Original Clinic Reality Study of intraradicular posts

Estudo da realidade clínica dos retentores intraradiculares

Larissa S. R. VILANOVA[1], Ludmilla F. EUZÉBIO[2], Rodrigo B. FONSECA[3],Sicknan S. ROCHA[3]

1 - PhD – Department of Prevention and Oral Rehabilitation, Dentist School,Federal University of Goiás, Goiânia, Go, Brazil;

2 - DDS - Department of Prevention and Oral Rehabilitation, Dentist School, Federal University of Goiás, Goiânia, Go, Brazil;

3 - PhD, Professor – Department of Prevention and Oral Rehabilitation, Dentist School, Federal University of Goiás, Goiânia, Go, Brazil.

ABSTRACT

Objetive: This study aimed to understand and analyze the systematic use of post space, including its indications and most frequent problems for professionals in Goiania-Go. Material and Methods: We used a 16-question questionnaire applied to a sample of clinical and/or experts in the fields of dentistry and dental prosthesis. We conducted a random raffle among those enrolled in the Regional Council of Dentistry of Goiás. 121 research professionals participated. In order to compare proportions in levels of category variables, a chi-square test was applied. Results: Cast core is used by 70.2% of respondents, while only 25.6% prefer prefabricated posts. The most mentioned selection criteria were coronal, aesthetics and extent of restoration, regardless of the type of retainer. Zinc phosphate cement was the favorite material for cast post and core, and resin cement the one for pre-fabricated fiberglass. Difficult removal (57.9%), aesthetic risk (48.8%) and root fracture (44.6%) were the most frequent problems with the cast post and core. Loss of retention, filling and core pin fracture, and difficult removal were the most prevalent problems with prefabricated posts. Conclusion: Clinical experience and training proved decisive in the selection of post space. Participants with more experience in service and dental specialists tend to adopt more precise criteria for selection.

KEYWORDS: Dental prosthesis; Dental pins; Clinical competence.

INTRODUCTION

The human tooth becomes weakened with age due to cavities, abrasion, fracture and restauration prodedures[1]. Cavity preparation and endodontic treatment increase the potential for residual fracture[2] due to reduction of tooth structure and loss of nutrient supply of dental pulp. Therefore, the use of intraradicular is justified by the need to retain the core materials for filling, which will serve as the basis for the final restoration. However, there is a concensus that simply installing a retentor within the root does not increase fracture resistance of the tooth and may even weaken it[3-8]. Thus, post space is classically known as a promoter of retention and strengthening of coronal restorative material in fully engaged teeth, and it also replaces the dentin portion of the crown that is very damaged[9].

Intra radicular retainers can be classified in two lines - the prefabricated posts and metallic cores[10]. The two basic forms of intraradicular pins, cast or prefabricated, exhibit numerous variations in terms of material, manufacturing techniques, morphological characterists and biomechanical and clinic application[11,12].

The intraradicular cast pins have long been considered the standard treatment for teeth with reduced crown. They display such versatility in terms of use, that it is allowed in virtually all cases. Therefore, it is the treatment of choice for over-expulsive or elliptical roots, where the prefabricated circular post does not fit tightly to the root walls, resulting in a thicker cement layer[13].

However, intraradicular castings have the disadvantage of needing two clinical sessions to obtain the mold and cement the core, which also involves laboratory costs[14].

The prefabricated posts are devices used to promote the retention of restorative material to reinforce endodontically treated teeth, and the crown portion. Its use demands enough preparation to accommodate the dimentions of the post. The prefabricated core system consists of three components: prefabricated posts, cementing materials and the core material[15-17].

Essentially because of the advantages of prefabricated post when compared to cast post and core, there is an indiscriminate use of this form of intraradicular restraint. Clinical failures in the use of intraradicular restraint systems, especially fractures and cementing of post, have been linked to the inadequate use of prefabricated posts. Thus, it becomes important to know the clinical reality of post space use.

