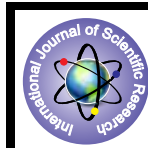


Rotary in Retreatment: a Review



Medical Science

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***Dr Lakshmi Nidhi Rao**

PG Student, Department of Conservative dentistry and Endodontics, A.B.Shetty Memorial Institute of Dental sciences, Mangalore-575018 *Corresponding author

Prof (Dr) Priyadarshini Hegde

Professor, Department of Conservative dentistry and Endodontics, A.B.Shetty Memorial Institute of Dental sciences, Mangalore-575018

Prof (Dr) Mithra N Hegde

Vice Principal and Head of the Department, Department of Conservative dentistry and Endodontics, Dean of dental faculty, A.B.Shetty Memorial Institute of Dental sciences, Mangalore-575018

ABSTRACT

Primary goal of endodontic retreatment is to regain access to the apical area by complete removal of the root canal filling material and sealers. This article compares the various rotary retreatment systems in removal of gutta-percha and sealers from the root canal. It analyzes the various studies done in this area to make an objective assessment. On the basis of various studies we can infer that a combination of rotary followed by hand instrumentation maybe the best possible option in the removal of filling material from the canal walls.

INTRODUCTION

Quality of dental care provided to the general population has improved immensely due to advancement in technology. These advancements along with increased dental patient education and awareness, have ensured that the dentition continue to remain a key part of people's lives. With increased population life span, the need to maintain a dentition for a prolonged period of time has led to a series of advanced dental procedures that were nonexistent few years ago. Therefore the need for conventional root canal therapy has also increased substantially¹.

Root canal treatment has reported a success rate between 62% and 96% over the last few decades². However it is unfortunate that a certain number of endodontically treated teeth have to be retreated. Variety of reasons have been attributed for the failure of root canal treatment, such as poorly treated and obturated canals, complications with respect to instrumentation, over extensions of obturating materials and complicated root canal anatomy³.

Primary goal of endodontic retreatment is to regain access to the apical area by complete removal of the root canal filling material and sealers and to eliminate microorganisms that have either survived previous treatment or have re-entered the root canal system.

Non surgical endodontic retreatment procedures have enormous potential for success if the guidelines for case selection are respected and the most relevant technologies, best materials and precise techniques are utilized. Success rate of endodontic retreatment ranges between 74-86%⁴.

Knowledge of the reasons of failure is advantageous in planning the optimal therapeutic approach.

Endodontic nonsurgical retreatment is a comprehensive field and may be divided into the following categories: coronal disassembly, locating previously missed canals, removing obturation materials, negotiating blocks, bypassing ledges, managing transportations, repairing perforations, removing posts and broken instruments and disinfection of the canal.

Subsequently, maintaining the original dentition in a state

of health should be the first alternative. Vast majority of teeth can be returned to health and long-term function by current retreatment procedures.

Removal of the obturating material and sealer can be achieved by several methods such as hand files, ultrasonics, solvents, heat pluggers, lasers and nickel-titanium rotary instruments. Recently, Specialized rotary instruments for retreatment have been introduced which are designed specifically to remove obturating material from root canals such as ProTaper Universal retreatment instruments, Mtwo retreatment files and R-Endo retreatment files.

Dental implants are an extraordinary service and have opened up options never before dreamed of, but a **healthy natural dentition is still the best implant**. This is why retreatment of an endodontically treated tooth also can be an extraordinary service for the patient.

ROTARY TECHNIQUES FOR REMOVAL OF GUTTA PERCHA⁵

1. Rotary instruments
Gates Glidden drill/Peesoreamer
GPX gutta-percha remover
NiTi rotary instruments

2. Specialized rotary instruments designed for retreatment
ProTaper Universal retreatment instruments
R-Endo retreatment files
Mtwo retreatment files

1. ROTARY INSTRUMENTS

1.a Gates Glidden Drill and Peeso Reamer

The use of Gates Glidden drill or Peeso reamer is a well-known technique to remove gutta-percha from the coronal and middle portion of the root canal. The non-flexible head and lateral cutting design of these instruments do not allow instrumentation in the curved portion of the root canal. Therefore, the additional use of hand instrument is often necessary. Due to their stiffness and predisposition to fracture, they are safer in the straight portions of the canal of anterior and posterior teeth.

