



Comparative Evaluation of Instrumentation Timing of Hand-K File and Pedoflex File in Primary Molar: An In-Vivo Study

Renjith Abraham*, Pooja Ahluwalia¹, Shrutiben Ghanshyambhai Panchal²

1.BDS, Dr. Harvansh Singh Judge Institute of Dental Sciences and Hospital, Chandigarh, India.

2.BDS, Government Dental College and Hospital, Jamnagar, Gujarat, India.

Corresponding Author: Renjith Abraham, BDS AL-Azhar Dental College, Thodupuzha, Kerala, India.

Copy Right: © 2021 Renjith Abraham. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Received Date: November 08, 2021

Published Date: December 01, 2021

Abstract

Pulp Therapy of primary teeth has been proposed using various protocols with variable success rates. Although the morphology of root canals in primary teeth renders endodontic treatment difficult, the conventional root canal instrumentation technique for primary teeth has been hand instrumentation, which is time-consuming. Manual root canal preparations have been conventionally performed with burs, reamers, and files. Niti rotary instruments have gained much attention recently as most of the hand preparation techniques are time-consuming and prone to iatrogenic errors like ledging, zipping, apical blockage and canal transportation. Presently, most of the current research on rotary endodontic is focused on permanent teeth with a lack of enough studies regarding the use of NiTi rotary endodontic files in primary teeth despite the advantages of these systems and studies performed on primary molars. Therefore, this in-vivo study was undertaken to evaluate and compare instrumentation timings between conventional K files and Pedoflex rotary endodontic files in primary molars.

Introduction

The sustainment of the teeth present in primary dentition becomes of utmost importance till it goes through the process of physiological exfoliation as it aids in the following functions such as maintenance of the arch integrity, helping with adequate masticatory load-bearing forces, speech function, esthetics, and prevents the child from developing deleterious habits which may result in malocclusions. (1)

Primary tooth decay is restored normally using various restorative materials when caries encroach both enamel and dentin. (2) However, if there is pulpal involvement of caries associated with the primary teeth, it requires to be pulpally treated to resolve the pain and functional preservation of the teeth until it exfoliates physiologically. The preferable choice of treatment for primary teeth with pulpal infection is pulpectomy, in which the pulpal tissue is entirely removed, debridement and canal preparation, followed by obturation utilizing an appropriate resorbable material. (3,4)

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 behavior. (5) Barr et al. was the first to use rotary NiTi files for primary root canal preparation. They reported that the use of NiTi files for root canal preparation in primary teeth was cost-effective, faster, and resulted in uniform and predictable fillings. (6) The designs and high flexibility of NiTi files allow instruments to closely follow the original root canal path, especially in curved canals and procedural errors such as ledges, over-instrumentation and apical transportation have been greatly reduced. (7) Introduction of these rotary instruments has made it easier for clinicians to perform root canal therapy without too much operator fatigue because it has been shown that shorter treatment times are required to complete the debridement procedure in the preparation of the canal walls. (8,9) Therefore, this in-vivo study was undertaken to evaluate and compare instrumentation timings conventional K files and Pedoflex rotary endodontic files in primary molars.

Methodology

The study was carried out after obtaining permission from the Scientific and Ethics committee. Forty children between ages 4 and 8 were selected among the patients who visited OPD after fulfilling the selection criteria and obtaining written informed consent.

The selection of the children was based on the following criteria:

Inclusion criteria:

1. Children in the age group of 4-8 years
2. Patients exhibiting Frankl's behavior rating scale score of 3 and 4 i.e., positive (+) and positive (++)

3. At least two-thirds of the remaining root length
4. Primary molar teeth with chronic irreversible pulpitis
5. Absence of internal or external pathologic root resorption
6. Presence of adequate coronal tooth structure to receive SS crown

Exclusion criteria:

1. Patients with a diagnosed systemic disease
2. Patients showing disruptive behavior during the procedure
3. Patients with nonrestorable teeth clinically, pulpal floor perforation, excessive mobility
4. Presence of frank dentoalveolar abscess or extra-oral swelling (presence of purulence in the canals)
5. Patients with more than one-third of pathologic root resorption.

