



The Precision Factor: Optimizing Distal Extension Rehabilitation

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ABSTRACT: Precision attachments were developed to strike a compromise between practical stability and aesthetic appeal for partial dentures.¹ Restoring a partially edentulous patient can be problematic, especially if the posterior section of teeth is absent unilaterally or bilaterally. In distal extension cases, dentures rely on teeth, mucosa, and underlying alveolar ridges for support. However, during functional activity, the abutment teeth and remaining ridges may experience undue stress.⁵ A precision attachment is an interlocking device where one component is fastened to an abutment and the other is inserted into a removable dental prosthesis for stability or retention. This article provides an overview and a simplified approach through a case report for treating the patient

KEYWORDS: Precision attachment, CAD-Designing, extra-coronal attachments

I. INTRODUCTION

A number of procedures, including over dentures, clasp-retained removable partial dentures (RPDs), and RPDs with precise attachments, are used in prosthetic rehabilitation of partially edentulous mouths depending on the patient's preferences for aesthetics and the anatomical correlations between tissues. A precision attachment is a connecting link made up of two components one for retention and another for stabilization of the prosthesis.¹

One part is fixed to an abutment, while the other is incorporated into a removable partial denture (RPD) to provide stability and retention. It includes male and female components that connect the RPD to fixed bridgework.

The male component is a metal receptacle or keyway soldered to fixed crowns, and the female component attaches to the partial denture.² This precision attachment serves as a replacement for the occlusal rest, bracing arm, and retaining arm of a conventional clasp-retained partial denture. Mensor (1971) categorised Precision attachments into intra-coronal, extra-coronal, pushbutton type, bar type,

and auxiliary type. These attachments are recommended for aesthetic zones, force redistribution, proper control of loading and rotational forces, segmenting long-span bridges, and acting as stress breakers in free-end saddles and bridges. They are contraindicated in patients who are ill or elderly, those with severe periodontitis, patients with a high caries rate, inadequate space, and narrow facio-lingual dimensions.^{3,4}

Precision attachments provide significant benefits due to their flexibility. However, they have historically been overlooked due to high costs and a lack of understanding of their potential applications.^{5,6} As the public has gained more knowledge over the past decade, dental surgeons who are knowledgeable with precise attachments can expand their treatment options. Precision attachments can be extra coronal or intra-coronal. Attachment-retained cast partial dentures provide a cosmetic and functional substitute for missing teeth. Studies suggest a survival percentage of 83.35% for 5 years, 67.3% for 15 years, and 50% for 20 years.^{7,8}

II. CASE REPORT

A 58-year-old male patient presented to the Department of Prosthodontics at The Oxford Dental College in Bengaluru with the primary complaint of missing mandibular posterior teeth. The patient's medical history was not relevant to their prosthodontic treatment. An intraoral examination showed well-formed maxillary and mandibular ridges in the Class I ridge relationship. The patient had missing right mandibular first, second, and third molars unilaterally (Kennedy's Class II). In this case of distal extension, the patient refused a removable prosthesis. The implant placement was not feasible due to limited bone quality. Therefore, an attachment-retained removable partial denture was selected as a therapeutic alternative

After a thorough clinical and radiological examination, a prosthetic treatment plan was established. The crown height of the abutments was sufficient for a removable partial denture with an extra coronal attachment (Rhein 83-matrix part and

sleeve matrix) for the lower distal extension. After intentional RCT of the abutments, 44,45 teeth were prepared for

post and core followed porcelain fused to metal crowns. After producing a definitive impression, the abutments were temporarily prepared. A bite block was used to determine jaw relation. In the laboratory, using EXOCAD software, joint survey crowns with attachments were milled and tested to ensure proper fit. A metal trial was done before the final ceramic layering. The ceramic powder was then applied to the abutments before burning with porcelain.⁷The fixed component with matrices (male part) was tested in the patient's mouth and a pick-up imprint was taken using PVS impression material⁷.

Crowns were cemented using glass ionomer cement, and the acrylic prosthesis was connected using a ball attachment. Occlusal contacts were assessed in both centric and eccentric positions. The patient was recalled after one week for post-insertion examination. The patient was instructed to maintain good oral hygiene.