1.b. GPX Gutta-percha Remover

The GPX gutta-percha remover (Prestige Dental) is a spe-

cially designed file used in a slow speedhand piece. It plasticizes the gutta-percha by frictional heat and facilitates its removal from the root canal by its H-file like flute design. These stainless steel drills are more effective in the coronal and middle –third portion of the root canals. These drills are available in various sizes, ranging from ISO 25–50, and more recently introduced NiTi GPX removers that can be used in curved canals as well.

1.c. NiTi Rotary Instruments

The use of NiTi Rotary instruments has the advantage of removing gutta-percha as well as shaping the root canals in an under-prepared tooth, simultaneously. The number of studies carried out for comparing the gutta-percha removal efficacy of rotary with the hand instrumentation, have shown both techniques to be almost equally effective. It has been advocated that the use of rotary devices in endodontic retreatment should be followed by hand instrumentation to achieve optimal cleanliness of root canal walls. The rotary instruments reach the whole working length easily, plasticize gutta-percha through frictional heat, & remove gutta-percha quickly.

Later, hand instruments can refine and complete the removal. These instruments are recommended to be used at rotational speed of three-four times more than that of the rotational speed which is recommended for routine cleaning and shaping procedures. The rotary instruments also have increased chances of fracture in case they are forced through the mass of gutta-percha. At present, 3 manufacturers have introduced the specially designed instruments along with their set of NiTi rotary instruments as retreatment instruments⁶.

A study was done by Banga et al to compare the effectiveness in retreating gutta-percha obturated root canals using Profile (with and without the aid of chloroform) to hand files (with chloroform). Profiles without chloroform, showed less obturation material when compared to Hand files with chloroform and Profiles with chloroform respectively (without any significant difference). Profiles with chloroform took the least time for removing gutta-percha/sealer.⁷

2. SPECIALIZED ROTARY INSTRUMENTS DESIGNED FOR RETREATMENT

2.a. ProTaper Universal Retreatment Kit (DentsplyM-aillfer)

The ProTaper Universal retreatment kit consists of three instruments D1, D2 and D3.

D1 FILE: is a 30/0.09 NiTi file (marked with one white ring) of 16 mm in length used for removal of filling material from the coronal third of the root canal.

D2 FILE: is a 25/0.08 NiTi file (marked with two white rings) of 18 mm in length used for removal of filling material from the middle third of the root canal.

D3 FILE: is a 20/0.07 NiTi file (marked with three white rings) of 22 mm in length used for removal of filling material from the apical third of the root canal.

Their unique nonworking round tip follows the canal path for effective removal of the obturating material without modifying the original curvature or shape of the root canal.

A study was done by Valentina et al to evaluate the efficiency of the ProTaper retreatment files, K-files and Profile 0.06 with respect to removal of obturating materials.

Sample group of 42 anteriors were used as part of the study. The teeth were prepared using nickel-titanium rotary instruments and obturated with gutta-percha cones along with sealer. These were then divided into 3 random groups. Solvent along with ProTaper retreatment files, K-file and Profile 0.06 were used to remove the filling materials. Longitudinal sectioning of the roots were done. Finally the images of the root surface were captured in appropriate digital format. The ProTaper retreatment files showed better efficiency in removing obturating materials compared to Profile rotary instruments and hand instruments. The teeth which were treated with ProTaper retreatment files showed cleaner root canal walls when compared to Profile Rotary and K-file hand instruments.⁸

2.b. R-Endo (Micro-Mega)

R-Endo instruments are made up from a round blank, and their cross-section is characterized by three equally spaced cutting edges. The instruments neither have radial lands nor active tip. These instruments are recommended to be used at a speed of 300-400 rpm along with gutta-percha solvent. The R-Endo retreatment kit, consists of a series of six files named as Rm, Re, R1, R2, R3 and Rs.

