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Comparision between Two Different Files Systems and Two Different Obturating Techniques in Primary Teeth: An In Vivo Study

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ABSTRACT

Aim: The aim of the study is to radiographically evaluate the quality of obturation of root canals of primary teeth subsequent to Biomechanical preparation with any two different file systems and two different obturation techniques.

Materials and methods: Twenty teeth in subjects with mean age 8.7years were selected randomly using two different file systems and two different obturating techniques, i.e. Group 1: Manual K files & Reamers (20), Group 2: Manual K files & Navitips, (20) Group 3: Rotary kedo SG files & Reamers (20), Group 4: Rotary kedo SG files & Navitips (20). Quality of obturation and presence or absence of voids were assessed by taking radiographs after obturation was done using both the techniques.

Results: Results of quality of obturation and voids were analyzed using Chi-square test. No statistically significant difference between two different files systems and two different Obturating Techniques ($p > 0.05$) was observed. However, higher voids were seen with the manual method with both the Reamer and Navitip files. Further, optimal fill was comparably higher with the Rotary method with both the files.

Conclusion: Both the fie system and obturation techniques were found to be equally efficient statistically, though higher voids are seen through the manual method with both the Reamer and Navitip files and underfilling was seen with the Reamer files in both the manual and rotary methods (37.5, and 43.8% respectively)

INTRODUCTION

Pediatric dentists play a vital role taking care of primary teeth. In the primary dentition, primary goal of pulp treatment is to keep each primary tooth as a completely functioning component of the dental arch to assist with proper function, phonetics, as well as maintaining the space needed for succedent tooth eruption and the prevention of negative psychological effects caused by tooth loss.[1]To accomplish these objectives, pulp therapy procedures are indicated .[1]

Pulpectomy is the procedure of removing the diseased pulp along with microorganisms and debris from the root canals and filling the canals with an antibacterial resorbable filler substance. Pulpectomy is required to produce a strong hermetic seal, which is dependent on a number of criteria including appropriate

biomechanical preparation, the type of obturating material employed, and the accomplishment of minimal voids.[2]

Endodontic treatment in primary teeth is difficult because of structure and morphology of root canals. Complete biomechanical canal preparation offers a channel for irrigant and also assists in closing the canals with biocompatible obturating material while retaining radicular anatomy[2]. As a result, biomechanical canal preparation is a critical factor of pulpectomy success[2]. Traditionally, hand k-files are used to clean and prepare the root canals of infected deciduous teeth. Hand instrumentation, despite its widespread usage, can result in iatrogenic errors due to the indiscriminate and belligerent cutting action of stainless-steel files. [3]

In the year 2000, Rotary devices were first reported to be used to clean and shape deciduous teeth. It turned out to be an effective technique resulting in a uniform shape of canals with predictable obturation. It is a suitable choice because of being able to make conical-shaped canals and save canal preparation time.3 Obturation of the canal results in a snug seal along the length of the root canal from the orifice to the apex. The lentulo spiral, which may be operated manually or coupled to a micromotor handpiece, is the most often used technique as a root canal paste carrier. The treatment is straightforward and affordable. Filling the root canal has minimal impact in a well compacted root canal filling, and paste adherence to the canal walls is very reliant.[3] The simplest method of completely obturating canal space is disposablesyringe method by avoiding voids and incomplete filling along the canal space of the root[4]. The past inject paste carrier is comparable to lentulospiral in that it enables good obturating material placement while minimizing voids and delivering a high density of obturating materials[3]. So far, none of the known obturation methods have been shown to be optimal for obturating the canal space in the deciduous teeth. Past inject is utilized for placing calcium hydroxide and root canal sealers in permanent teeth, but there haven't been enough research to determine its efficacy as an obturation procedure in deciduous teeth. The current study includes compare and evaluate two filing systems and two obturation methods namely reamers and NaviTip radiographically in root canals of deciduous tooth.

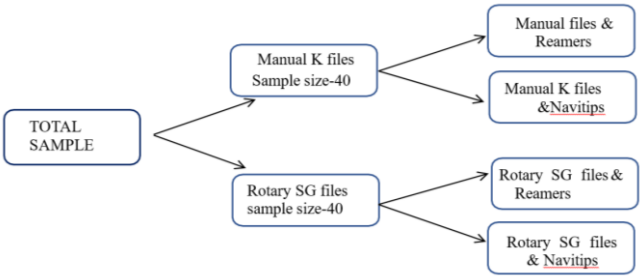
1. Materials and Methods

This study was conducted in Department of Pediatric and Preventive Dentistry, Anil Neerukonda Institute of Dental Sciences, Sangivalasa, Visakhapatnam, Andhra Pradesh after obtaining the ethical clearance from the Institutional Ethical Committee. The study included all necrotic posterior teeth with at least 2/3rds root structure enduring, sufficient crown structure for rubber dam, and crown placement. Patients who did not provide informed consent, those who had systemic sickness, non-restorable teeth with furcal perforation, and those who had pathological mobility were all excluded from the study.Pulpectomy was performed in all teeth indicated for pulp therapy. Depending upon the filing systems for cleaning and shaping and obturation technique for obturating canals, Samples division for the current study was categorized as follows

