



Five-year of tooth-supported overdenture as prosthetic solution for elderly patients: A case series

Cristian Schuh^a, Jovito Adiel Skupien^b, Tatiana Pereira-Cenci^b, Noéli Boscato^b

Abstract

Purpose: This is a case series report with up to five-year follow-up of preservation of remaining teeth used as retentive attachments to support an overdenture.

Case Description: A valuable treatment to achieve immediate retention and stability was performed by using the patient's remaining teeth with root-retained attachments combined with an overdenture. All overdentures were considered successful at the 5-year follow-up.

Conclusion: Within the limitations of this case series, the use of short-coping and ball attachments to improve the retention and stability of overdentures is recommended. This treatment option is usually related to limited financial resources or to any health restraint.

Keywords: Overdenture; geriatric dentistry; elderly; precision attachment

^a Department of Prosthodontics, CEOM, Passo Fundo, RS, Brazil

^b Graduate Program in Dentistry, Federal University of Pelotas, Pelotas, RS, Brazil

Cinco anos de acompanhamento de overdenture dento-suportada como solução protética para pacientes idosos: Série de Casos

Resumo

Objetivo: O presente estudo é uma série de casos com 5 anos de acompanhamento de preservação de remanescente dental usado como retentor para suporte de *overdenture*.

Descrição do Caso: Um valioso tratamento para alcançar retenção e estabilidade imediata foi realizado utilizando remanescentes dentais com retentores radiculares combinados com *overdentures*. Todas *overdentures* foram consideradas satisfatórias ao final dos 5 anos.

Conclusão: Dentro das limitações desta série de casos, o uso de *copings* curtos e retentores do tipo "bola" para aumentar a retenção e estabilidade de *overdentures* é recomendada. Esta opção de tratamento é usualmente relacionada com recursos financeiros limitados ou nenhuma restrição de saúde.

Palavras-chave: Overdenture; odontologia geriátrica; idosos; encaixe de precisão

Correspondence:
Jovito Adiel Skupien
skupien.ja@gmail.com

Received: February 07, 2013
Accepted: November 15, 2013

Conflict of Interests: The authors state that there are no financial and personal conflicts of interest that could have inappropriately influenced their work.

Copyright: © 2014 Schuh et al.; licensee EDIPUCRS.

This work is licensed under a Creative Commons Attribution-NonCommercial 3.0 Unported (CC BY-NC 3.0).

ISSN: 1980-6523

Introduction

The use of natural teeth as overdenture abutments has become a realistic alternative to the extraction of remaining teeth over the past decades [1,2]. Overdentures support and/or retention are obtained using one or more teeth or roots, which are located above the denture's basal surface [3]. When manufacturing an overdenture, mechanical retainers may be used on a substructure; another option is the coverage of remaining roots with metal, which are also known as telescopic crowns, short-coping, long-coping, or attachment depending on the type of root coverage. The remaining teeth height will be determined by the analysis of the vertical dimension and teeth's vertical bone height [3,4].

Comparing various treatments within each other, implants may be described as the first choice in well selected patients [5,6], while it can be considered an aesthetic long-term treatment for elderly patients [7,8] and is not indicated for individuals with poor general health status.

However, it is economically inaccessible to numerous patients. In addition, it is important to highlight that in some cases, implant therapy cannot be performed immediately, requiring a temporary measure to replace the tooth until the healing process occurs (or implant's placement).

Although the concept of overdentures is not new, a conservative management of remaining dentition is the rationale for its application and should be preferred instead of total extraction [9,10]. Considering the treatment procedure, teeth that are to be used for the short-coping method to retain an overdenture should be reduced to a level of 1-2 mm above the gingival margin with copings with at least 4 mm in height, which will help to avoid overdenture's fracture. Thus, they are indicated for teeth with reasonable bone height, periodontal support and insufficient interocclusal distance. However, this treatment modality usually requires endodontic treatment and these represent lower retention when compared to other types of overdentures. Yet, this format allows an efficient plaque control and is applicable in almost all clinical cases [3,4].

When comparing coping formats, long-coping or attachments present improved retention and stability due to their height around 6 to 8 mm and are indicated for teeth with adequate bone and periodontal support and sufficient interocclusal distance. The increased coping height may jeopardize the treatment, as it requires that the teeth withstand lateral and torque forces, while prosthesis may fracture where interocclusal space are reduced [3]. This is why the definition of which coping to select is based on the interocclusal space comprehensive evaluation [3,11].

The aim of this report is to present a case series with up to five-year follow-up of preservation of remaining teeth used as retentive attachments (attachment-coping and short-coping) to support an overdenture and to provide a treatment modality for low income patients.

