

# Quality of reminescent root in endodontically treated teeth with intraradicular retainers

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## ABSTRACT

**Objective:** The objective was to evaluate the quality of root reminescent of endodontically treated teeth with intraradicular posts. **Methods:** This retrospective study assessed the records from every patient treated in the Integrated Clinic of the Dentistry School of Pernambuco University, from 2006 to 2007, which recorded the presence of an intraradicular post, totalizing 78 patients. Two professionals graduated in dentistry evaluated the intraradicular post and root reminescent data. **Results:** For 99 of the evaluated teeth, the post length was lower than 2/3 of the root length in 86,87%, and the post diameter

was inadequate in 31.31%, 20.20% and 11.11% in the coronal, middle and apical thirds, respectively. In 51.51% there was a void between the root canal filling and the intraradicular post, and the reminescent of root canal filling was classified as satisfactory in most cases, mean 6.1 mm. Eight cases showed deviation in the root canal shaping for the post. **Conclusion:** The endodontically treated teeth rehabilitated by intraradicular posts did not follow the recommended standards.

**Keywords:** Post and core technique. Root canal obturation. Mouth rehabilitation.

**How to cite this article:** Veloso HHP, Sampaio FC, Monteiro IS, Dias ML. Quality of reminescent root in endodontically treated teeth with intraradicular retainers. *Dental Press Endod.* 2012 Apr-June;2(2):59-63.

» The authors report no commercial, proprietary or financial interest in the products or companies described in this article.

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Submitted: May 16, 2012 / Accepted: June 2, 2012.

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## Introduction

The rehabilitation of endodontically treated teeth is based in esthetical and physical principles.<sup>1</sup> They are considered less resistant and more leaning to fractures compared to vital teeth.<sup>2</sup> This frailty could be determined by collagen and water loss.<sup>3</sup> However, the main factor to this frailty is structural loss due to tissue damage by carious lesion.<sup>4</sup>

Due to the extensive coronal destruction, usually associated to teeth indicated for the endodontic treatment, these teeth rehabilitation normally needs the use of an intraradicular post to reinforce the restorative materials retention.<sup>5,6</sup>

Despite the efforts to reinforce the endodontically treated teeth, fractures can happen.<sup>1,7</sup> Studies showed that the use of an intraradicular post did not enhance the tooth resistance. This is mainly related to the coronal reminescent.<sup>5,8,9</sup> In addition, the correct diagnosis of reminescent structures, root anatomy, periapical lesion and root canal filling is crucial for a teeth to receive an intraradicular post.<sup>6</sup>

The retention is affected mainly by length, diameter and taper of the post.<sup>10</sup> Even though retention may be enhanced significantly by increasing the post diameter, the loss of structure weakens the tooth. Thus, the root canal shaping must follow principles that aim to maintain the most tissue from the tooth, and the intraradicular post might distribute uniformly the mastication tensions.<sup>2</sup>

Considering the importance to preserve the dental tissues to enhance resistance of endodontically treated teeth, this study aimed to evaluate the quality of root reminescent of endodontically treated teeth with intraradicular posts.

## Material and methods

This retrospective study assessed the records of 78 patients treated in the Integrated Clinic of the Dentistry School of the Pernambuco University from 2006 to 2007, which recorded the presence of an intraradicular post previously to the treatment. Poorly filled records and poorly processed radiographies were the exclusion criteria.

Many data from the records were assessed (Table 1) and recorded in previously made files. A pilot study was performed with 10 records of patient from an anterior period from the defined for the study. The data were

evaluated by two examiners, graduated in Dentistry, previously trained and calibrated. When no agreement was reached by the examiners, a third examiner, specialist in Endodontics, made the final decision.

This study was approved by the Ethics Research Committee of the Pernambuco University (Process 124/03).

The data were organized in frequency tables and a descriptive analysis of the data was performed.

## Results

Seventy eight patient records were assessed, mean age of 32.4 years (11-65), 54 female (69.23%) and 24 male (30.77%).

From a total of 99 teeth evaluated by the radiographs, 79.80% consisted of maxillary teeth and 20.20% were mandibular teeth. The maxillary incisors were more usually associated to rehabilitation with intraradicular posts (56.57%). Radiolucent image suggestive of periapical lesion was found associated to the teeth assessed in 71.72% of the cases.

