

# Mandibular Overdenture Retained by Telescopic Crowns and Ball Attachments on Semierupted Premolars

## Abstract

This clinical report describes the oral rehabilitation with a mandibular overdenture retained by telescopic crowns and ball attachments on semierupted permanent teeth with a 5-year follow-up. A female patient used an old complete denture in the maxilla and was willing to extract her remaining mandibular teeth to have new dentures. The treatment included preservation of semierupted premolars because of the high surgical risk for mandibular fracture and paresthesia, a new maxillary complete denture, and a mandibular overdenture supported by combined telescopic crowns and ball attachments. The prosthetic rehabilitation restored function and esthetics with high patient satisfaction after 5 years in function.

**Keywords:** Ball attachment, impacted teeth, overlay denture, overlay prosthesis, telescopic denture

## Introduction

Overdenture with attachments combines removable and fixed prostheses on remaining natural teeth or dental implants to improve retention, stability, biomechanics, esthetics, and patient's comfort.<sup>[1-4]</sup> Overdentures allow the restoration of lip support and facial profile, compensating for alveolar bone resorption, which often cannot be restored with fixed prostheses. On the other hand, overdentures are more expensive and technically complex than dental extractions and conventional complete dentures, but the maintenance of remaining teeth as retainers substantially reduce crestal bone loss over time.<sup>[2]</sup>

Different attachment systems, such as telescopic crowns, ERA or ball attachments, bar or magnetic clips, are used to retain overdentures.<sup>[1-5]</sup> Another option is the use of rigid telescopic crowns, which can offer good support, stability, and transmission of masticatory forces along the dental or implant retainers.<sup>[1]</sup>

This article reports an unusual case of oral rehabilitation with a mandibular overdenture retained by a combination of telescopic crowns and ball attachments on semierupted premolars with a 5-year follow-up.

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## Case Report

A 48-year-old female patient sought dental treatment at the outpatient prosthodontics clinic of the university dental school. She was wearing a conventional maxillary denture and had four remaining mandibular teeth (right second premolar, left canine, left first premolar, and left second premolar). Both second premolars were semierupted. A computed tomography scan showed that the semierupted premolar roots were in contact with basilar cortical bone, and the mandibular third molars were impacted [Figure 1].

The treatment plan included preservation of the remaining natural teeth, a new conventional complete denture for the edentulous maxilla, and a mandibular overdenture retained by telescopic crowns and ball attachments. The impacted third molars were left undisturbed as they had been asymptomatic for decades and the patient refused to have surgery.

All four erupted mandibular teeth received endodontic treatment. The root canals of semierupted premolars were prepared, and an impression was made with polyvinylsiloxane impression material of addition type (Express, 3M ESPE) for fabrication of ball attachment cast in nickel-chromium alloy (Dan Ceramalloy). Metal post and cores were modeled, cast,

**Elisa C. Knebel,  
Paulo C. A. Maccari,  
Rosemary S. A.  
Shinkai**

Department of  
Prosthodontics, Pontifical  
Catholic University of Rio  
Grande do Sul, Porto Alegre,  
RS, Brazil

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### Address for correspondence:

Prof. Rosemary S. A. Shinkai,  
Pontifical Catholic University  
of Rio Grande do Sul, Avenida  
Ipiranga, 6681 - Prédio 6,  
Porto Alegre, RS 90619-900,  
Brazil.

E-mail: rshinkai@puers.br

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and cemented with zinc phosphate cement on the left canine and first premolar. The metal cores were repaired, and an impression was taken to fabricate the outer crowns in nickel-chromium alloy. The outer crowns and ball attachments were adjusted, and a transfer impression was made.

Denture manufacturing followed a conventional protocol with a two-step impression technique, wax rim adjustments, intermaxillary relations recordings, and mounting on a semiadjustable articulator. The trial dentures with acrylic teeth (Vivadent, Ivoclar Vivadent) were approved clinically before final denture fabrication by a specialized laboratory.

The telescopic crowns and ball attachments were cemented (Rely X U200, 3M ESPE). Two resilient components (Servo-Dental GmbH and Co., pink cap) for ball diameter 2.5 mm and soft retention (removal force 8–9.5 N) were fixed into the overdenture. At prostheses delivery, the patient received detailed instructions for personal oral hygiene and recalls.

After 4 years, the patient was fully satisfied with the oral rehabilitation, and her oral tissues were in excellent condition [Figure 2]. The ball attachments had lost some retention, but the patient refused to adjust them due to financial constraints. After 5 years, the patient returned and reported discomfort in the right posterior mandibular region. A panoramic X-ray [Figure 3] showed that the right third molar should be extracted. The patient was referred to the oral surgery outpatient clinics. The overdenture and abutment teeth continued to function successfully.

## Discussion

Overdentures on natural teeth are less invasive and expensive than implant-supported prostheses<sup>[2]</sup> and are particularly useful for patients with severe dental misalignment and cleft palate.<sup>[4]</sup> Another advantage is that overdentures allow the restoration of lip support and facial profile, compensating for the volume lost by alveolar bone resorption, which often cannot be achieved with fixed prostheses.<sup>[4,6]</sup> In the present case, extraction of semierupted premolars was not recommended because of the high risk for mandibular fracture and paresthesia. Thus, the patient was treated with a new maxillary complete denture and a mandibular overdenture retained by telescopic crowns and ball attachments to restore esthetics, phonetics, and masticatory function.

