

Original Research

Comparison of rotary files system during root canal treatment in pediatric patients

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ABSTRACT:

Background: this study was conducted to assess the Comparison of rotary files system during root canal treatment in pediatric patients. **Material and methods:** A total of 50 deciduous mandibular molars were divided into 2 groups at random (n = 25). ProTaperGold rotary files and Kedo-SG Blue rotary files made up groups A and B. Standardised digital radiography was taken prior to and following the instrumentation of the root canals, and the instrumentation time was recorded. Following data recording, statistical analysis of the data was performed using SPSS Software version 22.0. ANOVA and the Chi-square test with a level of significance of 0.05 were used to compare the instrumentation time and obturation quality across the groups. **Results:** In this study, out of 50 children, 35 were girls whereas 15 were boys aging between four and eight years. With reference to obturation quality among the three groups, 48% of teeth instrumented using ProTaper Gold, and 48% of teeth instrumented using Kedo-SG Blue rotary files displayed optimal fill. No statistically substantial variation had been noted among the 2 groups. The instrumentation time was recorded, and an ANOVA test was used to compare the three groups within themselves. This revealed a statistically significant difference between the two groups (p<0.05). **Conclusion:** In terms of obturation quality, the two types of rotary files performed very similarly. However, there was a discernible difference between the two rotary files in terms of how long it took to complete the procedure on deciduous teeth.

Keywords: rotary, RCT, pediatric

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INTRODUCTION

Early childhood caries is a globally existing oral health condition possessing a strong risk of primary teeth getting lost at an earlier age. Early loss of primary teeth endures to be a major concern in the field of pediatric dentistry. The role of a pedodontist is to maintain the primary teeth in its position until exfoliation without signs of infection, thus preserving the integrity of the dental arches.¹ Hence, endodontic management of primary teeth with infected pulp became the growing field in pediatric dentistry. In modern pedodontic practice, pulpectomy of such teeth is regarded as a treatment of choice over extraction.^{2,3} Success of a pulpectomy procedure mainly depends

upon the biomechanical preparation of the root canal systems.⁴ Although manual instrumentation for root canal preparation is widely used in primary teeth, there are limitations regarding patient cooperation and time consumption.^{4,5} Therefore, more and more practitioners are exploring the benefits of rotary endodontics in modern-day practice.⁶ However, its use has been fairly limited to permanent teeth. With changing trends, much attention has been directed towards making pulpectomy a less time-consuming and a more-efficient procedure.

Rotary instrumentation has made a quantum leap in the field of endodontics.⁷ These changes lead to the introduction of rotary endodontics in pediatric

dentistry. However, the bizarre root canal morphology and thinner root dentin limited the use of rotary endodontics in primary teeth.⁸ To overcome such barriers, various modified protocols have been introduced to prevent any undesirable complications.^{9,10}

Hence, this study was conducted to evaluate the Comparison of rotary files system during root canal treatment in pediatric patients.

MATERIAL AND METHODS

This study was conducted to assess the Comparison of rotary files system during root canal treatment in pediatric patients.

A total of 50 kids, aged between four and eight years, who needed pulpotomies on either of their deciduous mandibular molars were divided into one of two groups: ProTaper Gold rotary files are in group A, and Kedo-SG blue rotary files are in group B. Inclusion criteria for the study were participants with enough coronal tooth structure to sustain a stainless steel

crown, vital or non-vital lower deciduous molars without sinus tract, and no external or internal pathologic root resorption in teeth. Children who lacked the ability to cooperate, those with underlying systemic disorders, and those who required specific medical care were all eliminated from the study.

In order to deroof the pulp chamber and eliminate superficial cavities, a round carbide bur was utilised in a high-speed handpiece. A spoon excavator was used to perform a coronal pulp amputation, and a no. 10 size K-file was used to assess the canals' patency. The preoperative radiograph was used to determine the working length according to Ingle's radiographic approach. A helper used a stopwatch to record the instrumentation time for the canals in seconds. Saline irrigation was completed, followed by sterile paper points being dried. With the aid of cotton pellets, calcium hydroxide and iodoform paste were carefully pushed into the wound to obturate it. Statistical analysis was conducted using SPSS software.

RESULTS

Table 1: Gender-wise distribution of subjects.

Gender	Number of subjects	Percentage
Boys	15	30%
Girls	35	70%
Total	50	100%

Out of 50 children, 35 were girls whereas 15 were boys aging between four and eight years.

Table 2: Comparison of quality of obturation among the different groups expressed in percentage

Assessment of quality of obturation	ProTaper Gold rotary files	Kedo-SG Blue rotary files
Under-fill	11%	20%
Optimal-fill	48%	48%
Over-fill	29%	16%

With reference to obturation quality among the three groups, 48% of teeth instrumented using ProTaper Gold, and 48% of teeth instrumented using Kedo-SG Blue rotary files displayed optimal fill. No statistically substantial variation had been noted among the 2 groups.