The objective of this research was to determine the systematic use of means of intraradicular restraint by dentists in Goiânia, Goiás.

MATERIALS AND METHODS

As a data collection instrument for this qualitative and quantitative research, a questionnaire with 16 objective questions was used.

The population of this study was a sample of dentists from Goiânia who are enrolled in the Regional Dentistry Council of Goiás (CRO-GO).

Inclusion criteria were that participants had to be odontology graduates, enrolled in the CRO, and general practitioners or specialists in esthetic dentistry and / or prosthodontics. Professionals who did not fit these specifications, refused to participate in the study, and those who had no business address in Goiania were excluded.

Participation in the study was voluntary and participants signed a prior- informed consent form - IC. This study was approved by the Ethics in Research Committee of Federal University of Goiás (protocol 187/2010).

The data collected through the questionnaire were analyzed by SPSS. (SPSS for Windows, version 19.0, SPSS Inc, Chicago, EUA) The chi-square test was used to compare proportions in levels of class variables.

RESULTS

450 questionnaires were distributed to surgeon dentists, general practitioners, and, clinical specialists in prosthetics and / or esthetic dentistry working in the city of Goiania-GO. There was a feedback of 121 questionnaires from professionals who participated voluntarily.

Of the 121 participants, 56.2% (n = 68) were female and 43.8% (n = 53) were male. Regarding the length of experience, 33.9% (n = 41) graduated in the last five years while 66.1% (n = 80) have been working as dentists for more than five years.

As for the specialty of the respondents, 60.3% (n = 73) work as general practitioners, 28.1% (n = 34) are prosthetists, 9.1% (n = 11) are specialists in esthetic dentistry, and 2.5% (n = 3) have expertise in dental prosthesis. Among those who are specialists, 15.7% (n = 19) have been engaged in their specialty for one to five years, 8.3% (n = 10) for five to ten years, and 15.7% (n = 19) have had over ten years experience in the area.

Regarding the clinical use of the retainer post space, the most popular retainer was the cast metallic post (CMP) - 70.2%, while only 25.6% prefer prefabricated posts.

Among the criteria for selection of the intraradicular retainer, the most appointed were - coronal 95.9% (n = 116), aesthetics 68.6% (n = 83) and extent of restoration 58.7% (n = 71). The other items were - fixed partial denture retainer or removable prosthesis 47.1% (n = 57), patient's occlusion 46.3% (n = 56), channel configuration 45.5% (n = 55), cost-effectiveness 28.9% (n = 35), arch position of the tooth 26.4% (n = 32). 6.6% (n = 8) selected other criteria, but only four listed them as: follow up, longevity, predictability, crown-root ratio size, amount of remaining root; accuracy according to the preparation and quality of coronal structure.

To select the type of alloy for CMP`s the most important aspects considered were: stiffness 48.8% (n = 59), remaining root 36.4% (n = 44), and restorative materials 32.2% (n = 39) followed by cost 30.6% (n = 37), availability in the laboratory 22.3% (n = 27), surface hardness 12.4% (n = 15). Other issues were also pointed out by 8.3% (n = 10) including the patient's financial condition, consent given to the prosthetic, scientific evidence, corrosion resistance, tension after use, and color. 2.5% (n = 3) did not answer the question.

The type of cement used in most metallic posts was zinc phosphate 87.6% (n = 106) followed by resin cement 20.7% (n = 25), glass ionomer cement, and modified glass ionomer resin 9.9% (n = 12).

Among the most frequent problems experienced with the use of CMP`s, the ones that stand out are: difficult removal 57.9% (n = 70), aesthetic risks 48.8% (n = 59), root fracture 44.6% (n = 54), corrosion of the pin and loss of pin retention 17.4% (n = 21). Only two professionals have reported other problems such as a lack of clinical experience in proservation and 3.3% (n = 4) did not respond the issue.

