

Comparison of instrumentation time and obturation quality between manual files and rotary files in root canal treatment of deciduous teeth.

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Abstract

Background: Deciduous teeth are different from permanent teeth in canal morphology and tendency for root resorption. Pulpectomy has been a treatment of choice in all necrotic primary teeth. The aim of the present study was to compare manual and rotary instrumentation techniques in deciduous teeth in root canal treatment.

Material and methods: The present study was conducted among children of 5-7 years. Single visit pulpectomy was performed for all primary teeth. In Group 1, Manual instrumentation was carried out using hand H-file. In Group 2, Kedo-S Rotary File System instrumentation was done. The total instrumentation time was measured using a digital stopwatch. To evaluate the quality of obturation, the radiograph was taken. The observer graded each radiograph as optimal, over and underfilling. The statistical analysis was performed using SPSS software version 22.

Results: In the present study in each group 40 participants in which 20 were Females and 20 were males respectively.

Mean age was 5.46 years. Instrumentation time of Group 1 i.e. H file was more than Group 2 i.e Kedo-S. Group 1 shows optimum obturation in 27.5% cases and Group 2 shows optimum obturation in 80% cases.

Conclusion: Our study concluded that Kedo-S Rotary File System was better in instrumentation as well as obturation quality than H-files.

Keywords: Obturation, Kedo-S Rotary File System, H-files.

Introduction: Deciduous teeth play an important role in the oral cavity. The primary function is mastication, whereas it also serves to maintain the distance for the eruption of permanent teeth. Preshedding of deciduous teeth leads to difficulty in eating as well as space closure. The causes of early loss of deciduous teeth are dental caries, trauma, and peri-apical infection.¹ The premature loss of primary teeth may cause changes in the chronology and sequence of eruption of permanent teeth. Maintenance of primary teeth until physiological exfoliation contributes to mastication, phonation, and esthetics and prevents

deleterious habits in children.² Pulpectomy is the treatment of choice for primary teeth with necrotic or irreversibly inflamed pulp. Successful treatment depends on the technique of instrumentation, irrigation, disinfection, and obturation of the root canal.³ Pulpectomy procedure aims at complete removal of pulp, debridement and shaping of root canal space to receive a resorbable obturating material.⁴ Stainless steel hand files have been used since many years for cleaning and shaping the canals. These have their limitations such as limited flexibility and difficulty in accessing narrow and constricted canals. Rotary endodontics has been widely used in permanent teeth. Rotary endodontics in pediatrics is a new concept. It uses nickel-titanium file (Ni-Ti) system.⁵ Barr *et al.*, introduced the Ni-Ti rotary file system rotary file system for primary teeth.⁶ The aim of the present study was to comparative evaluation of effectiveness of Manual instrumentation and Rotary instrumentation in deciduous teeth in root canal treatment.

Material and methods: The present study was conducted at Department of Dentistry, UPUMS, Saifai, Etawah among school going children of 5-7 years. Before the commencement of the study ethical approval was taken from the Ethical Committee of the institute. An informed consent was obtained from individual parent regarding the participation of the study. All necrotic posterior teeth with minimum of 2/3rd root structure remaining, sufficient crown structure for rubber dam, and crown placement were included in the study. Patients who did not provide informed consent, patient with systemic illness, nonrestorable tooth with furcal perforation, and pathological mobility were excluded from the study. Single visit pulpectomy was performed for all primary teeth. Local anesthesia was administered using Lignocaine Hydrochloride injected with a 2-ml syringe containing 20-mm 25G needle. Rubber dam isolation was done for all

the pulpectomy procedures. Access cavity was made using no 4 round carbide bur after initial caries removal was completed which was accompanied by pulpal involvement. The roof of the access cavity was removed using safe ended diamond tapered fissure with outward brushing motion. The initial orifice was located using DG-16 explorer which was followed by working length determination using no 15 hand K-file. The working length was determined using the radiographic method and was kept 1-mm short of radiographic apex. In Group 1, Manual instrumentation was carried out using hand H-file up to no 35 H-file using retraction motion. In Group 2, rotary instrumentation was preceded by initial hand instrumentation up to no 20 K-file. The rotary instrumentation was done using the Kedo-S rotary file system for primary teeth with D1 and E1. In between subsequent filling, saline irrigation was done for all the groups. The total instrumentation time was measured using a digital stopwatch. The timer was started with the introduction of the first file and stopped at the final saline irrigation. The corresponding instrumentation time was noted for each group by the operator. After complete instrumentation and irrigation, the canals were dried using no. 30 paper points and canals were obturated using calcium hydroxide iodoform paste. The excess of coronal filling is removed, and initial entrance filling was given using glass ionomer cement. The final restoration was completed using stainless steel crown placed on the same visit. To evaluate the quality of obturation, the radiograph was taken. The observer graded each radiograph as optimal, over and underfilling based on the criteria given by Coll and Sadrian.⁷ The obturation was considered as over in case of beyond the apex. Obturation 2-mm short of radiographic apex was considered as under obturation. Obturation at or within 1 mm of radiographic apex was

