



PROSTHODONTIC REHABILITATION USING RHEIN BALL ATTACHMENT SYSTEM - A CASE REPORT

Dental Science

Dr Rakshit BM

Assistant Professor, Department of prosthodontics, Crown bridge and implantology AME's Dental College and Hospital, Raichur.

Dr Sunil Dhaded

Professor and Head of Department, Department of prosthodontics, crown bridge and implantology, AME's Dental College and Hospital, Raichur.

ABSTRACT

Overdenture has been a proven mainstay of conservative prosthodontic treatment when proper diagnosis, treatment planning, and most importantly, patient compliance are achieved. Despite recent developments in dental implantology, the conservative approach to root preservation followed by an overdenture is still valid. Conventional complete dentures can cause functional and para-functional occlusal forces that can resorb the underlying bone. Roots under the over denture base preserve the alveolar ridge, provide sensory feedback and improve the stability of the dentures. Furthermore, the use of copings and precision attachments on the remaining teeth enhances the retention of the denture. This clinical report describes a method of fabricating a tooth supported overdenture retained with an extra coronal castable precision ball attachment system (rhein attachments). Which is a simple and cost effective alternative treatment for enhancing the retention of tooth supported overdentures.

KEYWORDS

Overdenture, precision, rhein attachments

INTRODUCTION :

According to DeVan "Perpetual preservation of what remains is more important than the meticulous replacement of what's missing¹. In conventional complete denture wearers, it is mostly observed that there is a progressive loss of residual alveolar bone due to the transfer of all occlusal forces from the teeth to the oral mucosa². Overdenture may be a favored treatment modality for elderly patients with few remaining teeth. Roots maintained under the denture base preserve the gum ridge, provide sensory feedback³ and improve the steadiness of the dentures. Furthermore, the utilization of copings and precision attachments on the remaining teeth enhances the retention of the denture⁴.

The presence of a healthy periodontal ligament maintains alveolar ridge morphology, whereas a diseased periodontal ligament, or its absence, is associated with a variable but the inevitable time-dependent reduction in residual ridge dimensions⁵. Restored retained abutments teeth are frequently endodontically prepared and used as abutments for an over-denture. The objective is to distribute stress concentration through retained abutments and denture-supporting soft tissues^{6,7}.

Tooth-supported overdenture are often retained with attachments that improve both retention and stability while simultaneously reducing alveolar bone resorption. They may even be cost-effective and maintain more dental proprioception than implant-supported overdenture. Precision attachment may be a connector consisting of two or more parts⁸. One part is connected to a root, tooth, or implant and therefore the other part to the prosthesis. Precision attachments can be classified into four main groups: 1. intracoronal 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 teeth⁹.

Among the attachments, the ball attachment system is taken into account as 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^{4,10}. However, excellent home oral health care with professional assistance is required to stop failures.

This article describes prosthetic rehabilitation of the patient with mandibular overdenture having an extra coronal castable precision attachment (rhein attachments) attached to the abutment crowns¹¹.

Case Report

A 57-year-old male patient reported to the Department of Prosthodontics and Crown & Bridge, with a chief complaint of multiple missing teeth and inability to chew the food. His medical history was not significant. On intraoral examination revealed complete edentulous upper arch and several missing lower teeth except 33 and 43,44,45. (Fig.1 & Fig.2)

The different treatment options for prosthetic rehabilitation were given to the patient- 1) Extraction of remaining teeth followed by conventional complete dentures; 2) Implant retained prosthesis, OR 3) Retaining the remaining teeth for tooth-supported overdentures. The patient did not choose an implant-retained prosthesis due to additional surgical procedures and expenditures. Thus it was planned to retain the remaining natural teeth and fabricate a tooth-supported overdenture with extra coronal ball attachments.

The approximate vertical dimension of occlusion is determined by fabricating the preliminary casts with wax rims. The interarch space can be assessed with the help of diagnostic articulation and it was found to be adequate interocclusal space for attachments. Thus the treatment plan includes fabrication of tooth retained overdenture using 33 and 43 as abutments for attachments and 44, 45 with metal copings.

