

Hyflex Remover: The Top-Drawer Endodontic Retreatment Tool

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ABSTRACT

Endodontic retreatment is a complex procedure often required for various reasons. For a successful endodontic retreatment, it is necessary that all existing gutta-percha is cleared away, thus allowing the root canals to be reshaped. Generally, this requires the use of a solvent, which can prove toxic for patients. Thus, COLTENE has upgraded its file preparation sequence with the addition of a Hyflex remover, a file specifically designed for removal of gutta percha eliminating the need of any solvents. For nonsurgical endodontic retreatments, the REMOVER file will efficiently remove obturation material from the root canal minimizing the number of files to be used and hence making it an essential tool for all endodontic specialists.

INTRODUCTION

Non-surgical retreatment is an endodontic procedure whose goals are "to remove materials from the root canal space and, if present, address deficiencies or repair defects that are pathologic or iatrogenic in origin" (C.J Ruddle). Its need arises in varied situations which mostly includes failure of the initial root canal treatment, a successful initial treatment followed by a new problem of decay, broken crown or tooth fracture or a case of technical retreatment in case of a new restoration. The cause of failure of initial root canal treatment can lie at any treatment stage like improper selection of the treatment strategy, incorrect oral examination, misinterpretation of radiographs or operative causes. Operative causes include failures during access preparation, canal preparation, irrigation, obturation and miscellaneous. Wherein, perforation and under/overextended preparation are the most common mishaps during access preparation. On the other hand, perforations, ledge formation, canal blockade/untreated calcified canal, missed canal and instrument separation are the common mishaps during canal preparation. While during irrigation, incorrect irrigants and insufficient disinfection of the root canal and during obturation, an over/under extended filling or periodontal involvement can equally contribute to an endodontic failure. While other causes of failures can include a poor coronal restoration, resistant bacteria, economic constraints and inadequate sterilization of instruments. In other cases, a new problem can jeopardize a tooth that was successfully treated like a new decay exposing the root canal filling material to bacteria causing a new infection in the tooth, a loose, cracked or broken crown or filling or a fractured tooth.

DISCUSSION

Success rate of an initial root canal treatment varies from 74.7 %¹ to 94%². Most studies report an average success rate of 90% between 1 and 5 years², dropping at 73% after 20 years.³ Even with evolution of technique and materials from handles to rotary Niti etc there has been no drastic improvement in the success rate over the years.⁴ The success rate is greatly influenced by the type of operator, tooth, obturation, coronal restoration or patient. Better success rate at 5 years is achieved for root canal treatment performed by endodontists (98.1%) than general dental practitioners (89.7%).⁵ Four times more chance for good outcome has been observed if treatment is

performed by a graduate dentist rather than a student.⁶Multi rooted teeth and particularly molars, have lowest success rate due to a more complex anatomy and less accessibility thus the treatment is more difficult.^{7,8} The success rate of an infected tooth (periapical lesion) is decreased by 10%-20% compared to a non- infected tooth.^{9,10}Vertical compaction is found to have better outcome according to Chevigny et al. (2008) compared to lateral condensation.¹¹For tooth with coronal leakage of the restoration, the success rate is reduced by 20%.^{3,8,12}For patients with auto immune diseases (diabetes, arthritis), the success rate is reduced by 8.¹³Thus, success rate of retreatments goes from 92% to 98% in the absence of any apical pathology.¹⁴However,with presence of an apical pathology success rate drops to about 64-70% .¹⁴Other factors that may affect the success rate of retreatments include the quality of the overall initial RCT according to Chevigny et al. (2008) and Farzaneh et al. (2004),^{15, 16}, quality of the first root canal obturation¹⁷ and altered anatomies like zipping, perforations, internal resorption and canal transportation.¹⁸As a conclusion, a 20% reduction in success rate is observed due to compromised quality of treatment , whereas a 40% reduction is observed on not respecting the original anatomy of the canal. In this global trend of retreatment there was a mushrooming need of a comprehensive retreatment solution specifically dedicated to retreatment procedure which led to the emergence of the new Hyflex file by COLTENE.

