

Comparative evaluation of obturation quality between Hand K-files and Rotary Pedoflex files in primary mandibular molars

Dr. Milind Rajan, Post graduate student, Department of Pedodontics and Preventive Dentistry, Coorg institute of dental sciences, Virajpet, Karnataka

Dr. Rajeshkrishna Malge, Associate Professor, Department of Pedodontics and Preventive Dentistry, Esic Dental College, Kalaburagi, Karnataka

Dr. Shimoli Shah, BDS, 32, Rameshpark Society, Nr. Panchsheel Bus Stand, Usmanpura, Ahmedabad, Gujarat

Dr Pratik Surana, Senior lecturer, Department of Pedodontics and Preventive Dentistry, Maitri college of Dentistry and Research Center, Durg, Chhattisgarh

Dr. Rucha Thakkar, BDS, College of Dental Sciences and Research Center, Ahmedabad

Dr. Neha Kashav, Lecturer, Department of Pedodontics and Preventive Dentistry, Maharishi Markandeshwar college of Dental Sciences and Research, MMDU, Mullana, Ambala

Corresponding address: Dr Pratik Surana, Senior lecturer, Department of Pedodontics and Preventive Dentistry, Maitri college of Dentistry and Research Center, Durg, Chhattisgarh.
email id- suranadrpratik@gmail.com

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

Materials and methods: A randomized controlled trial was designed, recruiting participants with pulpally involved primary mandibular molars requiring pulpectomy in the age group of 4-8 years. Forty primary mandibular molars were randomly allocated into two equal groups. Group I: 20 teeth were instrumented using hand K-files; Group II: 20 teeth were instrumented with rotary pedoflex files. A post obturation radiograph was taken to assess the quality of obturation. The obturation quality was graded as under fill, optimal fill, over fill.

Result: In Group 1 (Hand K files): 55 % of the canals were optimally filled; 30% and 15% were under and over filled, respectively. In Group 2 (Rotary Pedoflex file): 85% of the canals were optimally filled; 10% were under and 5% were over filled each. Results of unpaired t-test comparing the obturation quality between the two groups reveal a statistically significant result of rotary pedoflex files showing better obturation quality as compared to K hand files ($P < 0.001$).

Conclusion: Authors found that rotary pedoflex file was better in terms of obturation quality as compared to Hand K files.

Keywords: Pulpectomy, Pedoflex file, K file

Introduction: The primary objective of performing pulpal therapy in primary teeth is to maintain the integrity and preserve the health of oral tissues.¹ Pulpectomy aids in the

retention of primary teeth in the dental arch diagnosed with irreversible pulpal pathosis and inflammation in a symptom-free state.² The goal of root canal therapy is the elimination of infected tissue and prevention of apical tissue. Proper root canal shaping is the predictive factor for the success of endodontic treatment.³ Root canal shaping aims to eliminate microorganism, remove infected and necrotic dentin and shape the root canal system. Mechanical root canal instrumentation should create a continuous tapered preparation in order to facilitate antiseptic irrigation and the placement of filling materials.¹

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.⁴ 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. Investigators have evaluated various root canal preparation systems and compared the efficacy of instrumentation between the hand and rotary files.⁵ No study has compared the rotary pedoflex file system in primary teeth. Hence, the present study aims to comparatively evaluate the obturation quality using Hand K- File with Pedoflex rotary file in primary mandibular molars.

Methodology

The present study was conducted in the Department of Pedodontics. It comprised of 40 children age ranged 4- 8 years of both gender. Ethical clearance was obtained prior to the study. Consent was obtained from parents of all children before the procedure.

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. After confirmation of the diagnosis, local anesthesia was administered using 2% lignocaine with 1:200,000 adrenaline. 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 one 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.

The canals were then irrigated with saline and sodium hypochlorite and dried using sterile paper points. The obturation was done using combination of calcium hydroxide and iodoform paste by gently pushing with cotton pellets. A post obturation radiograph was taken to assess the quality of obturation. The obturation quality was graded as under fill, optimal fill, over fill.

The glass ionomer cement was given as the post obturation filling. The pulpectomy treated teeth were restored with SS crowns either on the same day or in the next appointment. Results thus obtained were subjected to statistical analysis.

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**)

With respect to quality of obturation among the groups, in Group 1 (Hand K files): 55 % of the canals were optimally filled; 30% and 15% were under and over filled, respectively. In Group 2 (Rotary Pedoflex file): 85% of the canals were optimally filled; 10% were under and 5% were over filled each. Results of unpaired *t*-test comparing the obturation quality between the two groups reveal a statistically significant result of rotary pedoflex files showing better obturation quality as compared to K hand files ($P < 0.001$). (**Table no. 2**)

Gender	Hand K file	Rotary Pedoflex file
Male	12	11
Female	8	9
Mean Age	6.25	

Orbturation Quality	Hand K File	Rotary Pedoflex File	P Value
Optimal Filling	11 (55%)	17 (85%)	< 0.001
Under Filling	6 (30%)	2 (10%)	
Over Filling	3 (15%)	1 (5%)	
Total	20 (100%)	20 (100%)	

Discussion: Pulpectomy is a treatment of choice for necrotic primary teeth. Success out of pulpectomy in primary teeth is being attributed to the cleaning and debridement of root canal, apical and coronal seal.^{6,7} 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 Rotary instrumentation reduces manual dexterity, thereby increasing the efficiency of the operator.⁹ This can be the possible reason for reduced instrumentation time.¹⁰ The previous study has reported higher cervical enlargement and restricted apical preparation with greater taper than constantly fixed taper.¹¹ This can be the reason of better obturation quality with the greater taper rotary pedoflex files as compared to fixed narrow taper hand files. Another reason for better obturation quality with rotary pedoflex files as compared to hand files can be due to the use of NiTi material, which increases the flexibility of files.¹⁰ This aids in the adaptation of files to the primary canal curvature, rather than increased zipping and transportation as in hand instrumentation.¹² The present study measures success based on the clinical outcome. However, a more microscopic and volumetric analysis with large sample size would provide better scope for improvement in the present study to achieve sound conclusion.

Conclusion: Authors found that rotary pedoflex file was better in terms of obturation quality as compared to Hand K files.

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