

Influence of specialty on post space preparation

Hamza Alsharief¹, Nizar Mohammed Ahmed¹, Feras Aalam¹, Adel Alharbi², Hiba Gari¹, Mohammad Alhashmy Alamer³, Amjad Omar Alsiyud³

¹Department of Restorative, Alnoor Specialist Hospital; Dental Centre, MOH, Makkah, Saudi Arabia

²Department of Pedodontics, Alnoor Specialist Hospital; Dental Centre, MOH, Makkah, Saudi Arabia

³General Dentist, Alnoor Specialist Hospital; Dental Centre, MOH, Makkah, Saudi Arabia

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ABSTRACT

Aim and Objectives: Intraradicular posts are provided to retain coronal restoration in root canal treated teeth. The retention they provided can be influenced by many factors including length, accuracy of fit and diameter of the post. To measure the minimum residual thickness of proximal root walls of teeth prepared with two different specialty dentists, endodontist and prosthodontics.

Methodology: Twenty extracted human single-rooted teeth with oval cross section were instrumented and filled with gutta-percha and sealer. The sample was allocated to 2 operators. Endodontist (OP1) and prosthodontist (OP2), of clinical experience of more than 10 years as specialist. Each operator will prepare 10 teeth for tapered post channels (RTD DT fibre post). Then roots were sectioned horizontally at three levels, apical, middle and coronal. And digital measure of the minimum residual dentine thickness was done by simple linear measurements.

Results: Prosthodontist shows more incidence of minimum RDT measurements at all segment levels than endodontists.

Conclusion: Within limitation of this study, clinician philosophy in post size selection and its preparation technique could have influence on remaining dentine thickness.

Keywords: Prosthodontist, proximal, minimum, level

INTRODUCTION

Intraradicular posts are provided to retain coronal restoration in root canal treated teeth [1, 2]. The retention they provided can be influenced by many factors including length, accuracy of fit and diameter of the post [3, 4]. These factors could jeopardize the remaining tooth structure.

Preservation of remaining tooth structure is the most important factor in providing strength and resistance to fracture of endodontically treated teeth [5]. In oval shape cross section root canal, where bucco-lingual diameter is 1.5 wider than meso-distal diameter or more, preservation task is more difficult to achieve [6, 7].

To achieve this balance between providing ideal post with safe post-space preparation and preservation of RDT may need a clinician of good experience [2, 8]. Although, post placement is common practice of general dentist, restorative dentist, endodontist and prosthodontist.

The size of the post is dependent on the root canal morphology. Generally, the post width should not be greater than 1/3 of root width at its narrowest dimension [4]. And there should be at least 1 mm of sound dentine on each side of the post [4, 7, 9].

Posts should be fitted with minimal canal alteration especially in premolars and lower anterior where the root morphology in these teeth is oval or deep oval cross section [4]. Post diameter must be 1 mm or less at its tip to fit these requirements [10]. On the other hand, *In vitro* studies have reported that increasing the post diameter increased retention and post fracture resistance minimally [10].

Ideally, post space preparation should be completed at the appointment when root canal is filled, at this time, the clinician is the most familiar with canal system [11].

There are various methods to remove gutta-percha, including rotary instruments, heated instruments and solvent [12].

Gutta-percha removal and post space preparation should be not undertaken in a single act. Gates Glidden drills conformed to original canal anatomy more consistently than parapost drills [4, 12, 13].

Ricketts et al. 2005 stated that Gates Glidden burs should be used in sequence from small to large size before using post drill burs in sequence from small to large size. They concluded that this technique produced less heat generation and less risk of root perforation than other methods [14].

It is widely held that a minimum of 4 to 5 mm of gutta-percha must remain to preserve the apical seal of root canal filling[15].

The anatomy and morphology of teeth should be considered when planning for a post to avoid immediate root perforation or severely compromised the remaining tooth structure and risk of vertical root fracture[10, 16]. They recommended no or minor preparation in teeth with deep oval or ribbon shape internal canal cross section[10, 16].

Post design can be classified according to their surface characteristics and to their shapes. They may be parallel, tapered, or a parallel-tapered combination[4].

There is broad agreement that, all being equal, parallel posts are more retentive than tapered and produce more uniform stress distribution[15].

Tapered post conform to original root form and canal configuration, thus permitting optimal preservation of tooth structure at post apex[10].