Selected patients were randomly divided into two groups:

Group 1 - Manual instrumentation using K-files (Mani, Tochigi, Japan) ($n = 20$)

Group 2 - Rotary instrumentation using Pedoflex files (Neoendo) ($n = 20$)

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. Coronal access cavity was prepared with 4 number round bur and refinement of the cavity was done with safe end bur. No.10 K (ISO) file was introduced into each root canal to determine the patency of the canal. The no.10 K file that was inserted in the root canal the tip of the file was visualized through the apex. The working length was established 1 mm short of this visualized length as suggested by Silva LA et al. (10)

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 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 canals were then irrigated with saline and sodium hypochlorite and dried using sterile paper points. The obturation was done using a combination of calcium hydroxide and iodoform paste by gently pushing with cotton pellets. 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. Data obtained was compiled, tabulated, and subjected to statistical analysis. The consistency and reliability of evaluators were assessed using kappa statistics.

Result

The mean time taken for biomechanical preparation (in minutes and seconds) was significantly more among the Hand K file group (6.21 ± 1.45 min) in comparison to the Pedoflex group (3.747 ± 1.01 min). Hence, the Pedoflex group took significantly less time for canal preparation as compared to the Hand K filegroup.

Discussion

The present study was planned for comparative evaluation of manual Hand K file and rotary Pedoflex file techniques of root canal instrumentation in primary molars. A significant reduction in instrumentation time for primary molars was found in the present study with the rotary Pedoflex file.

This finding is consistent with the results of Romero et al. (2011) and Makarem et al. (2014) Morankar R et al. (2018) who too reported a significant decrease in mean instrumentation time. Decreased instrumentation time reduces the patient's and dentist's fatigue, thereby allowing a faster, safer and quality procedure.

Conclusion

From the results of the present study it can be concluded that the rotary Pedoflex file technique required significantly less time for instrumentation of root canals in primary molars compared to the Hand K file.

References

1. Jindal L, Bhat N, Mehta S, Bansal S, Sharma S, Kumar A. "Rotary endodontics in pediatric dentistry: Literature review". Int J Health Biol Sci 2020;3:9-13.

- 2.Santamaria RM, Innes NP, Machiulskiene V, Evans DJ, Splieth CH. “Caries management strategies for primary molars: 1-yr randomized control trial results”. J Dent Res 2014;93:1062-9
- 3.Smaïl-Faugeron V, Glenny AM, Courson F, Durieux P, Muller-Bolla M, Fron Chabouis H. “Pulp treatment for extensive decay in primary teeth”. Cochrane Database Syst Rev 2018;5:CD003220
- 4.Dean JA, Avery DR, Mc Donald RE. “McDonald and Avery's Dentistry for the Child and Adolescent”. Missouri: Elsevier; 2011. p. 353-4.
- 5.Govindaraju L, Jeevanandan G, Subramanian EMG. “Application of rotary endodontics in pediatric dentistry - A review of literature”. Journal of Pharmacy Research 2018; 12(4):480-3.
- 6.Barr ES, Kleier DJ, Barr NV. “Use of nickel titanium rotary files for root canal preparation in primary teeth”. Pediatr Dent. 2000;22:77 – 80
- 7.Dantas C.J. “Histological evaluation of the effectiveness of five instrumentation techniques for cleaning the apical third of root canals”. J Endod. 1997;23:499.
- 8.Suffridge C.B., Hartwell G.R., Walker T.L. “Cleaning efficiency of Nickel-Titanium GT and, 04 Rotary files when used in a torque-controlled rotary handpiece”. J Endod. 2003;29:346–348.
- 9.Mehlawat R, Kapoor R, Gandhi K, Kumar D, Malhotra R, Ahuja S. “Comparative evaluation of instrumentation timing and cleaning efficacy in extracted primary molars using manual and NiTi rotary technique - Invitro study”. J Oral Biol Craniofac Res. 2019 Apr-Jun;9(2):151-155.
- 10.Silva L.A., Leonardo M.R., Nelson-Filho P., Tanomaru J.M. “Comparison of rotary and manual instrumentation techniques on cleaning capacity and instrumentation time in deciduous molars”. J Dent Child. 2004;71:45–47.
- 11.Romero TO, Gonzalez VM. “Comparison between rotary and manual techniques on duration of instrumentation and obturation times in primary teeth”. J Clin Pediatr Dent 2011;35:359e64.
- 12.Makarem Abbas, Ravandeh Navid, Ebrahimi Masoumeh. “Radiographic assessment and chair time of rotary instruments in the pulpectomy of primary second molar teeth: a randomized controlled clinical trial”. JODDD 2014;8:84e9.
- 13.Morankar R, et al., “Manual versus rotary instrumentation for primary molar pulpectomies- A 24 months randomized clinical trial”, Pediatric Dental Journal (2018), <https://doi.org/10.1016/j.pdj.2018.02.002>.