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**Harsh Patel**

M.D.S. (Prosthodontics),  
Senior Resident, G.M.E.R.S.  
Medical College Sola, Ahmedabad,  
Gujarat, India.

**Kavan Patel**

M.D.S. (Prosthodontics),  
Senior Lecturer, Narsinhbhai  
Patel Dental College and Hospital,  
Visnagar, Gujarat, India.

**Srushti Thummer**

B.D.S. Pacific Dental College and  
Hospital, Udaipur, Rajasthan,  
India.

**Ruchita K. Patel**

B.D.S. Karnavati School of  
Dentistry, Uvarsad, Gujarat,  
India.

**Correspondence**

**Harsh Patel**

M.D.S. (Prosthodontics),  
Senior Resident, G.M.E.R.S.  
Medical College Sola,  
Ahmedabad, Gujarat, India.

## Use of precision attachment and cast partial denture for long-span partially edentulous mouth - A case report

**Harsh Patel, Kavan Patel, Srushti Thummer, Ruchita K. Patel**

**Abstract**

The awareness and demand for quality of dental treatment is relatively increasing in recent generation and more so, as far as aesthetics are concerned, along with other functions of the prosthesis. In treating partially edentulous mouth, it requires more attention, principally for esthetics, in design. While achieving the goal, the components which are incorporated in removable partial denture may result in unsightly appearance.

**Case Description:** An 58 year old patient reported to the department for replacement of his missing teeth for which a conventional mandibular denture and maxillary removable partial denture with precision attachments. Extracoronar resilient attachment was planned to re-claim support and thereby regainment of lost esthetics.

**Conclusion:** Retention achieved with lost esthetics.

**Clinical Significance:** Use of precision attachment has amplified the aspects of retention and particularly, esthetics when compared to conventional removable partial dentures.

**Keywords:** Precision Attachment, cast partial denture, partial edentulism, retention.

### 1. Introduction

Prosthetic rehabilitation of partially edentulous mouth involves diverse techniques for specific patients. Considerations regarding patient's concern and desires for esthetics, the state of remaining teeth, and anatomical relationships of tissues must be evaluated. Whatever treatment is planned, the final planning must offer the best solution suited to an individual patient rather than a solution which will be more contented for the operator. Treatment options available in the replacement of partially missing teeth includes Overdentures, Clasp retained removable partial dentures, Removable partial dentures with precision attachments and implants usage.

A removable partial denture with a retained attachment system is one of the treatment modalities which may assist a prosthodontist to achieve better functions and aesthetics in substituting missing teeth and oral structures. An attachment is defined as "A mechanical device for the fixation, retention and stabilization of a prosthesis".<sup>[1]</sup> It's a connector consisting of two parts, one part is connected to a root, tooth or implant and the other part to a prosthesis. Mensor (1971)<sup>[9]</sup> has classified attachments as intra-coronar, extra-coronar, push-button type, bar type and auxiliary type. They are also classified as solid or rigid, with or without a U pin or screw and based on resiliency (vertical, hinge, rotatory type)<sup>[2]</sup>.

Selection Criteria is Based upon Location, Function, Retention, Space and Economy. Depending on the *Location*, intra-coronar, extra-coronar, radicular/intraradicular stud type and bar type could be used. *Intra-coronar* type, as designed by Herman Chayes in 1906, consisted two parts, a slot (female) and a flange (male)<sup>[3]</sup>. The flange is connected to the removable prosthesis which fits into the slot embedded in a fixed restoration. Advantages being as occlusal forces which are close to the long axis of the tooth and better esthetics as attachment is within the crown of the abutment tooth; But also disadvantageous as it is not always possible to create box preparation for female element in every case. Radicular / intraradicular stud type composed of a projection soldered to a post-type crown and a corresponding female receptacle that is embedded in an overlay type of denture prosthesis.