In modern dentistry, the primary goal of post systems is to retain the core restoration that replaces the missing part of tooth structure.

Aim and Objectives

To measure the minimum residual thickness of proximal root walls of teeth prepared with two different specialty dentists, endodontis and prosthodontics.

Methodology

Twenty extracted human single-rooted teeth with oval cross section where instrumented and filled with gutta-percha and sealer.

The sample allocated to 2 operators. Endodontist (OP1) and prosthodontists (OP2), of clinical experience of more than 10 years as specialist in their field.

Each operator will prepare 10 teeth for tapered post channels (RTD DT fibre post). Then roots were sectioned horizontally at apical, middle and coronal levels, and digital measure of the minimum residual dentine thickness. Apical level determined to be 1mm above post space end, and the coronal level is 1mm below cement-enamel junction and middle level is mid-point between apical and coronal levels.

Roots were sectioned to a thickness of 300-400 µm with low speed diamond saw (Microslice 2, Hertfordshire, UK), sections were cleaned by soaking in solvent for a few seconds and then ultrasonic washing for 3 minutes to remove the surface debris.

The sections were photographed at x1 magnification with Zeiss photomicroscope and canon 350D Digital camera.

Measure of remaining dentine thickness in cervical ,middle and apical segments done by simple linear measurements of minimum dentine thickness in each section were made with image [1] software.

Measurements were recorded to an accuracy of 0.01mm

Results

Data analysis were achieved and the incidence of minimum RDT measurements of 0, <0.5mm, 0.5-1.0mm and >1.0 mm, after Tapered post preparation, at apical, middle and coronal levels were compared between 2 operators.

Table 1: comparison between Endodontist (OP1) and Prosthodontist (OP2) at apical part of post space preparation.

RDT (mm)	Op 1	Op2
perforation	1	2
<0.5	2	3
0.5-1.0	5	3
>1.0	2	1

Table 2: comparison between Endodontist OP1 and Prosthodontist OP2 at middle part of post space preparation.

RDT (mm)	Op 1	Op2
perforation	0	0
<0.5	1	5
0.5-1.0	2	3
>1.0	7	2

Table 3: comparison between Endodontist OP1 and Prosthodontist OP2 at coronal part of post space preparation.

RDT (mm)	Op 1	Op2
perforation	0	0
<0.5	0	0
0.5-1.0	1	6
>1.0	9	4

DISCUSSION

Root canal treatment is challenging in canals with oval cross section, where instrumentation is unable to encompass all canal walls[16]. Similar Issues may surround post placement in oval canals, where a balance between post preparation and safety must be achieved.

The chosen size of a post should be influenced by their recipient root and its canal morphology. Tapered post were designed to preserve the remaining dentine thickness and decrease the incidence of perforation compared to parallel sided post[17, 18].

Although, post space preparation has inherent risk of weakening or even perforation of root canal even if clinician has enough clinical experience.

Preoperative radiographs are important, in combination with operator judgment of accurate post fit, avoiding risk of weakening tooth structure, to guide decision on suitable post size. The guideline post space preparation has supported the view that post width should not be greater than 1/3 of root width at its narrowest dimension, and that there should be at least 1 mm of sound dentine on each side of a post.

The purpose of this study was to look at the difference of clinical decision between two specialists, for tapered post preparation in oval shaped root canal cross section. Efforts were made to select equivalent roots for study, although it is probably impossible to fully control for the infinite root canal morphology variation. In order to instil some clinical realism, no attempt was made to influence the required canal enlargement for satisfactory post adaptation. Rather, it was left to operators decision. It may be weakness that the teeth were not mounted in clinical realistic manner. Both specialists have good clinical experience to deal with post preparation and placement as part of their daily practice.

Our study suggests that operator decision to achieve proper post fit has a great influence on remaining dentine thickness. Endodontis shows more conservation and able to preserve remaining dentine at all root canal cross sections, although both clinician unable to avoid perforation or thinning to potentially critical degree <0.5mm.

Post channel preparation evaluated by sectioning technique which considered destructive method. This destructive sectioning method could result in damage and loss of thin sections. In our study we lost one section sample at apical level (n=9) with no damage at middle and coronal parts.

CONCLUSION

Within limitation of this in-vitro study, clinician philosophy in post size selection and its preparation technique could have influence on remaining dentine thickness.

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