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Pediatric rotary files: The new era of pediatric dentistry

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Abstract
Primary teeth are as important as permanent teeth and should be maintained dental arch until physiological exfoliation. Premature loss of primary teeth may cause changes in the chronology and sequences in eruption of permanent teeth. Therefore, primary teeth with pulpitis or necrosis should be considered for endodontic treatment. Pulpectomy is the choice of treatment for cariously involved primary teeth. Root canal preparation is one of the most important phases of pulpectomy in primary teeth which is mainly aimed at debridement of the canals. Present review literature highlights on the different rotary file systems for root canal preparation in the primary teeth.

Keywords: primary teeth, pulpectomy, rotary endodontics

Introduction

Primary teeth are as important as permanent teeth and should be maintained dental arch until physiological exfoliation. Premature loss of primary teeth may cause changes in the chronology and sequences in eruption of permanent teeth. Therefore, primary teeth with pulpitis or necrosis should be considered for endodontic treatment. Pulpectomy is the choice of treatment for cariously involved primary teeth [1]. Pulpectomy is defined as the complete removal of the pulp from the root canals of the primary teeth and filling them with an inert resorbable material so as to maintain the tooth in dental arch [2]. Root canal preparation is one of the most important phases of pulpectomy in primary teeth which is mainly aimed at debridement of the canals [3] Earlier root canal preparation was done with manual files but there are certain limitations with manual files such as inadequate cleaning of the canals, possibility of ledge formation, risk of lateral perforations [4] To overcome these limitations Ni-Ti rotary file was first introduced in pediatric endodontics by Barr *et al* in 2000 [5] The introduction of NiTi rotary instrumentation has made pediatric endodontics much easier and faster than manual instrumentation resulting in consistent and predictable root canal shaping [6] Present review literature highlights on the different rotary file systems for root canal preparation in the primary teeth.

Parts of rotary file

Tip of file

The cutting instrument can have a cutting (Active) or non-cutting tip (Passive). Rotary files with cutting tips are more aggressive as compared to non-cutting tips. Files such as the Profile and the Greater Taper (GT), along with the RaCe, new K3, and Hero 642 have a non-cutting tip. Universal ProTaper System has Shaping files with partially active tips while the finishing files have non-cutting tips [7]

Taper

The taper usually refers to the amount the file diameter increases each millimetre along its working surface from the tip the file to the file handle. It is particularly important to understand the "system concepts". These files have the constant apical tip size, but their taper varies from 0.04–0.12. The idea behind variable or graduating tapers is that each successive file is only engaging a minimal aspect of root canal wall [8]

Rake Angle

Rake angles are the important aspect of the file that affects the cutting efficiency of the instrument. The rake angle is formed

between the cutting edge and a cross section taken perpendicular to the long axis of the instrument. File with positive rake angle has better cutting efficacy than negative rake angles file [9]

Radial Land

A radial land is a surface that projects axially from the central axis, between flutes, as far as the cutting edge, this surface is called the land [10]

Pitch

Pitch is the number of flutes or spirals per unit length of file. Screws have a constant pitch and constant helical angles so that the instrument can be pulled down or sucking down effect into the canal. This feature is very common in rotary instrumentation while using a constant taper file system [11]

Pediatric Rotary File System

Kedo System

Kedo file system is an exclusive pediatric rotary file system introduced by Jeevanandan G *et al*. in 2016. Kedo nickel-titanium rotary files are patented files exclusively used for root canal preparation of primary teeth. Kedo rotary files have a variable taper designs providing the flexibility and efficiency to achieve consistently successful cleaning and shaping. These files result in significant preparation in the coronal third and sufficient preparation at the middle and apical third of the primary root resulting in an easy flow of the obturating material and avoiding lateral perforation at the apical region [12, 13]

Table 1: Different generation of Kedo file system

Features	Kedo SG	Kedo-SG	Kedo-SG Blue	Kedo -S Square
Length	16 mm length, 12 mm flutes	16 mm length, 12 mm flutes	16 mm length, 12 mm flutes	P1-16 mm length, 12 mm flutes A1- 17mm length, 13 mm flutes
Taper	4-8% variable taper	4-8% variable taper	4-8% variable taper	4-8% variable taper
Metallurgy	Ni-Ti rigid	Heat treated Ni-TI	Heat treated Ni-TI with titanium oxide layer	Heat treated Ni-TI with titanium oxide layer
File size	D1,E1,U1	D1,E1,U1	D1,E1,U1	P1, A1
Colour code	D1- Red,E1- Blue,U1-Black	D1- Red,E1- Blue,U1-Black	D1- Red,E1- Blue,U1- Black	P1- Red and blue bands on handle, A1-Green and Black Bands on handle
Tip diameter	D1-0.25,E1-0.30,U1-0.40	D1-0.25,E1-0.30,U1-0.40	D1-0.25,E1-0.30,U1-0.40	P1- 0.028 A1- 0.038
0.3Clinical use	D1-Narrowmolar canal E1-Wide molar canal U1-Anterior canal	D1-Narrowmolar canal E1-Wide molar canal U1-Anterior canal	D1-Narrowmolar canal E1-Wide molar canal U1-Anterior canal	P1- Molar A1- Anterior

Technique for using Kedo rotary file [6, 12].