The union of all the remaining teeth by an overdenture could distribute the transmission of the masticatory forces along the arch according to the support polygon. For overdenture retention, support, and stability, telescopic crowns were made for the left canine and first premolar, and stud ball attachments were placed over the semierupted second premolars. The telescopic crown walls determine the overdenture insertion axis, whereas retention results from the friction between dental and outer crowns. Conversely,

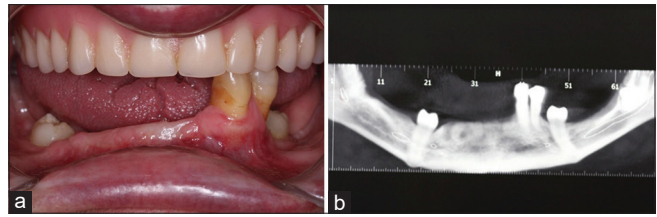


Figure 1: Initial situation: Patient's frontal view (a) Computed tomography coronal (b) View

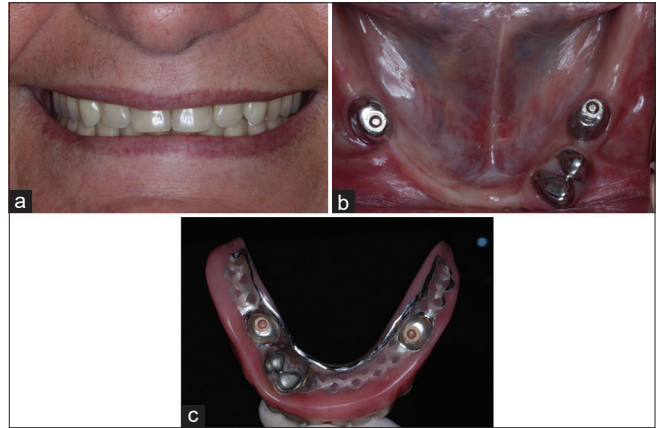


Figure 2: Four-year clinical follow-up: Frontal (a) and occlusal (b) Clinical views, and overdenture internal view (c)

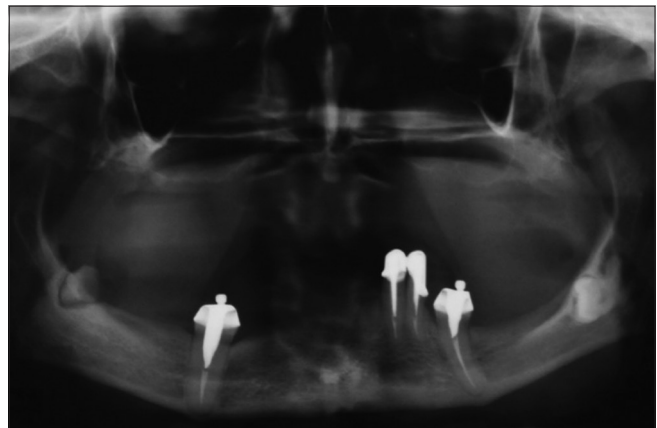


Figure 3: Panoramic radiograph at 5-year follow-up showing stable clinical conditions of abutment teeth and need for extraction of the right mandibular third molar

ball attachments can allow micromovement in multiple directions because of the resilient component. Therefore, the physiologic forces should be better distributed along the semi-impacted second premolars.

The replacement of the resilient component is frequent in cases where only ball attachments are used. In the follow-up, the patient refused to replace the resilient caps despite the professional recommendations and continue to wear her overdenture. The telescopic crowns probably reduced the wear of the pink cap functioning over the most distal retainers of the overdenture opposing a conventional complete denture. The combined biomechanical strengths

of the rigid telescopic crowns and resilient ball attachments probably reduced the wear of the resilient components functioning over the most distal retainers. Moreover, the retention loss may have decreased with the mucosa-borne support and opposing conventional denture.

The prostheses were functioning well after 5 years, with no biofilm accumulation around retainers, periodontal inflammation, or secondary caries, which are the main reasons for abutment loss.<sup>[5]</sup> This demonstrates that the patient was fully compliant with the necessary oral hygiene, which is vital for the treatment success. The patient could remove the overdenture and brush the intraoral retainers and prosthesis directly, facilitating the daily oral hygiene and prosthesis maintenance.<sup>[1-4,6]</sup>

### **Conclusion**

In summary, the mandibular overdenture retained by telescopic crowns and ball attachments on semierupted teeth restored esthetics and function for a reasonable cost and with full patient satisfaction over 5 years.

### **Declaration of patient consent**

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given her consent for her images and other clinical information to be reported in the journal. The patient understands that name and initials will not be published and due efforts

will be made to conceal identity, but anonymity cannot be guaranteed.

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Nil.

### **Conflicts of interest**

There are no conflicts of interest.

### **References**

1. Wenz HJ, Lehmann KM. A telescopic crown concept for the restoration of the partially edentulous arch: The Marburg double crown system. *Int J Prosthodont* 1998;11:541-50.
2. Carlsson GE. Implant and root supported overdentures – A literature review and some data on bone loss in edentulous jaws. *J Adv Prosthodont* 2014;6:245-52.
3. Chhabra A, Chhabra N, Jain A, Kabi D. Overdenture prostheses with metal copings: A retrospective analysis of survival and prosthodontic complications. *J Prosthodont* 2019;28:876-82.
4. Palmeiro MR, Piffer CS, Brunetto VM, Maccari PC, Shinkai RS. Maxillary rehabilitation using a removable partial denture with attachments in a cleft lip and palate patient: A clinical report. *J Prosthodont* 2015;24:250-3.
5. Mercouriadis-Howald A, Rollier N, Tada S, McKenna G, Igarashi K, Schimmel M. Loss of natural abutment teeth with cast copings retaining overdentures: A systematic review and meta-analysis. *J Prosthodont Res* 2018;62:407-15.
6. Breitman JB, Nakamura S, Freedman AL, Yalisove IL. Telescopic retainers: An old or new solution? A second chance to have normal dental function. *J Prosthodont* 2012;21:79-83.