Various techniques of retreatment have been existing with their respective drawbacks. The traditional hand files are extremely time consuming and possess an inherent risk of breakage. While Ultrasound tips mostly used for broken file removal, help in retreatment but cannot be used for the whole procedure. On the other hand rotary and reciprocating Niti files have also not shown any signification innovation since 2010.¹⁹ The competition analysis of the latest Hyflex remover with the currently marketed Dentsply Sirona protaper Universal and VDW Reciproc/ Reciproc Blue has been efficiently summarized in Table 1.²⁰

COMPARATIVE PARAMETER	HYFLEX REMOVER	DENTSPLY SIRONA PROTAPER UNIVERSAL RETREATMENT	VDW RECIPROC, RECIPROC BLUE
		D1. D2. D3	
NUMBER OF FILES TO REMOVE THE OBTURATION MATERIAL	1	3	≈1
NUMBER OF USES	3 CANALS	2 TO 8 CANALS	? CANALS
ACTIVE TIP	NO	YES NO. NO	?
DIMENSIONS	30.07 L19 OR L23	30.09 25.08 20.07	?
OBTURATION MATERIAL	GUTTA PERCHA	GUTTA PERCHA POINTS, OBTURATORS OR, EUGENOL BASED SOLUBLE PASTE.THEY CANNOT BE USED TO INFILL RESIN TYPE PASTE	GUTTA PERCHA AND CARRIER BASED ROOT CANAL FILLINGS

Table 1: Competition Analysis

The new Hyflex remover, is a file specifically designed to remove the obturation material with the unique features of being a single file which undergoes heat treatment to bypass previous ledges and hence is extremely efficient for removing the old obturation material. The purpose of this instrument is to efficiently remove the initial

obturation material, paving the way for access to the non-instrumented area with conventional NiTi instruments and thus allowing proper reshaping of the canal space. The Remover has been manufactured by COLTENE utilizing the optimum blend of technology and ample experience of file designing catering to the dental community's demand for an equipment offering safe, swift and simple means of gutta percha removal during a non-surgical endodontic retreatment procedure.

It additionally possess a non-active tip with a mini invasive wire diameter, available in two lengths of 19 and 23 mm in pre sterilized blister packs.²¹ A large number of cases can be addressed with 19 mm file, if the 19 mm Remover does not reach the full extent of the filling material, the 23 mm file can be used to make up for the missing millimetres.

Thus, its advent has greatly reduced the complexity of retreatment procedures especially removing the old filling material and essentially omitted the requirement of learning a new instrumental technique for the same or using a solvent which would often be dangerous for the patients.²²



Figure 1: The Hyflex Remover

The heat treatment renders it with excessive flexibility and cyclic fatigue resistance which allows it to respect the original anatomy and achieve a working length of 3mm thus, keeping the apical part safe. It is available in N°30, with a variable triplex helix cross section with an open flute which is symmetrical in the first 3mm and asymmetrical towards the shaft. It exhibits a 7 degrees taper limited to first 10mm followed by a 0 degree taper towards the shaft enhancing efficient debris removal while preserving peri radicular dentine. Its non-active tip of 30/100mm allows its usage in curved canals with active edges offering decreased risk of ledges while respecting the anatomy with an improved cutting efficiency, thus proving to be an overall safe endodontic file (Figure 1). Its uniquely designed using 1mm wire which makes it smaller than that of the majority of re-shaping or retreatment instruments thus being minimally invasive and yet renders it with improved flexibility allowing protection of the peri-cervical part by preserving the dentin and respecting the natural anatomy of the canals. Its compatible with any endo motor in continuous rotation with a speed of 400-800rpm with a recommended torque of 2.5N.cm for best results. It's meant for a single use on a single patient with up to 3 canals.

