

Rotary Instruments In Pedodontics: An Overview

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Abstract

Early loss of primary teeth leads to space loss for the permanent teeth to erupt. Natural tooth is considered as a space maintainer. The main loss of primary teeth are due to dental caries and traumatic injuries. In that dental caries serves as a main cause for loss of primary teeth. According to the Guidelines of the American Academy of Pediatric Dentistry, pulpotomy is suggested when both the coronal and radicular pulp is involved or involvement of pulpal necrosis with or without caries or pulpal hyperaemia. Nickeltitanium (NiTi) rotary instrumentation has made endodontic procedures in permanent teeth easier and faster than the manual instrumentation. Using of rotary instrument resulting in consistent and predictable root canal shaping. Practitioners must always have in mind that all file systems have both benefits and weaknesses, this is based on clinical experience of the practitioners must always bear in mind that all file systems have benefits and weaknesses. Ultimately, clinical experience of the practitioners, handling properties, usage safety, and case outcomes.

KEYWORDS *pulpectomy, rotary files, manual files, generations, newer file system*

INTRODUCTION

Primary teeth is considered as the natural space maintainers. The early loss of primary teeth leads to space loss for permanent teeth to erupt¹. The main loss of primary teeth are due to dental caries and traumatic injuries. In that dental caries serves as a main cause for loss of primary teeth. According to the Guidelines of the American Academy of Paediatric Dentistry, pulpectomy is suggested when both the coronal and radicular pulp is involved or involvement of pulpal necrosis with or without caries or pulpal hyperaemia²⁻⁴. Nickel-titanium alloy was developed first in 1960s and first NiTi rotary file was appeared in the market around 1993, which was used only for permanent teeth. Barr et al. (2000) was the first one to use nickel titanium rotary files for primary teeth root canals instrumentation⁵.

Methods Of Root Canal Preparation

Root canal preparations can be done by either conventional or manual methods or by rotary instruments. The root canal preparation includes cleaning the root canal for the removal of irreversibly inflamed or necrotic pulp tissue, followed by filling with a material. The filling material should have the resorbing period same as that of primary tooth.

Conventional or by manual methods, biomechanical preparation was done with endodontic broaches and hand files⁵. Usage of manual instrumentation is widespread in pulpectomy procedures of primary teeth. Though it has some advantages there are some limitations also associated with the manual instrumentation. They are, the procedure is time consuming, inadequate cleaning of the canals, there is possibility for the ledge formation, may cause fracture of the instruments, high risk of lateral perforation and dentin compaction.

Barr et al. (2000) was the first one to use nickel titanium rotary files for primary teeth root canal instrumentation⁵. The primary canals are tortuous and irregular. Hence NiTi rotary files clean effectively due to its flexible nature of the instruments that closely follows the original root canal path.

Application of Rotary Instrumentation Technique for Pulpectomy in Primary Teeth are access opening was done and the infected coronal pulp tissue was removed. Then determine the working length from a pre-operative radiograph. Followed by a NiTi file was inserted into the root canal of primary teeth in a rotating motion upto the pre-determined working length. With sequentially larger files, the cleaning and shaping of the canals were done. The pulp tissue and the dentinal debris was cleaned each time whenever the file was withdrawn⁷.

In the year 2000 Barr et al suggested that, rotary instruments were used in a slow speed of 150–300 rpm⁵. There are two types of shaft design in rotary instruments, one is progressive taper or constant taper. It has been reported that progressive taper instrument shape the canals more quickly than the constant tapers⁸. The instruments with increasing taper have enhanced flexibility in the middle region and also at the tip. The instruments with decreasing taper provides a larger taper in the apical region and make them stiff⁹. The file or flute should be checked frequently for unwinding or distortion, if its present the file should be discarded immediately. If no distortion is detected, discard the file after using on five primary teeth.

The advantages of rotary instruments are the chair side time gets reduced, proper preparation of funnel shaped canals provides uniform filling of obturating material, the tissues and debris are removed quickly, when compared to the manual technique rotary files have better cleaning ability of the canals finally the most importantly it increases the patient cooperation^{5,11,12}.

The disadvantages are there is increased risk of perforation of the canals due to thin dentinal walls in primary teeth, when using in dry field aggressively there are chances of instrument separation within the canal, overextension in the apical region causes enlarging of apical foramen, high cost, to learn the technique there is in need for training.

