

A Comparative Evaluation of a Labial Approach with a Conventional Palatal Approach for Endodontic Access in Primary Maxillary Incisors: A Pilot Study

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ABSTRACT

Aim: A straight-line access provides an uninterrupted path for a successful endodontic procedure and traditionally a palatal approach was used to achieve the same. A labial access opening may provide a straight-line access to the root canal more consistently than the conventional palatal access opening in primary maxillary incisors; its advantages being improved visibility and direct access to the root canal. This study was designed to compare and evaluate the time taken for pulpectomy in primary maxillary incisors with conventional palatal access and labial access as well as time taken for the postendodontic restoration.

Materials and methods: A cohort study was conducted wherein pulpectomy was performed on primary maxillary anterior teeth with labial endodontic access (group I—40 teeth) and palatal endodontic access (group II—40 teeth). Each group was further subdivided into two subgroups of 20 teeth each, requiring postendodontic composite restoration and requiring postendodontic strip crown restoration. Time taken for pulpectomy with both methods and for postendodontic restoration was evaluated.

Results: The mean time (in seconds) taken for pulpectomy and postendodontic composite restoration was significantly less with a labial access than a palatal access ($p = 0.000$). Although the time required for postendodontic strip crown restoration was less with a labial access compared with a palatal access, this difference was not statistically significant ($p = 0.907$).

Conclusion: From the results of this study, it can be suggested that labial endodontic access may be routinely used for pulp therapy of primary anterior teeth.

Clinical significance: A labial endodontic access for primary anterior teeth provides a straight-line access and improves operator convenience and patient compliance when compared with a palatal access.

Keywords: Cohort study, Early childhood caries, Labial endodontic access, Primary anterior teeth, Pulpectomy.

International Journal of Clinical Pediatric Dentistry (2020): 10.5005/jp-journals-10005-1704

INTRODUCTION

Early childhood caries (ECC) leading to pulpal pathosis, discoloration, and loss of vitality followed by traumatic injuries or a combination of these factors often necessitate endodontic treatment in primary anterior teeth in children.¹ A straight-line access provides an uninterrupted path for a successful endodontic procedure. Traditionally, a palatal access was used as the sole entry to anterior teeth, as it was believed to provide straight-line access and esthetics. It was primarily advocated due to the unesthetic appearance of previously available restorative materials such as silicate cement and unfilled acrylic resins.² However, this concern is overcome with the advent of acid etching and availability of esthetic resin restorative materials. The palatal access cavity, being inconsistent with the internal anatomy of the anterior teeth, is therefore deemed a compromise between esthetic and endodontic requirements.³

It has been suggested that a labial orientation of the access opening would provide a straight-line access to the root canal more consistently than the conventional palatal access opening.⁴ The advantages of labial access are improved visibility and direct access to the root canal. In addition, as the labial access is performed on a nonfunctional surface, the occlusal contacts and the natural lingual/palatal slopes remain undisrupted for anterior guidance.³

Although literature exists supporting labial endodontic access in the form of case reports, there are no studies till date analyzing the clinical convenience and comparison of time taken

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How to cite this article: Winnier J, Suresh R. A Comparative Evaluation of a Labial Approach with a Conventional Palatal Approach for Endodontic Access in Primary Maxillary Incisors: A Pilot Study. *Int J Clin Pediatr Dent* 2020;13(1):53–56.

Source of support: Nil

Conflict of interest: None

for pulpectomy in children utilizing either a labial or palatal access preparation.

Against this background, this study was designed to compare and evaluate the time taken for pulpectomy in primary maxillary incisors with conventional palatal access and labial access as well as time taken for the postendodontic restoration.

MATERIALS AND METHODS

A cohort study was conducted to assess the effectiveness of a labial approach and a conventional palatal approach in access opening for

primary anterior teeth. Children with ECC who required pulpectomy of primary maxillary central and/or lateral incisors were included in the study.

Teeth with clinical or radiographic signs of pulp necrosis, presence of draining sinus tract, uncontrollable copious hemorrhage or lack of hemorrhage upon entering the pulp chamber, traumatized, or discolored tooth with the presence of sinus were selected for the study. Teeth with physiologic or pathologic root resorption, mobility, or lack of adequate bone support were excluded from the study.⁵ Subjects with any systemic medical contra indications were also excluded from the study.