The favorite type of prefabricated pin among those surveyed was that of fiberglass 84.3% (n = 102), followed by metal 23.1% (n = 22), carbon fibers 13.2% (n = 16), and ceramic 4.1% (n = 5).

For the selection of prefabricated pins, the most commonly applied criteria were: aesthetic 77.7% (n = 94), extent of restoration 56.2% (n = 68) and compatibility with the restorative material and / or fill. Resistance 42.1% (n = 51), adhesion 38% (n = 46), cost-effectiveness 27.7% (n = 25), and biocompatibility 16.5% (n = 20) were also mentioned. There was also the suggestion of other criteria 1.7% (n = 2) such as remaining teeth and root configuration.

With respect to the cement used for prefabricated posts, many options were pointed out, and 8.3% (n = 10) did not answer the question. For metallic posts, zinc phosphate cement is used the most, but glass ionomer, resin modified glass ionomer and resin cements were also mentioned as options for cementing. Regarding carbon fiber posts, 45.5% (n = 55) of respondents do not use it, but the most frequently mentioned among the options of cement is resin cement, which is also the choice among dentists for fiberglass and ceramic pins.

DISCUSSION

When contrasting the specialty of the dental surgeons with the most used type of intraradicular retainer, it was observed that general practitioners and dental specialists prefer cast metallic posts whereas specialists in esthetic dentistry have a preference for prefabricated posts. There is a divergence of opinions that may be related to their training background (Figure 1).

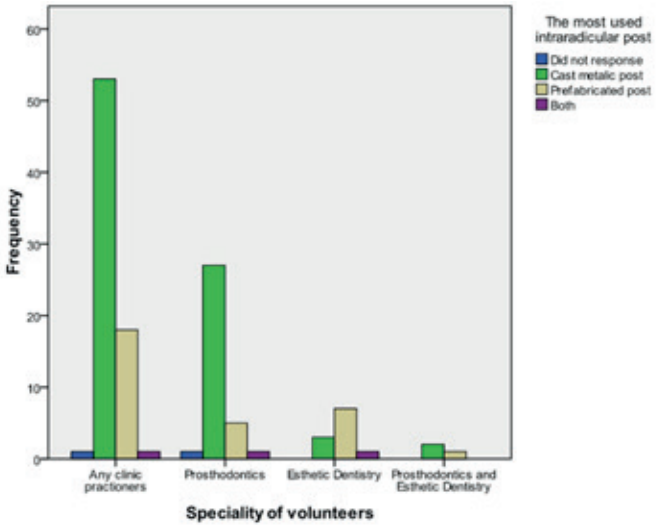

Figure 1 - Distribution by the type of retainer agreement with professional formation.

Prefabricated posts are used because of their good mechanical properties, elasticity which is similar to dentin, high resistance to bending, low cost, because they demand less clinical time, and their greater preservation of tooth structure[5,18,19]. The CMP has preference in our sample possibly because of predictability, its clinical success and high resistance to fracture. However, due to its high elasticity modulus when compared to dentin, it induces stress causing root fracture and subsequent tooth loss[5,9,20,21].

There should be clinical criteria for the recommendation of intra-radicular retention. Maximizing retention and minimizing risks of root fracture are essential in selecting the most appropriate system for each clinical situation. The amount of remaining dentin has its importance for maintaining the structural strength of the tooth and reduces the risk of root fracture. When there is an adequate preservation of the tooth structure, the post selection has little or no influence on the fracture resistance of the tooth. Most systems of prefabricated posts have the advantages of reduced clinical time, technical simplicity and lower costs, but the prescription

of prefabricated posts in teeth with no coronal structure should be considered with caution[22].

Also with regards to the selection criteria, another interesting fact refers to criteria items - partial denture retainer (PD), fixed prosthesis (FD) and/or occlusion of the patient. Opinions differ according to the training experience of the professional. The occlusion factor only tends to be considered by professionals with more than five years experience (P <0.05) (Table 1). For dentistry experts and general practitioners the PD or FD criteria were little recognized in selecting the type of retainer.

