

## Prosthodontic Rehabilitation using Attachment Retained Overdenture- Case Reports

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**Abstract:** The choice of a suitable prosthesis for a specific case is determined to a great extent by the number, position and salvageability of the existing teeth as well as the mucosa and underlying residual bone. Also of significance are the expectations and demands of the patient from the prosthesis. Treating a patient with a long span partially edentulous situation can be challenging especially when multiple teeth are missing. Successful restoration of such situation can be done with various conventional and contemporary treatment options. One such treatment modality is attachment-retained over denture. Precision attachments play an important role in dentistry by offering excellent means of retaining a prosthesis. However, there are many factors which need to be considered before undertaking the treatment. An accurate case selection is of paramount importance. This article describes prosthetic rehabilitation of patients with complete denture having an extra coronal castable precision attachment (Rhein attachments) attached to the abutment crowns.

**Keywords:** Castable, Impression technique, Overdenture, Precision attachment

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### I. Introduction

Successful prosthetic rehabilitation requires careful case selection and meticulous treatment planning. Rehabilitation of partially edentulous arch can be challenging when it is a distal extension situation or long edentulous span.[8]. Considering the number of partially or completely edentulous patients, various types of treatment may be indicated, including conventional complete denture and both tooth-supported and implant-supported overdenture. Overdenture increases the retention, stability and support improves the masticatory efficiency, preserves the alveolar bone and muscular patterns.[9] and preserves sensory receptors within periodontal ligament which increases manipulative skills in handling the denture.[1] Implants are always the first choice of treatment in distal extension situation or long edentulous span, but sometimes it is not feasible due to insufficient amount of bone and economic reasons. So, in such situations an acrylic partial denture or a cast partial denture is preferred.

Tooth-supported overdenture can be retained with attachments which improves both retention and stability while simultaneously reducing alveolar bone resorption. They may also be cost-effective and maintain more dental proprioception than implant supported overdenture. Precision attachment is a connector consisting of two or more parts. One part is connected to a root, tooth, or implant and the other part to prosthesis. Precision attachments can be classified into four main groups[10]: 1. Intra-crown attachments, 2. Extra coronal attachments, 3. Stud attachments and 4. Bar attachments. The selection of the most appropriate system depends on the number, distance, and location of the remaining natural teeth.[2] Among the attachments, the ball attachment system is considered an appropriate resilient mechanical attachment. Attachment selection should be determined after the analysis of the occlusal vertical dimension and each tooth's vertical bone height.[3,4] However, excellent home oral health care with professional assistance is needed to prevent failures.

### II. Case Report

A 56-year-old male patient came to the Department of Prosthodontics, College of dentistry, Indore with chief complaint of multiple missing teeth and inability to chew the food. His medical history was not significant. On oral examination several teeth were missing (Fig.1,2) . For evaluation orthopantomogram was taken (Fig.3). Irreversible hydrocolloid impressions (Algitex, Dental Products of India, Mumbai, India) were made and cast was poured with type III dental stone (Kalstone; Kalabhai Industries, Mumbai, India). Casts were mounted on articulator for diagnostic study and at the anticipated vertical dimension jaw relation was done which showed that there was sufficient interocclusal space for attachments. Thus the treatment plan includes extraction of teeth which didn't have favourable crown root ratio and fabrication of tooth retained overdenture using 33 and 43 as abutments for attachments.

After root canal treatment, the abutments were reduced to 0.5 to 1.0 mm above the gingival level, and the preparation was rounded to a dome-shaped contour (Fig.4). Posts (Rhein 83 castable pivot of 9mm length and sphere of normal size 2.5 mm diameter OTCAP SYSTEM) ( Fig.5) were selected and the canals in those teeth were prepared for optimum post length . The preservation of the teeth to be used as retentive attachments to support an overdenture is an effective procedure when implant therapy is not performed. The impression of

the prepared tooth was taken using irreversible hydrocolloid (Algitex, Dental Products of India, Mumbai, India). Once the pattern was fabricated on the cast it was then attached to the castable pivot and sphere on the patient and the pattern was modified as per the canal configuration using inlay wax (Fig.6). The sprue was attached on the lingual side and they were casted and finished.

