



**UNIVERSIDADE FEDERAL DE SANTA MARIA
CENTRO DE CIÊNCIAS DA SAÚDE
PROGRAMA DE PÓS GRADUAÇÃO EM CIÊNCIAS
ODONTOLÓGICAS
(ASSOCIADO AO PROGRAMA DE PÓS-GRADUAÇÃO EM ODONTOLOGIA
DA UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL)**

**AVALIAÇÃO RETROSPECTIVA DE PINOS PRÉ
FABRICADOS CIMENTADOS NAS CLÍNICAS DE
PRÓTESE DENTAL DA UFSM**

DISSERTAÇÃO DE MESTRADO

Rodrigo Farcili Trindade

**Santa Maria, RS, Brasil
2010**

**AVALIAÇÃO RETROSPECTIVA DE PINOS PRÉ-
FABRICADOS CIMENTADOS NAS CLÍNICAS DE
PRÓTESE DENTAL DA UFSM**

Dissertação apresentada ao Curso de Mestrado do Programa de Pós-Graduação em Ciências Odontológicas, Área de Concentração em Prótese Dental, da Universidade Federal de Santa Maria (UFSM, RS), como requisito parcial para obtenção do grau de Mestre em Ciências Odontológicas.

Candidato: Rodrigo Farcili Trindade

Orientador: Prof. Dr. Paulo Afonso Burmann

**Santa Maria, Rs, Brasil
2010**

**Universidade Federal de Santa Maria
Centro de Ciências da Saúde
Programa de Pós Graduação em Ciências Odontológicas**

A Comissão Examinadora, abaixo assinada, aprova a Dissertação de Mestrado

**AVALIAÇÃO RETROSPECTIVA DE PINOS PRÉ FABRICADOS
CIMENTADOS NAS CLÍNICAS DE PRÓTESE DENTAL DA UFSM**

elaborada por **Rodrigo Farcili Trindade** como requisito parcial para obtenção de grau de **Mestre em Ciências Odontológicas**

COMISSÃO EXAMINADORA

Prof. Dr. Paulo Afonso Burmann
(presidente/orientador)

Prof. Dr. Henrique Holweg
(Membro)

Prof. Dr. Wellington Corrêa Jansen
(Membro)

Santa Maria, 22 de fevereiro da 2010.

Dedicatória

Aos meus pais:

À minha mãe, Leila Farcili Trindade, por ser a principal responsável e incentivadora pela minha formação, pelo exemplo de uma pessoa batalhadora, de honestidade e perseverança.

Ao meu pai, Tabajara Potengy Trindade (*in memoriam*), que embora tenha me deixado ainda muito jovem pôde mostrar a mim e aos meus irmãos o grande valor da família, do respeito às pessoas, do jeito alegre de ser e de ter um coração bom.

Ao meu amor, Luiza Reginatto, por fazer parte de minha vida, por enfrentar junto os desafios que aparecem, por sempre me incentivar em minha profissão, por me entender e me amar do jeito que sou.

Agradecimentos

Primeiramente gostaria de agradecer a Deus por nossa existência. Ao curso de Odontologia por proporcionar os conhecimentos científicos desta linda profissão.

À Universidade Federal de Santa Maria, instituição que aprendi a gostar desde criança e que agora viabilizou a minha graduação e pós-graduação em Odontologia.

Ao programa de Pós Graduação em Ciências Odontológicas, bem como seus funcionários e professores, uma vez que mantiveram um grande empenho e coragem no desenvolvimento desse curso ainda jovem.

Aos colegas pelo companheirismo, em especial à colega Luciane Noal que muito me ajudou com a conclusão desse trabalho.

Aos alunos da iniciação científica: Joana Pereira, Gabriel Dal Forno, Rafaela Trevisan, Deise Osmari e Luiza Angonesi que ajudaram na seleção dos prontuários.

Ao Professor Henrique Hollweg, minha referência em Reabilitação Oral, agradeço pelo ensino, pela confiança e pelo aceite em fazer parte desta banca.

Ao Professor Tiago Ardenghi pela sua indispensável contribuição científica e pessoal.

Ao Professor Paulo Afonso Burmann por ser o primeiro a conseguir definitivamente trazer o curso de Mestrado em Ciências Odontológicas para a UFSM, por ser o primeiro Coordenador do programa.

Pessoalmente lhe agradeço por ter sido o meu grande professor, aquele que me ensinou os detalhes em prótese dental. Sempre fora o maior exemplo de professor, responsável com o ensino e com a precisão na realização dos procedimentos clínicos. Levo, também, comigo o exemplo de caráter, honestidade e bondade que é inerente a sua pessoa. Exemplo de homem que luta pela justiça, que ama seus alunos e sua família. Muito obrigado por me aceitar como aluno, pela paciência e pela confiança depositada. Espero um dia poder retribuir tudo o que fez por mim. Conte sempre comigo.

Epígrafe

“...o homem tem o tamanho da causa que ele abraça...”

SUMÁRIO

1 ABSTRACT	8
2 LISTA DE TABELAS	9
3 LISTA DE ANEXOS	10
4 LISTA DE APÊNDICES	11
5 PROPOSIÇÃO	12
6 CAPÍTULO	13
ARTIGO:	
<i>“RETROSPECTIVE ASSESSMENT PREFABRICATED POSTS CEMENTED AT THE UFSM DENTAL PROSTHETICS CLINICS”</i>	
7 ANEXOS E APÊNDICES	30

1. ABSTRACT

RETROSPECTIVE ASSESSMENT PREFABRICATED POSTS CEMENTED AT THE UFSM DENTAL PROSTHETICS CLINICS

Rodrigo Farcili Trindade¹; Luciane Noal Ravello²; Paulo Afonso Burmann³

The objective of this retrospective study was to assess the clinical performance over time of direct cores supported by prefabricated posts and cemented at the UFSM Dental Prosthetics Clinics between 1997 and 2007, as part of the restorative treatment proposed for patients with significant losses to coronary structures.