These results confirm the trend reported in literature to consider only the tooth or root in question alone[4,6,23] . It is very common for professionals to report the use of prefabricated posts when there is more than 50% of coronal remains, inferior amounts of cast post and core. This has compromised the long-term success in treatments. A large proportion of failures, especially with pre-fabricated posts, refers to inadequate prescription.

The results of this study, which show the tendency not to consider these aspects as relevant by clinicians and specialists in esthetic dentistry, refer to the need for urgent changes in teaching approaches. Retainers, especially pre-made ones, should be considered within a broad approach to restoring the function, and not in isolation, only the tooth or tooth root.

For the selection criteria of prefabricated posts, there was general agreement, except for the factor about restoration extension. Only the most experienced professionals consider it relevant in the selection of these posts. There is no doubt that clinical experience is a very important aspect in the success of dental treatment. Both the analysis of the restoration extent and the anatomical shape of the coronary chamber are essential[22].

Whereas these retainers are designed to support and retain the coronal portion of the core fill, the coronary sinus camera of posterior teeth is usually enough to assure that. This relates to the literature showing an undoubtedly higher incidence of prefabricated posts in anterior teeth, whose coronary chamber is reduced. Compliance with this aspect would prevent the cementation of many prefabricated posts in molars, which weakens the roots besides incorporating technical difficulties[23].

The fact that physicians and prosthetists rarely use the criterion of compatibility with the restorative material and/or fill may be related to the use of cast post and core in most cases. However, there is no doubt that they will face situations in which considering these two aspects could possibly avoid placing cast cores, whose disadvantages are well known. In most situations of endodontically treated posterior teeth that will receive partial restorations, directly or indirectly, the use of post space becomes unnecessary.

Among the problems experienced with the use of prefabricated posts, loss of post retention was the most prevalent. Studies have shown that failure in retention is the most common problem for both cast and for prefabricated posts. However, as long as they are used within the indications and with the support of clinical care, the chances of failure are minimized[24,25]. Due to structural coronal dentin and root differences, failures with prefabricated posts cemented with resin cements[26,27] have been reported.

Another aspect that has led to changes in the technique of prefabricated cementation posts is the thickness of cement between the pin and the walls of the conduit. In order to minimize this problem, reline post techniques with prefabricated composite prior to cementation[4,28] have been suggested. Another important technique is the association of accessory pins, which reduce the amount of cement inside the root canal[29,30].

Zinc phosphate cement is still the choice for cementation of cast metallic posts and for prefabricated metal, but it has a lack of adhesion to both the retainer and to the tooth structure as a disadvantage. Retention provided by zinc phosphate is based mainly on mechanical imbrications. However, besides presenting good results in retention tests, zinc phosphate cement demonstrates satisfactory performance on tests of flexion and resistance to rotational forces[18]. On the other hand, resin cement is the material of choice for cementation of prefabricated carbon fiber, fiberglass and ceramic. This type of cement has been used because of the advance of adhesive systems with good performance in adhesion to metals because they give resistance to the remaining teeth[18].

The results of this study should still be used in teaching, mostly undergraduate courses, in order to change the reality of intraradicular restraint employment, thus giving clinical longevity to endodontically treated teeth.

CONCLUSION

Within the limits of this study it can be concluded that:

- The clinical reality of post space employment is very diversified. With the emergence of new techniques and materials, there are many conduct options. Clinical experience and training proved decisive in the selection of the intraradicular restraint;

- There was a trend for participants with longer experience of service and dental specialists to adopt more precise criteria in the selection of post space.

REFERENCES

01. Salvi GE, Siegrist GBE, Amstad T, Joss A, Lang NP. Clinical evaluation of root filled teeth restored with or without post-and-core systems in a specialist practice setting. Int Endod J. 2007; 40(3): 209-15.

