

Technical Solutions for Complex Removable Partial Dentures Fabrication with Esthetic and Mechanical Considerations: Case Report

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Abstract

Daily clinical practice involves various solutions for the partial edentulism rehabilitation. Different designs of removable partial dentures (RPDs) were proposed. This report presented several complex RPD restorations. The possible options to restore partial edentulism using facet materials are proposed. The restorations were made by the same dental technician. The complex restorations include FPD and RPD with attachment CEKA extracoronal classic attachments. The veneers were made of indirect resin composite material and facet ceramics.

Keywords: Removable Partial Denture; Ceramics; Indirect Resin Composite Materials

Introduction

Daily clinical practice involves various solutions for the partial edentulism rehabilitation. Different designs of removable partial dentures (RPDs) were proposed. In majority of cases, RPD design depends on the remaining teeth and supporting residual tissues [1]. Patient's wishes have to be considered whenever treatment has to be planned. It's very important to find a compromise between patient's requests and demands of the current prosthodontics. Thus, many colleagues continue with searching for the best technical solution to restore different edentulism types [2]. Basically, this fact is associated with continual changing of technical protocols in design planning and fabrication of fixed (FPDs) or removable prostheses (RPDs). The design of prosthetic restoration regarding subjective patient satisfaction may be improved by introducing new ideas and technical details in RPD/FPD fabrication.

Case Report

Several complex RPD restorations were fabricated. The restorations were made by the same dental technician. The complex restorations include FPD and RPD with attachment CEKA extracoronal classic attachments.

In order to achieve improved esthetics and mechanical resistance on the occlusal and para-occlusal loads the bilateral distally extended unit located on one or both sides of FPDs close to free-end-saddle were extended like the wings composed of metal-ceramics. The winge/

wings are supported by CEKA attachment which connect FPD and RPD within complex (hybrid) removable partial dentures. Basically, two treatment modalities are proposed: mesially (anteriorly) extended unit as part of RPD skeletal design, composed of Artglass bonded to metal (Co-Cr-Mo alloy), and distally extended "semi-unit" composed of ceramic bonded to metal (Ni-Cr alloy). Thus, 2 systems were fabricated: one with indirect resin composite material (IRC) as composite facet-crown, and another one with glass-ceramics adhered on vestibular positioned metal base of distally extended wings (ceramic facet-veneer). The skeletal removable partial dentures and attachments were fabricated using conventional method for fabrication of RPD restorations. A protocol for fabrication was presented in figures.

Discussion

Contemporary esthetic dentistry includes different materials with improved mechanical properties. Previous prosthodontic treatments of subjects with the Kennedy 1 class partial edentulism and other forms of edentulousness where the absence of the frontal tooth/teeth exists, have guided by visible border between fixed and removable prostheses. This crossing line (zone) separates two dependent units, fixed and removable like intersection between two segments that leads to impaired esthetics. Thus two segments of dental arch can be noticed due to different materials and their physical characteristics. Another problem of such restoration lay in the fact of placing acrylic tooth over the attachment. Further, therapeutic failure may be a consequence of decreased bonding between acrylic tooth and attachment. In addition, occlusal forces are predominant in the region of occlusion guided by the teeth of the zone where attachment was positioned. So, beside esthetics, the second adverse effect of such restoration is mechanical failure.