After approval had been granted by the Research Ethics Committee at the UFSM, 191 patients, from a total of 321 patients, who had been treated with metal-ceramic restorations cemented onto direct cores, and for whom full address details were available, were invited to take part by letter or by telephone. Sixty-one of these patients were investigated for this study. Clinical and radiographic examinations were carried out at the UFSM dental prosthetics clinic by four trained examiners. A descriptive analysis of the data collected was performed using STATA 9.0.

The success rate of the treatments carried out was 96.38%, since 80 of the 83 teeth were still in place. The post-core assemblies were still in place in 96.38% of the treated teeth and 97.59% of the roots were intact. The percentage of crown restorations still intact was the same as for the teeth: 96.38% (80), with 72.5% (58) being single metal-ceramic crowns and 27.5% (22) fixed bridge pillars.

At the time of data collection, the mean survival time for the single metal-ceramic restorations was 5.68 years (± 3.28), while the fixed bridges had been in place and functional for 5.09 years (± 2.97). Fiberglass prefabricated posts had a mean survival of 4.45 years (± 3.14); and the metal posts survived 7 years (± 2.67).

The success rate observed in this study (96.38% to 97.59%) confirms the hypothesis that restorative technique of treating teeth endodontically with direct root canal retention and prefabricated posts is both safe and clinically applicable.

¹ DDS, Specialist in Dental Implant, Student at Dental Sciences Postgraduate Program, Federal University of Santa Maria (UFSM), Brazil;

² DDS, Specialist in Community Health, Student at Dental Sciences Postgraduate Program, UFSM, Brazil;

³ DDS, MS, PhD, Head Professor at Restorative Dentistry Department, UFSM, Brazil

2. LISTA DE TABELAS

Tabela 1 – distribuição da amostra quanto ao dente restaurado e tipo da restauração

Tabela 2 – distribuição da amostra quanto ao dente restaurado e tipo de pino.

Tabela 3: - distribuição quanto número e porcentagem dos achados clínicos.

Tabela 4 – distribuição quanto ao tempo médio de duração das coroas metalocerâmicas para elementos unitários e elementos de pontes fixas.

Tabela 5: distribuição quanto ao tempo médio de duração e tipo de pino.

3. LISTA DE ANEXOS

ANEXO A: Carta de aprovação do comitê de ética

ANEXO B: Autorização dos dirigentes imediatos:
Departamento de Odontologia Restauradora;
Coordenação do Curso de Odontologia.

4. LISTA DE APÊNDICES

APÊNDICE A: Termo de Consentimento Livre e Esclarecido (TCLE)

APÊNDICE B: Correspondência para o paciente

APÊNDICE C: Termo de Confidencialidade

APÊNDICE D: Ficha de exame clínico e radiográfico

5. PROPOSIÇÃO

O objetivo da pesquisa desenvolvida como base desta dissertação é apresentar e discutir os resultados de um estudo retrospectivo que avaliou o desempenho clínico longitudinal dos núcleos diretos ancorados em pinos pré-fabricados cimentados nas clínicas de Prótese Dental da UFSM, no período de 1998 a 2007, quanto à presença ou ausência do pino/núcleo, tipo de restauração de recobrimento e tempo médio de sobrevivência, conforme anotações na ficha clínica.

6. CAPÍTULO

Esta dissertação está baseada nas normativas da Universidade Federal da Santa Maria. Por se tratar de pesquisa envolvendo seres humanos, o projeto de pesquisa que originou este trabalho foi submetido à aprovação do Comitê de Ética em Pesquisa da Universidade Federal de Santa Maria, tendo sido aprovado (ANEXO A). Sendo assim, esta dissertação é composta de um capítulo contendo artigo que será enviado para publicação na revista “*International Journal of Prosthodontics*”.

Capítulo 1 – Artigo:

“*RETROSPECTIVE ASSESSMENT OF PREFABRICATED POSTS CEMENTED AT THE UFSM DENTAL PROSTHETICS CLINICS*”

Farcili, R., Noal, L. Burmann, P. A

RETROSPECTIVE ASSESSMENT PREFABRICATED POSTS CEMENTED AT THE UFSM DENTAL PROSTHETICS CLINICS

Rodrigo Farcili Trindade¹; Luciane Noal Ravanello²; Paulo Afonso Burmann³

¹ DDS, Specialist in Implant Dentistry, Student on Dental Sciences Postgraduate Program, Universidade Federal de Santa Maria (UFSM), Santa Maria, RS, Brazil;

² DDS, Specialist in Community Health, Student on Dental Sciences Postgraduate Program, UFSM, Santa Maria, RS, Brazil;

³ DDS, MS, PhD, Head Professor at Restorative Dentistry Department, UFSM, Santa Maria, RS, Brazil.

Universidade Federal de Santa Maria: Avenida Roraima, nº 1000, Cidade Universitária, Bairro Camobi, Santa Maria, RS, Brazil, CEP: 97105-900

Corresponding author:

Rodrigo Farcili (55) (55) 30277747, rodrigofarcili@terra.com.br

ABSTRACT

Aim: The objective of this retrospective study was to assess the clinical performance over time of direct cores supported by prefabricated posts and cemented at the Universidade Federal de Santa Maria (UFSM) Dental Prosthetics Clinics between 1997 and 2007, as part of the restorative treatment proposed for patients with significant losses to coronary structures. **Methods:** After approval had been granted by the Research Ethics Committee at the UFSM, 191 patients, from a total of 321 patients, who had been treated with metal-ceramic restorations cemented onto direct cores, and for whom full address details were available, were invited to take part by letter or by telephone. Sixty-one of these patients were investigated for this study. Clinical and radiographic examinations were carried out at the UFSM dental prosthetics clinic by four trained examiners. A descriptive analysis of the data collected was performed using STATA 9.0. **Results:** The success rate of the treatments carried out was 96.38%, since 80 of the 83 teeth were still in place. The post-core assemblies were still in place in 96.38% of the treated teeth and 97.59% of the roots were intact. The percentage of crown restorations still intact was the same as for the teeth: 96.38% (80), with 72.5% (58) being single metal-ceramic crowns and 27.5% (22) fixed bridge pillars. At the time of data collection, the mean survival time for the single metal-ceramic restorations was 5.68 years (± 3.28), while the fixed bridges had been in place and functional for 5.09 years (± 2.97). Fiberglass prefabricated posts had a mean survival of 4.45 years (± 3.14); and the metal posts survived 7 years (± 2.67). **Conclusion:** The success rate observed in this study (96.38% to 97.59%) confirms the hypothesis that restorative technique of treating teeth endodontically with direct root canal retention and prefabricated posts is both safe and clinically applicable.