The parents of the selected children were explained about both labial and palatal access cavity approaches for pulpectomy and the possible advantages and limitations of each. They were then asked to select the approach that they would like to be performed on their child. Depending on the technique selected by the parents, the children were divided into two groups such that each group composed of 40 teeth as follows:

Group I: 40 teeth for labial endodontic access.

Group II: 40 teeth for palatal endodontic access.

Each group was further divided into two subgroups of 20 teeth each depending on the type of postoperative restoration to be done as follows:

Subgroup I: 20 teeth indicated for composite restoration of the endodontic access cavity.

Subgroup II: 20 teeth with multisurface caries indicated for strip crown restoration.

All the procedures were performed by a single operator. During the first visit, the child's behavior was recorded by the operator according to Frankel behavior rating scale.⁶ Access cavity preparation was done after obtaining adequate anesthesia using 2% lignocaine with 1:200,000 adrenaline and complete caries removal. The palatal endodontic access was obtained for teeth in group I, in the same manner as for the permanent incisors. The labial endodontic access was performed for teeth in group II according to the technique specified by Mack and Halterman.² After access cavity was prepared, working length was determined using Root ZX II apex locator (Morita). Root canals were instrumented with ProTaper files (Dentsply, Maillefer)—SX followed by F2 (21 mm) up to the working length.⁷ 3% NaOCl (Deor, Azure laboratories) was used for irrigation. After completion of canal instrumentation, all canals were irrigated with normal saline for 30 seconds. The canals were dried with sterile paper points and obturated at the same appointment using Vitapex (Morita). Access cavity was provisionally restored with restorative glass ionomer cement (GC HS Posterior Extra).

The time taken for pulpectomy was recorded by an observer with the help of a stop watch beginning from administration of local anesthesia till the completion of obturation and provisional restoration of the access cavity.

A second visit was scheduled a week after the pulpectomy. During the second visit, for teeth in subgroup I, the provisional restoration was removed to up to 3 mm depth from the access cavity and a composite restoration was placed. For teeth in subgroup II with multisurface caries, a strip crown restoration was placed according to the procedure recommended by Kupietzky.⁸ All the restorative procedures were performed by a single operator, and the time taken for placing the postendodontic restoration was also recorded by an observer with the help of a stop watch.

All the collected data were subjected to statistical analysis.

STATISTICAL ANALYSIS

The frequency/percentage of discrete variables and mean/standard deviation of continuous variables (age, Frankl's behavior scores, and gender distribution) were determined. The differences of time taken for pulpectomy and postendodontic restoration time between the two approaches were analyzed using independent sample *t* test.

RESULTS

The distribution of teeth samples (mean and standard deviation) according to patient's age and Frankl behavior rating scale is presented in Table 1, and their distribution according to gender is presented in Table 2. The mean time (in seconds) taken for pulpectomy with a labial access (group I) was less than the time required with a palatal access (group II), and this difference was statistically significant ($p = 0.000$; Table 3). The time required for the postendodontic composite restoration was less with a labial access (subgroup I, group I) than a palatal access (subgroup I, group II), and this difference was statistically significant ($p = 0.000$; Table 4). When the mean time required for the postendodontic strip crown restoration (subgroup II) was assessed, it was noted that, although less time was taken for teeth with a labial access, this difference was not statistically significant ($p = 0.907$; Table 5).

DISCUSSION

Early childhood caries continues to be a major dental health issue in both developed and developing countries and has recently reached

Table 1: Sample characteristics of the study population according to age and Frankel rating

	Labial access		Palatal access	
	Mean	SD	Mean	SD
Age (in months)	45.78	6.96	45.51	6.96
Frankel behavior score	2.69	0.66	2.65	0.82

SD, standard deviation

Table 2: Gender distribution between groups

Access type		Male	Female	Total
Labial	<i>n</i>	20	20	40
	%	50.0	50.0	100.0
Palatal	<i>n</i>	20	20	40
	%	50.0	50.0	100.0
Total	<i>n</i>	40	40	80
	%	50.0	50.0	100.0

Table 3: Time required (in seconds) for pulpectomy

Access type	<i>n</i>	Mean	Standard deviation	<i>p</i> value
Labial	55	189.7455	9.85491	0.000
Palatal	55	226.8364	13.78104	

