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DILACERATED ROOT CANAL TREATMENT USING HYFLEX CM ROTARY FILES

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ABSTRACT
This case report aims to provide an alternative procedure in completing endodontic treatment at a dilated root. To avoid the occurrence of iatrogenic errors, it is important for the dentist to determine the degree of curvature of the root canal, before making any action, and to choose the right instrument for the management of the curved root preparation and perform the correct instrumentation techniques. The end result of endodontic treatment of a curved root canal is depends heavily on the flexibility of the instrument, diameter of the instrument, and the instrumentation technique. In this case report, the first step was to measure the degree of curvature at the distal root using Schneider method. It was done before performing any endodontic treatment. The root canal preparation uses a combination of K-file ISO and rotary Hyflex CM instruments. K-file ISO instrument used was a small sized file and 3mm from the the tip was pre-curved 45° first. The preparation result was good and the curvature of the root remain intact. Then on the following visit, the radiographic images showed signs of healing.

Key Words: dilaceration, curved root, schneider methods, pre-curved file, hyflex cm

INTRODUCTION
The root canal morphology is not always as straight and simple as it appears on the radiographs. Various curves are present along the length of the canal and in all regions of the oral cavity. Dental root variations can occur both from the number and shape of the roots.¹

The term dilaceration was first used by Tomes in 1848, and it is defined as a deviation or bend in the linear relationship of a crown of a tooth to its root (Latin: dilacero = tear up). According to this definition, dilaceration is thus distinguished from the rarely used term flexion, which is defined as a tooth with a hooked or a bent root. A tooth is considered to have a dilaceration toward the mesial or distal direction if there is a 90-degree angle or greater along the axis of the tooth or root, whereas others defined dilaceration as a deviation from the normal axis of the tooth.
of 20 degrees or more in the apical part of the root.\[2\]

These curved canals may also restrict the mechanical and chemical preparation of the curvature or may lead to some iatrogenic damage affecting the prognosis of the endodontics treatment, particularly in its apical third, resulting in errors like ledge, elbow or zipping of the canal.\[3\]\[4\]

To avoid occurrence of such errors, before initiation of treatment, clinician shall make an estimate about the degree of curvature of canals by seeing the radiograph. Also, it is also important to choose the correct instruments and instrumentation techniques as the final outcome of endodontic treatment in curved canals depends largely on the flexibility of the instruments used, diameter of the instrument, and technique of the instrumentation.\[6\], \[7\]

CASE REPORT

A 34-year-old female patient was came to Klinik Konservasi Gigi Universitas Indonesia, complaining with pain at her lower left back tooth when used for chewing since a week ago. The teeth had once been patched, but the patch was broken few months ago. Patients have no history of systemic disease.

Clinical examination showed occlusal caries in 38th tooth, negative vitality test, and were tender on percussion. (Figure 1a). Radiographic examination showed that caries already reached the pulp, visible radiolucent with unclear borders and widening of lamina dura in periapical. In the apical third the distal root appears as a sharp curve toward the distal (Fig. 1b). Based on anamnness, clinical examination and radiographic examination of the 38th molar tooth then the diagnosis of this case is a chronic apical abscess and causa necrosis of the pulp.

![Figure 1. (a) Preoperative clinical picture, (b) Radiographic diagnostic picture.](image)

**CLINICAL APPROACH**

Prior to initiation of endodontic treatment, the first step was determine the degree of curvature at the distal root using the Schneider method. The results of the calculation of the root dilatation was 95\(^{\circ}\), which means that the dilatation of the tooth is very (extreme) directed to distal area. After obtaining the degree of curvature of the root canal, the next step was the selection of instruments that will be used for the preparation of the root canal later. ProTaper XS hand use were used for widening the orifices (preflaring). Glide path was done using ISO file \#06, and ISO number \#06 to \#10 were used for initial manual preparation. After that, Hyflex CM files number \#15/0.04, \#20/0.04, \#25/0.04, and \#20/0.06 were used to finish the task.
At the first visit an access opening was performed by removing the caries and necrotic tissue in the pulp chamber using a round diamond bur, and dental loupé with 3.5x magnification was used as a visualization aid. Then the orifices search were done using a straight dental probe. Two orifices were found namely mesial and distal. After that orifices enlargement (preflaring) were done using Protaper XS Hand Use. The root canal paths were determined using K-file ISO #06 on the mesial and distal root canals (Figure 2a). Then a measurement of the working length was confirmed using a radiograph. The working length for mesial root was 19 mm and for distal root was 22 mm.

After obtaining the working length, mesial and distal root canals cleaning were done using K-file ISO (Mani, Inc, Japan) starting from file #06. This file #06 was the initial file to start root canal preparation, because it can fit in along the working length. For distal roots, the file was pre-curved by 45° approximately 3 mm from the tip of the file. Then the file was inserted into the root canal, and easily following the curvature of the root canal until it reaches the working length. The subsequent preparation was done using file #08, and for distal root the file was also pre-curved by 45° approximately 3 mm from the tip of the file. The next step was done using file #10, but for the distal root the file was too rigid to achieve the working length. If the preparation using file #10 was continued, it could lead to ledge or perforation.

Therefore the preparation process on the distal root canal was repeated using a more flexible file #08, until the root canal became wide enough to be continued using the smallest size of Hyflex CM (#15/0.04). Initial root canal preparation in this case was done using a small size ISO file with filling motion. Each replacement or change of preparation tool, the root canals were irrigated by following standardized irrigation solution using sodium hypochlorite (NaOCl) 2.5%. After that root canal preparation was continued by using Hyflex CM rotary instrument starting from file #15 with taper 0.04, followed by file #20 with taper 0.04, file #25 taper 0.04, and the last was file #20 with taper 0.06.