Keywords: prefabricated posts; retrospective study; dental prosthesis; metal-ceramic; dental restoration.

INTRODUCTION

Adhesive dentistry makes it possible to restore teeth with major structural losses using materials that bond micromechanically to dental structures. Nevertheless, within this field adhesion still requires further clinical investigation and a firmer scientific foundation is needed with relation to the mechanisms for bonding to the dentin substrate.^{1,2}

The restoration of teeth that have suffered extensive coronary destruction can be made more predictable if one takes into account the need for intra-root support, which can be by means of cast metal cores or direct cores.³⁻⁴⁻⁵⁻⁶

The use of cast metal cores results in a greater failure rate when compared with direct cores and they also tend to cause more short and medium-term complex and difficult-to-treat fractures.⁷

The choice of using direct core systems with prefabricated posts has been justified, among other reasons, by the increased bonding between dental structures and by the fact that there is a layer of adhesive cement between the post and the intra-root dentin, which tends to absorb and dissipate functional loads transmitted from the clinical crown to the root¹.

Prefabricated posts offer certain advantages, including the facts that preparation is more conservative, their adhesion to composites and mechanical properties are similar to those of dental structure and this translates to reduced load concentration and a reduced risk of fracture. Furthermore, the reduction in chair time and costs and the relative autonomy, when compared with laboratory procedures, have contributed considerably to the increase in indications and use of prefabricated posts⁹.

Using prefabricated posts makes more sense when it is considered that they make it possible to preserve a greater proportion of the dental structure and offer better

support, retention and stability to the prosthesis, particularly when the dental remnant is limited to the root and the post is the only available mechanism to support crowns used for restoration.

Nevertheless, the use of direct cores to restore crowns in such situations is the subject of debate, especially with relation to their resistance^{10, 11} and longevity, when compared with the performance of cast metal cores, which, according to some authors, are more resistant, more versatile and fit the root canal better^{3, 6}.

Among the different types of prefabricated posts available, fiber posts have shown themselves to offer better predictability in terms of aesthetics, since there is no metal in the core and they improve coloration of the cervical borders of restorations in pure ceramic. On the other hand, the modulus of elasticity that is similar to that of dental structures, their resistance to corrosion, the possibility of more conservative preparation and their good adhesion to dental structures all support the argument in favor of prefabricated fiber posts^{1, 12, 15}.

According to Ferrari et al.¹⁶, it is important to base performance comparisons on well-founded scientific studies. A number of different *in vitro* experimental models have been proposed to mechanically test the adhesive resistance of the bond between dental structures and adhesive materials, but longitudinal clinical studies make a decisive contribution to decision-making in clinical situations.

Clinical studies conducted by a wide range of research teams have indicated that the many different prefabricated post systems offer a good rate of resolution. Some of these studies followed predetermined standardized protocols, stipulating the type of post, patient follow-up and level of coronary destruction.¹⁷ Another section of the literature, and one which is no less important, is based on retrospective studies^{16, 18, 20}.

Clinical performance assessments, while uncommon, have returned results that have failed to converge, probably as a result of the methodologies employed, since there

are problems with standardization, primarily in terms of the number of patients assessed and the different treatment protocols employing prefabricated posts^{1,10,16,18,19,21}. Not with standing, these results have played a decisive part in consolidating the technique's scientific standing.

Under any circumstances, these studies provide clinical and scientific evidence that will certainly translate to precious information made available to the academic community and clinical dental surgeons, which in turn will contribute to the health of the population.

This study evaluated the survival rates of teeth treated using metal-ceramic single crown restorations or the pillar teeth of fixed bridges that had been cemented between 1997 and 2007 at the Dental Prosthetics clinics at Universidade Federal de Santa Maria (UFSM) and investigated in 2008. We observed the clinical performance over time in terms of the continued presence or absence of the post/core and restoration and of the condition of the root.

MATERIALS AND METHODS

This study was undertaken at the dental prosthetics clinics run by the Department of Restorative Dentistry at the UFSM (Santa Maria, RS, Brazil), with prior approval from the institution's Research Ethics Committee (CEP-UFSM CAAE 0135.0.243.000-07). The target population was 321 patients who had been treated between January 1997 and July 2007 and who were given indirect restorative treatment supported on cores retained by intracanal posts.

Just 191 of the 321 medical records selected had full address details and these patients were invited to take part in the study by telephone or letter. Sixty-one of these patients agreed to take part, with a total of 83 restorations between them.

At the evaluative consultation, clinical and radiographic data were collected from patients and each restoration was recorded on a separate chart. The type and number of each type of restoration and their distribution in terms of which tooth was restored are shown in Table 1, while Table 2 gives the same data for the root canal support systems.

Table 1. Distribution of the sample according tooth restored and type of restoration.