The intraradicular post material was metallic in 88.89% and non-metallic in 11.11%.

**Table 1.** Evaluated data from the files of patients.

Age
Gender
Tooth category
Presence of periapical lesion
Intraradicular post category
Root length
Post length
Post/root ratio
Post diameter
Root dentin reminescent thickness
Root canal filling reminescent
Space between root canal filling and intraradicular post
Deviation in the root canal shaping for the intraradicular post

The mean length of the evaluated roots was 16.1 mm. The Table 2 describes the mean length by tooth category.

The mean length of the intraradicular posts was 8.0 mm. The Table 3 describes the mean length of the posts by tooth category.

The intraradicular post was lower than 2/3 of the root remniscent length in 86.87% of the teeth (Table 4).

The mean diameter of the intraradicular roots was 1.7 mm, 1.5 mm, 1.2 mm for the coronal, middle and apical thirds, respectively. The mean diameter of the posts by the tooth category is described in Table 5.

The Table 6 describes the thickness of the root dentin remniscent by the different thirds of the root, assessed in the mesial and distal walls.

The intraradicular post diameter was inadequate in the coronal third in 31.31% of the teeth, in 20.20% for the middle third and 11.11% for the apical third (Table 7).

The root canal filling remniscent had mean length 6.2 mm. The mean length of the root canal filling remniscent by tooth category is described in Table 8.

The presence of void between the intraradicular post and the root canal filling was seen in 51 teeth (51,51%). The mean of this void is described by tooth category in the Table 9.

Eight teeth (8.08%) showed deviation in the root canal shaping for the intraradicular post: Six maxillary incisors (75.00%), one maxillary canine (12.50%), and one mandibular molar (12.50%).

**Table 2.** Mean length of the roots by tooth category.

Upper		Lower	
Maxillary Incisors:	16.4 mm	Mandibular Incisors:	14.0 mm
Maxillary Canine:	18.3 mm	Mandibular Canine:	18.0 mm
Maxillary Premolar:	15.1 mm	Mandibular Premolar:	16.6 mm
Maxillary Molar:	14.2 mm	Mandibular Molar:	14.5 mm

**Table 3.** Mean length of the intraradicular post by tooth category.

Upper		Lower	
Maxillary Incisors:	8.1 mm	Mandibular Incisors:	7.0 mm
Maxillary Canine:	11.0 mm	Mandibular Canine:	9.0 mm
Maxillary Premolar:	6.5 mm	Mandibular Premolar:	7.7 mm
Maxillary Molar:	6.2 mm	Mandibular Molar:	9.2 mm

**Table 4.** Post/root length ratio.

Lower than 2/3 of the root	86 teeth (86.87%)
Higher or equal to 2/3 of the root	13 teeth (13.13%)

**Table 5.** Mean diameter of the intraradicular posts by the tooth category and root third.

Tooth	Third			Tooth	Third		
	Coronal	Middle	Apical		Coronal	Middle	Apical
Maxillary incisors	1.8 mm	1.6 mm	1.3 mm	Mandibular incisors	1.5 mm	1.5 mm	1.4 mm
Maxillary canine	1.2 mm	1.2 mm	1.0 mm	Mandibular canine	1.5 mm	1.5 mm	1.4 mm
Maxillary premolar	1.5 mm	1.3 mm	1.1 mm	Mandibular premolar	1.7 mm	1.4 mm	1.2 mm
Maxillary molar	1.2 mm	1.1 mm	1.0 mm	Mandibular molar	1.3 mm	1.3 mm	1.0 mm

**Table 6.** Thickness of root dentin reminescent.

Tooth		Third			Tooth		Third		
		Coronal	Middle	Apical			Coronal	Middle	Apical
Mxl	M	2.1 mm	2.1 mm	2.0 mm	Mdl	M	1.0 mm	1.2 mm	1.3 mm
	D	2.1 mm	2.0 mm	1.8 mm		D	1.3 mm	1.5 mm	1.5 mm
MxC	M	1.9 mm	2.2 mm	2.0 mm	MdC	M	2.3 mm	2.4 mm	2.2 mm
	D	2.0 mm	2.2 mm	2.0 mm		D	2.5 mm	2.4 mm	2.4 mm
MxPM	M	1.8 mm	1.9 mm	1.7 mm	MdPM	M	1.8 mm	2.0 mm	1.8 mm
	D	1.7 mm	1.6 mm	1.6 mm		D	1.7 mm	1.7 mm	1.8 mm
MxM	M	2.1 mm	1.8 mm	1.5 mm	MdM	M	2.1 mm	1.5 mm	1.3 mm
	D	2.1 mm	1.8 mm	1.7 mm		D	2.1 mm	1.7 mm	1.4 mm