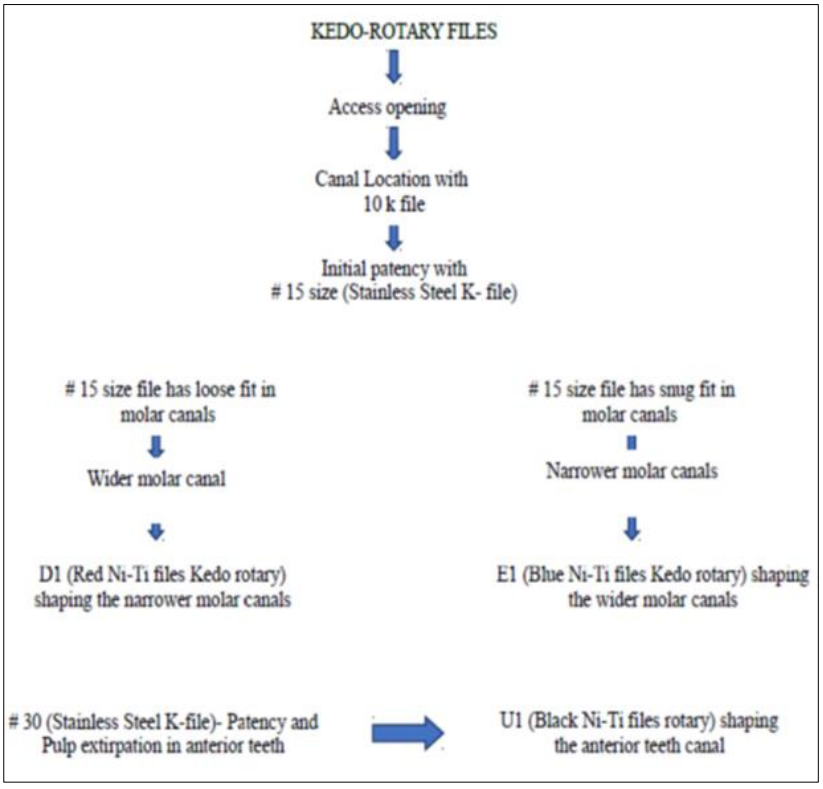

Fig 1: Technique for using Kedo rotary file

Instruction for use of Kedo file [12]

1. Use the files only in torque controlled endodontic motor with 300 RPM, 2-2.4 torque.
2. Always irrigate the canal before engaging a file and use the files 'in and out' action (not brushing).
3. Withdraw the files once the working length is reached.
4. Clean the files after each use and check for distortion.
5. Avoid forceful preparation during instrumentation by applying excess pressure on the files

Pro AF baby gold pediatric rotary file

Pro AF Baby Gold pediatric rotary file (Dentobizz) consist of 5 files made up of NiTi CM wire- Flexible with Constant taper of 4%, 6% [14]

Feature of Pro AF baby gold pediatric rotary file [14]

1. Specially designed pediatric files with short 17 mm length.
2. Unique orifice opener to enlarge orifice of the canal
3. High flexibility that reduces the chance of separation
4. Advance heat treated NiTi M wire for better canal centricity.

Instrument protocol [13, 14]

Table 2: Instrument protocol of Pro AF Baby gold file

Establish straight-line access			
Canal Location with #10k file folloed by negotiate Canal to working length upto #20 K file			
Orifice enlarger (if orifice enlargement needed) (BO- #15-10%)			
If Apex is narrow and #20 K file engages at Apex B1 (#20-4%) Yellow followed by B2 (#25-4%) Red	If Apex is wide and #20 K file is loose at apex B2 (#25-4%) Red followed by B3 (#25-6%) Red	If Apex is very wide (eg.Palatal and Distal canals) B2 (#25-4%) Red followed by B4 (#30-4%) Blue	Anteriors (Maxillary) B4 (#30-4%) Blue B5 (#40-4%) Black

Instruction to use [14].