Rm FILE: is a stainless steel 25/.04 hand instrument with a 17 mm working length. The file is used to break the hard layer of filling material.

Re FILE: is a 25/.12 NiTi file with a 15 mm working length. It is used for eliminating the dentine overhang and flaring the access space in order to increase the solvent quantity.

R1 FILE: is a 25/.08 NiTi file with a 15 mm working length. This file is designed for removal of filling material from the coronal-third.

R2 FILE: is a 25/.06 NiTi file with a 19 mm working length. This file is designed for removal of filling material from the middle-third of the root canal.

R3 FILE: is a 25/.04 NiTi file with a 23 mm working length. This is to be used in the last for removal of filling material from the apical- third of the root canal.

Rs FILE: is a 30/.04 NiTi file with a 15 mm working length. This instrument is designed to be used in cases that require further enlargement of apical diameter of the root canal.

2.c. Mtwo Retreatment Kit (Sweden and Martina)

The Mtwo instruments have an S-shaped cross-section, an increasing pitch length in the apical–coronal direction. The Mtwo retreatment kit consists of only two instruments with cutting tips, i.e., **Mtwo R 15/05** and **Mtwo R 25/05**, designed to reach the apex. They also have the advantage of shaping the root canal in an under-prepared tooth, simultaneously.

During the use of all retreatment files, the file penetration is carried out by exerting very slight apical pressure. The instruments should be withdrawn frequently, to inspect & remove the debris from its flutes, before continuing. In case of resistance felt during rotation, hand files should be used to confirm canal permeability. These files remove gutta-percha effectively by thermo softening the gutta-percha with frictional heat. They can be used in the combination with gutta-percha, solvents to soften and remove the obturation material.

In a study done by Athikesavan et al the efficacy of two retreatment NiTi systems (protaper universal retreatment

files, R-Endo) was compared to manual technique in removing Gutta-percha. The results showed that NiTi rotary instrument and hand instruments both left remnants on the root canal walls; mostly in the apical third of the canal. NiTi rotary retreatment files can be used to remove the filling material quickly but it should be followed by hand instruments to obtain better canal wall cleanliness especially in the apical third of the root canal.⁹

Lalit et al evaluated the efficiency of three rotary nickel titanium instruments (ProTaper Universal rotary retreatment system, R-Endo retreatment files, Mtwo retreatment files) and hand instrumentation (Hedstrom files) in removing gutta-percha and sealer from root canals. Their results showed that ProTaper Universal rotary retreatment system proved to be an efficient method of removing gutta-percha and sealer compared to R-Endo retreatment files, Mtwo retreatment files and Hedstrom files.¹⁰

In another study conducted by Jaiswal et al H-File was found to be more efficient in removal of gutta-percha and sealer compared to ProTaper Universal rotary retreatment system, R-Endo retreatment files and Mtwo retreatment files.¹¹

A study done by Dadresanfar et al to compare the efficacy of two retreatment rotary systems (Mtwo, ProTaper) in removal of gutta-percha (GP) and sealer from the root canal walls with and without use of solvent. The results showed that Mtwo without the use of solvent was more efficient in removal when compared to ProTaper.¹²

From these studies we can infer that more than the retreatment system the technique of removal is important. The clinician's ability to visualize the clinical anatomy of the root canal and dexterity plays a crucial role in removal of gutta-percha and sealers from canal walls.

CONCLUSIONS

During the last decade, significant procedural refinements have increased the ability of endodontics to fulfill the higher public expectations for predictable results. When the best of what endodontics has to offer is intelligently integrated, it can clinically drive, new practice – building techniques and improve success.

Various studies conducted showcase that NiTi rotary retreatment files are more efficient in removing the filling material quickly than hand files. But it should be followed by hand instruments to obtain better canal wall cleanliness⁹. However none of the systems can completely remove all the filling material from canal walls.

In the present scenario a combination of rotary followed by hand instrumentation maybe the best possible option in the removal of filling material from the canal walls.

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