Group 1: Manual K files & Reamers

Group 2: Manual K files & Navitips

Group 3: Rotary KEDO SG files & ReamersGroup 4: Rotary KEDO SG files & Navitips



Double blinding was followed with the participant and operator unaware of the material ans technique used. Since the type of treatment provided was known to the operator, the operator could not be blinded. Following gentle interaction, the child is made to sit comfortably in the dentist chair, and subsequently nerve block was directed using Lignocaine Hydrochloride (LIGNOX 2% ADRENALINE, INDOCO REMEDIES Limited,Mumbai , India) injected with a 2-ml syringe containing 20-mm 25G needle (DISPO VAN single-use syringe, Hindustan Ltd., Hindustan, India). The subjective and objective signs of the local anesthesia were verified before the continuation of the further treatment procedure. Isolation done by using Rubber dam (coltene whaledent Pvt.Ltd, USA) for all the pulpectomy procedures. Access opening was done using no 4 round carbide bur (Dentsply Maillefer, OK, USA) after initial caries removal was completed which was accompanied by pulpal involvement. Working length determination was done using no 15 hand K-file .Grounded on the protocol, the type of filling system is chosen for a particular tooth.

Group 1 (Manual files & Reamers): In Group 1, hand instrumentation was carried out using hand K-files up to no 35 K-file using quarter turn and pull motion. In between subsequent filling EDTA gel coated to the file, saline irrigation was done in the canal. After complete instrumentation and irrigation, and the canals of root were dried using no. 30 paper points and canals were obturated with reamer technique using zinc oxide eugenol. zinc oxide mixed initially in thin consistency was used to coat the walls of the canal, followed by a thick mixture that can be manually condensed into the lumen of the canal.

Group 2 (Manual K files & Navitips): In group 2 hand method was carried out using hand k-file up to no 35 k- file using quarter turn and pull motion. In between subsequent filling, saline irrigation was done. After complete instrumentation and irrigation, the canalswere dried using no. 30 paper points and canals were obturated with Navi-Tip technique using zinc oxide eugenol.

Group 3 (Rotary SG files & Reamers): In Group 3, rotary instrumentation was preceded by initial hand instrumentation up to no 20 K-file. The rotary instrumentation was done using the Kedo-S rotary files (Reeganz dental care Pvt. Ltd, India) for primary teeth with D1 and E1. In between subsequent filling, saline irrigation was done. After complete instrumentation and irrigation, the canals were dried using no. 30 paper points and canals were obturated with reamer technique using zinc oxide eugenol.

Group 4 (Rotary SG files & Navitips): In Group 4, rotary instrumentation was preceded by initial hand instrumentation up to no 20 K-file. The rotary instrumentation was done using the Kedo-S rotary files (Reeganz dental care Pvt. Ltd, India) for primary teeth with D1 and E1. In between subsequent filling, saline irrigation was done. After complete instrumentation and irrigation, the canals were dried using no. 30 paper points and canals were with Navi-Tip technique using zinc oxide eugenol.

To evaluate the obturation quality, the radiograph was obtained using a radiovisiography (RVG). The observer graded each radiograph as optimal, over and underfilling based on the criteria given by Coll and Sadrian.[19]

Assessment of Teeth

Immediate Radiographic Assessment: Immediate postoperative assessment was done based on the following criteria given by Coll and Sadrian (1996)[19]:

Score 0 – Complete absence of voids

Score 1 – Presence of one void

Score 2 – Presence of two voids

Score3 – Presence of three voids

Score 4 – Presence of four voids

Figure 1: Evaluation of Obturation Based On Extent of Fill

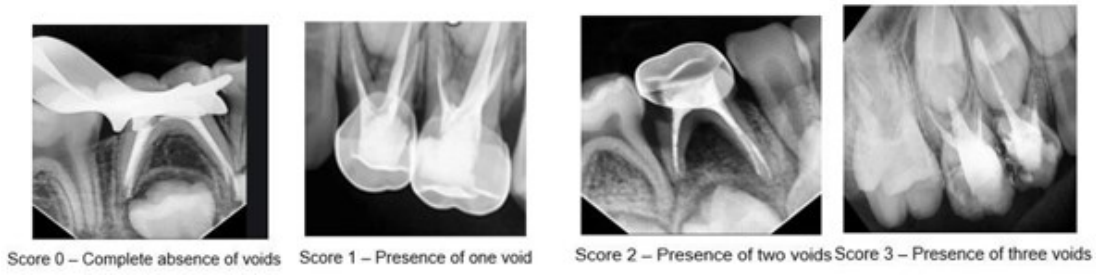


Figure 2: Evaluation of Obturation Based On Presence of Voids

The level of fill was scored from grade A to C based on the following criteria:
Grade A: Less than optimal fill
Grade B: Optimal fill
Grade C: Extrusion of obturation material beyond apex
The outcome of the radiographic examination of the sample collection have beencompiled and sent for statistical analysis.

2. Results

In the current study the obturation done was using two file systems (Manual k files& Rotary kedo s files) and two different obturation techniques (Reamers & Navi tips) and evaluated in 80 deciduous teeth. Statistical analysis was done using SPSS Version 23 software. Chi square tests was utilized to analyse the study data. Statistical significance was considered at ($p<0.05$).

In the manual method, there was no statistically significant variance between the Reamer and Navitip filing systems concerning the level of extent ($p=0.189$). Further, comparably the level of extent less than optimal fill of the canal (Grade A) was mostly seen with the Reamer file (75%), while with the Navitip file, the extent of fill was optimal fill (Grade B- 66.7%).

In the rotary method, a similar statistically insignificant variance was seen between the filing systems ($p=0.056$). Also, a higher % of samples that received filing with Reamer had less than optimal fill(87.5%). On the other hand, the Navitip filing system showed a better extent of fill (Grade B- 62.5%; Grade C- 56.3%) than the Reamer file (37.5%, 43.8% respectively)

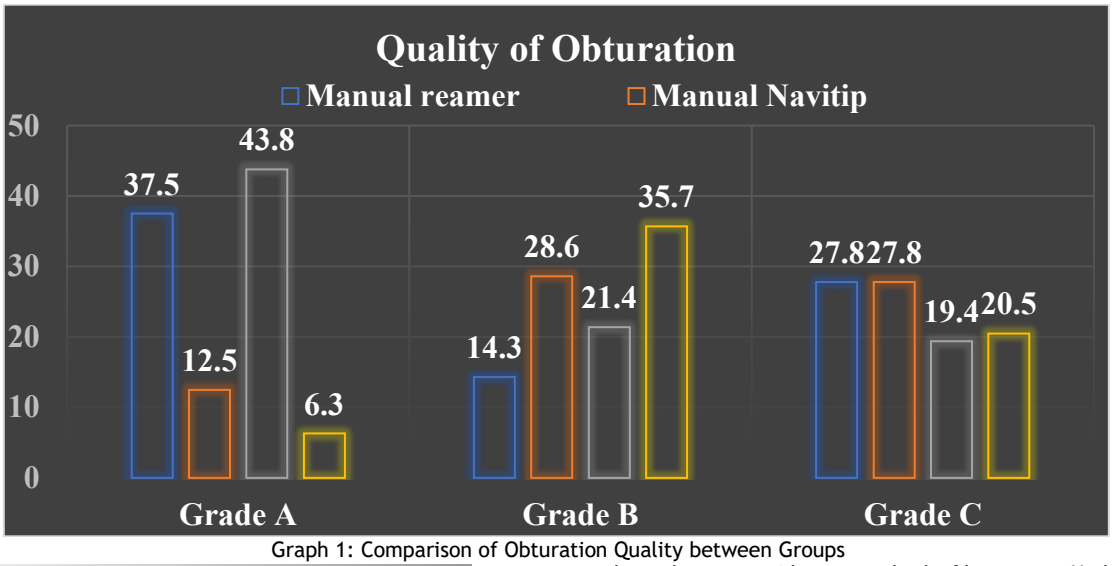
With the reamer files, there were no significant difference between the manual and rotary methods in the quality of obturation/extent of fill ($p=0.605$). However, the extent of optimal fill was comparably mostly seen with the rotary method (60%), while overfilling was mostly seen in the samples where the manualmethod was done for instrumentation (Grade C- 58.8%). A similar finding of insignificant difference between the two methods was also noticed with theNavitip file ($p=0.738$), with the optimal fill being mostly seen in Rotary method (55.6%) rather than Manual method (44.4%)

In the manual method, there was no statistically significant variance between theReamer and Navitip filing systems conferring to the number of voids ($p=0.459$). Nonetheless, the number of voids was comparably less with the Navitip file. Likewise, with the rotary method, the most of the samples had no voids with boththe Reamer and Navitip files ($p=0.549$).

