

## ENDODONTIC MANAGEMENT OF C-SHAPED ROOT CANAL ON A SECOND MANDIBULAR MOLAR

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### ABSTRACT:

The aim of this case report is to show and to treat the challenge of the management of the C-shaped root canal during negotiation, debridement and obturation on a second mandibular molar.

C-shaped root canal is frequent in the mandibular second molar, but also in maxillary and mandibular premolars and molars. The capacity to diagnose this configuration can help the practice to apprehend the difficulties and to adapt the therapy of the case.

Debridement can be realized by rotary and manual instruments, the disinfection can be assisted by the use of sonic or ultrasonic irrigation. The endodontic system can finally be filled by a tridimensional filling of the canal, followed by a coronal restoration to ensure the sealing of the endodontic disinfection.

**Keywords:** C-Shape canal; Root canal treatment; Disinfection.

### INTRODUCTION:

The first documentation in endodontic literature of the C-shaped root canal was carried out by Cooke and Cox in 1979. One of the prerequisite to make a successful endodontic treatment is to understand the morphology of the endodontic system. The recognition of a C-shaped canal configuration before treatment can facilitate the management of the root canal system.<sup>(1)</sup>

The C-shaped root canal is a result of a fusion failure of Hertwig's epithelial sheath. It can fail to fuse on the buccal side and results in the formation of a lingual groove, or fuse on the lingual side and leads to the formation of buccal groove.

This irregular fusion of the Hertwig's epithelial sheath can be attributed to trauma, but according to the documentation of racial predilection, it is more likely to be of genetic origin.<sup>(2)</sup>

The aim of this article is to explain how to optimize the endodontic treatment of the C-shaped root canal.

### CASE DETAIL:

A 22 year-old girl presented to the service of conservative dentistry at the faculty of dentistry of Rabat. The patient complained pain at mastication related with the left mandibular second molar.<sup>(37)</sup>

The clinical examination showed a coronal restoration, the palpation of the apical area and the percussion were painful, the thermal stimulus was negative.

The radiographic examination showed widening of the periodontal ligament and a radiolucent image which formed a V-shaped between the mesial and the distal root.

The diagnosis of chronic apical periodontitis was made and the C-shaped root canal configuration was suspected (Figure 1: Initial radiograph of the 37).

### **Management and outcome**

After placing rubber dam isolation, the tooth was trephined, the C-shaped root canal configuration has clearly appeared and matched the C1 type of Fan's classification (Figure 2: Picture of the access cavity). The configuration was confirmed by using manual K-files 15/100 and a radiographic with K-files on the canal which defined the working length (Figure 3: Radiographic with K-files on the canal).

The shaping of the root canal was made by NiTi rotary files with a crown down concept. The preparation was applied on the buccal side of the root canal to avoid any perforation on the lingual isthmus area.

A passive irrigation with 2,5% sodium hypochlorite is insufficient, especially in front of the complexity of the configuration of the C-shaped root canal and the presence of isthmus and anastomosis. So we decided to use an active ultrasonic irrigation.

After drying of the canal with a paper towels, the sealing of the root canal was made by cold lateral condensation of

gutta-percha cones against the mesial and the distal walls. After that, a vertical compaction with a blue Machtou pusher completes the filling and a radiographic control was taken to check the obturation (Figure 4: Root filling).

The coronal restoration was realized later with glass ionomer cement and a micro-hybrid composite (Figure 5).

A clinical and radiographic follow up was established, the radiographic of control one year later showed a recovery from injuries and disappearance of the widening of the periodontal ligament, and the stability of the sealing of the obturation (Figure 6).