Table 4: Post-endodontic restoration time (in seconds)—subgroup I (composite restoration)

Access type	<i>n</i>	Mean	Standard deviation	<i>p</i> value
Labial	20	501.5500	77.75635	0.000
Palatal	20	638.4500	124.40108	

Table 5: Post-endodontic restoration time (in seconds)—subgroup II (strip crowns)

Access type	n	Mean	Standard deviation	p value
Labial	20	791.0000	58.31403	0.907
Palatal	20	792.9500	46.18097	

epidemic proportions in the developing countries. The teeth primarily affected by ECC are the deciduous upper central incisors followed by deciduous upper lateral incisors. Studies conducted on the most affected surface of the incisors have revealed that the labial surface of maxillary anterior teeth was most affected (31.6%) and the lingual surface was least affected (1.01%).⁹ Hence, for primary incisors with ECC, it would be more logical to excavate the carious lesion and gain access to the root canal through the labial surface, thereby preserving an intact functional palatal surface. Also, in children with negative behavior and limited mouth opening, a labial access would be less time-consuming and provide better ease of access to the operator.

Anatomic studies have demonstrated that a labial endodontic approach provides a more straight-line access to the apex and is hence more desirable than a palatal approach.³ A study on locations and dimensions of access cavity on extracted permanent incisors has revealed that, in maxillary central incisor, the location of access was equally distributed between incisal edge and incisal half of the labial surface.¹⁰

LaTurno and Zillich⁴ radiographically analyzed the location of the access preparation in anterior teeth and reported that a more labial orientation of the access opening would provide straight-line access to the canal more consistently than the conventional lingual access opening. Mannan et al.¹¹ evaluated the ability of endodontic files to plane the walls of the root canals through different access cavity designs and observed that the straight-line incisal access cavity had the greatest proportion of instrumented root canal surface. The lingual cingulum access cavity performed least in this respect. Stambaugh and Wittrock¹² observed from their study on permanent maxillary incisors that preparations for labial endodontic entries are usually smaller than the conventional palatal entries that funnel toward the incisal edge and weaken the clinical crown. Similarly, Chae et al.¹³ suggested that more tooth structure is removed during palatal access cavity preparation in primary incisors as compared with labial access which could weaken the tooth and increase the possibility of tooth fracture.

Considering the results of the aforementioned studies, this study was designed to compare and evaluate the time taken with labial and palatal endodontic access preparation.

Previous studies support the use of rotary instrumentation in primary teeth.¹⁴ The root canal preparation time is reported to be significantly less with rotary file than K files, and the shape of the root canal is more conical, favoring a higher quality of the root canal filling and increasing clinical success, especially in single-rooted primary teeth.¹⁵ Hence, in this study, for both palatal and labial access, rotary instrumentation was performed.

In this study, on assessment of time taken for pulpectomy, it was noted that the mean time required was less with a labial access than palatal access, and this difference was statistically significant. More time was required to obtain the patients' cooperation to keep the mouth open when palatal access was performed; however,

with labial endodontic access the pulpectomy could be completed successfully with direct vision and even with the child's teeth in occlusion.

This study revealed that the time taken for a composite restoration was significantly higher with palatal as compared with labial access. The factors that lead to increased time with palatal access were contamination due to excursions of the child's tongue, difficulty in obtaining indirect vision, and occasional inability of patient to keep the mouth open throughout the procedure. These factors were absent or considerably less when restoration was placed on the labial aspect.

When the time taken for postendodontic restoration was evaluated, it was noted that although the placement of strip crown restoration is highly technique sensitive, there was no significant difference in the time taken, as the entire crown was circumferentially prepared, etched, bonded, and cured at the same time.

Before starting the procedure, the operator recorded the behavior of the child according to Frankel behavior rating scale, and it can be noted that the groups were statistically similar (Table 2) with respect to behavior.

From the results of this study, it can be suggested that labial endodontic access may be routinely used for pulp therapy of primary anterior teeth. This pilot study, the first of its kind, exhibited promising results with regard to time taken and operator convenience when the labial access cavity was compared with palatal access. However, more studies evaluating the longevity of restoration with both the techniques need to be conducted.

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