	UCI	LCI	UIL	LLI	UC	LC	UPM	LPM	UM	LM	TOTAL
MC - SC	12	0	13	0	3	0	17	6	4	6	61
MC-FPD	1	0	2	0	3	0	10	1	5	0	22
Sum	13	0	15	0	6	0	27	7	9	6	83

Legend: MC – SC = metallic ceramic single crown;
 MC-FPD = fixed partial denture - metallic ceramic retainer
 UCI = upper central incisor
 LCI = lower central incisor
 UIL = upper lateral incisor
 LLI = lower lateral incisor
 UC = upper canine
 LC = lower canine
 UPM = upper pre-molar
 LPM = lower pre molar
 LM = lower molar
 FIBER = fiber post
 METAL = metallic pré fabricated post

Only data relating to teeth restored with single crowns or to pillar teeth from metal-ceramic fixed bridges cemented onto direct cores with prefabricated posts were included in the analysis. Therefore, teeth with full crown restorations fully in metal, composite resin or acrylic resin and those cemented onto cast metal cores were excluded from this sample, leaving a total of 61 patients, 25 men and 46 women, aged from 31 to 64; and 83 restored teeth.

All patients signed free and informed consent forms and a guarantee of confidentiality, imposing mutual responsibilities. None of the examinations involved any cost to the patients and neither were they remunerated for participation.

Table 2. Distribution of the sample in terms of tooth restored and type of post used.

	UCI	LCI	UIL	LLI	UC	LC	UPM	LPM	UM	LM	TOTAL
Fiber	7	0	11	0	0	0	15	5	6	4	48
Metal	6	0	4	0	6	0	12	2	3	2	35
Sum	13	0	15	0	6	0	27	7	9	6	83

Any diagnoses made during the clinical or radiographic or examinations that required treatment were explained to the patients and they were offered the choice between treatment at the UFSM dental clinics or their own choice of professional, with treatment costs borne by the patient.

Examinations were carried out using a dental probe and a number 5 oral mirror. Periapical X-rays were taken using the parallel technique with the aid of X-ray guides.

Patients did not undergo any type of therapeutic intervention during assessment and neither were they subjected to any type of risk. During all stages of the study, patients had access to the professionals in charge, in case they felt the need to clear up any doubts. The examiners were one postgraduate dentistry student, two undergraduate students and the lead researcher, all of whom had undergone training in order to standardize the clinical and radiographic analysis, observing the following items:

1. Presence/absence of the restored tooth;
2. Presence/absence of the crown restoration;
3. Presence/absence of the post/core;
4. Clinical condition of the root (fracture);
5. The type of restoration supported by the post/core;
6. The type of post
7. The date the post/cores cementation.

All clinical and radiographic findings were recorded and tabulated on a dedicated spreadsheet and underwent descriptive statistical analysis using STATA 9.0.

The outcome was defined as successful when restoration, post and core were in place, with no clinical or radiographic signs of periapical lesion, retention failure, root fracture or post/core fracture.

It was not possible to blind the examiners since they were required to undertake a clinical and radiographic assessment of the restorations according to the preestablished criteria for treatment success or failure.

RESULTS

The treatment success rate was 96.38%, since 80 of the 83 teeth investigated were still in place. All post/core restorations were still in place in the remaining 80 teeth. Two roots had been removed (exodontia) because of fracture. The other 80 roots were considered intact, despite one having been removed due to advanced periodontal disease (Table 3).

Table 3: Number and percentage of clinical findings, according to study protocol.

Variables	N	%
Tooth still in place	83	100
Yes	80	96.38
No	3	3.62
Restoration still in place		
Yes	80	96.38
No	3	3.62
Core/post still in place		
Yes	80	96.38
No	3	3.62
Clinical condition of root		
Intact	81	97.59
Fractured	2	2.41

Both root fractures occurred in restorations with a direct core and metal prefabricated post, cemented in 2001 or 2002. Precise survival time is unknown in either case since neither had been followed-up.

Fifty-eight (72.5%) of the 80 restorations still in place were metal-ceramic crowns and 22 (27.5%) were fixed partial denture - metallic ceramic pillars (Table 4).

Table 4: Distribution of single crown restorations and fixed bridges by mean survival time and restorative material used.

Survival (years)	MC single crown	FPD MC retainer
1 year	7	1
2 years	7	6
3 years	8	0
4 years	5	0
5 years	5	7
6 years	0	2
7 years	0	0
8 years	10	0
9 years	6	5
10 years	13	1
Total	61-3=58	22
Mean survival (SD)	5.68 years (3.28)	5 years (3.08)

SD: Standard deviation. The mean survival time for the single metal-ceramic restorations was 5.68 years (± 3.28), while for the metal-ceramic fixed bridges it was 7 years ($+2.67$).

Table 5: distribution of post types by mean survival:

Survival (years)	Prefabricated fiber post	Prefabricated metal post
1 year	7	2
2 years	13	2
3 years	8	0
4 years	5	0
5 years	5	7
6 years	0	2
7 years	0	0
8 years	2	8
9 years	7	5
10 years	5	7
11 years	0	0
Total	48-1= 47	35-2=33
Mean survival (SD)	4 years (3.15)	7 years (2.67)

SD: Standard deviation.

DISCUSSION

Prefabricated posts and direct cores are widely used, despite the lack of longitudinal clinical studies demonstrating that it is safe to include them in treatment plans.

Despite the limitations inherent to retrospective study designs and the methodological difficulties encountered during the study, it can still be stated that this research found valid and significant results, particularly taking into account the long follow-up period and the number of restorations assessed.

During the sample selection stage, several problems were encountered related to the information on patient records. Many were missing data or were out-of-date. This was allied to the fact that the population seen at these clinics has a high turnover, since it is made up in part of residents from suburban conurbations and other towns in the state. Students also played a part in reducing the sample size. Other factors involved in reducing the sample size were patient deaths and refusals to take part.

Some of the medical records did not provide sufficient information on the treatment used, which was also an exclusion criterion. This lack of robustness in the patient record system meant that it was not possible to evaluate the performance of different bonding systems or of certain other relevant clinical conditions such as presence of parafunction, periodontal disease, visible plaque index, signs of gingival bleeding and presence or absence of active caries.

It should also be pointed out that the treatments evaluated in this study were undertaken in undergraduate teaching clinics, by students with little experience, which, despite supervision by qualified professors, may have led to the omission of some technical detail of greater or lesser relevance²².