After root canal treatment (Fig.2), 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. Posts (Rhein 83 castable pivot of 9mm length and sphere of normal size 2.5 mm diameter OTCAP SYSTEM) were selected and the canals in those teeth were prepared for optimum post length (Fig.5). 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 and castable pivots were picked using elastomeric impression material and the cast was poured with die stone. Once the pattern was fabricated on the cast it was then attached to the castable pivot (Fig.4) and sphere on the patient and the pattern was modified as per the canal configuration using inlay wax. 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 further acrylicled and finished. The casted attachment was then cemented using glass ionomer cement.(Fig.5)

Using a 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.5) 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 was checked and verified on the patient. Cold cure acrylic resin was used, at the dough stage, it was loaded on the denture and was positioned in the maximum intercuspal position. After complete polymerization, the denture was removed and now the housings are a part of the denture(Fig.6) Voids and irregularities were filled with additional auto polymerizing acrylic resin and the overdenture was then cleaned, polished, and reinserted.

The patient was instructed to comply with an oral hygiene program and Post insertion instructions were given With a 6-month recall schedule.



Fig. 1 Intraoral View Showing Edentulous Maxillary Arch



Fig. 2 Endodontically Treated Mandibular Remaining Teeth



Fig. 3 Tooth Preparation Done On 33 And 43,44,45



Fig.4 Wax Pattern Fabricated On The Cast



Fig.5 Casted Precision Attachments With Coping Cemented On Abutment & Housing On Attachments For Direct Pick Up



Fig.6 Acrylised Lower Denture With Housings

DISCUSSION:

Fabrication of tooth-supported overdenture is a step in the direction of preventive prosthodontics¹². The residual ridge reduction with reduced dexterity at advanced age impairs the adaptation to denture prosthesis². The obvious way to prevent denture problems is to save the natural teeth to give prosthesis or retain them to give a tooth-supported overdenture with added benefits of enhanced retention and stability of the prosthesis, patient proprioception, maintain the integrity of the remaining alveolar bone and improve patient satisfaction⁶. The two most vital factors for the success of the overdenture are the proper selection of the patient and establishing the careful mode of treatment which will satisfy both the patient and therefore the dentist. According to Zarb et al, the advantages of overdentures include retention and stability especially the mandibular dentures¹³.

According to Robert L De franco tooth supported overdenture accomplishes three important goals. It maintains the abutment as a neighborhood of the residual ridge which successively provides more support than a standard complete denture². When the teeth are retained, alveolar bone integrity is maintained as they support the alveolar bone. However when teeth are removed alveolar bone resorption process begins. With the preservation of the teeth, there's also the preservation of the periodontal membrane and this successively preserves proprioceptive impulses leading to better occlusal awareness, biting forces, and consequent neuromuscular control. Rissin et al. in 1978 compared masticatory performance in patients with natural dentition, complete denture, and overdenture. They found that the over-denture patients had a chewing efficiency one-third higher than the complete denture patients¹⁴. Additional retention also can be provided in overdenture with help of varied attachment systems available counting on the wants of the clinical case thus adding to improved patient acceptability.

In this present case report, we used RHEIN 83 OT CAP attachments system for overdenture which was less time-consuming and cost-

effective for the patient. This system allows for selective placement of the retention sphere on the root surface and control of retention through the size of the retention sphere¹¹. The castable OT CAP male is often easily casted alongside the crowns during the wax-up stage avoiding complicated adaptation procedures like welding a metal attachment after casting of crowns. The male component design is a sphere with a flat head and the feminine component is a retentive silicon cap which is colour-coded consistent with different retentive properties.

CONCLUSION:

Tooth-supported overdentures are still an excellent and economic therapeutic concept. In cases of partially edentulous patients, giving a traditional removable partial denture further degrades the prognosis of present teeth. Whereas planning the overdenture improves the crown root ratio of present teeth, improves proprioception, decreases the bone resorption, and increases the retention as well. Thus it can be considered as a reliable alternative option to total edentulism as well as dental implant surgery for prosthetic rehabilitation.

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