### **DISCUSSION:**

An early diagnosis can facilitate the management of C-shaped root canal configuration, a preoperative radiographic and an additional radiograph from 20° mesial or distal projection are a non invasive ways to provide clues about this morphology.<sup>(3)</sup>

The radiographic taken with K files on the canal gives an idea about the potential presence of a furcation. In a true C-shaped canal like our case, the instrument can pass from mesial to distal without any obstruction.<sup>(3)</sup>

The C-shaped canal system is large and can present transverse anastomoses and isthmus which can be considered as a bacterial reservoirs. The use of Hedstroöm files no larger than n° 25 is more effective to remove debris, the ultrasonic irrigation occure more efficiency to disinfect the inaccessible areas. The light activated

disinfection method may be an effective approach also.<sup>(4)</sup> The final use of oscillatory instrumentation using NiTi hand files decrease significantly the uninstrumented canal walls that remained after Reciproc or Self Adjusting File (SAF) instrumentation.<sup>(5)</sup>

It's important to avoid the use of a Gates Glidden on the mesial and distal isthmus because the high risk of root perforation due of the thinness of the lingual wall.<sup>(6)</sup>

The form of C-shaped canal requires modifying the technique of obturation. The mesial and the distal spaces can be sealed by a cold lateral condensation but the central isthmus is narrow and deep to allow a quality sealing by the standard technique, so the use of thermo-plasticized gutta percha is easier to manipulate.<sup>(7)</sup>

According to the meta-analysis of Peng and al.<sup>(8)</sup> There is no significant difference in the long term outcome between warm gutta percha and cold lateral condensation filling. In other studies, no significant effect was found in the C-shaped root canal configuration about the healing rate of the endodontic therapy in mandibular molars. Instead, proper pulpal diagnosis and final restoration were indicated as having significantly greater influence on the healing outcomes of C-shaped and non-C-shaped canals.<sup>(9, 10).</sup>

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A particular attention must be attempted if endodontic surgery or post placement are indicated. In endodontic surgery, the retro filling must be conducted carefully to ensure a perfect sealing of the apical area. Hemisection or root amputation is also contraindicated. Instead, when endodontic surgery becomes necessary for a mandibular molar with a C-shaped root, extraction, root-end filling and intentional replantation are suggested. Furthermore, due to their conical shape, C-shaped roots are usually easy to extract without fracture<sup>(11)</sup>. The preparation of the placement can occur an embitterment and perforation because of the thinness of the lingual wall.<sup>(3)</sup>

## CONCLUSION:

To optimize the root treatment of a C-shaped canal system, the practitioner must after identifying this endodontic configuration, to use preferably manual instruments like a Hedstroöm files for cleaning, to ensure a good contact with the canal walls and to extirpate a maximum of pulpal parenchyma. To disinfect the root canal, the active irrigation is more effective and allows access to the inaccessible areas. Finally, concerning the sealing technique, the use of warm gutta-percha obturation techniques seems to be easier than a cold lateral condensation.

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## FIGURES:

Figure 1: Initial radiography of the 37

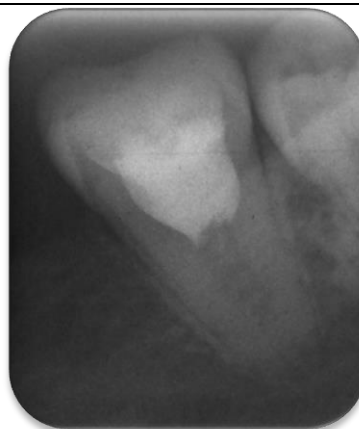


Figure 2: Access cavity of the 37



Figure 3: Radiography with K files on the canal of the 37

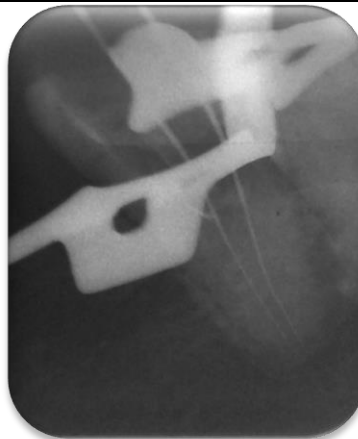


Figure 4: Radiography of root filling of the 37



Figure 5: Coronal restoration of the 37

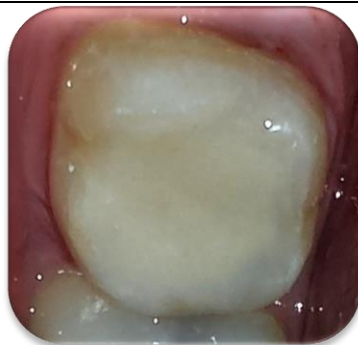


Figure 6: Control radiography 1 year later of the 37