The success rate of 96.38% to 97.59% (Table 3) observed in this study justifies the safety and clinical applicability of this restorative technique for treating teeth endodontically

with direct cores and prefabricated posts. This has also been supported by other retrospective studies²³⁻²⁵. Fredriksson et al.¹⁸ found success rates of 98% for a two to three year period; Ferrari et al.¹⁶ observed that just 3.2% of restorations failed (1304 posts) over a period of 1 to 6 years, while Stefan & Werder²⁴ and Fredriksson et al.¹⁸ reported success rates of 91 to 100%, with losses primarily associated with retention failure.

On the other hand, randomized prospective clinical trials of 5 to years have returned results that are in line with those of this study, with success rates of around 90%²⁶.

Along with the 96.38% success rate for teeth restored over 10 years, a 97.59% rate of intact roots was also observed, since just two roots, both restored with metal prefabricated posts, were removed because of irreparable fracture. The only failure involving a fiber post did not involve fracture. In this case the tooth was removed because of advanced periodontal disease.

Nevertheless, the mean survival time of metal posts was greater than that for fiber posts, although it should be noted that the majority of the metal posts were fitted from eight to 10 years before assessment (Table 5) and the majority of the fiber posts have 5 years follow-up or less, which factor alone guarantees that the metal posts have a longer survival time.

The failures that occurred with metal posts may be related to the high modulus of elasticity (ME) that is characteristic of metal posts, despite their lesser intrinsic resistance^{1,7, 12-15,27}.

Despite the fact that Stefan and Werder²⁴ assessed zirconium oxide posts combined with vitroc ceramic cores (ME=210 GPa), their results were similar to those published by Fredriksson et al.¹⁸, who investigated fiber post with composite resin cores (ME=21 GPa), which is compatible with the majority of cases investigated in this study, and which suggests

that the theory relating the modulus of elasticity to clinical survival rates still lacks a foundation in clinical research.

It can be stated that there was no clinical evidence of fiber posts inducing or leading to the occurrence of root fractures or periodontal problems, indicating that fiber posts can be used in routine treatment with safety, predictability and a positive prognosis for a mean period of up to 6 years^{16,18, 19,27}.

With relation to Crown restorations, it is worth remembering that, with the intention of standardizing the sample, only single crowns and the pillars of metal-ceramic fixed bridges were evaluated in this study. The mean survival under function of 5.6 years (± 3.28) for the single restorations and 5.09 years (± 2.97) for fixed bridges are in line with the mean figures for direct post/cores (Tables 4 and 5).

It should also be taken into account that the mean survival times given in this study relate to the follow-up period assessed, varying from 1 to 10 years.

The similarity and length of the survival times for the two types of crown restoration investigated could lead to indicating both types of core. However, further studies involving variables such as the number of elements within the fixed bridge, the quantity and quality of remaining dental elements, periodontal support and occlusal factors should be undertaken in the hope of confirming this hypothesis.

CONCLUSIONS

Within the limits of the study design adopted, direct cores anchored on prefabricated posts demonstrated appropriate clinical performance with a mean survival in function of 6 years, together with 5.09 and 5.6 years for single restorations and pillars of metal-ceramic fixed bridges, respectively. These clinical survival figures for direct cores and metal-ceramic restorations suggest that this restorative technique could be an alternative to other conventional treatment strategies. However, the design characteristics limits the conclusive effects of the results and therefore mean that it is necessary for prospective clinical follow-up study is to be undertaken.

ACKNOWLEDGMENTS

The authors would like to thank the following undergraduate students who helped with organizing medical records and locating patients' addresses: Gabriel Dal Forno, Deise Osmari, Joana Pereira, Luisa Angonesi and Rafaela Trevisan. The authors are also grateful to DDS, MSc Chaiana Piovesan, DDS Luciane Noal, and DDS, MSc PhD Professor Thiago Machado Ardenghi for their incisive advice on statistical treatment of the data.

REFERENCES

1. Ferrari M, Grandini S, Simonetti M, Monticelli F, Goracci C. Influence of a microbrush on bonding fiber post into root canals under clinical conditions. *Oral Surg Oral Med Oral Pathol Oral Radiol* 2002;94:627-631.
2. Cardoso PE, Braga RR, Carrilho MR. Evaluation of micro-tensile, shear and tensile tests determining the bond strength of three adhesive systems. *Dent Mater* 1998;14:394-398.
3. Perel ML, Muroff FI. Clinical criteria for posts and cores. *J Prosthetic Dent* 1972;28:405-411.
4. Kantor ME, Pines MS. A comparative study of restorative techniques for pulpless teeth. *J Prosthet Dent* 1977;38:405-412.
5. Gelfand M, Goldman M, Sunderman EJ. Effect of complete veneer crowns on the compressive strength of endodontically treated posterior teeth. *J. Prosthet. Dent* 1984;52:635-638.
6. Cohen BI, Pagnillo MK, Newman I, Musikant BL, Deutsch AS. Retention of a core material supported by three post head designs. *J Prosthet Dent* 2000;83:624-628.
7. Maccari PC, Cosme DC, Oshima HM, Burnett HL, Shinkai RS. Fracture strength of endodontically treated teeth with flared root canals and restored with different post systems. *J Esthet Restor Dent*. 2007;19:30.
8. Mannocci, F.; Vichi, A.; Ferrari, M; watson, T.; davidson, C. L., Carbon Fiber posts : clinical and laboratory studies. In: Reconstructions with carbon fiber posts. Italy. p. 17-21, março 1998.
9. Caputo AA, Standlee JP. *Biomechanics in clinical dentistry*. 1st ed. Chicago: Quintessence Publishing, 1987:134.

