Journal of Dentistry and Dental Practices
ISSN: 2689-5994

Academic Strive
Researcher's perception is our reality

Case Report *Volume 6 Issue 2*

Case Report: The Importance of Using Precision Attachments for Achieving Optimal Results in Prosthodontic Treatment

Parnaadji R*

Department of Prosthodontics, University Jember, Indonesia

***Corresponding author:** Rahardyan Parnaadji, Faculty of Dentistry Universitas Jember, Kalimantan Street I No. 37, Jember, East of Java, Indonesia, Tel: (0331) 333536; Fax: (0331) 331991; Email: rahardyan_p.fkg@unej.ac.id

Received Date: November 15, 2024; **Published Date:** November 26, 2024

Abstract

Cases of tooth loss involving several teeth are often not recommended for fixed bridge denture treatment. In such cases, a prosthodontic treatment plan with a precision attachment design becomes very important, especially if it involves anterior teeth. The advantages of a precision attachment design are that it can be made in the denture space or streamlined, is comfortable to use and can significantly improve aesthetic function because it does not require a clasp arm. The type of attachment used in this case is an extra-coronal attachment. The primary consideration is that the mesiodistal space and buccal-lingual distance as the attachment site for teeth 11 and 21 looks narrow, require minimal tooth reduction and facilitate the direction of installation. The selection of the type of extra coronal attachment uses a rigid attachment type, namely an extra coronal rod attachment. This choice is based on the results of vertical space measurements showing less than 2.8 mm and can still use the total number of abutment teeth. Efforts to maintain the condition of the abutment teeth by using an extra coronal rod attachment are carried out using acrylic resin dentures and a female cap attachment. This female cap attachment can absorb adverse movements to protect the abutment teeth as shock absorber and functions to control flexibility. Prosthodontic treatment with precision attachment design, with its significant aesthetic improvement, can provide a sense of appreciation for the enhanced appearance.

Keywords: Anterior Tooth Loss; Precision Attachment; Aesthetic

Abbreviation:

RPDs: Removable Partial Dentures.

Introduction

Tooth loss in a person can be caused by various causes, namely dental caries, periodontal disease, trauma, and malignancy. Replacement of missing teeth can be done with removable dentures or fixed dentures. Fixed dentures are the most frequently recommended treatment compared to removable dentures. Various designs of fixed denture options can be chosen, ranging from dentures supported by conventional teeth to those]supported by implants [1]. In general, prosthodontic treatment functions to maintain or improve speech function, improve chewing function, stabilize tooth occlusion relationships, and improve the desired aesthetics [2].

One of the prosthodontic treatments to improve aesthetic function is to use a precision attachment design. Prosthetic rehabilitation of partial edentulous ridge has several

treatment designs, namely overdentures, clasp-retained removable partial dentures (RPDs), and RPDs with precision attachment based on patient needs, aesthetics, and the relationship between anatomy and oral cavity tissue [3]. Fixed bridge denture treatment is often not recommended in tooth loss involving several teeth or a long span. Considering a treatment plan with a precision attachment design becomes very important, especially if it involves anterior teeth. Applying the precision attachment design will involve two parts, namely the female and male parts, which will be connected precisely. In this design, the female part will be placed extra coronally on the distal part of the abutment teeth, and the male part will be placed on the mesial part of the removable partial denture.

Precision attachment refers to a retainer comprising two main components: a metal receptacle known as the matrix and a closely fitting part called the patrix. The matrix is typically positioned within the standard or expanded contours of the crown on the abutment tooth or dental implant, while the patrix is connected to a pontic or a removable partial denture [4]. Mishra A, et al. [5] highlighted several advantages of using precision attachments compared to conventional clasp-retained partial dentures. They noted that precision attachments offer better retention and stability, are less likely to fracture than clasps, are less bulky, and reduce the incidence of secondary caries. Additionally, cross-arch load transfer, force transmission, and prosthesis stabilization may be improved with attachments, especially when a rigid precision attachment is employed [5]. Besides that, lateral forces in the abutment during the insertion and removal are eliminated, and more axial forcing functions are achieved as force application is closer to the fulcrum of the tooth than in the case of occlusal rest or incisal rest; therefore, decreased lever arm reduces non-axial loading and decreases torquing and rotational forces [5]. This case report aims to explain the management of aesthetic rehabilitation treatment in prosthodontics involving anterior teeth using a precision attachment design on the patient's dentures.