**Table 7.** Post/root thickness ratio.

Larger than 1/3	Coronal	31 teeth (31.31%)
	Middle	20 teeth (20.20%)
	Apical	11 teeth (11.11%)
Lower or equal to 1/3	Coronal	68 teeth (68.69%)
	Middle	79 teeth (79.80%)
	Apical	88 teeth (88.89%)

**Table 8.** Mean length of the root canal filling reminescent by tooth category.

Maxillary incisor: 6.7 mm	Mandibular incisor: 6.5 mm
Maxillary canine: 6.3 mm	Mandibular canine: 12.0 mm
Maxillary premolar: 5.7 mm	Mandibular premolar: 6.2 mm
Maxillary molar: 4.2 mm	Mandibular molar: 3.9 mm

**Table 9.** Void between the intraradicular post and the root canal filling.

Tooth	Number of teeth (%)	Mean void
Maxillary incisor	29 (56.86%)	1.4 mm
Maxillary canine	2 (3.92%)	1.5 mm
Maxillary premolar	7 (13.73%)	1.4 mm
Maxillary molar	1 (1.96%)	2.4 mm
Mandibular incisor	0 (0.00%)	----
Mandibular canine	0 (0.00%)	----
Mandibular premolar	8 (15.69%)	1.5 mm
Mandibular molar	4 (7.84%)	0.5 mm

## Discussion

The endodontic treatment allows the function re-establishment of a tooth affected by several pathological alterations. However, the endodontically treated teeth will only definitely recover function after the restoration concluded.<sup>11</sup>

Although the radiographic exam is not conclusive in evaluating the root reminescent and intraradicular posts, this is the diagnostic tool available for the evaluation of teeth with intraradicular metallic posts, since the cone beam computerized tomography, method which allows

three-dimensional visualization of the image, presents then beam-hardening as a limitation, artifact that complicate visualization of anatomical structures examined where there is high density materials near the evaluated area.<sup>12</sup>

The post length is the most important factor for retention of the intraradicular post. The longer the post, greater the retention it promotes.<sup>11</sup> Surely, two factors acts as limiting: Root canal internal anatomy and apical reminescent of the root canal filling.<sup>6</sup> In this study, the post length was lesser than 2/3 of the root length in 86.87% of the cases, considered lesser than the

recommended length.<sup>11</sup> Similar results were observed in a study that radiographically evaluated the clinical situation of intraradicular metallic posts in 447 single rooted teeth, in which 93.29% of the posts were lesser than the 2/3 recommended.<sup>13</sup>

Another relevant factor is the post diameter. The diameter must be compatible to the maintenance of the root dentin, reduction of fracture and perforation risk, recommended as 1/3 of the root diameter.<sup>11</sup> This study shows that the larger the post, and thus lesser the root dentin thickness, the higher probability of root fractures.<sup>14</sup> In this study, in 31.31%, 20.20% and 11.11% of the teeth in the coronal, middle and apical thirds, respectively, this principle was not followed. This fact brings to unnecessary destruction of root dentin and, thus, tooth weakening.

The removal of root canal filling and the root canal shaping for the post is a treatment phase that requires maximum concentration, due to the risk of deviation and perforation of the root canal, what might compromise the treatment success.<sup>11,15</sup> The use of high-rotation rotatory instruments should be avoided, as enhances

the risk of deviations and perforations of the root canal.<sup>15</sup> There was deviation in the root canal shaping for the post in 8 cases.

It is primordial that the intraradicular post and the sealer used fill the space created after the removal of the root canal filling. An empty space favors communication with the periodontium and could allow the development of periapical pathologies.<sup>11</sup> Empty spaces were found in 51.51% of the cases, what might lead to failure of the endodontic treatment.