Table 3: Comparison of instrumentation time among the three groups

Group	Number of subjects	Instrumentation time	P value
ProTaper Gold rotary files	25	3.02	<0.05*
Kedo-SG Blue rotary files	25	1.72	

The instrumentation time was recorded, and an ANOVA test was used to compare the three groups within themselves. This revealed a statistically significant difference between the two groups ($p < 0.05$)

DISCUSSION

When a primary tooth gets exfoliated early, it turns out to be a crucial concern in the field of pediatric dentistry as preservation of primary teeth is essential for maintaining the proper integrity of the dental arch and facial tissues. It also serves as a guide for the eruption of succedaneous permanent teeth.¹¹

The ProTaper rotary file has a convex triangular-shaped cross-sectional design with sharp cutting edges and no radial lands, noncutting tip, and variable taper with balanced helical angle and pitch to prevent "screwing in" effect.^{12,13} Kuo et al.⁴ used Sx file of ProTaperNiTi rotary system for instrumentation to

about 3 mm beyond the root canal orifice with a slight buccolingual brushing motion to gain a straight line access. The S2 file was then inserted into the canal while rotating till the calculated working length. If a point of resistance was encountered, no attempt was made to go beyond, so as to avoid the risk of instrument separation. It was concluded that lateral perforation can be avoided by using only SX and S2 files. As the gradual taper of SX files can selectively remove the dentin in a safe way. S1 and F series were not used as the increased taper and tip size resulted in excessive apical dentin removal. Azar et al.¹⁰ modified the sequence of the three ProTaper instruments

slightly to prepare the canals. Root canals were cleaned in a crown down method with three instruments in the sequence from S1 in the coronal third of the root canal, S2 in the middle third, and F1 till the working length. Pinheiro et al.¹⁴ prepared the root canal with ProTaper using a handpiece with an electric motor X-Smart. At a speed of 300 rpm and torque of 3 N/cm, S1 and S2 ProTaper files were used for shaping the primary molar root canals. For F1 and F2, 2 N/cm torque with a speed of 300 rpm was used with an anticurvature filing method for finishing the canals.

Kedo-S14 (Kids Endodontic Shaper) is the world's first rotary file exclusively for shaping primary teeth. It is invented by Dr Ganesh Jeevanandan and came into existence in November 2016. It is a three-file system 16 mm in length—D1, E1, U1. D1 is specifically designed for molars with narrower canals. E1 is designed for molars with wider canals and U1 is designed for incisors. They are made functional at a speed of ≤ 250 rpm. This system claims to provide a safe and simple technique for shaping of primary root canals in the shortest time available. However, studies are yet to confirm its efficacy.

In this study, out of 50 children, 35 were girls whereas 15 were boys aging between four and eight years. With reference to obturation quality among the three groups, 48% of teeth instrumented using ProTaper Gold, and 48% of teeth instrumented using Kedo-SG Blue rotary files displayed optimal fill. No statistically substantial variation had been noted among the 2 groups. The instrumentation time was recorded, and an ANOVA test was used to compare the three groups within themselves. This revealed a statistically significant difference between the two groups ($p < 0.05$)

Waly et al¹⁵ compared two rotary file systems and hand instrumentation for root canal preparation in regard to canal transportation, centering ability ratio, and dentin thickness using cone-beam computed tomography (CBCT). A total of 72 canals from 24 freshly extracted mandibular deciduous second molars were divided into a set of 8 teeth, then prepared using 2 rotary files systems: the Kedo-S pediatric file system (Group A) and Pro AF Baby Gold file system (Group B) were compared to hand instrumentation (Group C). CBCT scans before and after root canal preparation were used to evaluate tested parameters. Instrumentation time for all three techniques was also measured using a chronometer. Although rotary file systems have shown superior results in root canal preparation as compared to hand instrumentation, no significant differences were observed between all the groups for canal transportation and dentin thickness at all three levels of prepared canals. A comparison of centering ability ratio between all the groups was found to be statistically significant only at the cervical level. A significant difference was observed between hand instrumentation using K-files (117.3 s) and both rotary systems (Kedo-S (81 s) and Pro AF Baby Gold

(81.5 s)) in terms of canal preparation time ($P < 0.001$). It was concluded that both tested rotary systems and hand instrumentation demonstrated comparable canal preparation results, with differences that were statistically non-significant in most tested parameters, without shaping errors. However, both the rotary systems were more efficient and faster than hand instrumentation.

CONCLUSION

In terms of obturation quality, the two types of rotary files performed very similarly. However, there was a discernible difference between the two rotary files in terms of how long it took to complete the procedure on deciduous teeth.

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