

Comparative Evaluation of Efficiency of Three Obturation Techniques for Primary Incisors- An In Vivo Study

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ABSTRACT

Aim: The study compared the obturation qualities in primary teeth using three endodontic obturation techniques namely incremental filling technique, lentulospiral technique and pressure syringe technique. **Methods:** The study was conducted on eighteen primary maxillary incisors of five individuals aged 4-5 years who required primary endodontic treatment. The selected samples were equally and randomly distributed into 3 groups with respective to the technique used. Obturation was done, and the evaluation of pulpectomized incisors was done by a single author using radiographic criteria. **Results:** The results showed no statistically significant differences among the three techniques tested when apical seal, voids and extrusion were evaluated.

KEYWORDS: Primary teeth, Lentulospiral Techniques, Children

INTRODUCTION

Maintaining the integrity of primary teeth in the oral cavity is one of the major goals of dentistry.¹ Preserving the primary teeth is important for maintaining the arch length. It is important to maintain the vitality of the primary teeth but a tooth without a vital pulp can also remain clinically functional.² Pulpectomy is one of the treatment options for severely decayed primary teeth. Successful root canal therapy is dependent upon the quality of obturation of the root canal system. Various endodontic obturation techniques are available to save the tooth. The material can be carried to the canal using lentulospiral; pushed into the canal in bulk using cotton pellet; applied by using an endodontic pressure syringe. Many investigations have been carried out to evaluate and compare the success rate of different root canal filling materials used for primary teeth. Previous in vitro investigations of methods of obturation in primary teeth showed good performance of the lentulo spiral over other techniques.^{3,4} In vitro evaluation of root canal obturation methods in primary teeth have reported superiority of the lentulo spiral mounted in a slow-speed handpiece in filling straight and curved root canals of primary teeth, but in vivo clinical evaluation has been investigated less. In the present study, comparison of the efficiency of these three techniques in primary incisors was tested and evaluated.

Aims and Objective: The aim and objectives of the study are to compare the obturation qualities in primary teeth using three endodontic obturation techniques

namely incremental filling technique, lentulospiral technique, and pressure syringe technique

MATERIALS AND METHODS

The study was conducted at the Department of Pedodontics and Preventive Dentistry, KLE VK Institute of Dental Sciences, Belgaum after obtaining permission from the Institutional ethical committee. The study was conducted on eighteen primary maxillary incisors of five individuals aged 4-5 years who required primary endodontic treatment. The inclusion and exclusion criteria for the study are as follows:

Inclusion criteria:

- No gingival swelling or presence of sinus tract
- No purulent exudates expressed from the gingival margin
- No abnormal mobility other than mobility due to normal exfoliation

Exclusion criteria:

- Any pathologic signs of external and internal resorption
- Periradicular involvement extending into the permanent tooth bud
- Non restorable crown
- Pathologic root resorption involving more than one third of the root
- Presence of dentigerous or follicular cyst
- Pathologic loss of bone support with loss of the normal periodontal attachment

The selected samples were equally and randomly

How to cite this article:

Reddy PVR, Hugar SM, Shigli A, Suganya M, Hugar SS, Kukreja P. Comparative Evaluation of Efficiency of Three Obturation Techniques for Primary Incisors - An In Vivo Study. *Int J Oral Health Med Res* 2015;2(2):15-18.

distributed into 3 groups with respect to the technique used (Figure 1).

Group A – Incremental filling technique

Group B – Lentulospiral technique

Group C – Pressure syringe technique

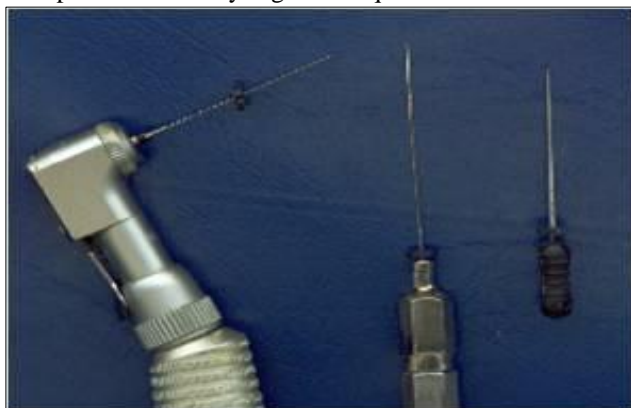


Fig 1: techniques used for obturation

The methodology is as follows:

Before initiating the treatment, standardized baseline radiographs were taken for all the patients. Local anaesthesia was given and the teeth requiring endodontic treatment were isolated using rubber dam. Access to the pulp was obtained using a #2 carbide bur which was followed by working length estimation (Figure 2). Biomechanical preparation was done using H files from size 10 up to size 40 with frequent irrigation. The canals were then dried and obturated (Figure 3) using the three different techniques mentioned.



Fig 2: preoperative radiograph of primary incisors with working length.



Fig 3: post-operative radiograph of primary incisors

For incremental technique, endodontic pluggers (Pulpdent) were used and for the next two techniques, lentulospiral and pressure syringe (Pulpdent) were used respectively. The powder liquid ratios were 2:1, 1:1 and 1:1 for the three groups respectively. The post obturation radiographs were placed on a viewer with a graph sheet behind the radiographs (Figure 4). All teeth were evaluated as per the criterias given below after obturation using the three techniques.



Fig 4: post-operative radiograph placed in a viewer with graph

Criteria For Evaluation:

- Apical seal was evaluated horizontally in mm from the apical end of the filling material to the radiographic apex.
- Quality of filling was defined as the measuring (mm) of the largest dimension of any voids within the filling material measured vertically from the radiograph.
- Extrusion was defined as a measuring (mm) of the largest dimension of any extruded material vertically beyond the radiographic apex.
- The measurements were standardized and given a scale of 1, 2, 3, while scale 1 measured as ≤ 1 mm, scale 2 measured as 1-2mm, scale 3 measured as > 2 mm.
- Scale 1 indicated the best possible results, while 3 as the worst.

RESULTS

The values were tabulated, and the results are given separately for the three parameters tested, apical seal, voids, and extrusion. With respect to the apical seal, 5 samples in each technique group showed measurement of scale 1, one sample in each technique group shows values of scale 2. None of the samples were in the range of scale 3. (Chart and table 1)

When voids are measured, six samples in group A, five samples in group B, four samples in group C showed values of scale 1. None of the samples in group A and group B had values of scale 2 but one sample in group C showed value of scale 2. One sample from each in group

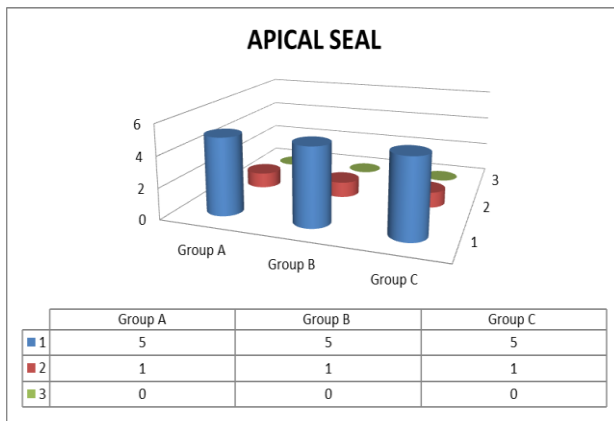


Chart with table 1 showing results of apical seal

B and C showed the values of scale 3 (Chart and table 2). With regard to measurement of extrusion, all the six samples in each group showed the values of scale 1. None of the samples had the values of scale 2 or 3 (Chart and table 3). This depends on the operator's manual dexterity.