Methods

Patient population

Four elderly patients (3 men e 1 woman, mean age 66) who searched for treatment in the Meridional Study Centre, Uningá, Brazil, with an edentulous span and remaining teeth able to support an overdenture were selected to receive treatment with overdenture. A signed written informed consent form was obtained from all patients prior to commencement of the clinical treatment.

Clinical exams and diagnosis

During the examination, the patients related discomfort, lack of esthetics, retention, and poor masticatory function. Based on the examination, was observed an urgent need for rehabilitation of the maxillary and mandibular arches. Several treatment options were offered to the patient; based on the patient's low income and general health status, tooth-supported overdenture was selected. Radiographs and diagnostic casts were made.

During radiographic and clinical exam, periodontal health status of the remaining teeth was assessed. The remaining teeth should have at least one half of the root length embedded in alveolar bone without a pocket depth higher than 3 mm to allow a favourable crown-to-root ratio for an overdenture retained by short-copings (Fig. 1B, 3B (posterior) and 4B). If a tooth did not present this ratio, extraction was suggested and executed with the consent of the patient. The remaining teeth, with adequate bone and periodontal support and sufficient interocclusal distance, received teeth overdenture retained by ball attachments (Fig. 3B (anterior) and 2B).

Clinical procedures

The initial step was manufacturing wax rims replicating the arch form and occlusal plane at the patient's vertical and horizontal jaw relations in order to certify and evaluate if the interocclusal space was enough to carry out the proposed treatment.

Wax rims replicating the arch form and occlusal plane at the patient's vertical and horizontal jaw relations were made to evaluate if the interocclusal space was enough to carry out the proposed treatment.

The teeth included in the criteria above were submitted to endodontic therapy. Next, were reduced to a level 0.5-1.0 mm above the ridge and a bevelled finish line was placed all around the teeth. The root canals were prepared to receive the posts. Posts were first manufactured round shaped in acrylic resin (Duraley; Reliance Dental Mfg Co, Chicago, Ill) and casted in a Ni-Cr-Ti based metal (Tilite; Talladium Inc., Valencia, Calif). The short metallic copings and ball attachments were adjusted and cemented with zinc phosphate (LS; Vigodent, Rio de Janeiro, Brazil).

Overdentures manufacturing

Once the copings were cemented, the overdentures were manufactured. Initially, gypsum casts were obtained and

customized trays prepared with acrylic resin (Jet; Clássico Campo Limpo Paulista, Brazil). Border-moulded areas were impressed using a green modeling plastic impression compound (Impression Compound Sticks; Kerr Corp, Orange, Calif) followed by a secondary impression with a polysulfide *impression material* (Permalastic; Kerr Corp). Impressions were boxed and 5 mm of the border of the impression preserved. Definitive casts were poured with type III gypsum (Microstone; Whip Mix Corp, Louisville, Ky). A record base was prepared for the wax trial.

Wax rims were made replicating the arch form and occlusal plane at the patient's vertical and horizontal jaw relations. A face-bow and maxillomandibular relationship records were obtained to mount the rims in an articulator on definitive casts and teeth arranged. On the following appointment, wax rims with the mounted teeth were tested and evaluated for aesthetics, phonetics and occlusion. Artificial gingival colour (STG; Vipi Ind Com Exp Imp, Sao

Paulo, Brazil) was selected. The dentures were processed, polished and delivered.

The patients were instructed to comply with an oral self care programme including the use of fluoridated toothpaste and a recall schedule with regular checkups every 6 months. The recalls were performed to accomplish clinical and radiographic exams and to take patient satisfaction with the treatment made.

Results

An average of five-year follow-up was done. After clinical and radiographic analysis, any kind of repair procedure was necessary. All roots and copings remained in great condition. There were no reports of fractures on denture base, loss of retention and stability and the patients reported being very satisfied with the treatment. All overdentures were considered successful at the five-year follow-up (Fig. 1, 2, 3 and 4).



Fig. 1. Patient 1. A) Initial case; B) Intraoral view after five-years to begin the prosthetic rehabilitation with short coping cemented on remaining root; C) Intraoral view after overdenture instalation; D) Patient smile after five-years follow-up.



Fig. 2. Patient 2. A) Initial case; B) Intraoral view after five-years to begin the prosthetic rehabilitation with ball attachment cemented and posterior teeth used to improve stability; C) Close-up of the overdenture; D) Intraoral view after overdenture instalation.



Fig. 3. Patient 3. A) Initial case; B) Both types of retainers: for anterior - ball attachment - and for posterior - short coping; C) Close-up of the overdenture base; D) Intraoral view after five-years follow-up.



Fig. 4. Patient 4. A) Initial case; B) Intraoral view after five-years to begin the prosthetic rehabilitation with five short-coping cemented; C) Front view of cemented copings; D) Intraoral view after prosthetic rehabilitation.