Simultaneously the primary and secondary impressions were taken and jaw relation was done. Teeth setting and try in was done and the lower complete denture and upper removable denture were acrylicised and finished. The casted attachment was then cemented using glass ionomer cement (HY-BOND GLASIONOMER, Shofu, Japan) (Fig.7).

Using direct technique the housings were picked up in the intaglio surface of the denture. The housings were seated on the sphere of the cemented attachments (Fig.8). The periphery margins of the housings were sealed using utility wax to restrict the flow of resin between the sphere and the housing. The denture was relieved sufficiently and the utility wax was used to block out the undercuts and were checked and verified on the patient. Light pink color and clear acrylic resin (DPI-RR Cold Cure, Dental Products of India, Mumbai, India) was used in 1:1 ratio and mixed, at the dough stage it was loaded on the denture and was positioned in the maximum intercuspal position. After complete polymerisation the denture was removed and now the housings are a part of the denture (Fig.9). Voids and irregularities were filled with additional autopolymerizing acrylic resin and the overdenture was then cleaned, polished, and reinserted (Fig.10).

The patient was instructed to comply with an oral hygiene program that included the use of fluoridated toothpaste and a 6-month recall schedule.

A second case was done using the same attachment system but with an indirect impression technique for 40 year old patient with multiple missing teeth in mandibular arch and planned for overdenture using 33 and 43 as abutments (Fig.11). The abutments were reduced and post space preparation was done. Following post space preparation impression of the canal was taken with the prepared tooth using acrylic posts with retention at their coronal ends (Fig.12).

The impression (Fig.13) was poured with die stone (Kalstone; Kalabhai Industries, Mumbai, India) and castable pivot, attached with castable sphere was placed in canal and coping was fabricated on the die (Fig.14), casted and cemented on the patient (Fig.15). The remaining steps were followed as per the previous case report. The patient was happy with the treatment (Fig.16).

Both the patients were satisfied at subsequent follow up. 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-up every six months.

### **III. Discussion**

The edentulous state disturbs the integrity of the masticatory system with adverse functional, esthetic and psychological sequelae.[11] An overdenture diminishes the bone resorption of ridge around the teeth and the adjacent areas, where as maintaining dental proprioception. From a psychological perspective patient's own acceptance when wearing an overdenture is greater than when compared to traditional complete denture.<sup>[9]</sup> 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.[4,6] There is wide range of attachments available to use in different situations. The abutment selection also plays a vital role in the prognosis of overdentures. Amongst anteriors, canines are the most important proprioceptive organs, the shape and strategic position and the larger periodontal attachment area make them ideal abutments.[9] Retained roots primarily help in retention and positional orientation of the prosthesis, so the attachments should be precisely oriented to the copings and denture base during casting. When the teeth are devitalised and used as secondary abutments the occlusal forces are transmitted as tensile load to the underlying bone by the periodontal fibres which is conducive to bone repair and reduces or delays resorption of alveolar bone.[12] Both retention and parallelism increase the attachment's longevity and prevent premature failure of the overdenture.

The RHEIN 83 OT CAP attachments system used in the case discussed is extra coronal castable attachment. The castable OT CAP male can be easily casted together with the crowns during wax-up stage avoiding complicated adaptation procedures like welding a metal attachment after casting of crowns. The male component design is sphere with a flat head and female component is retentive silicon cap which is colour coded according to different retentive properties.[7]

