

ROTARY ENDODONTICS IN PRIMARY DENTITION: A REVIEW

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ABSTRACT

Biomechanical tooth preparation is the most time consuming procedure in root canal treatment, which is also most important step in therapy. Conventional technique of instrumentation is the benchmark over hand instrumentation, which makes procedure time consuming and hectic for both patients and dentists. Using rotary instruments for primary tooth pulpectomies is cost effective and results in fills that are consistently uniform and predictable. The purpose of this article is to review the rotary instrument in primary root canal procedure.

Keywords: rotary, file, endodontic

INTRODUCTION

Successful endodontic treatment of primary teeth mainly depends on the biomechanical preparation of teeth.¹ although manual instrumentation is a time tested technique, there are some limitations related to patient cooperation and time consumption.^{1, 2} Rotary endodontics has gained tremendous popularity in permanent teeth. Limited time period of child cooperation shifted the focus towards making pulpectomy a less time consuming with more efficient

procedure.³ rotary endodontics has some limitations with respect to primary teeth due to peculiar root canal morphology and less thickness of root-dentin.^{4,5,6}

Barr et al.⁵ was first to demonstrate the use of NiTi rotary files in primary molars advocating the same principles of biomechanical preparation as described for permanent teeth. The flexibility and the instrument design allow the files to closely follow the original root canal path. Studies have consistently shown that root canal preparation in permanent teeth with NT is efficient and effective. The same principles of canal debridement and dentin shaping using NT can be applied to primary teeth. The tortuous and irregular canal walls of primary molars are effectively cleaned with NT since the clockwise motion of the rotary files pulls pulpal tissue and dentin out of the canal as the files are engaged.⁵

Many authors have reported the clinical success of Profile, ProTaper, Mtwo, FlexMaster, Light Speed LSX, Hero 642, K3, and WaveOne rotary files in primary teeth.^{7, 8}

This article reviews the different rotary instrument in primary teeth

REVIEW

PROFILE 0.04 (DENTSPLY MAILLEFER)

Pulp therapy in primary tooth starts with access preparation followed by coronal removal of pulp.^{5, 9} after working length determination size 0.04 NiTi File was chosen and it was inserted into the canal while rotating at a slow speed of 150–300 rpm till the calculated working length. After every instrumentation canals were cleaned with irrigating solution and further shaped with sequentially larger files until the last file. With this file system after preparation of five primary teeth chances of unwinding of file and distortion noticed and need to be discarded. Canals must be kept moist and hence copious irrigation requires. ProFile 0.04 (Dentsply Maillefer) has a triple U-shaped cross-sectional design with flat radial lands (fig 1), a non-cutting tip, and constant taper with a 20° helical angle and constant pitch.

Various authors have instrumented the root canals with rotary Profile 0.04 system up to a 35 size file. Then the files were stepped back with 40, 45, and 50 size rotary files.^{2, 10} Whereas some authors used ProFile 0.04 taper 29 series starting from size 2 to 7 in a reduction-gear handpiece. Files were advanced slowly toward the apex, which were withdrawn when working length was reached.¹¹

PROTAPER

Incorporated balanced helical angle and pitch prevent this file from screwing effect and maintain the anatomical curvature of canal.^{12, 13} this file system has SX file which obtains straight line access in coronal 1/3rd area of root.¹⁴ it has S1, S2 and F series files but preparations were limited till S1 only as S2 and F series causes excessive apical dentin removal.¹⁵

FLEX-MASTER

These NiTi rotary files have same cross sectioning design as protaper rotary system. Shaping of canal was done by gently advancing and then withdrawing the file. Instruments were removed when resistance was felt and changed for the next instrument. Study conducted showed superior radiographic findings in flex master files.¹⁶ canal orifices was enlarged with the orifice shaper “Introfile” of Flex-Master file system until the root canal middle third was reached. Crown down preparation was performed with a 64:1 speed gear reduction handpiece. At first, 25/0.04 rotary file was used until resistance was felt followed by 25/0.02 rotary file till working length.¹⁷

HERO SHAPER

Triple helix cross section provides these files extra elasticity. HERO stands for high elasticity in rotation. Adapted pitch separates this file system from other. Kummer et al.¹⁸ prepared the root canals with Hero 642 system and a reducing 50:1 handpiece. These file system has 3 instrument: (1) Hero 642 taper 0.04, size 30, 2 mm short of the working length; (2) Hero 642 taper 0.02, size 35, up to the working length; (3) Hero 642 taper 0.02, size 40, up to the working length. Each Hero instrument was introduced into the canal with a gentle push-and-pull motion.

MTWO

It is a new generation of NiTi rotary instruments with an “italic S” cross-section with two cutting blades, noncutting tip, and fixed taper, variable pitch. Azar et al.¹⁹ used four 21-mm Mtwo instruments (10/0.04, 15/0.05, 20/0.06, and 25/0.06) in a crown down technique with a maximum speed of 280 rpm till the working length in primary teeth.

K3 (SYBRONENDO, ORANGE, CALIFORNIA)

It is available with asymmetrical design with a slightly positive rake angle for optimum cutting, three radial lands with peripheral blade relief, fixed taper, a noncutting tip, and variable pitch.^{20,21}

Instrumentation started with the 0.06 taper file. The canals were cleansed and shaped with three progressively larger tapered files, using the “crown down” technique; each instrument was changed according to the manufacturer’s recommendation. The rotary files were used with an X-Smart motor at 350 rpm and slow torque. Rosa et al.³¹ also instrumented the root canals with K3 rotary files using crown down technique in the sequences No. 25/0.8, 30/0.6, 25/0.4, 25/0.2 at a speed of 250 rpm.²²

LIGHT SPEED (SYBRONENDO)

Cross-sectional geometry of light speed rotary files is triple U shaped with radial lands and short cutting head and long noncutting taperless shaft.

It has a triple U-shaped cross-sectional geometry with radial lands, a short cutting head and a long, noncutting, taperless shaft. The rotary Light Speed LSX instruments were used in the canal

preparation to a size 50 for anteriors and to a size 40 for molars by vieyra et al.²³ For Protaper, the root canals were instrumented with SX orifice opener rotary file for widening the orifice and then with S1–F2 till the full working length. Musale et al.²⁴ used ProFile, ProTaper, Hero Shaper, and K-Files for instrumentation of primary molars as per the manufacturer's recommendations. It was concluded that not only more conical canals were prepared with rotary files but also reduced preparation time with rotary files enhanced patient cooperation.

CONCLUSION

The research within the field of rotary endodontics is an ongoing procedure. With every passing day, more recent structures with higher efficiencies are added. NiTi rotary gadget in pediatric dentistry is like a double-edged sword. The design and flexibility of NiTi rotary instruments not only preserves the original anatomy of curved canals but also reduces procedural errors. It allows faster procedures, thereby enhancing patient cooperation, which is of paramount importance in paediatric dentistry.

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