Discussion

Despite the enhancement of support and stability, maintenance of strategically located teeth offers several advantages for the patients from biological and functional aspects. An overdenture diminishes the ridge's bone resorption around the teeth and adjacent areas, whereas maintains dental proprioception. In addition, even though the teeth are located inside the denture's basal area, maintenance of teeth leads to enhanced self-esteem and confidence in social life. From a psychological perspective, patient's own acceptance when wearing an overdenture is greater when compared to traditional complete dentures [10].

Adequate bone support, a 1:2 crown/root ratio and at least 5 mm of bone surrounding the root (confirmed by radiographs) allows the use of ball attachment [4,12]. However, if this ratio is not adequate, the use of short-copings may be indicated, leading to minimal stress caused by lateral forces during mastication and facilitating axial forces development. Thus, teeth with mobility may be used as retainers, without however, the need of additional attachments [3,4]. It is important to highlight that a correct mouth care regimen should be followed in patients with teeth/root supported overdentures, as treatment failures are attributed to poor oral hygiene and inadequate follow up care, leading to caries or periodontal disease [12-14].

Due to small height, the use of short-copings reduce the possibility of fracture of the overdenture base, when compared with higher coping, as telescopic crowns and attachments, as well the stress distribution in remaining teeth is lower in short-copings, especially in non-axial forces. Although a coping with higher height and attachments, may present greater stability and retention [11].

To preserve the health of overdenture abutment teeth, the patient was instructed to comply with an oral self care program that included the use of fluoridated toothpaste, remove plaque effectively and regular check-ups every six months [13,14]. Therefore, oral rehabilitation with root-supported overdentures is an effective treatment and may be indicated as a clinical alternative in patients with systemic disorders or economic reasons that could impair an implant-based rehabilitation.

Conclusions

Within the limitations of this case series, the use of short-coping and ball attachments to improve the retention and stability of overdentures is recommended. A regular maintenance program is recommended to prematurely prevent any problem. Further studies with a larger number of cases and with a control group are necessary, and long-term follow-up will provide more insight on the viability and security of this procedure.

References

1. Kalk W, van Rossum GM, Van Waas MA. Edentulism and preventive goals in the treatment of mutilated dentition. *Int Dent J* 1990;40:267-74.
2. Van Waas MA, Jonkman RE, Kalk W, Van 't Hof MA, Plooij J, Van Os JH. Differences two years after tooth extraction in mandibular bone reduction in patients treated with immediate overdentures or with immediate complete dentures. *J Dent Res* 1993;72:1001-4.
3. Basker RM, Harrison A, Ralph JP. Overdentures in general dental practice. Part 5 – the use of copings and attachments. *Br Dent J* 1983;155:9-13.
4. Zamikoff II. Overdentures - theory and technique. *J Am Dent Assoc* 1973;86:853-7.
5. Leblebicioglu B, Rawal S, Mariotti A. A review of the functional and esthetic requirements for dental implants. *J Am Dent Assoc* 2007;138:321-29.
6. De Rouck T, Collys K, Cosyn J. Immediate single-tooth implants in the anterior maxilla: a 1-year case cohort study on hard and soft tissue response. *J Clin Periodontol* 2008;35:649-57.
7. Norton MR. Biologic and mechanical stability of single-tooth implants: 4- to 7-year follow-up. *Clin Implant Dent Relat Res* 2001;3:214-20.
8. Tang CB, Ma JM, Tong X, Ding C, Li L. A clinical evaluation of implant dentures over 10 years. *Shanghai Kou Qiang Yi Xue* 2007;16:470-74.
9. Keltjens HM, Creugers TJ, van't Hof MA, Creugers NH. A 4-year clinical study on amalgam, resin composite and resin-modified glass ionomer cement restorations in overdenture abutments. *J Dent* 1999;27:551-55.
10. Scotti R, Melilli D, Pizzo G. Overdenture supported by natural teeth: analysis of clinical advantages. *Minerva Stomatol* 2003;52:201-10.
11. Dong J, Ikebe K, Gonda T, Nokubi T. Influence of abutment height on strain in a mandibular overdenture. *J Oral Rehabil* 2006;33:594-99.
12. Toolson LB, Smith D, Phillips C. A 2-year longitudinal study of overdenture patients. Part II: Assessment of the periodontal health of overdenture abutments. *J Prosthet Dent* 1982;47:4-11.
13. Brewer AA, Morrow RM. *Overdentures*. 2. ed. St. Louis: Mo: Mosby; 1980: 347.
14. Ettinger RL, Qian F. Abutment tooth loss in patients with overdentures. *J Am Dent Assoc* 2004;135:739-46.