10. Mannocci, F. Fiber posts: clinical and laboratory studies. In: Adhesion and reconstruction, in modern dentistry. Italy. p.16-19, março 1999.
11. Torbjörner A, Karlsson S, Odman PA. Survival rate and failure characteristics for two post designs, J Prosthetic Dent 1995;73:439-444.
12. Chang WC, Millstein PL. Effect of design of prefabricated post heads on core materials. J Prosthet Dent 1993;69:475-48213.
13. Deutsch AS, Musikant BL, Cavallari J, Lopley JB. Pre-fabricated dowels: a literature review. J Prosthet Dent 1983;49:498-503.
14. Vichi A, Grandini S, Ferrari M. Comparison between two clinical procedures for bonding fiber posts into a root canal: a microscopic investigation. J Endod 2002;28:355-360.
15. Asmussen E, Peutzfeldt A, Heitmann T. Stiffness, elastic limit, and strength of newer types of endodontic posts. J Dent 1999;27:275-278.
16. Ferrari M, Vichi A, Mannocci F, Mason PN. Retrospective study of the clinical performance of fiber posts. Am J Dent 2000;13(Spec No):9B-13B.
17. Naumann M, Blanckstein F, Dietrich T. Survival of glass fibre reinforced composite post restorations after 2 years - an observational clinical study. J Dent 2005;33:305-312.
18. Fredriksson M, Astbäck J, Pamenius M, Arvidson K. A retrospective study of 236 patients with teeth restored by carbon fiber reinforced epoxy resin posts. J Prosthet Dent 1998;80:151-157.
19. Grandini S, Goracci C, Tay FR, Grandini R, Ferrari M. Clinical evaluation of the use of fiber posts and direct resin restorations for endodontically treated teeth. Int J Prosthodont 2005;18:399-404.
20. Hedlund SO, Johansson NG, Sjögren G. A retrospective study of pre-fabricated carbon fibre root canals posts. J Oral Rehabil 2003;30:1036-1040.

21. Isidor F, Ödman, P, Brondum K. Intermittent loading of teeth restored using prefabricated carbon fiber posts. *Int J Prosthodont* 1996;9:131-136.
22. De Backer H, Van Maele G, De Moor N, Van den Berghe L, De Boever J. An 18-year retrospective survival study of full crowns with or without posts. *Int J Prosthodont* 2006;19:136-142.
23. 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;37:115-121.
24. Paul SJ, Werder P. Clinical success of zirconium oxide posts with resin composite or glass-ceramic cores in endodontically treated teeth: a 4 year retrospective study. *Int J Prosthodont* 2004;17:523-528.
25. Balkenhol M, Wöstmann B, Rein C, Ferger P. Survival time of cast post and cores: A 10-year retrospective study. *J Dent* 2007;35:50-58.
26. Nico HJC, Mentink AGM, Fokkinga WA, Kreulen CM. 5 year follow-up of a prospective clinical study on various types of core restorations. *Int J Prosthodont* 2005; 18:38-39.
27. Hatzikyriakos AH, Reisis GI, Tsingos N. A 3 year postoperative clinical evaluation of posts and cores beneath existing crowns. *J Prosthet Dent* 1992;67:454-458.

7. ANEXOS E APÊNDICES

APÊNDICE A : TERMO DE CONSENTIMENTO LIVRE E ESCLARECIDO

Acredito ter sido suficientemente informado a respeito das informações que li ou que foram lidas para mim, descrevendo o estudo “Avaliação clínica retrospectiva de pinos pré-fabricados cimentados nas clínicas de prótese dental da UFSM”.

Eu discuti com o Dr. Paulo Afonso Burmann sobre a minha decisão em participar nesse estudo. Ficaram claros para mim quais são os propósitos do estudo, os procedimentos a serem realizados, seus desconfortos e riscos, as garantias de confidencialidade e de esclarecimentos permanentes. Concordo voluntariamente em participar deste estudo e poderei retirar o meu consentimento a qualquer momento, antes ou durante o mesmo, sem penalidades ou prejuízo ou perda de qualquer benefício que eu possa ter adquirido, ou no meu atendimento nesta Instituição de Ensino.

Santa Maria, ____ de _____ de 2008.

Assinatura do sujeito de pesquisa/representante legal

Identidade nº:

APÊNDICE B : CORRESPONDÊNCIA PARA O PACIENTE

Prezado(a) Sr (a).!

Como Coordenador de projeto de pesquisa vinculado ao programa de Pós-graduação em Ciências Odontológicas, venho, juntamente com os estudantes do curso de graduação de Odontologia da Universidade Federal de Santa Maria (UFSM), Deise Osmari, Gabriel Frasson Dal Forno, Joanna Tatith Pereira, Luísa Garcia Angonesi, Rafaela Trevisan Correia e com o Cirurgião Dentista (Pós-graduando) Rodrigo Farcili Trindade, apresentar-lhe o convite para participar de uma pesquisa que usará exames dentários clínicos e radiografias dos dentes que foram tratados nas clínicas de Prótese Dentária da Odontologia da UFSM, onde ocorreu seu atendimento.

A pesquisa tem por objetivo avaliar o desempenho clínico das próteses cimentadas sobre núcleos com pinos pré-fabricados.

Caso o(a) Sr.(a) aceite participar da pesquisa, solicitamos a gentileza de comparecer à Clínica de Prótese Dentária da Odontologia da UFSM, a partir do dia 05 de maio, às segundas, quartas e quintas feiras pela manhã, das 8:00 às 11:00 horas (III andar) e às segundas, quartas e sextas à tarde, das 14:00 às 17:00 (VI andar), no antigo prédio da reitoria, à rua Marechal Floriano Peixoto, 1184 (centro de Santa Maria), trazendo consigo esta carta. Caso prefira marcar horário para o exame ou para quaisquer outras informações, colocamos os telefones 3220-9290 e 3220-9276 à sua disposição.

A sua participação na pesquisa é voluntária e não acarretará qualquer custo. Caso o (a) Sr.(a) aceite colaborar, fica desde já claro que a qualquer tempo poderá desistir desta participação sem qualquer prejuízo, constrangimento ou penalização.

