case report  _root canal position and anatomy complications

Getting to the 00.00 point

Author  _ Prof. Philippe Sleiman, Lebanon

Anatomy and nature still teach us on a daily basis. Root canal treatment, while it is becoming a routine procedure, surprises and sometimes bad cases still occur. In this article, I will present two unusual case reports from my own practice.

Case 1

The first is a clinical case that in my experience posed rather a challenge. The patient was referred to my office suffering from paraesthesia of his lower lip on the one side after a root canal treatment had been performed on his mandibular second molar.

The preoperative radiograph (Fig. 1), which was sent by his dentist, showed a well-performed root canal treatment that did not explain the clinical manifestations, but looking closely at the apical part one could observe that the obturation material lay in proximity to the apex of the mandibular canal. Immediate retreatment was required. Unfortunately, the material that had been used was the plastic carrier Thermafil (DENTSPLY), and it was extending into the nerve, causing the inflammation, and the inflammation was causing pressure on the nerve. The Thermafil was removed from the canals—never an easy thing to do—using K3XF files (Sybron-Endo; Fig. 2) and without any solvent in order to avoid any more damage to the nerve in case of leakage. I set the Elements Adaptive Motor (Kerr Endodontics; Fig. 3) to K3XF mode, first using a 25.06 file in the softened part of the gutta-percha with the System B plugger. I was very careful not to push the carrier further inside the nerve and not to damage the plastic carrier and lose the grip. The second file used was the 25.04 K3XF to remove more gutta-percha and to liberate the carrier.

The instrument was used to hold the carrier and to remove it from the canal (Fig. 4). Once the Thermafil...
had been removed and the exact working length had been determined using the ApexID apex locator (Axis, SybronEndo, Fig. 5), the canals were shaped following the SM sequence in TF Adaptive mode to the working length, and I used the EndoVac irrigation system (SybronEndo, Fig. 6) with cold physiological saline in order to reduce the inflammation by cooling down the roots. All of the canals were irrigated with the cold saline for at least 20 minutes. The reason I used this technique was to immediately lower the inflammation inside the mandibular canal, which is not well innervated. Reducing the inflammation inside and around the nerve can take a while and I needed to lower it as soon as possible. The canals were kept empty with a cotton pellet inside the access cavity and a hermetic seal on top.

I asked immediately for a CT scan (i-CAT, Imaging Sciences International) to be taken in order to study the case. To my surprise, I found that the position of the mandibular canal was different from the contralateral one and that it was in contact with the apex of the second molar where the root canal treatment was performed (Fig. 7).

The patient was prescribed anti-inflammatories and kept under observation. Several days later, his lip was normal in function, but there was still some of loss of sensibility. Thirty days postoperatively, another CT scan was taken (Fig. 8) in order to check the inflammation inside the nerve itself, but during this time we continued to irrigate the canals with cold physiological saline at intervals of three days.

Until the patient reported the slow return of sensitivity, I decided to seal the canals, and it was for me the moment of truth, since I knew that I needed to seal the canals to the 0.00 point and place a small puff of sealer at the end too. Carefully adjusted master cones were placed inside the canals with a very tight tug back. The correct amount of sealer was applied in order to avoid any excess and gentle warm obturation was performed with the
Elements Obturation Unit (SybronEndo). The integrity of the obturation was checked with a CBCT scan (Figs. 9 & 10).

Six months later, a conventional radiograph was performed (Fig. 11) in order to follow up on the case; the patient was doing very well with a completely functional and sensitive lip. The final radiograph showed a sealed root canal space and none of the sealer inside the mandibular canal remained.

The conclusion of this case is that we will never know the reason for such a difference in the position of the mandibular canal between the right and left of the mandible, and that we need to respect the 0.00 point of the length of the roots—nothing more and nothing less. And the most important conclusion is that nature and the human body have a truly amazing healing power once the cause of inflammation has been eliminated.

**Case 2**

In the second clinical case, the patient presented at the office with problems biting on his molar, with a fistula on the buccal side of his mandibular first molar. The preoperative radiograph showed an acceptable root canal treatment performed in accordance with recommendations (Fig. 12).

Studying the radiographs in detail, we could obviously see that something was not right in the apical area of the mesial canals. A closer look indicated some kind of pathology in the coronal part of the distal canal and possibly a cervical resorption or an internal resorption that might explain the fistula in this area.

Again K3XF files were used to retreat the case, with the proper irrigation technique using the EndoVac. A 50.04 file or the ML3 file in TF Adaptive mode was used to shape the last 3 mm of the canals. Adequate master cones were prepared with a very strong tug back placed 0.5 mm short of the working length. My choice was the Elements Obturation Unit in order to perform the sealing of the root canal system. The choice of the plugger was made, selecting the largest plugger to reach 5 mm from working length in each canal, in order to generate hydraulic pressure and to seal in 3-D during the down-pack or the first wave of obturation. Manual pluggers were also adjusted to reach 5 mm and 10 mm from the working length. Medium viscosity was chosen for the cartridge with a large opening and the extruder was set to two arrows or fast injection. The sealer was placed on the cones and inserted into all four canals, the first wave of condensation was performed in the canals one after another, and the manual plugger that reached 5 mm from working length was used thereafter in order to control the apical plug. Sealer was placed inside the canal, the preheated cartridge was inserted very slowly with no pressure applied on the needle, since it should reach 7 mm from the working length, 5 mm was injected into each canal, manual pluggers were used to condense this part and final filling of the root canal system was performed, also followed by hand plugging. The hydraulic force generated with this technique is sufficient to seal lateral and accessory canals and, of course, the resorption in the distal canal that appeared in the final postoperative radiograph (Fig. 13).

The root canal system has a very complex anatomy and this is not often apparent on radiographs. Performing a partial root canal treatment and placing one cone is not the gold standard in root canal treatment. Sealing the root canal system is the final step performed by the endodontist to complete the root canal treatment, but it should be concluded with a hermetic seal on top of it.

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**Author**

Prof. Philippe Sleiman
Advance American Dental Center
Abu Dhabi and Dubai, UAE
profsleiman@gmail.com