To ensure the apical seal, primordial condition for endodontic treatment success, most authors agrees that the removal of root canal filling for the post should keep a reminiscent of at least 3 to 5 mm.<sup>11,16</sup> In this study, the maintenance of these recommended limits was seen in most teeth, mean higher than 6 mm.

## Conclusion

Most rehabilitations of endodontically treated teeth by an intraradicular post did not follow the recommended principles for these treatments.

## References

- Soares CJ, Santana FR, Castro CG, Santos-Filho PC, Soares PV, Qian F, et al. Finite element analysis and bond strength of a glass post to intraradicular dentin: comparison between microtensile and push-out tests. *Dent Mater* 2008;24:1405-1411.
- Schwartz RS, Robbins JW. Post placement and restoration of endodontically treated teeth: a literature review. *J Endod* 2004;30:289-301.
- Rivera EM, Yamauchi M. Site comparisons of dentine collagen cross-links from extracted human teeth. *Arch Oral Biol* 1993;38:541-546.
- Reeh ES, Messer HH, Douglas WH. Reduction in tooth stiffness as a result of endodontic and restorative procedures. *J Endod* 1989;15:512-516.
- Pereira JR, Neto Tde M, Porto Vde C, Pegoraro LF, do Valle AL. Influence of the remaining coronal structure on the resistance of teeth with intraradicular retainer. *Braz Dent J* 2005;16:197-201.
- Lopes HP, Estrela C, Rocha NSM, Costa Filho AS, Siqueira JF, Jr. Retentores intra-radiculares: análise radiográfica do comprimento do pino e da condição da obturação do canal radicular. *RBO* 1997;54:277-80.
- Fraga RC, Chaves BT, Mello GS, Siqueira JF, Jr. Fracture resistance of endodontically treated roots after restoration. *J Oral Rehabil* 1998;25:809-813.
- Clavijo VG, Reis JM, Kabbach W, Silva AL, Oliveira Junior OB, Andrade MF. Fracture strength of flared bovine roots restored with different intraradicular posts. *J Appl Oral Sci* 2009;17:574-578.
- Pereira JR, Valle AL, Shiratori FK, Ghizoni JS, Melo MP. Influence of intraradicular post and crown ferrule on the fracture strength of endodontically treated teeth. *Braz Dent J* 2009;20:297-302.
- Nergiz I, Schmage P, Ozcan M, Platzer U. Effect of length and diameter of tapered posts on the retention. *J Oral Rehabil* 2002;29:28-34.
- Leles CR, Rocha SS, Souza JB, Busato ALS. Intraradicular posts for endodontically treated teeth. In: Estrela C, editor. *Endodontic Science*. 1 ed. São Paulo: Artes Médicas; 2009. p. 1197-1223.
- Estrela C, Bueno MR, Porto OC, Rodrigues CD, Pecora JD. Influence of intracanal post on apical periodontitis identified by cone-beam computed tomography. *Braz Dent J* 2009;20:370-375.
- Hilgert E, Buso L, Mello EB. Avaliação radiográfica de retentores intraradiculares metálicos fundidos. *Cienc Odontol Bras* 2004;7:52-59.
- Santini MF, Wandscher V, Amaral M, Baldissara P, Valandro LF. Mechanical fatigue cycling on teeth restored with fiber posts: impact of coronal grooves and diameter of glass fiber post on fracture resistance. *Minerva Stomatol* 2011;60:485-493.
- Oliveira Júnior L. Pinos/Núcleos Metálicos Fundidos na Rgeião Anterior. In: *Guia Clínico de Dentística e Prótese Dentária*. 1 ed. Goiânia: Ed. do Autor; 2007. p. 113-144.
- Siqueira Jr. JF, Lopes HP, Elias CN. Obturação dos canais radiculares. In: Lopes HP, Siqueira Jr. JF, editors. *Endodontia: Biologia e técnica*. 3 ed. Rio de Janeiro: Guanabara Koogan; 2010. p. 641-690.
- Almeida GA, Veloso HHP, Sampaio FC, Oliveira HF, Freire AM. Restoration quality and endodontic failure. *Rev Odontol Bras Central*. 2011;20(52):83-7.