# AESTHETIC AND FUNCTIONAL REHABILITATION WITH ATTACHMENT-RETAINED CPD

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## INTRODUCTION

Precision attachments are components, designed to enhance the retention, stability, and esthetics of removable partial dentures and overdentures. These attachments function as connectors between the prosthesis and abutment teeth or implants, allowing for controlled movement and improved distribution of masticatory forces, thereby minimizing trauma to abutments and soft tissues (1).

Precision attachments are primarily categorized based on their location relative to the abutment tooth into intracoronal and extracoronal types. Intracoronal attachments are housed entirely within the contours of the crown portion of a natural tooth. This design offers a non-resilient connection, providing a precise path of placement and enhanced esthetics due to the absence of visible clasps (2).

In contrast, extracoronal attachments are positioned outside the natural contours of the abutment tooth. They are often employed in scenarios where intracoronal attachments are not feasible, such as in cases with limited tooth structure or when additional retention is required. Extracoronal attachments can accommodate slight movements, offering a semi-resilient connection that aids in stress distribution and reduces the load on abutment teeth (3).

Among extracoronal attachments, the double ball attachment system has gained attention for its efficacy in enhancing prosthesis retention and stability. This system comprises two ball-shaped metal components on the denture that correspond to silicone or metal housings on the abutment teeth or implants, creating a secure and stable connection. The double ball design offers increased retention compared to single ball attachments, distributing occlusal forces more evenly and reducing stress on abutment teeth. This configuration is particularly beneficial for patients with limited residual dentition, as it provides improved masticatory efficiency and comfort (4).

The selection between attachments depends on factors such as the condition of abutment teeth, available inter-arch space, esthetic considerations, and patient-specific

functional requirements. A thorough understanding of these attachment systems enables clinicians to devise prosthetic solutions that are both functional and esthetically pleasing, thereby enhancing patient satisfaction and oral health-related quality of life (5).

The following article describes prosthetic management of partially edentulous patient using precision attachment and cast partial denture thereby enhancing the aesthetic and functional outcomes.

## CASE REPORT

A 57-year-old male patient reported to the Department of Prosthodontics with a chief complaint of missing teeth(figure-1). The patient had no relevant medical history. Dental history revealed endodontic treatment with a bridge on 14, 15, 16 and crowns on 21, 35, 36, and 44.

Clinical examination showed missing teeth: 12, 24, 25, 26, 27, 31, 32, 33, 34, 41, 42, 43, 45, 46, and 47. Based on Kennedy's classification, the case was categorized as Class II, Modification 1 in both the maxilla and mandible, with insufficient vertical space for prosthetic rehabilitation. To correct this, the vertical dimension was increased by 2mm by adding composite (3M ESPE) to the articulating surface of tooth 44, and the patient was instructed to return after one week for evaluation.

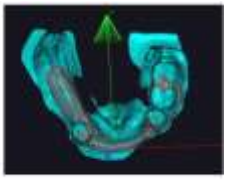
(Figure-1)

(Figure-2)

Diagnostic impressions were made, and casts were obtained and transferred to a semi-adjustable articulator using a facebow transfer and centric record at the predetermined vertical dimension. A diagnostic wax-up and removable partial denture (RPD) design were created using EXOCAD software, incorporating an anteroposterior (A-P) palatal strap connector for the maxilla and a lingual bar for the mandible.

Tooth preparations were performed for full-contour porcelain-fused-to-metal (PFM) crowns on maxillary teeth 12, 11, 21, 22, and 23 (figure-2) and mandibular teeth 37 and 44. A putty-light body impression (Reprosil, Densply) was made, and casts were obtained. Metal copings along with ball attachments(Patrix) was designed in ExoCad along with mandibular CPD framework(figure 3,4) A full-contour wax-up was fabricated with a double ball attachment (Patrix) on the distal surface of 23(figure-5). Following this, a metal trial was conducted, and a pickup impression of the metal coping along with the ball attachment was made using addition polysilicon impression material, Putty consistency (Aquasil soft putty, Densply) for fabrication of the matrix and CPD framework (figure-6,7).

(Figure-3)



(Figure-4)

(Figure-5)

(Figure-6)

(Figure-7)

After porcelain layering, the crowns were luted using GIC (Hy-bond, Shofu), and a

CPD framework trial was carried out for both the maxilla and mandible. A functional impression of the mandible was taken using the CPD framework, and an altered cast technique was used to obtain an accurate master cast. The bite registration was done, followed by an RPD trial, during which the patient was evaluated for aesthetics, phonetics, fit, and occlusion.

Upon the patient's approval, the final denture was inserted, and the patient was placed on a continuous follow-up and monitoring protocol to ensure long-term success and adaptation.(figure-8)

**(Figure-8)**

## DISCUSSION

Extra-coronal precision attachments are widely used in removable partial dentures (RPDs) to enhance retention, stability, and stress distribution while preserving esthetics and reducing the need for visible clasps (6). In the present case of Kennedy Class II Modification 1 in both maxilla and mandible, a double ball attachment distal to 33 was incorporated to improve retention and aesthetics in the upper arch. This design offers enhanced stress distribution by allowing slight movement, reducing torque on the abutment teeth (7).

The double ball attachment provides increased mechanical retention by engaging corresponding metal housings within the denture base, ensuring a secure yet resilient connection (8).

One of the critical considerations in this case was the increase in vertical dimension by 2mm to restore prosthetic space. According to Study by Chikunov I et al, suggests that moderate vertical dimension increases can enhance esthetics and function without causing discomfort or temporomandibular joint complications when properly assessed (9). The double ball attachment, with its resilient nature, helps accommodate minor variations in occlusal forces, further enhancing patient adaptation.

Long-term success depends on proper case selection, precise attachment positioning, and patient compliance with maintenance protocols. Periodic evaluation of abutment health, retention inserts, and occlusal balance is necessary to ensure continued prosthesis function.

1. Figure 1- Intra-oral Pre-operative photograph at maximum intercuspation
2. Figure 2- Preparation of 11,21,22,23 for PFM crowns and Patrix ball attachment
3. Figure 3- Designing of Metal coping and ball attachment in EXOCAD
4. Figure 4- Designing of mandibular cast partial denture framework in EXOCAD
5. Figure 5- Crowns with Double ball attachment
6. Figure 6- Mandibular partial denture framework
7. Figure 7- Maxillary Partial denture framework along with "O" rings
8. Figure 8- Intra-oral Post-operative photograph at maximum intercuspation

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