Upon reopening the canal, its entrance is located and an orifice modifier (HyFlex EDM, COLTENE; or One Flare, COLTENE MicroMega) can be used for initial 2-3mm with a speed of 400-800rpm to create a pilot hole in the gutta percha and guide the remover in achieving a straighter access. Thereafter the remover should be used at a continuous rotation speed of 400-800 rpm and 3.0-3.5 Ncm with minimal apical guidance till 2-3mm until slight resistance is felt. Following which it should be pulled out with selective pressure on canal walls dislodging the gutta percha. Generally, three to four in out motions are sufficient to remove the entire filling material which can

come out as small shavings or as a mass. This must be followed by copious irrigation in order to wash away all the debris and sealer residue. After successful removal of the entire filling material, scouting and glide path creation can be carried out using manual or NiTi file. Standard reshaping instruments such as 2Shape, One Curve (COLTENE MicroMega), or HyFlex CM or EDM (COLTENE) can now be used to clean and shape the non-filled canal space ensuring smooth transition between previously filled and unfilled portions. Practitioners must ensure a continuously tapered preparation which is absolutely essential for achieving a 3D obturation.

It is often advised to limit the use of the Remover to 2 mm short of the estimated working length when clinically and radiographically obturation material is evidently reaching the apical area. This aids in preventing potential overextension of filling material into the periapical area. This last 2mm of filling material can be safely removed using a manual file. Once all previous material has been removed, the cleaning and shaping can be undertaken using standard NiTi shaping instruments

Thus a highly recommended overall protocol advises Hyflex Orifice Opener 25.12 with 400 rpm for access to the canal entrances followed by the use of Hyflex remover to remove the filling material further progressed by reshaping done using Hyflex EDM/Hyflex CM under 400 rpm.²³

COLTENE has thus continued to revolutionize endodontics dating back to the introduction of controlled shape memory in contrast to the traditional Niti shape memory rotary files via its Hyflex CM files which had a unique property of retaining the canal's shape even outside the canal thus minimizing mishaps of ledge formation, perforations and effectively preserving the natural anatomy of the canal. It displayed supreme clinical fatigue resistance property along with optimum flexibility and lesser taper thus making it suitable to be used in curved canals. This was further followed by the advent of Electrical discharge machining wherein the files were machined by generating a potential between the tool and the workpiece. This created a much tougher and fracture resistant surface layer of the EDM files by melting and evaporating the metal. This property along with its flexibility enabled these files to enhance minimally invasive endodontics and minimizing the number of files to be used.²⁴

Additionally with the advent of Glidepath file 15/.03 enabling safe and competent shaping of curved and S shaped canals and also available in pre bent form to facilitate easy access or to bypass ledges, has made their file sequence greatly comprehensive. Apart from this, COLTENE also manufactures various supplementing solutions, materials and equipments for irrigation, sealing and obturation.

Their advancements further extend to COLTENE's CanalPro Jeni, which is a digital assistance system which makes canal preparation extremely safe by utilizing algorithms enhancing autonomous navigation in the root canals to control the file speed and motion and also to assess the need of irrigation.²⁵ Thus, the entire COLTENE pack can increase a dentist's efficiency to many folds making endodontic retreatments a complete success.

The REMOVER being the latest addition to COLTENE's HyFlex file range offers upgraded endodontics by making the The HyFlex EDM preparation sequence even a greater performer allowing minimal number of files to be used for the entire treatment procedure. This new instrument, specifically designed for endodontic retreatments, optimally blends the recent concepts of both endodontics and technology by embodying asymmetry, electropolishing and heat treatment to build its specific features.

The efficiency of Hyflex Remover has also been tested and compared with Mani GPR on curved canals with Vertucci type IV configuration. Wherein, both the systems were found to be equally efficient with better performance noted upon addition of passive ultrasonic irrigation.²⁶

CONCLUSION

However, the choice of the shaping instruments to be used after HyFlex REMOVER is subjected to the practitioner's own decision, depending on the clinical case. Undoubtedly, this instrument's ability of safe, thorough and swift removal of gutta percha has made endodontic retreatment a very predictable and easier task. Though, the clinician's skill and judgement has an imperative role in deciding the success rate of the retreatment by individually finishing each case with a different size and taper corresponding to its anatomical variations. We must keep in mind that the size and taper of the final shaping file should allow a total elimination of the filling

material enhancing complete reshaping and cleaning of the apical third accompanied by extensive irrigation using ultrasonic generators and tips like EndoUltra (COLTENE MicroMega). Only successful accomplishment of the above would facilitate a complete 3D obturation and hence a favourable root canal therapy outcome.²⁷ This exclusive product is available in best price possible with a price lower than any other product in competition thus making it a top drawer tool for your retreatment.

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