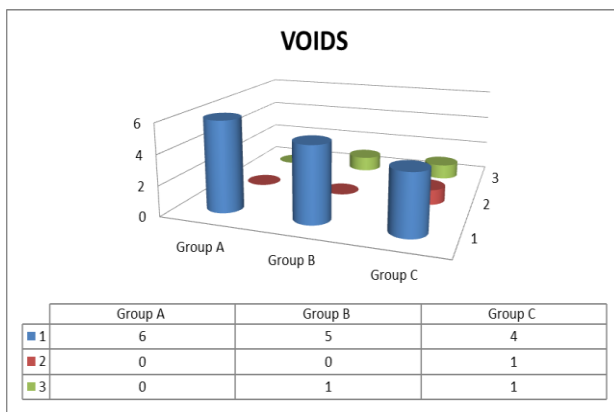


Chart with table 2 showing results of voids

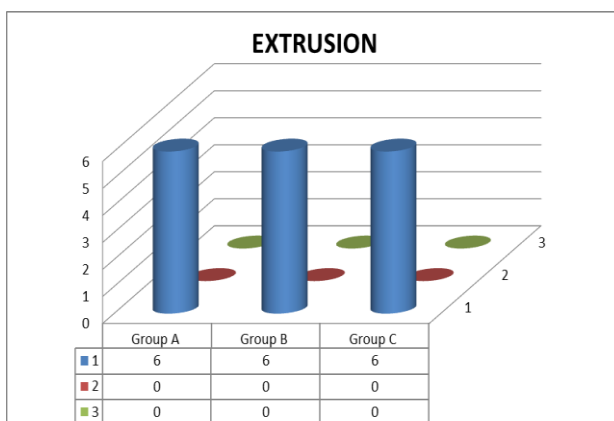


Chart with table 3 showing results of extrusion

DISCUSSION

Pulpectomy of primary teeth consists of extirpation/debridement of the pulp tissue, filling of the canals to remove organic debris and obturation with an antibacterial and a resorbable filling paste. The goal of this procedure is to maintain arch length and function by preserving primary teeth that are essential for proper guidance of the permanent dentition⁵ and maintain the

integrity and health of the tooth and their supporting tissues.²

In the past, many studies have been done to determine the ideal root canal obturation material for primary teeth, but few studies are there to quote an effective delivery system for obturation of primary teeth. A need has always persisted to evaluate the optimum technique of obturation of primary teeth, so as to obtain a compact and dense filling of the root canal. Hence, the purpose of this study was to comparatively evaluate the efficiency of three different obturation techniques for primary teeth.

In this study, all primary molars were obturated using ZOE because it is the most commonly used root canal filling material for primary teeth, and many investigations have assessed its clinical performance. Also, the material can be easily obtained.^{6,7}

The results showed no statistically significant differences among the three techniques tested when apical seal, voids, and extrusion were evaluated. Apical Seal was defined as the measurement (mm) between the apical end of the filling material and the radiographic apex. Quality of Filling was defined as the measurement (mm) of the largest dimension of any voids within the filling material. Extrusion, in this study, was defined as the measurement (mm) of the largest dimension of any extruded material beyond the radiographic apex.

The scales used in this study were based on giving equal importance to each variable tested, (apical seal, voids, and extrusion). The clinical significance of each of these variables is difficult to fully establish. In primary dentition due to the extent of infection with in 4-5 years age group patients as the teeth were affected by nursing bottle caries. However, if one extrapolates from the findings of the endodontic dental literature, extrusion and apical seal may represent a more important aspect of endodontic care than the presence of voids. In the apical seal and extrusion similar results were obtained for the three different techniques.

A study by Reddy VVS⁸ evaluated the depth of the canal fill, presence or absence of voids and canal overfill. The author concluded that endodontic pressure syringe and tuberculin syringe were better than lentulospiral in controlling voids, which was a contrary to the results obtained in the present study. Also it was found that endodontic pressure syringe was superior in controlling extrusion of zinc oxide eugenol cement.

Guelmann M et al⁹ in their study reported that the NaviTip system demonstrated the highest number of flush or complete fillings compared to lentulospiral mounted on a slow speed handpiece and vitapex syringe system. The author also reported the technique fast and user friendly. But the evaluation of obturation techniques was done using different materials which is not standardized. In the present study, a single obturation material has been used to obtain the same radio opacity and consistency. Another study by Bawazir OA, Salama FS¹ found that there was no statistically significant

difference between the two techniques; that is lentulospiral mounted in a slow speed handpiece and hand-held.

CONCLUSION

The present study found no significant differences among the three techniques used for obturation of primary teeth canals. In the present study it was concluded that operators manual dexterity was very important than the technique of obturation.

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Source of Support: Nil
Conflict of Interest: Nil