The preparation technique used was single length technic, which mean all files of the instrumentation sequence should be used to the full length of the working length.

Each replacement or change of file size, the pulp chamber was irrigated by following standardized irrigation solution using sodium hypochlorite (NaOCl) 2.5% and recapitulated with the initial file or one smaller number. After preparation was completed, a Master Apical Cone (MAC) was inserted and photographed, using a single cone gutta percha from Hyflex CM #20 taper 0.06 (figure 2b). Then the root canal was rinsed using a saline solution, after that the root canal was flushed with 17% EDTA and activated by endoactivator for approximately 20 seconds. Then the root canal was rinse again using a saline solution.
The root canal was medicated using a cotton pellet, dripped with ChKM and squeezed dry, and placed in the pulp chamber and then covered with a temporary filling material (Cavit) for a week.

In the next visit, patient were tested; percussion test negative, palpation test negative and no subjective complaints from patient. After that, the temporary filling material was taken out, the root canal was cleaned and rinsed with saline solution and dried with paper points. Furthermore, the root canal was filled using gutta percha from Hyflex CM #20 taper 0.66, using a lateral condensation technique with MTA Filapex sealer on both root canals (figure 2c). The bottom of cavity was covered with RMGIC (Resin Modified Glass Ionomer Cement) as a base material. Patients were asked to return one week after root canal filling for control and fixed restoration post endodontic treatment.

On subsequent visit, patient was examined (one week after post root canal filling); percussion test negative, palpation test negative and no subjective complaints from patient. Radiographic signs of healing were seen in periapical with radiolucent images become slightly more opaque (figure 2d). After that, restoration after endodontic treatment was made. Due to the patient's schedule, only two days left from the schedule to return to her hometown, it was decided to restore the tooth using temporary direct composite onlay. Then patient was advised after arriving at her hometown, to immediately go to the dentist and replace the temporary direct composite onlay with permanent indirect onlay (Figure 2e).

![Radiographic images](image1.png)

Figure 2. (a) Radiographic image of root canal glide path, (b) Radiographic image of master apical cone, (c) Radiographic image of root canal filling, (d) Radiographic image of follow up visit control, (e) Clinical image of direct composite onlay restoration

**DISCUSSION**

In this case report, there was a dilaceration at distal root in radiographic image of the third molar tooth that the patient complained about. Before starting endodontic treatment, it was ascertained the degree of root curvature of the tooth to be treated, as this was closely related
to the selection of the instruments to be used. In the case presented we have followed Schneider method of curvature determination, because of its simplicity and wide acceptance. The curvature was categorized as straight if the degree of curvature was \(\leq 5^\circ\), categorized as moderate if the degree of curvature was \(10^\circ - 20^\circ\) and categorized as severe or extreme if the degree of curvature was \(\geq 25^\circ\). [5] The result of calculation of distal root curvature in this case was 95\(^\circ\), which means the root curvature of the tooth was categorized as severe or extreme to distal direction.

The widening of the orifices (pre-flaring) was done using ProTapper XS Hand Use until reach the middle thirds of the working length. The purpose of pre-flaring was to make sure that the file can easily inserted into the root canal, and irrigation on debris materials can flushed out easily. The use of ProTapper XS Hand Use for pre-flaring in this case was possible because root canal curvature was on apical third. [6]

Initially, the plan were using combined instruments of ISO files #0.6 - #10 and Hyflex CM #15 - #20. But in implementation, when preparation was conducted using ISO file #10, it was not able to follow the anatomy of root canal curvature. If the preparation was continued using ISO file #10, it might causing ledge or perforation. Therefore the root canal preparation was taken back one step by using a more flexible ISO file #08, until the root canal became wide enough to be continued using the smallest sized file Hyflex CM (#15 / 0.04). In the early stage of preparation for this case, ISO file instruments with a small size were selected because according to Sakkir et al. (2014) [4] it was said that ISO file under size #15 were quite flexible and can be used for manual preparation of curved root canals. This was also confirmed by Gupta et al in 2016. [1] While the reason for choosing Hyflex CM because based on the results of studies conducted by Pengone et al (2012) [8], Saber et al. (2014) [9], and Capar et al. (2014) [10], Hyflex CM had better physical properties when compared to other files. Few Hyflex CM physical properties were: has excellent fatigue resistance, very flexible, can be used many times, and has a controlled memory system. By having good fatigue resistance, it was expected that the file will not be broken when used on the curved root canal.

The irrigation material used in this case report were 2.5% sodium hypochlorite solution (NaOCl) 2.5% and ethylenediaminetetraacetate solution (EDTA) 17% as both were considered to be effective as a disinfectant and as solvent for organic and inorganic tissues.

The sealer material used in this case report was MTA Filapex, because it have good seal, binds to dentinal tubules, biocompatible, antibacterial, and have a good flow. And in a case of curved root canals, good flow was considered as a very important physical property.
The obturation technique used in this case was lateral condensation, using a single cone gutta percha from Hyflex CM of size #20 / 0.06 and added with a gutta percha accessory. At the apical third gutta percha cone can fill the root canal completely, but at middle third of root canal still had empty space, so it was filled with gutta percha accessory from ISO. However, in a case like this, it would be more effective if the root canal filling was done using Thermafil technique.

CONCLUSION

In this case of dilacerated root canal treatment, with the diagnosis of chronic apical abscess et cause necrosis of the pulp, a successful root canal treatment has been performed after preparation using the Hyflex CM instruments and obturation with lateral condensation techniques. The evident for successful treatment was the presence of sign of healing in periapical area shown in radiographic images where radiopaque spectrum in periapical area become slightly more opaque during post-obturation recall.

REFERENCES