02. Solomon CS, Osman YI. Aesthetic restoration of the compromised root: a case report. SADJ. 2003; 58(10): 373-6.

03. Schmage P, Nergiz I, Platzer U, Pfeiffer P. Yield strength of fiber-reinforced composite posts with coronal retention. J Prosthet Dent. 2009; 101(6): 382-7.

04. Chuang SF, Yaman P, Herrero A, Dennison JB, Chang CH. Influence of post material and length on endodontically treated incisors: an in vitro and finite element study. J Prosthet Dent. 2010; 104(6): 379-88.

05. Giovani AR, Vansan LP, Neto MDS, Paulino SM. In vitro fracture resistance of glassfiber and cast metal posts with different lengths. J Prosthet Dent. 2009; 101(3): 183-8.

06. Melo MP, Valle AL do, Pereira JR, Bonachela WC, Pegoraro LF, Bonfante. Evaluation of fracture resistance of endodontically treated teeth restored with prefabricated posts and composites with varying quantities of remaining coronal tooth structure. J Appl Oral Sci. 2005; 13(2): 141-6.

07. Schmage P, Nergiz I, Platzer U, Pfeiffer P. Yield strength of fiber-reinforced composite posts with coronal retention. J Prosthet Dent. 2009; 101(6): 382-7.

08. De Oliveira JA, Pereira JR, Do Valle AL, Zogheib LV. Fracture resistance of endodontically treated teeth with different heights of crown ferrule restored with prefabricated carbon fiber post and composite resin core by intermittent loading. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2008; 106(5): 52-7.

09. Caputo AA, Standlee JP. Pins and posts – Why, when and how. Dent Clin North Am. 1976; 20(2): 299-311.

01. Zarow M, Devoto W, Saracinelli M. Reconstruction of endodontically treated posterior teeth--with or without post? Guidelines for the dental practitioner. Eur J Esthet Dent. 2009; 4(4): 312-27.

02. Asmussen E, Peutzfeldt A, Heitmann T. Stiffness, elastic limit, and strength of newer types of endodontic posts. J Dent. 1999; 27(4): 275-8.

03. Christensen GJ. Posts: necessary or unnecessary?. J Am Dent Assoc. 1996; 127(10): 1522-4.

04. Piovesan EM, Demarco FF, Cenci MS, Pereira-Cenci T. Survival rates of endodontically treated teeth restored with fiber-reinforced custom posts and cores: a 97-month study. Int J Prosthodont. 2007; 20(6): 633-9.

05. Morgano SM, Bracktett SE. Foundation of pulpless teeth: application of traditional principles in present and future contexts. J Prosthet Dent. 1999; 82(6): 643-57.

06. Nergiz I, Schmage P, Ozcan M, Platzer U. Effect of length and diameter of tapered posts on the retention. J Oral Rehabil. 2002; 29(1): 28-34.

07. Sahafi A, Peutzfeldt A, Asmussen E, Gotfredsen K. Retention and failure morphology of prefabricated posts. Int J Prosthodont. 2004; 17(3): 307-12.

08. Chen DC, Lai YL, Chen HL, Lee SY. Effect of circumferential undercut placement in the root canal wall on the retention of a tapered post in large and small root canals. J Dent. 2003; 31(4): 247-52.

09. Jongsma LA, Kleverlaan CJ, Feilzer AJ. Influence of surface pretreatment of fiber posts on cement delamination. Dent Mater. 2010; 26(9): 901-7.

10. Beck N, Graef F, Wichmann M, Karl M. In vitro fracture resistance of copy-milled zirconia ceramic posts. J Prosthet Dent. 2010; 103(1): 40-4.

11. Gómez-Polo M, Llidó B, Rivero A, Del Río J, Celemín A. A 10-year retrospective study of the survival rate of teeth restored with metal prefabricated posts versus cast metal posts and cores. J Dent. 2010; 38(11): 916-20.