Generations Of Rotary Systems

1st GENERATION FILES are passive cutting radial lands, the fixed taper of 4% and 6%, need numerous files to achieve the preparation objectives. Eg, GT files (DENTSPLY) a fixed taper on a single file of 6%, 8%, 10% and 12%.

2nd GENERATION FILES are of active cutting edges, has mitigate taper lock, has fixed taper design. Eg, Endosequence (brassler USA) and BioRaCe (FKG Dentaire) provide file lines with alternating contact point.

3rd GENERATION FILES reduce cyclic fatigue, reduced broken files. Made up of heat treatment technology and twisted file. Eg, Hyflex (coltene Whaledent) GT, Vortex, Wave One.

4th GENERATION FILES are single file technique. Due to its compressible open design, it exerts uniform pressure on the dentinal wall, regardless of the cross-sectional configuration of the canal. Have a reciprocating movement is equal to the counterclock or clockwise rotations and it requires

more inward pressure to progress. Eg, M4 (SybronEndo), Endo Express (Essential Dental Systems), and Endo-Eze (Ultradent).

5th **GENERATION FILES** are Safest, most efficient, and simplest file systems, offset design in the file minimize the engagement between the file and dentin and enhances removing the debris out of a canal and also improves flexibility along the active portion of a ProTaperNext file. Offset design and produce a mechanical wave of motion that travels along the active length of the file. Revo-S, One Shape, ProTaperNext

Newer file systems available in Pediatric endodontics

Kedo file system¹⁵

the world's first files designed for root canal preparation in primary teeth management are kedo files. Kedo files are available both in Hand type (Kedo - SH) and rotary type (Kedo - S, Kedo - SG).

Kedo-S pediatric rotary file system

The Kedo-S file system (Reeganz dental care Pvt. Ltd. India), it consists of three Ni-Ti rotary files. The total length of the files are 16 mm and the working length of the files are 12 mm.

The files are named as D1, E1, U1, respectively. Corresponding to the use in primary teeth all the files have a variable taper.

D1 file has a tip diameter of 0.25 mm with a variable taper. It can also be used in primary molars containing narrow canals (mandibular molars mesial canals, and disto buccal canal in maxillary molars).

E1 file has a tip diameter of 0.30 mm and can be used in wider molar canals (distal canal in mandibular molars and palatal canal in maxillary molars).

U1: Has a tip diameter of 0.40 mm which used in primary incisor teeth.

According to the diameter of primary teeth with narrow and wide root canals the taper of the instruments are designed.

Kedo-S paediatric rotary file system must be used in a low speed constant- torque handpiece. The speed of the file in slow speed is 150rpm – 300 rpm

The kedo-S paediatric rotary files have a gradual taper. This aids in easy coronal enlargement which provides straight line access. This gradual taper offered by the kedo-S files also help in efficient canal preparation and it avoids over instrumentation of the inner wall of root surface to prevent lateral perforation. To remove any loose pulp tissue it is necessary to use copious amount of irrigating solution and to ensure that the canal walls are clean before obturation¹⁶.

A statistical study was conducted in the year 2018 by Govindaraju L, with 45 children. They are grouped into three (15 per group) for the assessment of quality of obturation, instrumentation time and intensity of pain with pediatric rotary file (Kedo-S) in primary anterior teeth . 1st group is treated using k-hand files; 2nd group is treated with pro-taper files and the 3rd group is treated with kedo-S files.

The Kedo-S rotary file instrumentation time is much lesser than the ProTaper rotary file. The reduced working length (flute length) which is exclusive for the pediatric file, which is about 12 mm. due to the decrease in the length of the Kedo-S file permits easy insertion and also removal of the file into the oral cavity of the children, this makes the treatment much easier and simpler for both the dentists as well as the children. Hence it will be helpful to bring positive impact on the child's behaviour¹⁵.

SUMMARY

The main loss of primary teeth are due to dental caries and traumatic injuries. In that dental caries serves as a main cause for loss of primary teeth. Using of rotary instrument resulting in consistent and predictable root canal shaping. There are many newer rotary file systems are available. Based on some

studies kedo-S rotary file system makes treatment much easier and simpler for both the dentists as well as the children. Hence it will be helpful to bring positive impact on the child's behaviour.

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