As necessidades de tratamento, quando encontradas, serão encaminhadas para as clínicas da Universidade ou profissional da sua preferência.

Todos os procedimentos, incluindo o exame intra-bucal e as radiografias, serão conduzidos dentro das normas de biossegurança para garantir a máxima proteção de sua saúde.

Todos os dados coletados serão mantidos em segredo preservando-lhe de qualquer exposição.

Desde já agradecemos sua atenção e esperamos poder contar com sua participação, que será muito importante para o desenvolvimento de uma Odontologia mais segura e de melhor qualidade.

Respeitosamente, equipe do projeto.

Coordenador do Projeto: Prof. Tit. Dr. Paulo Afonso Burman

APÊNDICE C: TERMO DE CONFIDENCIALIDADE

Título do projeto: Avaliação Clínica Retrospectiva de pinos Pré-fabricados cimentados nas Clínicas de Prótese Dental da UFSM

Pesquisador responsável: Paulo Afonso Burmann

Instituição/Departamento: Departamento de Odontologia Restauradora –
Universidade Federal de Santa Maria (UFSM)

Telefone para contato: 55 32209-276 (9112-9029)

Local da coleta de dados: Clínica de Prótese Dental da UFSM (III andar do antigo prédio da reitoria)

Os pesquisadores do presente projeto se comprometem a preservar a privacidade dos pacientes cujos dados serão coletados em prontuários e através de exames clínicos e radiográficos, nas Clínicas de Prótese Dental da UFSM. Concordam, igualmente, que estas informações serão utilizadas única e exclusivamente para execução do presente projeto. As informações somente poderão ser divulgadas de forma anônima e serão mantidas no arquivo do Departamento de Odontologia Restauradora por um período de até 10 anos, sob a responsabilidade do (a) Sr. Paulo Afonso Burmann. Após este período, os dados serão destruídos.

Este projeto de pesquisa foi revisado e aprovado pelo Comitê de Ética em Pesquisa da UFSM em 11/09/2007, com o número do CAAE 0135.0.243.000-07.

Santa Maria,de maio, de 2008.

Prof. Paulo Afonso Burmann

CI: 9000511551 SSP/RS CRO: 5537

APÊNDICE D: FICHA DE EXAME CLÍNICO RADIOGRÁFICO

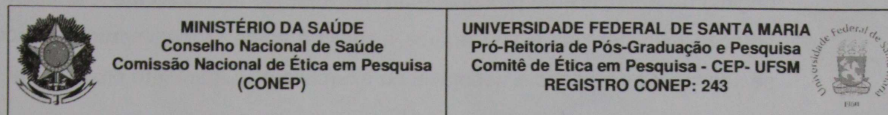
IDENTIFICAÇÃO

NOME:..... ENDEREÇO:.....
 TELEFONE (S):..... CONDIÇÃO SÓCIO-ECONÔMICA:.....

ACHADOS CLÍNICO/RADIOGRÁFICOS

DENTE RESTAURADO	AUSENTE PRESENTE		Razão da perda:.....														
	<input type="checkbox"/> <input type="checkbox"/>																
INTEGRIDADE RADICULAR	HÍGIDA		FRATURADA		CARIADA												
	<input type="checkbox"/> <input type="checkbox"/> SIM NÃO		<input type="checkbox"/> <input type="checkbox"/> SIM NÃO		<input type="checkbox"/> <input type="checkbox"/> SIM NÃO												
RESTAURAÇÃO	UNITÁRIA			PONTE FIXA													
	<table border="1"> <tr><td><input type="checkbox"/></td><td>Metálica</td></tr> <tr><td><input type="checkbox"/></td><td>MC</td></tr> <tr><td><input type="checkbox"/></td><td>RC</td></tr> <tr><td><input type="checkbox"/></td><td>RA</td></tr> </table>			<input type="checkbox"/>	Metálica	<input type="checkbox"/>	MC	<input type="checkbox"/>	RC	<input type="checkbox"/>	RA	<table border="1"> <tr><td><input type="checkbox"/></td><td>Metálica</td></tr> <tr><td><input type="checkbox"/></td><td>MC</td></tr> </table>			<input type="checkbox"/>	Metálica	<input type="checkbox"/>
<input type="checkbox"/>	Metálica																
<input type="checkbox"/>	MC																
<input type="checkbox"/>	RC																
<input type="checkbox"/>	RA																
<input type="checkbox"/>	Metálica																
<input type="checkbox"/>	MC																
CONDIÇÃO CLÍNICA DA RESTAURAÇÃO	ADAPTAÇÃO CERVICAL V		ADAPTAÇÃO CERVICAL L		INTEGRIDADE ANATÔMICA												
	<input type="checkbox"/> <input type="checkbox"/> SIM SIM NÃO		<input type="checkbox"/> <input type="checkbox"/> SIM NÃO		<input type="checkbox"/> <input type="checkbox"/> SIM NÃO												
RESTAURAÇÃO NÚCLEO PINO RAIZ	RESTAURAÇÃO PRESENTE	NÚCLEO PRESENTE		PINO PRESENTE		RAIZ FRATURADA											
	<input type="checkbox"/> <input type="checkbox"/> SIM NÃO	<input type="checkbox"/> <input type="checkbox"/> SIM NÃO		<input type="checkbox"/> <input type="checkbox"/> SIM NÃO		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 1/3 2/3 3/3											
PROCESSO PARAENDODÔNTICO	SIM NÃO			SINTOMÁTICO													
	<input type="checkbox"/> <input type="checkbox"/>			SIM NÃO <input type="checkbox"/> <input type="checkbox"/>													
ISG	LOCAL			GERAL													
	(+) (-) <input type="checkbox"/> <input type="checkbox"/>			(+) (-) <input type="checkbox"/> <input type="checkbox"/>													
PINO/RAIZ	<input type="checkbox"/>			2/3 <input type="checkbox"/>													
CIMENTO	ADESIVO		PINO		ISOL. ABSOLUTO												
					<input type="checkbox"/> <input type="checkbox"/> SIM NÃO												