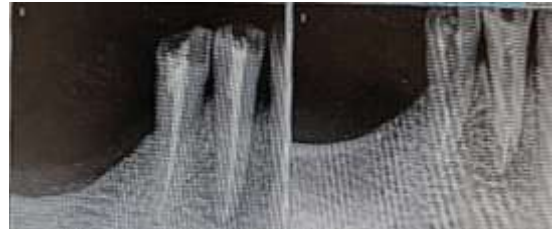


Figure 4: Post-space preparation followed by fiber optic post and core.



Figure 6: Fiber optic post using relyx u 200 resin cement.



Figure 1: Pre-op



Figure 7



Figure 2: Left lateral

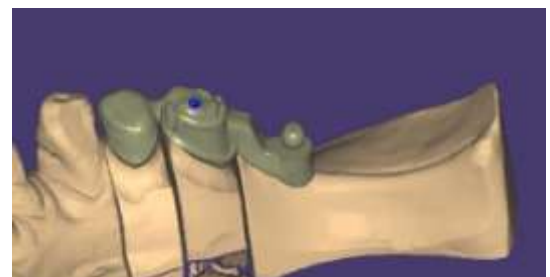


Figure 8



Figure 3: Right lateral



Figure 9

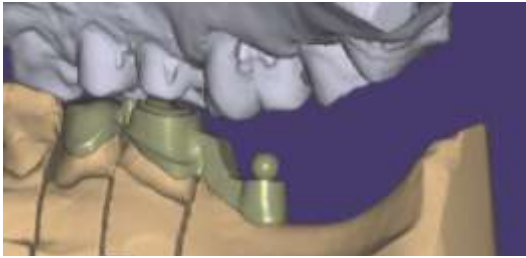


Figure 10 – Cad designing of joint crown with attachments



Figure 14: Try in



Figure 11: Metal trial in patient's mouth.



Figure 15: Final prosthesis



Figure 12: Wax bite along with the metal trial



Figure 16: Cementation of survey crowns



Figure 13: Pick up impression of the metal trial with attachments using addition silicone.



Figure 17: Survey crowns attached to heat cure acrylic denture using rhein 83 attachment.



III. DISCUSSION

The precise attachment bridges the gap between fixed and removable partial dentures by combining elements from both types of construction.⁹

Rehabilitating a distal extension partially edentulous patient can be problematic if they are unable to insert implants or wear a detachable prosthesis.

There is no distal abutment, thus fixed partial dentures are not an option. To address this serious issue, combination prostheses are recommended. A combination prosthesis retains an acrylic prosthesis with an extra coronal attachment to the tooth, providing the benefits of fixed prostheses without the need for surgery.^{11,12}

Precision attachments offer several benefits for patients with removable prostheses, including retention, aesthetics, support, stabilization, and fixation.¹³

This form of prosthesis is known as a distal extension prosthesis. Attachments are an alternative to clasps in removable partial denture therapy for cosmetic and practical reasons.[14] A removable partial denture with a retained attachment mechanism can help prosthodontists improve function and aesthetics when replacing missing teeth and oral tissues.

Precision attachment is typically used for long-span edentulous arches, distal extension bases, and non-parallel abutments (Gupta et al,2013).¹¹

A precision attachment is a connector made up of two or more pieces. One portion is attached to the root, tooth, or implant, and the other to the prosthesis. The attachment system employed is extra coronal attachment (Rhein 83), which extends from the distal surface of the crown.

Dr. James Andrews introduced fixed removable prostheses (Munot et al, 2017; Walid, 1995; Jain, 2013).¹⁴

Precision attachment dentures can be effective with correct diagnostic and treatment planning.

This connection has drawbacks, including the necessity for well-trained lab technicians to fabricate it and the need to replace pieces over time owing to wear and tear (Angadi et al, 2012).¹³

IV. CONCLUSION

This case report addresses the challenge of providing a permanent or detachable prosthesis in circumstances when the distal abutment is lacking. Combined prosthesis is a non-surgical solution for inserting prosthesis in distal extension instances.¹¹

To achieve long-term success with precision attachment retained removable partial

dentures, it is crucial to conduct a thorough evaluation, develop a treatment plan that aligns with the patient's aesthetic preferences, and schedule periodic recalls every three months. Preventative therapy is also recommended.

Successful prosthodontic rehabilitation requires a balance of current and traditional treatment techniques. Attachment retained partial dentures are a prosthodontic rehabilitation approach.¹³

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