Advantages being promote better oral hygiene, crown-root ratio is enhanced with the low profile of stud attachment. Bar type involves of a bar spanning an edentulous area that splints the existing teeth together. The bar is then used to support a denture prosthesis that houses matching, prefabricated sleeves. It Benefits as splinting of abutments for mutual support and may allow conversion to a stud type attachment. But hindrance would be food entrapment, blanching of tissue and tissue proliferation. Extra-coronal types have most of their mechanism outside of the diameter of abutment restoration. In most types, a projecting receptacle is soldered to the crown, and a corresponding fitting or housing is incorporated in the removable prosthesis. With this type of attachment, there is usually a certain amount of movement between the two sections of the prosthesis however it can maintain normal tooth contour and requires minimal tooth reduction and thus less possibility of devitalizing the tooth<sup>[4]</sup>.

It is important to differentiate between solid and resilient type of restoration. Abutment or tooth supported restorations are considered solid, where abutment or tooth and tissue supported restorations are considered resilient and therefore are classified as with or without locks. Cost is always a factor, however, it should be the last consideration. It is less expensive in long-term to utilize a more expensive attachment with a low maintenance factor than a low cost attachment with a high maintenance factor. Cost is directly related to the type and material of attachment selected.

The condition explained, demands the same and hence extracoronal attachment was used along with cast partial denture for maxillary arch and conventional complete denture for mandibular arch. So, the purpose of this report is to present a technique which is a more effective approach utilizing precision attachment in rehabilitating partially edentulous patient.

## 2. Case report

A 58 year old male patient reported to the department with a chief complaint of missing all teeth in the lower jaw and some missing front and back teeth on either side of the upper jaw and wishes to replace the same. On clinical examination 13, 14, 23, 24, 25 were present (fig. 1, 2). As only few teeth were present and they were periodontally sound, so we were certain to retain the remaining teeth and with the help of these teeth, treatment planned was attachment retained removable partial denture for the maxillary arch and conventional complete denture for mandibular arch. An informed and written consent was obtained from the patient prior to begin the treatment.



Fig 1: pre-operative photograph



Fig 2: intra-oral picture

## 3. Treatment

Primary impressions, with Impression compound (DPI Pinnacle, The Bombay Burmah Trading Corporation, Mumbai, India) for mandibular arch and with alginate (chromalgin, Dentsply, Gurgaon, India) for maxillary arch were made and then conventional border molding procedure using low fusing impression compound (DPI Pinnacle Tracing Sticks, The Bombay Burmah Trading Corporation, Mumbai, India) and definitive impression were recorded for mandibular arch with zinc oxide eugenol impression paste and dual impression procedure for recording maxillary arch. Later, Jaw Relation record was established in the usual manner, casts were mounted on semi-adjustable articulator with the help of face-bow records, teeth arrangement were done and maxillary treatment partial denture and mandibular conventional complete denture were fabricated and inserted (fig. 3). The mandibular denture was used as a guide to establish maxillary occlusal plane in the fabrication of more definitive maxillary prosthesis.



Fig 3: mandibular conventional complete denture and maxillary treatment partial denture.

Based on the selection criteria, attachment system selected was extracoronal, resilient (OT CAP, rhein 83 inc, USA) for complete crown.

Tooth preparation was performed for porcelain fused to metal and occlusal clearance was assessed by keeping mandibular denture in position. Final impression of the prepared tooth made with Polyvinylsiloxane impression material using dual impression procedure and then poured with die stone (Neel Kanth, Udaipur).

Irreversible hydrocolloid impression of mandibular arch with mandibular denture in place was made and poured with dental stone so as to get a stable occlusal surface for maxillary arch.

Bite record was taken with dentures in mouth and casts were mounted on semi-adjustable articulator, wax patterns were fabricated for porcelain fused to metal crown. With the Ney Dental surveyor, Guiding planes, rest seats were prepared in the wax pattern and Patrice's were added to the axial surface of the abutment<sup>[5]</sup> (Fig. 4a, 4b). Male attachment is kept 1mm

above the gingival to facilitate oral hygiene [6] subsequently casting, finishing and veneering of fixed component was done. Margins and fit of the crowns were checked with the attachment in the patient's mouth (fig. 5).