considered as optimal obturation. The statistical analysis was performed using SPSS software version 22.

Results: In the present study in each group 40 participants in which 20 were Females and 20 were Males respectively. Mean age was 5.46 years.[Table 1] Instrumentation time of Group 1 i.e. H file was more than Group 2 i.e Kedo-S. Group 1 shows optimum obturation in 27.5% cases and Group 2 shows optimum obturation in 80% cases.[Table 2&3]

Discussion: The primary and the ultimate objective of pulpectomy is to prevent further destruction of the teeth, thus preventing the early loss of primary teeth.⁸ A successful root canal therapy depends on complete hermetic seal preventing the ingress of bacteria into the root canal space. Chemico-mechanical preparation and adequate obturation of the root canals remains a crucial factor in clinical success of pulpectomy.⁹

Primary molars have bizarre root canal anatomy with narrow ribbon shaped canals which makes root canal preparation cumbersome.¹⁰ Ni-Ti rotary instruments show greater resistance to fracture as it is flexible and also minimizes transportation.¹¹ The instrumentation using rotary file system is proved to be time efficient with less flare ups when used in curved root canals.¹²

In the present study in each group 40 participants in which 20 were girls and 20 were males respectively. Mean age was 5.46 years. Instrumentation time of group 1 i.e. H file was more than group 2 i.e Kedo-S. Group 1 shows optimum obturation in 27.5% cases and group 2 shows optimum obturation in 80% cases.

Ochoa-Romero et al included forty necrotic teeth which were treated with rotary system and manual technique and found that rotary system was better than manual system. There was optimal filling of canals and less instrumentation time.¹³

Pathak S *et al.*, compared the cleaning efficacy of manual instrumentation and two rotary systems and found that rotary file system showed better cleaning efficiency in coronal and middle one-third of the root canals compared to other preparations.¹⁴

Vieyra and Enriquez compared instrumentation time efficiency of rotary and hand instrumentation on vital and necrotic primary teeth. They included 45 primary molars in both arches. The mean time of root canal preparation in rotary system was found to be less as compared to protaper and manual method groups. It was 20.10 ± 7.86 , 9.37 ± 2.19 , and 10.45 ± 4.77 min, respectively. Rotary system had less underfilled and overfilled canals than that of other groups.¹⁵

In vitro study by Deshpande AN *et al.*, showed complete filling of the root canals with rotary instrumentation whereas, in hand file group the quality of obturation was found to be unsatisfactory.¹⁶

Elnagar et al in their study evaluated and compared the cleaning efficacy of rotary and manual systems for root canal preparation in primary teeth. It comprised thirty single-rooted human primary teeth. Teeth were divided into two groups. In Group I, teeth were manually instrumented with Ni-Ti K files. In Group II, Revo-S™ rotary instruments were used. There was better cleanliness with Revo-S rotary system than that obtained by manual system.¹⁷

Conclusion: Our study concluded that Kedo-S files were better in instrumentation as well as obturation quality than H-files.

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Legends Tables

Table 1: Demographic Data

Gender	Instrumentation	
	Group 1	Group 2
Female	20	20
Male	20	20
Mean age	5.46	

Table 2: Comparison of Instrumentation Time

Group	Instrumentation time mean ± SD
Group 1	13.89 ± 0.345
Group 2	9.56 ± 0.889

Table 3: Comparison of Obturation Quality

Obturation quality	Group N(%)			p-value
	Group 1	Group 2	Total	
Optimal	11(27.5%)	32(80%)	43(53.75%)	<0.001
Over	0(0%)	7(17.5%)	7(8.75%)	
Under	29(72.5%)	1(2.5%)	13(16.25%)	
Total	40(100%)	40(100%)	80(100%)	