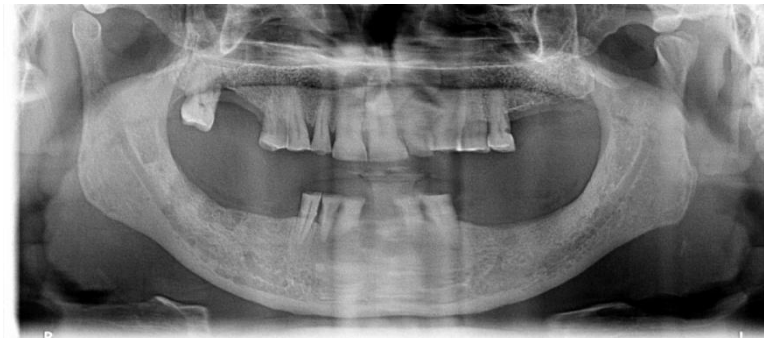
**IV. Figures And Tables**



**Fig. 1** Intraoral picture showing maxillary teeth of the patient (Case-1)



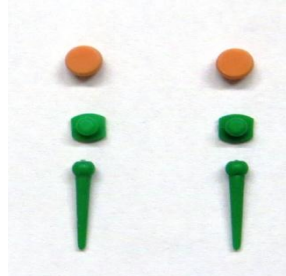
**Fig. 2** Intraoral picture showing mandibular teeth of the patient (Case-1)



**Fig. 3** Diagnostic orthopantomogram of the patient (Case-1)



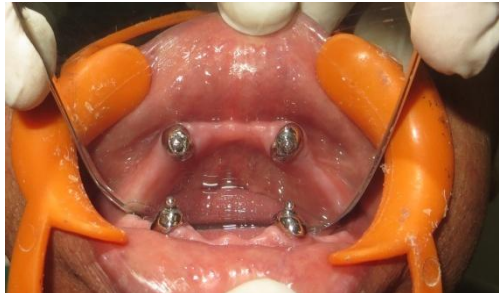
**Fig. 4** Prepared Abutment for Precision Attachments (Case-1)



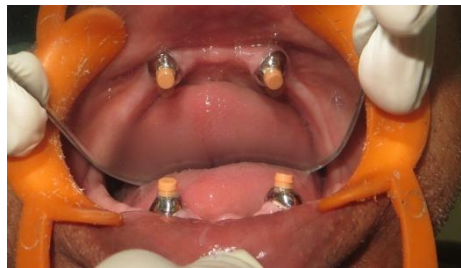
**Fig. 5** Castable Precision Attachment (Rhein 83 attachments)



**Fig. 6** Precision Attachment with coping tried on patient (Direct technique) (Case-1)



**Fig. 7** Casted Precision attachments with coping cemented on Abutment (Case-1)



**Fig. 8** Housing on attachments for direct pick up (Case-1)



**Fig. 9** Intaglio surface of the denture showing housings (Case-1)



**Fig. 10** Rehabilitated patient (Case-1)



**Fig. 11** Picture showing Pre- op condition (Case-2)



**Fig. 12** Acrylic posts for indirect impression technique (Case-2)



**Fig. 13** Impression with acrylic posts (Case-2)



**Fig. 14** Wax pattern fabricated on the cast (Case-2)



**Fig. 15** Casted Precision attachments with coping cemented on abutment (Case-2)



**Fig. 16** Rehabilitated patient (Case-2)

## V. Conclusion

Therefore, oral rehabilitation with root supported overdenture is an effective treatment modality and may be indicated as a clinical alternative in patients with systemic disorders or economic reasons that would impair an implant based rehabilitation. The results are excellent if appropriate case selection is done and proper hygiene instructions are followed by the patient.

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**Legends**

- Fig.1** Intraoral picture showing maxillary teeth of the patient (Case-1)  
**Fig.2** Intraoral picture showing mandibular teeth of the patient (Case-1)  
**Fig.3** Diagnostic orthopantomogram of the patient (Case-1)  
**Fig.4** Prepared Abutment for Precision Attachments (Case-1)  
**Fig.5** Castable Precision Attachment (Rhein 83 attachments)  
**Fig.6** Precision Attachment with coping tried on patient (Direct technique) (Case-1)  
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