**Fig 4a:** splinted crown with attachment



**Fig 4b:** splinted crowns with attachment



**Fig 5:** Intraoral view of crown with attachments.

A Custom tray (Rapid Repair, Dentsply, Gurgaon, India) was fabricated for maxillary arch, border molding was done and pick-up impression was made of maxillary arch with medium bodied elastomeric impression material (Fig 6). Impression was then poured in die stone, wax patterns were made for cast partial denture framework, then casting, finishing and polishing was done with female attachment in place (Fig.7). Crowns with attachments were temporarily cemented with Kalzinol, cast partial denture framework was tried in the patient's mouth and adjusted accordingly, wax rims were fabricated and jaw relation record was established, bite record was made (fig. 8) and casts were mounted on semi-adjustable articulator, teeth arrangement was done in order to achieve canine guided occlusion, trial dentures were finished and try-in was done in patient's mouth.



**Fig 6:** Pick Up Impression



**Fig 7:** intaglio surface with attachment



**Fig 8:** jaw relation recorded

After patient's approval for esthetics and speech, cast partial framework was processed with Heat activated acrylic resin (DPI, The Bombay Burmah Trading Corporation, Mumbai, India). Finishing and polishing was performed. Then, Metal ceramic crowns were cemented with glass ionomer cement (FUJI GC I, Japan) and cast partial denture was inserted in patient's mouth (fig.9), deflective contacts were checked and corrected using articulating paper (fig.10), and post insertion instructions were given. Patient is kept under observation for subsequent periods (fig.11).



**Fig 9:** final prosthesis



**Fig 10:** intra oral view



**Fig 11:** post-operative outcome

#### 4. Outcome and follow-up

Regular follow-up has been done for 6 months and necessary occlusion correction has been performed. Patient was satisfied with the given treatment not only esthetically but also functionally.

#### 5. Discussion

There are several treatment options for the rehabilitation of partial edentulism. Depending on several given diagnostic factors and a patient's perspective, best treatment plan should be selected for the patient. In recent years, dentistry has witnessed the use of Computer aided design and Computer assisted milling (CAD-CAM) (William *et al*, 2006; Eggbeer *et al*, 2005) <sup>[10]</sup>, precision milled and semiprecision attachments, improved impression materials, improved techniques and designs which would eventually attain a comprehensive treatment. In case of partially edentulous mouth, Retention provided by the usage of precision attachments which may be related to comfort, satisfaction, chewing ability, as well as adequate distribution of occlusal loads to, and preservation of abutment teeth in patients with removable partial dentures. Retentive ability increases significantly over time in the metal-alloy precision attachment group. Charkawi HG *et al* <sup>[7]</sup> evaluated and quantified changes in retention ability and weight change over time and thus reported Metal-alloy and plastic inserts precision attachments preserve supporting teeth and alveolar bone ridges when associated with at least two splinted abutments <sup>[7]</sup>.

Holst *et al* <sup>[8]</sup> cited as it is difficult to evaluate precision attachments' effects on treatment longevity based solely on *in vitro* results since other factors such as continuous ridge resorption, changes in saliva flow and composition, and occlusal considerations may affects its long-term success.

The decision to use attachments in removable partial denture design should be carefully considered. Clasp-type removable partial dentures should be used whenever practical because of their lower cost, ease of fabrication and maintenance, and the predictability of results. However, if an attachment removable partial denture is the treatment of choice because of esthetics, abutment alignment, or the need for greater cross-arch bracing,

it must be used with a thorough knowledge and understanding of prosthodontic principles and attachment use, as well as an awareness of the intricacies and special problems associated with attachments. In treatment using the attachment-retained distal extension removable partial denture, the development of a stress-directing attachment design as well as the proper distribution of forces between the residual ridge and abutment teeth should be goals for successful treatment.

#### 6. Clinical Significance

Use of precision attachment has amplified the aspects of retention and particularly, esthetics when compared to conventional removable partial dentures.

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