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Original Article

Case Report on Distal Extension Edentulous Rehabilitation Using Claspless Extra-Coronal Attachments

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ABSTRACT

Kennedy Class I and II cases can present significant challenges in prosthetic rehabilitation, particularly when encountering a complete denture. Retention may sometimes be hindered due to the nature of the remaining soft and hard tissues. While implant-supported prostheses are usually considered the optimal solution for such cases, they may not be feasible for patients with certain health conditions. Traditional cast partial dentures with clasps are an alternative, but they often lack aesthetic appeal, making them less desirable for many patients. A suitable option in these scenarios is the use of extra-coronal attachment retained prostheses. These offer a combination of fixed and removable components that provide a more aesthetically pleasing and easier-to-manage solution compared to both implant-supported options and clasp-retained partial dentures. This case report discusses the rehabilitation of a Kennedy Class I edentulous situation encountering a complete denture using extra-coronal attachments.

Keywords: Semi-precision attachments, Precision attachments, Distal extension, Cast partial dentures.

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Introduction

Rehabilitating distal extension cases can be challenging as these rely on both tooth and tissue support, requiring stable abutment teeth. The difficulty increases when the distal extension is opposed by a completely edentulous arch. Fixed prostheses are often not suitable for these cases due to the extended cantilever length, which would cause issues with stability [1]. Implant-supported prostheses, though effective, can be costly for patients. On the other hand, traditional clasp-retained cast partial dentures often fail to meet aesthetic expectations due to the visible metal components. This limitation can be addressed with the use of extra-coronal attachments, including precision or semi-precision types [2, 3].

Semi-precision attachments involve manually creating the wax pattern for the attachment, followed by conventional casting, whereas precision attachments are pre-made alloys used directly in the restoration. As a result, precision attachments offer superior retention compared to semi-precision ones. Cast partial dentures with extra-coronal attachments improve both functionality and aesthetics, with survival rates of 83.35% over five years and as high as 50% over twenty years [4, 5].

The case report discusses the management of a Kennedy Class I modification in the maxillary arch using semi-precision attachment-retained cast partial dentures, opposing a completely edentulous mandibular arch.

Case report

A 68-year-old male patient visited the Department of Prosthodontics, reporting problems in chewing food for the past month following the extraction of several of his natural teeth due to mobility. On clinical examination, the remaining natural teeth were between 13 and 23. Both teeth 11 and 12 exhibited grade III mobility, making them candidates for extraction. An OPG scan revealed widespread bone loss in both the maxillary and mandibular arches. Post-extraction, the maxillary arch presented with Kennedy's Class I modification, and the mandibular arch was fully edentulous (**Figure 1**). After completing the necessary periodontal treatment and evaluating diagnostic casts, the treatment plan was devised. This included a tooth-supported fixed prosthesis spanning from the upper right canine to the left canine, with semi-precision attachments placed distal to the abutments. A cast partial removable denture was planned for the maxillary arch, and a conventional complete denture was planned for the mandibular arch. Due to the patient's systemic condition—uncontrolled diabetes and ongoing antiplatelet therapy—implant-supported prostheses were not a viable option. The treatment plan was designed to be as non-invasive as possible, considering the patient's overall health.

Figure 1. Preoperative view

Using diagnostic casts, denture bases were fabricated from self-cure acrylic resin. Subsequently, occlusal rims were constructed with modeling wax. Vertical dimension and a provisional centric relation were recorded and articulated using these setups. Tooth preparation was performed with supragingival margins on teeth 13, 21, 22, and 23, ensuring minimal trauma. Impressions for the maxillary arch were made with monophase impression material (**Figure 2**). For the mandibular arch, border molding and wash impressions were done using a low-fusing impression compound and zinc oxide eugenol paste. On the master cast, wax patterns were created for metal copings, and prefabricated castable OT cap attachments were added behind the abutments (**Figure 3**). These attachments, placed extra-coronally, provide elastic retention and serve as stress breakers, absorbing excess forces. The male part was incorporated into the wax pattern of the fixed partial denture, while the female part was integrated into the cast partial denture.

Figure 2. Preliminary impression

Figure 3. Wax trial with attachment

The metal copings for the fixed partial denture (FPD) were cast using the traditional lost wax method. Afterward, the copings were checked intraorally to ensure proper fit and accuracy at the margins (**Figure 4**). Following this, a pick-up impression was taken with the metal copings in place using elastomeric polyvinyl siloxane impression material (Photosil Impression Material, DPI Dental Products, Mumbai, India).

Figure 4. Intraoral metal try-in

After the metal copings were covered with ceramic material, the fixed partial denture (FPD) was put on the master cast and mounted on a dental surveyor to evaluate the insertion path for the cast partial denture. The pattern of wax for the partial denture was crafted using pattern resin, then invested and cast in the usual manner. Denture bases were formed for both the maxillary and mandibular arches, and a final jaw relation was saved and articulated. Teeth arrangement followed, and a wax trial was conducted to assess the occlusion, phonetics, and overall aesthetics. Once finalized, the maxillary partial denture and complete mandibular denture were processed (**Figure 5**). O-rings were put in the maxillary denture base, secured with a metal ring, to facilitate future replacement if wear occurs. During the cementation of the FPD, the cast partial denture was temporarily attached outside the mouth after applying petroleum jelly to the attachments. Glass ionomer cement was then used to make sure the correct insertion path for both the fixed and removable prostheses was used. Finally, the maxillary and removable mandibular dentures were inserted (**Figure 6**).

Figure 5. Prosthesis with extra coronal claspless attachment

Figure 6. Postoperative view

Rehabilitation of Kennedy's Class I and II cases can present significant challenges, primarily due to the characteristics of the supporting tissues. While implants are often seen as the ideal solution, they may not always be viable because of a patient's systemic health conditions [6-8]. Conventional cast partial dentures are another option, but they are often deemed aesthetically unappealing due to the visible metallic clasps. A more aesthetically pleasing and functional solution involves the use of semi-precision attachments, which not only improve the visual appeal but also serve as stress breakers. These attachments blend the benefits of both removable and fixed prostheses. The choice of attachment type depends on the available interocclusal space. This approach enhances the aesthetics, stability, retention, and support of the prosthesis, resulting in improved patient acceptance [9-12]. Moreover, it offers a non-invasive treatment option.

However, the fabrication of these attachments requires precision and skill. Correctly positioning the matrix and patrix components along the intended insertion path is essential for the success of the prosthesis [13, 14]. Processing dentures with such attachments can sometimes be complex, and manually creating the wax pattern for these components can lead to a loss of friction between the parts, resulting in a prosthesis with poor retention [15, 16]. In contrast, Rhein 83 OT cap attachments are prefabricated castable attachments that can be easily incorporated into the wax pattern of the coping and cast conventionally, improving the accuracy of the final prosthesis.

Conclusion

In cases of distal extension, the use of cast partial dentures with precision or semi-precision attachments offers the combined benefits of both removable and fixed prostheses. These solutions are visually appealing, leading to higher patient satisfaction and acceptance. While the fabrication process is technique-sensitive, the aesthetic drawbacks of traditional clasps are eliminated, and retention can be enhanced over time by simply replacing the retentive caps. Additionally, this approach serves as a more affordable option compared to implant-based surgical treatments.

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