In this study three esthetic materials were included to upgrade frontal segment of the attachment body. At first, preparation of abutment teeth was done in patients with partial edentulisms (Figure 1). The following materials employed were: Vita 95 (Vita, Germany), Ceramko 3 Porcelain System (Dentsply Sirona, Canada) and Artglass (Heraeus Kulzer, Germany). Previously, Artglass showed improved mechanical properties due to presence of higher percentage of filler content (70%) with dominant irregular-shaped particles of Barrium silicate glass of 0.7 μm . In addition, multifunctional methacrylic acid ester as monomer was incorporated in resin matrix [3]. Whenever complex RPDs is planned, facets of Artglass can be satisfactory solution and showed advantages compared to acrylic tooth which has been usually placed on the top of attachment or around the attachment (acrylic tooth covers attachment). Unlike Artglass, Vita 95 ceramic and Ceramko 3 Porcelain System are proved to be leading glass ceramics regarding esthetics and mechanical properties but still very brittle [4,5]. In this report, these ceramics are the integral part of FPD blocks and therefore behave as one single unit. In this report the preparation of wax wings as distally extended FPD-units was done using wax technique following modelation of semi-circular anterior bridge in articulator (Figure 2 and 3). After positioning of attachments and milling in paralelometer, wax models were prepared for casting (Figure 4 and 5). Thus, we have the same material (Vita 95 or Ceramko or Ivoclar InLine) used for MK bridge and distally extended units. After obtained of the fixed casts (Figure 6) and standard impressions using 3M ESPE impression material plaster models were obtained, and transferred to master models. The modelling of skeletal construction using profile wax was performed. In the phase of modeling skeletal construction of RPDs additional modeling was performed to fabricate facet-crowns as parts of active prosthetic segments in RPD's design. The vestibular surface of facet crowns were covered using beads placed on the whole vestibular surface of wings in the facet-space to improve mechanical resistance and retention of Artglass. In addition, after RPDs cast were obtained the whole surfaces of facet crowns was covered using Artglass opaque material which is responsible for strong bonding between Artglass IRC and Co-Cr-Mo alloy (Figure 7-10).



Figure 1: A collage of clinical phases conducted in this study.



Figure 2: A modeling of fixed prosthesis in wax with CEKA classic resilient – M3OL694-RPR attachment placed in dental paralelometer.

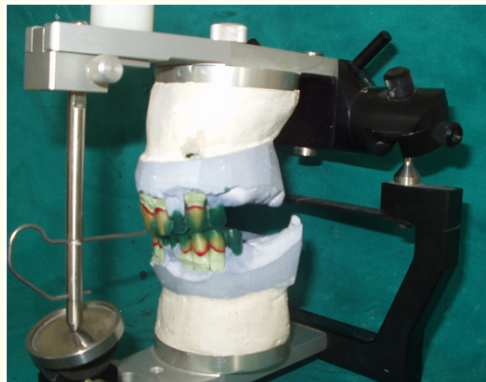


Figure 3: The occlusion and articulation were performed in Articulator Teleoptic Ziroskopi (Galenika, Serbia).



Figure 4: The preparation of wax-models for casting in the Rotax machine.



Figure 5: The wax models prepared for casting and placed on the conus.



Figure 6: The cast models obtained using Nickle Chrom alloy for porcelain to metal restorations I-Bond 02 Interdent.



Figure 7: A fixed partial denture made of Ivoclar InLine ceramic and ceramic facets from the same material in the position of right upper first premolar and left upper canine: Kennedy Class 1 partial edentulism before and after RPD fabrication.



Figure 8: FPD and RPD fabricated and prepared for determination of intermaxillary relations (centric relation). The FPD block and right upper second incisor is a facet crown made of Vita 95, and left upper second premolar was made of Artglass.



Figure 9: The complex removable partial denture with Ceramko porcelain fused to metal (left). The separated segment of complex RPD for better explanation of attachment system and Ceramko facets (right).



Figure 10: Another successful planning and designing of complex RPD with FPD block construction and Ceramko facets (right lower first premolar and Ceramko facet in the region of left lower first molar).

Conclusions

This report showed a possibility to fabricate two types of facets (veneers), IRC and ceramics in front of the vestibular surface of the CEKA attachment used for complex RPD (FPD-attachment-RPD) fabrication. It is suggested by authors to modeled ceramic-facets as the integral part of FPD block and IRCs as the extension of RPD-skeleton. Technically, two different facet-materials and methods for their application were presented in rehabilitation of partial edentulism using complex RPDs. These materials became segments of two independent prostheses units, whether FPD or RPD. In this way, prosthetic demands are satisfied due to achieved improved esthetics and mechanics of fabricated facets.

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