Comparison of the number of voids conferring to the method of instrumentation showed no significant variance when Reamer ($p=0.105$) and Navitip files ($p=0.177$) were used. With both file systems, more voids were seen with the manual method than rotary.

Comparison of obturation quality with the instrumentation method and the filing system revealed no significant variance ($p=0.124$). It was observed that underfilling was seen with the Reamer files in both the manual and rotarymethods (37.5, and 43.8% respectively). Further, optimal fill was comparably higher with the Rotary method with both the files. [Graph 1]

Comparison of the number of voids with the instrumentation method and the filing system revealed no significant difference ($p=0.106$). Comparably, higher voids are seen with the manual method with both the Reamer and Navitip files.(Graph 1)



Graph 1: Comparison of Obturation Quality between Groups

DISCUSSION

The present study includes comparison of the number of voids with the Manual and Rotary filing systems, Reamer and NaviTip obturation techniques revealed no significant difference (p=0.124). It was observed that underfilling was seen with the Reamer files in both the manual and rotary methods (37.5, and 43.8% respectively). Further, optimal fill was comparably higher with the Rotary method with both the files.

Similar findings have been made in studies done by Lavanya Govindaraju et al [7] Silva et al (2004)[9].In distinction a study done by Panchal, Veerale, the rotational Kedo-S files provided statistically significant optimal obturation (P 0.001)[10].

In the current study assessment of the number of voids with the Manual and Rotary filing systems, Reamer and Navitip obturation techniques revealed no significant difference (p=0.106). Comparably, higher voids are seen with the manual method with both the Reamer and Navitip files.

In the manual method, there was no statistically substantial variance between the Reamer and Navitip filing systems according to the number of voids (p=0.459). Nonetheless, the number of voids was comparably less with the Navitip file. With both file systems, more voids were seen with the manual method than rotary.

In contrary to a study done by Ellana Jermiah Joseph et al (2019)[22] evaluated the obturation quality using lentulospiral and navitip, the navitip double sideport produced the best.[22] In the present study no statistically substantial variance between the reamer and navitip filing systems concerning the extent of fill (p=0.189).

However a higher % of samples that received filing with reamer had filled the canal less than optimal fill (87.5%). but the Navitip filing system showed a better extent of fill (Grade B- 62.5%; Grade C-56.3%) than the Reamer file (37.5%, 43.8% respectively).

A study done by Jayalakshmi Pandranki et al compared motor-driven lentulospiral and pluggers which were almost equally efficient to fill Endoflas to an optimal level, free of voids and both were deemed superior to navitip system. [20]

In the present study manual K files and Rotary kedo-s files, Reamer and Navitip obturation techniques showed no statistically substantial variance between the obturation quality among four groups ($p > 0.05$).

Further, comparably the extent of fill less than optimal fill of the canal (Grade A) was mostly seen with the Reamer file (75%), while with the Navitip file, the extent of fill was optimal fill (Grade B-66.7).

Optimal fills were more frequent with rotary instrumentation (60%) than manual (41.2%), which showed higher overfilling (58.8%). A similar, insignificant difference was noted with Navitip files (rotary 55.6% vs. manual 44.4%; $p = 0.738$). Voids were fewer with the Navitip file, especially when used with the rotary method, where most samples showed no voids with either Reamer or Navitip files ($p = 0.549$). In contrast, the manual method showed more voids across both file types. Underfilling was observed with the Reamer technique in both methods, while optimal fills were consistently higher with the rotary approach for both files.

CONCLUSION

In accordance to the findings of the current study, it can be determined that assessment of the number of voids through the manual and rotary filing systems,Reamer and Navitip obturation techniques revealed no significant difference (p=0.106). Comparably, higher voids are seen through the manual method with both the Reamer and Navitip files.

Assessment of the number of voids with the Manual files and kedo-s Rotary filingsystems, Reamer and Navitip obturation techniques revealed no significant difference (p=0.124). It was observed that underfilling was seen with the Reamerfiles in both the manual and rotary methods (37.5, and 43.8% respectively). Further, optimal fill was comparably higher with the Rotary method(with Reamers 21.4 % & with navi tip 35.7%) in comparsion with manual files (with Reamers 14.3% & with navi tip 28.6%).

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