1. The files should be instrumented at 2N, 300 rpm.
2. The file should be lubricated with 18% EDTA gel in brushing motion.
3. Before introduction of rotary file prepare the canal manually upto 20/02.
4. Place orifice opener to enlarge upto 4 mm in calcified canals or narrow orifice

Pedoflex Rotary Files

Pedoflex pediatric rotary files are introduced by Neoendo with length 16mm and taper 4% [15]

Table 3: Pedoflex rotary file

Length	**16mm**
Taper	4%
Colour coding	Yellow, Red, Blue
Tip size	Yellow- 0.20 Red- 0.25 Blue- 0.30
Speed	350RPM
Torque	1.5N

Instrument protocol [15].

1. Establish straight line access, identify and negotiate the canal.
2. Explore the canal with #10, #15 K file or #12 Neoprobe file and determine working length.
3. Always use file in brushing motion: take file passively to point of résistance and brush out of the root canal, repeat the procedure until working length is achieved.
4. After every stoke flutes should be clean and canal should be irrigated.
5. Always use with torque and speed recommended by manufacture.

Advantages of Rotary Systems in Primary Teeth [5, 16, 17, 18].

1. Reduces the chair side time
2. Results in funnel-shaped canals preparation which offers uniform fill of obturating material.
3. Remove infected pulp tissue and debris very quickly
4. Excellent cleaning ability of the canals as compared to the conventional technique
5. Improve the patient cooperation

Limitation of Rotary System [18, 19]

1. Increased risk for perforation which is attributed due to the complex anatomy of the primary teeth.
2. High cost
3. Chances for separation or fracture of the file within the canal when instrumented aggressively and in dry field
4. Overfilling of the obturating material occurs with overextension of the instrument beyond the apical foramen

References

1. Leonardo MR, Silva LAB, Nelson FP, Silva RAB, Raffaini MSGG. Ex vivo evaluation of the accuracy of two electronic apex locators during root canal length determination in primary teeth. Int Endod J. 2008; 41:317-21.
2. Fuks AB. Vital pulp therapy with new materials for primary teeth: New directions and Treatment perspectives. Pediatr Dent. 2008; 30:211-9.
3. Coll JA, Sadrian R. Predicting pulpectomy success and its relationship to exfoliation and succedaneous dentition. Pediatr Dent. 1996; 18:57-63.
4. Walton RE, Torabinejad M. Principles and practice of endodontics. 3rd ed. Saunders Company Inc. 2002; 222.
5. Barr ES, Kleier DJ, Barr NV. Use of nickel-titanium rotary files for root canal preparation in primary teeth. Pediatr Dent. 2000; 22:77-8.
6. Trushana K Thakkar. *Et al*. "Advances in Rotary Endodontics in Pediatric Dentistry". EC Dental Science. 2019; 18(6):1320-1330.

7. Koch K, Brave D. Real World Endo: Design Features of Rotary Files and How They Affect Clinical Performance. Oral Health / February. 2002; 39.
8. Zarna Sanghvi, Kunjal Mistry. Design features of rotary instruments in endodontics. J Ahmedabad Dent College and Hospital. 2011; 2(1):6-11.
9. Jindal L, Bhat N, Mehta S, Bansal S, Sharma S, Kumar A. Rotary Endodontics in Pediatric Dentistry: Literature Review. International Journal of Health and Biological Sciences. 2020; 3(2):9-13.
10. Schafer E, Tepel J. Relationship between design features of endodontic instruments and their properties. Part III. Resistance to bending and fracture. J Endod. 2001; 27:299-303.
11. Young GR, Parashos P, Messer HH. The principles of techniques for cleaning root canals. Australian dental Journal Supplement 2007; 52:52-60.
12. https://kedofiles.com/
13. Marwah N. Text book of pediatric dentistry. 4rd Ed. New Delhi: Jaypee Pub. 2020; 688-690.
14. http://kidsedental.com/Content/downloads/Pro%20Af%20Baby%20Gold%20Files%20Brochure.pdf.
15. https://orikamhealthcare.com/product/pedoflex/
16. Silva LA, Leonardo MR, Nelson-Filho P, Tanomaru JM. Comparison of rotary and manual instrumentation techniques on cleaning capacity and instrumentation time in deciduous molars. J Dent Child. 2004; 71:45-7.
17. Makarem A, Ravandeh N, Ebrahimi M. Radiographic assessment and chair time of rotary instruments in the pulpectomy of primary second molar teeth: A randomized controlled clinical trial. J Dent Res Dent Clin Dent Prospects. 2014; 8:84-9.
18. Poonacha KS, Yadav A, Deshpande A, Bargale S, Shah Y. Postoeprative pain assessment after root canal preparation with hand and rotary file in primary molar teeth: A randomised control study. Dogo Rangsang Res J. 2020; 10(6):202-17.
19. Govindaraju L, Jeevanandan G, Subramanian G. Application of rotary endodontics in pediatric dentistry - A review of literature. Journal of Pharmacy Research. 2018; 12(4):480-83.