two Root Canals and two Separated Roots: A Case Report

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## Abstract

Maxillary central incisors have been reported as presenting with only 1 root canal and a single root in 100% of cases. Variations in the number of roots or canals in the upper central incisors are rare. Therefore, to achieve a technically satisfactory endodontic outcome, the clinician must have adequate knowledge of the internal canal morphology and be aware of the possible variations. The purpose of this study was to report a clinical case with a varying number of roots in a right maxillary central incisor. After the appropriate cleaning and shaping of the missed root canal, it was filled using the Tagger's technique. Cone beam computed tomography follow up showed complete healing of the lesion after 36 months.

**Keywords:** Cone Beam Computed Tomography, Dental Operating Microscope, Internal Anatomy, Maxillary Central Incisor, Root Canal Treatment

## Introduction:

The success of root canal treatment is highly dependent on the cleanliness and shaping of the root canal system. The aim is the removal of pulp tissue and bacteria and their by-products, while the canal is shaped in preparation to receive the filling material.<sup>1</sup>

To achieve cleanliness and decontamination of the canal, adequate knowledge of the internal anatomy of the teeth and possible variations is essential. The use of a dental operating microscope with adequate instruments that permit visualization and negotiation of the root canal system is also important.<sup>2</sup>

Since the first report by Hess<sup>3</sup> in 1925, the maxillary central incisor has been reported as presenting with 1 root canal and a single root in 100% of cases. In 1975, De Deus<sup>4</sup> studied the internal dental anatomy of 1137 teeth. Among them were 37 maxillary central incisors and all of them had 1 root canal in a single root. Further studies such

as Vertucci<sup>5</sup> in 1984 have also evaluated the internal anatomy of the teeth and reported the same findings.

Despite these findings of 1 root canal in a single root being presented in the vast majority of cases, some variations have been reported. Reid<sup>6</sup> *et al.* reported 2 cases of maxillary permanent incisors with 2 root canals in a single root. In 2003, Genovese<sup>7</sup> reported a maxillary central incisor with 2 separated roots. In addition, Sponchiado<sup>8</sup> *et al.* reported a case with this variation to the anatomy in a tooth with coronal macrodontia. In 2009, Gondin<sup>9</sup> reported an upper incisor presenting 3 root canals.

## Case Report:

A 42-year-old Caucasian woman was referred for endodontic treatment of the maxillary right central incisor due to apical radiolucency and prosthetic indications. The tooth was asymptomatic, with an absence of sinus tract or swelling. A provisional acrylic crown was in position. The tooth had been previously treated by an endodontic specialist, but

without the use of a microscope or any other kind of magnification.

Radiographic examination (fig. 1) revealed that the tooth had 2 separated roots. The buccal root exhibited radiopaque material, and the palatal root showed a narrow canal and an apical radiolucent area.

After local anesthetization with 3% prilocaine and 0.03 IU/mL felipressine (DFL, Rio de Janeiro, Brasil), the tooth was isolated with a rubber dam, all the provisional cement was removed and the pulp chamber was irrigated with 2.5% sodium hypochlorite (Biodinâmica, São Paulo, Brazil). Using an 8× magnification on a dental operating microscope (DFVasconcellos, Rio de Janeiro, Brazil), the gutapercha present in the buccal canal was assessed. The entrance of the palatal root was obliterated. Using TRA 01 and TRA 24D ultrasonic tips (Dental Trinks, São Paulo, Brazil) and with the illumination and magnification provided by the microscope, the palatal root was located and negotiated. The working length was established with an apex locator (Sybron Endo, California, USA) and a radiograph was taken to confirm the patency of the canal. No treatment was performed on the buccal canal.

Chemical and mechanical instrumentation was performed with Gates Glidden burs (DentsplyMaillefer, Ballaigues, Switzerland), manual files (Flexofile, DentsplyMaillefer, Ballaigues, Switzerland), and rotary Ni-Ti files (MTwo, VDW, Munich, Germany). At every change of instrument, the canal was thoroughly irrigated with sodium hypochlorite; after preparation, it was flooded with 17% EDTA (Biodinâmica, São Paulo, Brazil) for 3 min. Passive ultrasonic irrigation (PUI)

was used for 20 sec to activate the hypochlorite; this procedure was repeated 2 more times. After final hypochlorite irrigation, the root canal was dried with paper points. A dressing of calcium hydroxide with saline solution was left inside the canal for 14 days.

At the following appointment, the patient was asymptomatic with the provisional crown not showing any clinical sign of leakage. After anesthesia and placement of the rubber dam, the root canal was again accessed. The calcium hydroxide dressing was removed, the canal was irrigated with sodium hypochlorite then EDTA, and passive ultrasonic irrigation was performed using the same protocol as for the first visit, and finally the root canal was dried with paper points. Filling was performed with standard #60 gutta percha points and accessory M, FM, and F (Dentsply, Petropolis, Brasil). Endofill (Dentsply, Petropolis, Brasil) cement and Tagger's technique were used to complete the root canal filling.

Final radiographs were taken from the orto, mesial, and distal aspects. A prosthesis was cemented and the patient was referred for general dentistry. Due to the initial attempt at canal location, a deviation was observed in the palatal root. (fig. 2)

Thirty-six months after treatment, the patient was asymptomatic; the probing test was normal and a permanent crown was complete. Radiographic examination (fig. 3) revealed that the radiolucent area had become normal with characteristics of a healing area. With the aid of cone beam computed tomography the independent roots could be visualized (fig 4,5). The original lesion was completely healed, and there was no perforation at the palatal root.



Figure No. 1



Figure No. 2



Figure No. 3



Figure No. 4



Figure No. 5

**Discussion:**

Conventional endodontic treatment, particularly in cases of anatomic variation, must be performed efficiently to ensure functionality of the tooth. Substantial coronal destruction may jeopardize prosthetic rehabilitation and encourage patients to reconsider prosthesis on implant. Teeth with a small coronal remnant and apical radiolucency may have a favorable outcome in cases where the root canal system is properly negotiated and filled. Root canal retreatment is usually more cost-effective than an implant-supported restoration.<sup>10</sup> Considering that the palatal root had no canal obturation, performing apical surgery in this case would have been unlikely to be successful.<sup>11</sup>

Variations in the anatomy of the root canal may be associated with coronal aberrations such as dens invaginatus,<sup>12,13</sup> talon cusp fusion,<sup>14</sup> or germination, even with a clinically normal crown.<sup>15</sup> In this case, the patient had no natural crown, precluding the assessment of the original morphology. The case reported herein exhibited a rare situation of a maxillary central incisor with 2 independent root canals, classified as a class IV as described by Vertucci.<sup>5</sup>

The success in this case was largely dependent on the localization, negotiation, and proper treatment of the palatal root. In spite of having had previous appointments with an endodontic specialist, the complete domain of the internal anatomy was not achieved. It is believed that the use of magnification and illumination may increase the success of accessing “calcified” canals or those with an uncommon morphology.<sup>16,17</sup>

It is important to use ultrasonic tips with different shapes when removing calcifications, pulp nodules, or materials that obliterate the canal entrance. The utilization of microsonics<sup>18</sup> is a safe way to deal with difficult anatomies by minimizing the risk of perforation or other adverse events. Modern endodontic practice must involve not only knowledge of the internal anatomy, but also the technology necessary to adequately negotiate the entire root canal system.

**Conclusion:**

The use of dental operating microscope and the appropriate ultrasonic tips can be considered an important armamentarium to locate root canals. The root canal treatment of the tooth reported in this study was effective, less invasive and cost effective in comparison with an implant-supported single crown.

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