12. Ozcopur B, Akman S, Eskitascioglu G, Bell S. The effect of different posts on fracture strength of roots with vertical fracture and re-attached fragments. J Oral Rehabil. 2010; 37(8): 615-23.

13. 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(4): 297-302.

14. Aghdaee NA, Darban JG, Mohajeri A. Fracture strength in restored teeth before and after load cycling: an in vitro study. J Calif Dent Assoc. 2011; 39(5): 300-7.

15. Balkenhol M, Wostmann, Rein C, Ferger P. Survival time of cast post and cores: A 10-year retrospective study. J Dent. 2007; 35(1): 50-8.

16. Signore A, Benedicenti S, Kaitsas V, Barone M, Angiero F, Ravera G. Long-term survival of endodontically treated, maxillary anterior teeth restored with either tapered or parallel-sided glass-fiber posts and full-ceramic crown coverage. J Dent. 2009; 37(2): 115-21.

17. Goracci C, Grandini S, Bossu M, Berteli E, Ferrari M. Laboratory assessment of the retentive potential of adhesive posts: a review. J Dent. 2007; 35(11): 827-35.

18. Bonfante G, Kaizer OB, Pegoraro LF, do Valle AL. Tensile bond strength of glass fiber pots luted with different cements. Braz Oral Res. 2007; 21(2):159-64.

19. Boksman L, Hepburn AB, Kogan E, Friedman M, de Rijk W. Fiber post techniques for anatomical root variations. Dent Today. 2011; 30(5): 106-11.

20. Jongsma LA, Kleverlaan CJ, Feilzer AJ. Influence of surface pretreatment of fiber posts on cement delamination. Dent Mater. 2010; 26(9): 901-7.

21. Maceri F, Martignonib M, Vairo G. Mechanical behaviour of endodontic restorations with multiple prefabricated posts: A finite-element approach. J Biomech. 2007; 40(11): 2386-98.

RESUMO

Objetivo: Este estudo teve como objetivo compreender e analisar o uso sistemático dos retentores intrarradiculares, incluindo as suas indicações e dificuldades mais frequentes para os profissionais em Goiânia-GO. Material e Métodos: Foi aplicado um questionário de 16 perguntas a uma amostra de clínicos e/ou especialistas nas áreas de odontologia e próteses dentárias. Foi realizado um sorteio aleatório entre os inscritos no Conselho Regional de Odontologia de Goiás (CRO-GO). 121 profissionais participaram da pesquisa. O teste do qui-quadrado foi aplicado, a fim de comparar as proporções nos níveis de variáveis categóricas. Resultados: núcleo fundido foi utilizado por 70,2% dos entrevistados, enquanto apenas 25,6% preferem pinos pré-fabricados. Os critérios de seleção mais citadas foram coroas, estética e extensão da restauração, independentemente do tipo de retenção. Cimento de fosfato de zinco foi o material favorito para pinos e núcleos, e cimento resinoso para pinos pré-fabricados de fibra de vidro. Remoção difícil (57,9%), risco de estética (48,8%) e fratura da raiz (44,6%) foram os problemas mais frequentes com o núcleo fundido e núcleo. Perda de retenção, sensibilidade, fratura do núcleo, e difícil remoção foram os problemas mais prevalentes com pinos pré-fabricados. Conclusão: A experiência clínica e formação revelou-se decisiva na seleção de retentores intrarradiculares. Os participantes com mais experiência e especialistas tendem a adotar critérios mais precisos para a seleção.

PALAVRAS-CHAVE: Prótese dentária; Pinos dentários; Competência clínica.

AUTOR PARA CORRESPONDÊNCIA

Sicknan Soares da Rocha
Faculdade de Odontologia da Universidade Federal de Goiás
Av. Universitária esquina com 1ª avenida s/n
setor leste universitário,
Goiânia- GO – Brazil
CEP: 74605-010
Telefone: (62) 3209-6250; Fax: (62) 3209 6323
E-mail: sicknanrocha@yahoo.com.br