European Journal of Molecular & Clinical Medicine

ISSN 2515-8260 Volume 07, Issue 11, 2020

Comparative evaluation of instrumentation time between Hand K-files and Rotary Pedoflex files in primary mandibular molars

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Aim: To compare instrumentation time between Hand K-files and Rotary Pedoflex files in primary mandibular molars.

Method: A randomized clinical trial was carried on 40 patient aged between of 4–8 years requiring pulpectomy in primary mandibular molars. Patients were equal distributed for instrumentation with Hand K files and Rotary Pedoflex files. During the canal preparation, the instrumentation time was recorded using a stopwatch by an assistant.

Results: The mean instrumentation time for Rotary Pedoflex file was 8.41 ± 0.54 min. The mean instrumentation time observed for Hand K-file was 12.05 ± 0.82.

Conclusion: The instrumentation time with Rotary Pedoflex files was significantly less as compared to Hand K-file instrumentation.

Keywords: Pulpectomy, Rotary endodontics, Pedoflex file, K- file

Introduction: In pediatric dentistry, the pulpectomy procedure for restorable primary teeth is the preferred treatment for infected pulp tissue. Before placing the pulpectomy paste, the root canals of primary teeth are shaped and cleaned.[1]

The primary aim of pulpectomy in deciduous teeth is to debride the root canal and maintain the tooth in nonpathologic state until the exfoliation. This can be achieved by the careful manipulation of the root canal with the instruments and adherence to the biologic principles essential for cleaning and promote healing. The biologic aim involves removal of necrotic pulp, bacteria and bacterial toxins with instrumentation and irrigation and filling the sterile root canal with a resorbable material. Apart from the meticulous cleaning and debridement of the root canal, the time taken for the treatment holds significance in pediatric dentistry. With the aim of achieving a quality treatment within a short period, use of rotary instrumentation has been introduced in dentistry.[2]

Conventionally, hand files are used for cleaning and shaping and are time consuming. The length of the appointment is strongly associated with the child's behaviour.[3] Barr et al. was the first to

use rotary NiTi files for primary root canal preparation. They reported that use of NiTi files for root canal preparation in primary teeth was cost-effective, faster, and resulted in uniform and predictable fillings.[4] Nickel-Titanium (Ni-Ti) rotary files are widely used for cleaning and shaping of permanent tooth. But when the same files are used in primary teeth the clinician finds that the long length (21mm,25mm,28mm,31mm) & high taper of these files makes working difficult. To solve this problem Neoendo has introduces Pedoflex Rotary Files with length 16mm & taper 4%.[5]

The aim of this study was to compare instrumentation timing of manual instrumentation (Hand K file) and rotary systems (Pedoflex file) in the preparation of primary mandibular molar root canals.

Materials and method: The randomized controlled trial was carried out in the Department of Pediatric and Preventive Dentistry. The trial design was approved by the Institutional Review Board. The informed consent was obtained from the parents of the children participated in the study. A total of 40 children aged 4–8 years requiring pulpectomy in any one of the primary mandibular molars were randomly allotted to one of the two groups where instrumentation was done using: Group 1: Hand K files; Group 2: Rotary Pedoflex files.

The selection of the children was based on the following criteria: (a) vital or nonvital mandibular primary molars without sinus tract, (b) absence of internal or external pathologic root resorption, (c) presence of adequate coronal tooth structure to receive SS crown. The children lacking cooperative ability, children with underlying systemic diseases, and children with special health care needs were excluded from the study.

All the procedures were done by a single operator. A full mouth examination with intraoral periapical radiographs of the teeth indicated for pulpectomy was taken before the start of the clinical procedure. After confirmation of the diagnosis, local anesthesia was administrated using 2% lignocaine with 1:200,000 adrenaline. The tooth was isolated using rubber dam.

Using a round carbide bur in a high speed handpiece, the superficial caries and roof of the pulp chamber were removed. Coronal pulp amputation was done with spoon excavator. No. 10 size K file was used to determine the patency of the canals. The working length was determined with radiograph and was kept 1 mm short of the apex. The canal preparation was done using:

Group 1 (Hand K file): Hand instrumentation was carried out using Hand K-file (Dentsply Maillefer, USA) up to no 35 K-file using quarter turn and pull motion.

Group 2 (Pedoflex rotary file): Pedoflex pediatric rotary files are introduced by Neoendo with length 16mm and taper 4% used according to manufacturer instructions.

During the canal preparation, the instrumentation time was recorded using a stopwatch by an assistant. The canals were then irrigated with saline and sodium hypochlorite and dried using sterile paper points. The obturation was done using metapex by gently pushing with cotton pellets. The glass ionomer cement was given as the post obturation restoration. The pulpectomy treated teeth were restored with SS crowns either on the same day or in the next appointment. The statistical analysis was done using SPSS software version 17.0. (Chicago, SPSS Inc).

Result: In present study the total 40 teeth underwent for pulpectomy and equally divided into two groups based on randomization. Out of the 40 children being treated, 17 were girls and 23 were boys in the age group of 4–8 years with the mean age of 6.25 years. **(Table no. 1)**

The instrumentation time observed for Rotary Pedoflex files was 8.41 min with a standard deviation of 0.54. The mean instrumentation time observed for Hand K-file was 12.05 min with a standard deviation of 0.82. Results of unpaired *t*-test shows that the mean instrumentation time between the two groups reveals a statistically significant result of Rotary Pedoflex files showing less instrumentation time as compared to K-file ($P < 0.001$). **(Table no. 2)**

Table no. 1: Demographic distribution of subjects according to gender		
Gender	**Hand K file**	**Rotary Pedoflex file**
Male	12	11
Female	8	9
Mean Age	6.25	

Table no 2 – Comparison of instrumentation time between the two groups			
Group	**N**	**Mean instrumentation time**	**P Value**
Group I (Hand K File)	**15**	**12.05 ± 0.82**	**< 0.001**
Group II (Rotary Pedoflex file)	**15**	**8.41 ± 0.54**	

Discussion: The present study compared the instrumentation time of Hand K files and Rotary Pedoflex file in the preparation of primary mandibular molars. Babaji P et al (2019)[6] compared rotary system with manual system and concluded that rotary system is superior in terms of instrumentation time.

Although manual instrumentation is widely used in primary teeth, there are limitations regarding effective cleaning of root canals, possible ledge formation, perforations, dentine compaction, and instrument fracture.[8] In present study it was found that Rotary Pedoflex file required significantly lesser timing for canal preparation as compared to hand K file.

Panchal V et al.(2019) also deduced that pediatric rotary files Kedo-SG has better obturation quality in minimum instrumentation time as compared to Hand K and H files which is in support of our study.[2] Rotary instrumentation reduces manual dexterity, thereby increasing the efficiency of the operator. This can be the possible reason for reduced instrumentation time.[8]

Conclusion: In present study it was found that instrumentation time with Rotary Pedoflex files was significantly less as compared to Hand K-file instrumentation.

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