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The next level of performance to single file endodontics: Hyflex edm rotary file system

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Abstract

The introduction of newer instruments and techniques has resulted in endodontic procedures becoming easier, faster and safe. The most important among the advances is Nickel Titanium (NiTi) rotary instrumentation that has resulted in consistent, predictable and reproducible shaping of the root canal system. The noticeable features of these file system include flexibility, extreme fracture resistance, controlled memory, pre sterilized modular system, cutting efficiency and safety. This case report is an attempt to enlighten the design features of a newly introduced nickel titanium single file rotary system Hyflex EDM used for root canal preparation.

Keywords: Next level, performance, single file endodontics, Hyflex edm rotary file system

1. Introduction

Effective cleaning and shaping of the root canal system is essential to achieve the biological and mechanical objectives of endodontic treatment. One of these objectives is the elimination of the organic content of the root canal system, as much as possible. In conjunction with this, gaining appropriate canal shaping will facilitate irrigation and three dimensional canal obturation [1].

The use of engine driven rotary Nickel-Titanium (NiTi) instruments with continuous rotation helps the clinician achieve these objectives, but carries the risk of instrument separation and alteration of the original shape of the canal. Manufacturers have introduced different cross-sectional and longitudinal designs to minimize apical transportation and achieve faster and more predictable canal preparation. In recent years, single-file systems have been introduced that meet the mechanical objectives of root canal cleaning and shaping [1].

The property of super-elasticity and strength of the Nickel Titanium alloy have made it possible to manufacture rotary instruments with double, triple and quadruplet taper compared to the traditional standard. 02 taper of the stainless steel hand instruments [2].

Earlier nickel titanium files were used as multiple file system which are still in use. But these files are time consuming as series of files have to be used for the proper cleaning and shaping of the root canal. So, Single file system is introduced which is made up of Nickle titanium or M wire technology [3].

Single file system is more efficient and takes less time for the bio-mechanical preparation. Many new single file systems have been introduced in the market [3].

Recently a new file system, Hyflex EDM has been introduced. It is made of a nickel titanium alloy and is intended for the root canal treatment till the apex.

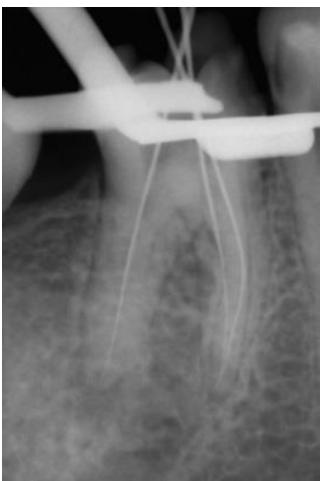
2. Case Report

Case: A 37 year old female patient came with the complaint of pain in lower right back area since 1 month. The pain was dull, constant and localized in nature. It was increased on biting & chewing and relieved by taking medication. On clinical examination caries were seen with respect to 46. Radiographic examination showed restoration exposing the pulp chamber and periapical radiolucency with respect to 46. Treatment planning was endodontic treatment with respect to 46.

The preoperative periapical radiograph showed a small area of thickened periodontal ligament around the root apices. (fig.1)

**Fig 1:** Preoperative Radiograph

A standard endodontic procedure was carried out after local anesthesia. A rubber dam was placed for endodontic access and the pulp chamber was exposed clearly. Examination of the pulp floor with an endodontic explorer revealed 3 distinct canals-MB, ML, and D canal. K-type flexo file were used for gross removal of pulp tissue in the three main canals. All canals were easily negotiated, and were chemo mechanical prepared by crown-down technique with 5.25% NaOCl, 17% EDTA and saline as irrigating solution. The working length was determinate by using apex locator- MB=20mm, ML=19mm, D=21mm. Apical preparation of the 3 canals was completed after instrumentation with Hyflex EDM. Prepared canals were obturated using the lateral condensation technique and Ah Plus as a sealer. (fig. 2, 3)

**Fig 2:** Establishing working length**Fig 3:** Postoperative after obturation

3. Discussion

The Hyflex EDM system (Neolix, France) is an efficient file system to shape the root canal completely to a continuously tapering funnel shape. It has

1. Extreme fracture resistance- HyFlex EDM files are produced using an innovative manufacturing process called Electrical Discharge Machining. The EDM process results in a file that is extremely flexible and fracture resistant. In fact, HyFlex EDM files are up to 700% more resistant to cyclic fatigue compared to traditional NiTi files [4].
2. Controlled Memory-Thanks to controlled memory properties, HyFlex EDM files follow the anatomy of the canal, which can significantly reduce the risk of ledging, transportation and perforation.
3. Fewer Files Required-The combination of flexibility, fracture resistance and cutting efficiency of the HyFlex EDM make it possible to reduce the number of files required for cleaning while preserving anatomy
4. Pre Sterilized Modular System- Provided as a modular system of sterile instruments, HyFlex EDM includes Shaping, Glidepath, OneFile, Orifice Opener and Finishing files and may be used in combination with HyFlex CM files.

It not only fulfils the biological requirements for adequate irrigation to get rid of all bacteria, bacterial by-products and pulp tissue in the root canal system, but also provides the perfect shape for obturation of the canals with gutta-percha.

Low cyclic fatigue fracture is a concern during the clinical use of rotary Nickel Titanium instruments. This may cause instrument fracture. It is associated with rotational speed and the angle of curvature of the canal. To prevent these complications a new technology EDM (Electric Discharge Machining) is introduced.

The Hyflex EDM file system is made up by the EDM (Electric Discharge Machining) process which is responsible for the unique behavior of the file. The process consists of sparks produced by high energy and high frequency electric discharges between the metal work piece (e.g. the Neo NiTi file) and an electrode (e.g. the cutting wire). This leads to melting and evaporation of the work piece material locally resulting in finished product of desired geometry. This exclusive process allows sharp cutting edges, built-in abrasive properties, variable changing profiles and a progressive flexibility.

This file system consists of orifice opener for coronal enlarging and glide pathfile and one file for canal shaping upto the apex [4].

After preparation of the access cavity, the working length is established using a # no10 K file. Hyflex EDM orifice opener is then used for widening the canal orifices and removing dentin interferences. This file is used in a circumferential brushing action in the coronal third only. Glide path file and one file is used for shaping the middle and apical thirds. First it is used till the middle thirds using 3 or 4 circumferential brushing actions. Then the file is used till the working length using pecking motion [4].

The Hyflex EDM file system operates at a speed of 500 rpm and a torque limit of 2.5 Ncm, except the Glidepath files, which can be used with 300 rpm and at a torque of up to 1.8 Ncm (18 mNm). The file is used in a circumferential motion in the middle thirds and then in a pecking motion till the working length. The canal is irrigated constantly in each canal every time the file system is used [4].

Regeneration by Thermal Treatment- The built-in shape memory of HyFlex EDM files prevents stress during canal preparation by changing their spiral shape. A normal autoclaving process is enough to return the files to their original shape and fatigue resistance. Should the file fail to regain its shape after heat treatment, risk of fracture is increased, and the file should not be used after visual inspection. A series of cases have been done in the department using this file system^[4].

4. Conclusion

In Conclusion, the HYFLEX EDM rotary file may be a good alternative for biomechanical preparation of the root canal system.

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