Case

A 52-year-old man visited the Prosthodontics Specialist Dental Clinic at the Dental Teaching Hospital of Jember University due to difficulties in chewing and a lack of confidence resulting from tooth loss. He requested dentures to enhance his appearance, boost his self-confidence, and provide comfort during use. The clinical examination showed missing teeth 12, 13, 22, 23, 24, 25, 26, 34, 35, 45, 46 and 47. The patient was scheduled for partial denture treatment using a precision attachment (hybrid prosthesis) in the upper jaw and partial dentures with a metal frame in the lower jaw.

Case Management

The intraoral and supporting examination analysis was performed based on the patient's complaints and clinical conditions, with the patient actively participating in the process. Before prosthodontic treatment, the patient was referred for pre-prosthetic procedures, including scaling and root planning of the teeth in the upper and lower jaws, demonstrating his commitment to oral health. The condition of the supporting tissue of the denture, including an ovoid jaw arch, a flat torus, a deep vestibule, and a U-shaped palate, was carefully assessed. The results of the panoramic radiography examination show that the height of the alveolar bone strongly supports the denture.

The treatment plan was meticulously crafted, beginning with the preparation of a fixed splint with extracorporeal attachment on teeth 11 and 21. The preparation of teeth 11 and 21 for the fixed splint with extra coronal attachment was carried out with utmost precision, ensuring the end of the preparation was in the form of a chamfer with the placement of the end of the preparation of the abutment teeth being subgingival margin. The results of measuring the gingival sulcus depth on teeth 21 showed 1.5 mm, and tooth 22 showed 1 mm, guiding the restoration margin placement to be 0.5 mm below the gingival peak (Figure 1-4).

Figure 1: Preparation of teeth 11 and 21 in preparation for making a fixed splint with extra coronal attachment.

In the next stage, occlusal rest preparations were performed on the mesial surfaces of teeth 14, 15, 16, 24, 28, 36, 37, 44, and 48. This preparation was necessary for the manufacture of metal frame partial dentures for both the upper and lower jaws. Before taking impressions of the abutment teeth (11 and 21), the gingival retraction was performed around these teeth using the Ringmaster tool. The upper jaw abutment teeth were examined using the putty-wash one-step impression technique. Bite records were also created using the bite guide previously made during this stage. The

patient was instructed on properly opening and closing their mouth for the process. Bite records were obtained using polyvinylsiloxane for bite registration. The stage concluded with the placement of temporary fixed splints on teeth 11 and 21, secured with temporary cement (Freegenol®/GC).

In the laboratory stage, the upper and lower jaw working models were created from impressions of the abutment teeth filled with Type IV dental stone. The fixed splint coping was made on teeth 11 and 21, accompanied by palatal milling and installation of extra coronal attachments on the distal teeth 11 and 21. A trial coping installation was carried out to make fixed splints on teeth 11 and 21, and the accuracy of the fixed splint coping was examined against the preparation results on teeth 11 and 21. At this stage, the laboratory results were evaluated on the margin section accuracy, measuring the distance of the fixed splint coping installation with the antagonist's teeth on the lower jaw and the ease of installation. Subsequently, the rod-type extra-coronal attachment was examined to ensure proper placement against the soft tissue underneath. If both the coping and extra-coronal attachment installations were deemed correct, a re-impression would be taken to proceed with the laboratory process (Figure 2).

Figure 2: Checking the accuracy of the fixed splint coping with the preparation results on the abutment teeth.

Next, functional impressions of the upper and lower jaws were made to manufacture metal frame dentures using medium-bodied consistency impression material using the monophase impression technique. In the upper jaw impression, fixed splints 11 and 21 were included. The impressions were then filled using a type IV dental stone. The process was continued by making a metal frame on the upper and lower jaws in the laboratory.

After the laboratory stage of making a fixed splint porcelain fused to metal with a metal frame denture is completed, a trial installation is carried out on the patient. Next, an examination is carried out on the male attachment (matrix) to determine whether it is correctly installed on the metal frame and can lock with the female attachment (matrix) on the fixed splint. The examination continues on the metal frame's retention, stability, occlusion, and articulation. Next, a trial installation of the metal frame is performed by installing a fixed splint with extra coronal attachment on teeth 11 and 21. At this stage, the accuracy of the placement of the metal frame is checked by milling on the fixed splint of teeth 11 and 21, as well as the accuracy of the clasp arms on the abutment teeth, the accuracy of the metal frame seat on the supporting tissue of the denture and the retention aspect along with its stabilization.

Trial installation of a fixed splint with extra coronal attachment on teeth 11 and 21 using temporary cement material (Freegenol®/GC). The upper denture is installed before the freegenol setting process. Next, the denture is installed on the lower jaw. Next, retention, stability, occlusion accuracy and articulation are checked using articulating paper to determine whether or not premature contact is present.

