



HyFlex® CM ROTARY INSTRUMENT ADVANTAGE IN S-SHAPED CANALS: A CASE REPORT

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ABSTRACT

Root canal systems often demonstrate high complexity with multiple curves in different planes. To deal with such complexities a new Nitinol rotary instrument (HyFlex® CM) has recently been marketed that is machined from a wire (termed CM-wire) thermomechanical processing procedure. HyFlex® CM NiTi files have been manufactured utilizing a unique process that controls the material's memory, making the files extremely flexible but without the shape memory of other NiTi files. This gives the file the ability to follow the anatomy of the canal very closely, reducing the risk of ledging, transportation, or perforation compared to other instruments with rebound effect. The manufacturer reports that the shape and strength of files with straightened spirals can be restored during autoclaving. This means that the file appears to regain its shape after sterilization and reuse. Files not returning to original shape should be discarded. The aim of this paper is to demonstrate a case of S-shaped canal performed with HyFlex® CM rotary instruments.

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INTRODUCTION

Nature often demonstrates curved root canal systems of high complexity with multiple curves in different planes.¹ Endodontic cleaning and shaping are challenging when such root canal systems are encountered.^{2,3} Many studies have highlighted the complexity of the root canal system,^{4,5} which can create significant endodontic treatment difficulties. Curves in multiple spatial orientations provide examples of these clinical challenges and an “ideal” preparation can be a challenging task to achieve, especially in canals with these features.⁶⁻⁸

To deal with such complexities a new Nitinol rotary instrument (HyFlex® CM) has recently been marketed that is machined from a wire (termed CM-wire) thermomechanical processing procedure. The manufacturer has reported that this new CM-wire instrument has considerably improved flexibility, resistance to cyclic fatigue, and good adaptation to the canal space anatomy, compared to conventional rotary instruments that are machined from superelastic austenitic NiTi wire. Clinical use seems to indicate that these new HyFlex® CM rotary instruments have outstanding clinical fatigue resistance.⁹

HyFlex® CM NiTi files have been manufactured utilizing a unique process that controls the material's memory, making the files extremely flexible but without the shape memory of other NiTi files. This gives the file the ability to follow the anatomy of the canal very closely, reducing the risk of ledging, transportation, or perforation compared to other instruments with rebound effect.¹⁰

The manufacturer reports that the shape and strength of files with straightened spirals can be restored during autoclaving. This means that the file appears to regain its shape after sterilization and reuse. Files not returning to original shape should be discarded. The aim of this paper is to demonstrate a case of S-shaped canal performed with HyFlex® CM rotary instruments.

Case Report

A 22 year old female patient, reported to the Department of Conservative Dentistry and Endodontics with the chief complaint of pain in upper right tooth region since 10 days. On clinical examination, right maxillary first premolar had a silver amalgam restoration on the disto-proximal aspect. The tooth was tender on percussion. Radiographic examination of the tooth revealed radiolucency in the disto-proximal aspect, with pulp exposure. The roots of the tooth were ‘S’ shaped. (Fig.1) On the basis of clinical and radiographic findings, a diagnosis of pulp necrosis was made and endodontic treatment was initiated.

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Figure 1 Pre-op IOPA showing S-shaped root canal anatomy

Clinical Procedure

After administration of anesthesia, the operating field was isolated with rubber dam and access opening was done. The access cavity preparation was oval in outline, in the buccopalatal direction. The working length (Fig no. 2) radiograph was taken with K Flex Files (MANI, Japan LOT: 2458) (Fig. 2)



Figure 2 Working length determination

The patency of the root canals was determined with help of ISO 10 size nickel-titanium K-files. The chemico-mechanical preparation was done using HYFLEX CM file system (Coltene/Whaledent, LOT : MT-243448).

Canal irrigation was done using normal saline, 2.5 % Sodium hypochlorite, and EDTA Liquid (SMEAR CLEAR, Sybron Endo), alternately with side vented irrigation probe (CANAL CLEAN, BIODENT, KOREA LOT: 30C1236502). 2% Chlorohexidine was used as final rinse. After proper cleaning and shaping of the root canals, master cone was inserted (Fig.no.3). Root canals were obturated using Roekoseal resin sealer (Coltene/Whaledent). The final obturation with lateral condensation can be seen in Fig. 4.



Figure 3 Master cone selection



Figure 4 Postoperative radiograph of the obturated root canal

DISCUSSION

Root canal treatment should result in thorough mechanical and chemical debridement of the entire pulp cavity, followed by a three dimensional obturation. Larger NiTi instruments may transport the canal space, causing strip perforations because of their rigidity. This issue has been easily resolved by the introduction of Controlled Memory files (Hyflex CM, Coltene), which retain their shape in curved canals and do not possess the 'Spring back action', thereby avoiding any perforation.^{9,10} The conventional NiTi files have another drawback of not giving a 'warning sign' before breakage (unlike stainless steel files, which show such signs in the form of unwinding of flutes, or presence of a shiny spot on the file, indicating that the file should be discarded). Hyflex files have overcome this problem with the unique characteristic of rewinding of the file after autoclaving. If the file does not rewind, it indicates that it needs to be discarded. This is a very useful criterion for the clinician to decide when to discard the file.^{10,11}

A unique combination of 3 and 4 fluted file designs has been incorporated in these files to provide optimum performance and strength. Also, these files can be pre-bent similar to stainless steel files before introduction in the curved canals. In general, there are a few technical considerations to be kept into

account while using Hyflex files. The number of times the instruments can be re-used depends on the treatment and procedure. Instruments must be inspected before and after use. Hyflex® CM files may respond to pressure, torque, and resistance with a lengthening / opening up of the spirals.^{9,12}

Electrical discharge machining (EDM) is a manufacturing process whereby a desired shape is obtained using electrical discharges (sparks). Principle of Electrical Discharge Machining (EDM) technique is a controlled metal-removal process that is used to remove metal by means of electric spark erosion. In this process an electric spark is used as the cutting tool to erode the work piece to produce the finished part to the desired shape. The metal-removal process is performed by applying a pulsating (On/Off) electrical charge of high-frequency current through the electrode to the work piece. This erodes very tiny pieces of metal from the work piece at a controlled rate. The repeated bombarding of the alloy with sparks melts the material or even leads to evaporation in some places. The result is a file with a distinctly textured surface where heat creates a new surface hardness. Spark erosion generates a unique, hardened surface, which improves cutting performance even further. Hyflex EDM files are one of the first endodontic instruments manufactured with EDM technology. There are three different cross section designs in single file. The rectangular cross section at the tip provides more 'core material', which results in high resistance to breakage of these files. Then the cross section becomes trapezoidal in the middle of the file and finally near the handle, the cross section changes to triangle which keeps the file more flexible there. It can be labelled as a unique combination of flexibility and strength.¹³⁻¹⁵

CONCLUSION

The development of the HyFlex® CM rotary file system, a new Nitinol rotary instrument, with two types of flute blades, may be used to perform a root canal with a simplified instrument sequence. With its great flexibility, the HyFlex® CM rotary file system preserves both the root canal anatomy and minimizes file separation, imperatives which are fundamental to performing predictable endodontic treatments. Controlled memory files have no shape memory effect, increased flexibility and fatigue resistance. As a result, they move passively inside the highly curved or double curved canals guided only by the anatomy and not by the restoring force of other files.

Disclaimer

The authors of this article have no commercial ties with the manufacturer or any conflicts of interest to disclose.

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