ANEXO A: Autorização do comitê de ética em pesquisa da UFSM



CARTA DE APROVAÇÃO

O Comitê de Ética em Pesquisa – UFSM, reconhecido pela Comissão Nacional de Ética em Pesquisa – (CONEP/MS) analisou o protocolo de pesquisa:

Título: Avaliação clínica retrospectiva de pinos pré-fabricados cimentados nas clínicas de prótese dental da Universidade Federal de Santa Maria

Número do processo: 23081.012143/2007-91

CAAE (Certificado de Apresentação para Apreciação Ética): 0135.0.243.000-07

Pesquisador Responsável: Paulo Afonso Burmann

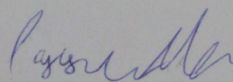
Este projeto foi APROVADO em seus aspectos éticos e metodológicos de acordo com as Diretrizes estabelecidas na Resolução 196/96 e complementares do Conselho Nacional de Saúde. Toda e qualquer alteração do Projeto, assim como os eventos adversos graves, deverão ser comunicados imediatamente a este Comitê. O pesquisador deve apresentar ao CEP:

Dez/2008 **Relatório parcial**
Jan/2009 **Relatório final**

Os membros do CEP-UFSM não participaram do processo de avaliação dos projetos onde constam como pesquisadores.

DATA DA REUNIÃO DE APROVAÇÃO: 11/09/2007

Santa Maria, 11 de setembro de 2007



Prof. Dr. Carlos Ernando da Silva
Coordenador do Comitê de Ética em Pesquisa – UFSM
Registro CONEP N. 243.

ANEXO B: AUTORIZAÇÃO DOS DIRIGENTES IMEDIATOS: DEPARTAMENTO DE ODONTOLOGIA RESTAURADORA E COORDENAÇÃO DO CURSO DE ODONTOLOGIA

Ilmo. Prof. Antônio Roberto Bisogno

MD. Chefe do Departamento de Odontologia Restauradora - CCS - UFSM

Prezado Professor!

Pelo presente, solicitamos sua autorização para a utilização da clínica de Prótese Dental, com o intuito de realizarmos a pesquisa “Avaliação clínica retrospectiva de pinos pré-fabricados cimentados nas clínicas de prótese dental da UFSM”. A pesquisa tem por objetivo avaliar o desempenho clínico das próteses cimentadas sobre núcleos com pinos pré-fabricados, feitas por estudantes de odontologia, sob supervisão de professores das disciplinas de Prótese Dental.

Considerando que para a seleção dos pacientes tratados nas clínicas referidas, necessitamos ter acesso aos seus prontuários, solicitamos, também, vossa autorização para o manuseio e coleta de informações a partir dos mesmos.

Os pacientes que foram submetidos a esse tratamento restaurador entre o período de Janeiro de 1998 e Julho de 2007 serão convidados, através de correspondência, a participar da pesquisa. Uma vez que aceitem o convite, passarão por exame clínico intra-bucal e radiográfico, sendo que todos os procedimentos somente serão executados mediante ao consentimento livre e esclarecido dos mesmos por escrito.

A participação dos pacientes é voluntária e estes não serão prejudicados caso desistam de colaborar com a pesquisa. Os procedimentos realizados não acarretarão nenhum custo e caso seja detectado alguma necessidade de tratamento, os pacientes receberão encaminhamento para as clínicas da Universidade ou profissional da sua preferência.

Qualquer informação obtida será tratada como confidencial e destinada somente para fins de pesquisa científica.

Na expectativa de vossa compreensão e apoio subscrevo-me.

Respeitosamente,

Prof. Tit. Paulo Afonso Burmann

Coordenador do projeto

O departamento de Odontologia Restauradora autoriza a utilização da Clínica de Prótese Dental e o acesso aos prontuários dos pacientes das disciplinas de Prótese Dental pelo projeto de pesquisa acima citado.

Chefe do Departamento de Odontologia Restauradora

Ilmo. Prof. Jorge Abel Flores
Coordenador do Curso de Odontologia
CCS - UFSM

Pelo presente informo que estou coordenando o projeto de pesquisa “Avaliação clínica retrospectiva de pinos pré-fabricados cimentados nas clínicas de prótese dental da UFSM”. A pesquisa tem por objetivo avaliar o desempenho clínico das próteses cimentadas sobre núcleos com pinos pré-fabricados, feitas por estudantes de odontologia, sob supervisão de professores das disciplinas de Prótese Dental.

Considerando que para a seleção dos pacientes tratados na Clínica Integrada III (Prótese) necessitamos ter acesso aos seus prontuários, solicitamos vossa autorização para o manuseio e coleta de informações a partir dos mesmos.

Os pacientes que foram submetidos a esse tratamento restaurador entre o período de Janeiro de 1998 e Julho de 2007 serão convidados, através de correspondência, a participar da pesquisa. Uma vez que aceitem o convite, passarão por exame clínico intra-bucal e radiográfico, sendo que todos os procedimentos somente serão executados mediante ao consentimento livre e esclarecido dos mesmos por escrito.

A participação dos pacientes é voluntária e estes não serão prejudicados caso desistam de colaborar com a pesquisa. Os procedimentos realizados não acarretarão nenhum custo e caso seja detectado alguma necessidade de tratamento, os pacientes receberão encaminhamento para as clínicas da Universidade ou profissional da sua preferência.

Qualquer informação obtida será tratada como confidencial e destinada somente para fins de pesquisa científica.

Na expectativa da vossa acolhida e atenção, subscrevo-me.

Respeitosamente,

Prof. Tit. Dr. Paulo Afonso Burmann
Coordenador do projeto

A Coordenação do Curso de Odontologia autoriza o acesso aos prontuários dos pacientes da Clínica Integrada III (Prótese) pelo projeto de pesquisa acima citado.

Coordenador do Curso de Odontologia