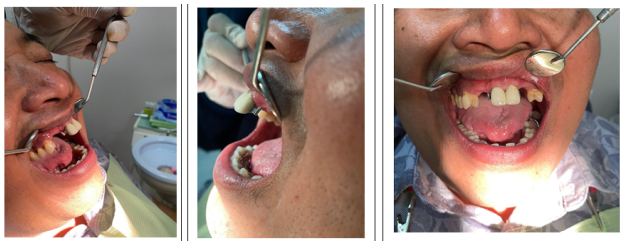

Figure 3: Trial installation of fixed splint with extra coronal attachment on teeth 11 and 21.

Figure 4: Installation of removable partial dentures with extra coronal type precision attachment on the upper jaw (hybrid prosthesis) and partial metal frame dentures on the lower jaw.

The patient was instructed to use the denture for 24 hours. The denture may be used for soft food, drinking and talking. A check-up was then carried out 1 day after the trial. There were no complaints from the patient, and the results of the clinical examination of the soft tissue showed no abnormalities. The patient was then told how to install and remove the denture and was instructed to have a check-up 7 days after the trial. During the check-up, the patient could adapt well and chew food well.

Furthermore, after 7 days of the trial, a fixed splint with extra coronal attachment on teeth 11 and 21 was installed using Fuji I (Luting Cement/GC). The upper and lower jaw dentures were installed before the luting cement setting. Examination of retention, stability and occlusion of the upper and lower jaw teeth was carried out. The patient must pay attention to and maintain the cleanliness of the abutment teeth, surrounding tissue and the dentures. The abutment teeth can be cleaned using a soft-bristled toothbrush and fluoride toothpaste. Every night, the dentures are removed and soaked in clean water. Patients are instructed to pay attention to the female cap attachment area, and if it comes off, they should immediately notify the dentist. Patients must also make regular check-up visits to the dentist so that the health of the teeth, supporting tissue and condition of the denture can be evaluated.

Discussion

Prosthodontic treatment can be an aesthetic rehabilitation treatment for the condition of anterior teeth to improve patient confidence. One alternative aesthetic rehabilitation treatment involving anterior teeth is precision attachment. Precision attachment has the same function as a clasp with occlusal rest, bracing arm and retentive arm components [6]. The advantages are that it can be made as limited as the denture space (streamlined), comfortable to use, aims to achieve aesthetics because it does not require a clasp arm on the labial or buccal part of the anterior teeth or premolars, can last a long time with good oral hygiene, splinting of supporting teeth so that a chewing load distribution can be obtained that is beneficial for the teeth and the creation of a tooth crown that can protect the supporting teeth from the emergence of dental caries. In addition, removable partial dentures with precision attachments will direct the force on the supporting teeth with the long axis of the teeth. The fulcrum is closer to the alveolar bone peak, increasing the resistance of the supporting teeth and patient satisfaction [7-9]. The drawback is that it is expensive and requires more prolonged treatment [8,10].

The decision to use a precision attachment design for the upper jaw dentures is based on the patient's desire to enhance aesthetics and improve chewing function, especially after losing a significant number of teeth. Given these circumstances, a permanent denture treatment is inappropriate, and additional bracing support is necessary for the dentures on both sides of the jaw. Examination results indicate that the mesiodistal space and buccal-lingual distance at the attachment sites on teeth 11 and 22 are narrow, necessitating minimal tooth reduction and simplifying the installation process. Furthermore, clinical analysis shows that preparing the abutment teeth for extra coronal attachments is straightforward since this can be achieved using conventional porcelain-fused-to-metal crowns.

Examination results reveal that the mesiodistal space and buccal-lingual distance at teeth 11 and 22 attachment sites are narrow, necessitating minimal tooth reduction. This condition facilitates the installation process and allows for a straightforward clinical analysis when preparing the abutment teeth for extra coronal attachments, which can be effectively achieved using conventional porcelain-fused-to-metal crowns. The choice of an extra coronal attachment type, specifically a rigid attachment such as the extra coronal rod attachment, is informed by the vertical space measurements indicating less than 2.8 mm. This approach enables the utilization of the maximum number of abutment teeth. Furthermore, the findings are consistent with the assertion made by Staubly and Bagley (2002) that in this clinical scenario, a ball-type attachment cannot be employed, as it requires a minimum vertical space of 3 mm [6].

The extra coronal rod attachment is placed on distal 11 and 22 and only allows vertical movement according to the direction of installation. The abutment teeth for the rigid type should use double abutment teeth to obtain strong abutment restorations. Therefore, a fixed splint was made on teeth 11 and 21. This fixed splint, a rigid structure, adds stability to the proximal 11 and 21. It functions as a cingulum rest and provides comfort for wearing dentures because its shape matches the contour of the abutment teeth [6]. The stabilizer aims to protect the attachment from the effects of torque, rotation or leverage, which may be caused by chewing force [11,12].

Efforts to maintain the condition of the supporting teeth by using extra coronal rod attachment (rigid type) are carried out using artificial teeth made of acrylic resin and female cap attachment. The female cap attachment is a crucial component of this treatment plan. It absorbs adverse movements, acting as a shock absorber to protect the supporting teeth. It also controls flexibility, facilitates removal, and provides comfort [6].

The choice of a metal frame for denture manufacturing offers several advantages. Notably, the base can be constructed

to be exceptionally thin (approximately ± 0.11 mm), which enhances user comfort, reduces the likelihood of breakage, ensures an accurate fit, and remains lightweight due to its relatively low density [13,14]. Additionally, metal frames are corrosion-resistant and possess superior thermal conductivity, allowing temperature sensations to be quickly transmitted to the mucosa. During routine check-ups, examinations are conducted on the supporting teeth, the underlying tissue of the denture, and the area surrounding the female cap attachment. Patients are informed to consult their dentist immediately if the female cap becomes detached. Patients express satisfaction and comfort with their dentures when they function effectively. Prosthodontic treatment incorporating precision attachments increases denture retention and enhances aesthetics, boosting the patient's self-confidence [15-17].

- **Ethics Approval and Informed Consent**: Written and verbal consent has been obtained from the patients presented in this paper, including for publication.
- **Conflicts of Interest:** There are no conflicts of interest
- **Acknowledgements:** The authors thank the staff of Dental Teaching Hospital University of Jember for their cooperation and laboratory support.

References

1. Arunraj D, Gnanam P, Chander GN (2021) Prosthodontic Rehabilitation of a Patient with Missing Teeth and Loss of Vertical Dimension Using Telescopic Overdentures. Contemp Clin Dent 12(1): 67-72.

2. Carr AB, Brown DT (2015) McCracken's removable partial prosthodontics. In: 13th (Edn.), Elsevier, St. Louis, Mosby.

3. Ghiaz K, Shaheen Shaik S, John P, Kumar A, Vijayakumar N (2022) Precision Attachment Boon to Prosthodontists. J Pharm Bioallied Sci 14(S1): S1030-S1032.

4. (2023) The Glossary of Prosthodontic. Terms Journal of Prosthetic Dentistry 130(4S1): E7-E126.

5. Mishra A, Gulati M, Kumar MS (2021) Precision attachments: A review. International Journal of Health Sciences 5(S2): 1352142.

6. Staubly EP, Bagley D (2002) Attachment and Implant. Reference Manual 2002 (Edn.), Attachment International Inc., San Mateo, California, USA, pp: 1-8.

7. Maity S, Sharan S (2023) Precision Attachment. Lambert Academic Publishing, Saarbrücken, Germany.

8. Lammie GA (1986) Osborne and Lammie's Partial Denture. Blackwell Science Publication. London, pp: 254-56.

9. Ajay Gupta A, Khanna G, Bhatnagar M, Markose GM, Singh S (2018) Precision Attachment in Prosthodontics. International Journal of Preventive and Clinical Dental Research 5(2): 34-39.

10. Jain R, Aggraval S (2017) Precision Attachment: An Overview. Annals of Prosthodontics & Restorative Dentistry 3(1): 6-9.

11. Rani S, Kumar S, Pratibha, Kumar V (2016) Clinical Application of Precision Attachment: A Review. International Journal of Contemporary Medical Research (3)2: 342-346.

12. Mishra A, Gulati M, Kumar MD (2021) Precision Attachments: A Review. International Journal of Health Sciences 5(S2): 135-142.

13. Campbell SD, Cooper L, Craddock H, Hyde TP, Nattress B, et al. (2017) Removable partial dentures: The clinical need for innovation. The Journal Of Prosthetic Dentistry 118 (3): 273-280.

14. Phoenix D, Charles C (2008) Stewart's Clinical Removable Partial Prosthodontics. 4th (Edn.), Quintessence Publishing Co, Inc. Canada.

15. Lahoti K, Alone N, Gade J (2020) Precision Attachment-A Review. International Journal of Current Advanced Research 9(10B): 23222-23228.

16. Patil R, Shetty O (2019) Prosthetic rehabilitation using extra coronal attachments. International Journal of Dentistry Research 4(1): 05-08.

17. Jyothish V, Nagabhairava RK, Anagha KR, Kazi MS (2024) The Precision Factor: Optimizing Distal Extension Rehabilitation. International Journal Dental and Medical Sciences Research 6(4): 236-240.