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CASE REPORT

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PROSTHODONTIC MANAGEMENT OF KENNEDY CLASS II/1 PARTIAL EDENTULISM IN THE LOWER JAW: A CASE REPORT

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The quality and number of remaining teeth, bone quality, feasibility of dental implant treatment, condition of the supporting tissues, and the patient's financial condition must be considered when planning prosthetic rehabilitation for partially edentulous patients. Herein, we report the prosthetic rehabilitation of a 59-year-old man with a unilaterally edentulous mandible, using a bar-and-precision-attachment system embedded in a cast partial denture. Metal-ceramic crowns were fabricated on the remaining teeth in the lower jaw, and the crowns on either side of the bounded saddle were connected using a bar. Additionally, two precision ball attachments were placed on the occlusal aspect of the bar. Distally, a precision ball attachment was placed towards the free saddle. Subsequently, cast partial dentures for the lower and upper jaws were fabricated. The patient was successfully rehabilitated, and orofacial functions were restored. At the follow-up examination 18 months after treatment, the patient had no complaints. The findings in this case show that rehabilitation of partially edentulous patients with cast partial dentures featuring an increased number of retention attachments leads to satisfactory orofacial prosthetic rehabilitation without altering the existing neutro-occlusal relationship of the teeth.

Keywords: cast partial denture, precision attachment, free saddle, edentulous space, Kennedy classification, cast denture

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INTRODUCTION

Partially edentulous patients frequently present with a unilateral free-end saddle and a bounded saddle in the posterior region on the contralateral side (1-3). In addition to the quality and number of remaining teeth in the jaw, the bone quality, the possibility of placing dental implants in the free-saddle region, the condition of the supporting tissues, and the patient's financial condition should be considered during planning the prosthetic rehabilitation of such patients. Herein, we report the prosthetic rehabilitation of a unilaterally edentulous mandible with a bar-and-precision-attachment system embedded in a cast partial denture.

CASE REPORT

A 59-year-old Caucasian man with previous experience of wearing removable partial prostheses was referred to our department from the oral rehabilitation. Anamnesis, clinical examination (inspection and palpation), and panoramic radiographic findings revealed partial edentulism in the upper and lower jaws, which resulted in other disorders of the orofacial system during swallowing, chewing, talking, facial expression, and other functions of the stomatognathic system. The edentulous spaces in the upper and lower jaws were classified as Kennedy class I and Kennedy class II/1, respectively.

The occlusal relationship of the patient's natural teeth and of the dentures he subsequently wore was Angle class I.

First, rehabilitation of the partially edentulous lower jaw was initiated. A preliminary impression of the lower jaw was made using alginate and a standard stock metal box-shaped tray, and a study model was fabricated using alabaster "soft" plaster. The study model was mounted on a semi-adjustable articulator and analyzed using a parallelometer. The patient refused implant placement in the free-end saddle in the lower jaw. Considering the patient's financial condition, the quality of the remaining solid dental tissues, and the type of partial edentulism, we determined that the best prosthetic rehabilitation for the lower jaw would be the fabrication of milled crowns on the abutment teeth connected with a bar and a cast partial denture (CPD). Next, an individual tray was fabricated on the study model for a definitive impression of the prepared teeth. The anterior teeth, premolars, and last remaining molar on the right side of the lower jaw were prepared. At the end of each preparation, demarcations were made in the form of half grooves (ISO 806 314 290 534 014 torpedo, ISO 806 314 199 534 016 and ISO 806 314 199 514 016 rotary diamond dental instruments-burs, NTI, Kahla, Germany) (4). Before making the impression, two retraction cords were placed in the sulci of all prepared teeth: a size 00 cord at the bottom of the sulcus and another size 0 cord above it (Sure-cord, knitted retraction cord, non-impregnated, Sure-endo, South Korea). The cords were moistened with Retrargin (Profarm, Beograd, Serbia) for gingival retraction (Figure 1A). Impressions of the prepared mandibular teeth and supporting tissues were made using the custom tray and addition silicone (Panasil® contact plus X-Light and Panasil putty, Kettenbach, USA). The impression was cast using plaster (HERA, Moldastone, CN), and removable dies were prepared. Wax models of fixed prostheses were constructed on the removable dies (Inlay wax Interdent, Slovenia; Red cervical wax Bego, Germany), and a milled bar (Bar Vario Soft Profilsteg, Bredent Group, Senden, Germany) was attached to bridge the saddle. Two ball-shaped precision attachments (Vario-Kugel-Snap vks-oc 1.7 Bredent Group, Senden, Germany) were placed on the occlusal surface of the bar using a parallelometer. The designed framework was milled in wax, and on the left side, an attachment matrix (Vario-Kugel-Snap vks-sg 1.7 Bredent Group, Senden, Germany, EU) was placed distally towards the free-end saddle using a parallelometer (Figure 1B). The metal skeleton was cast using an alloy (Remanium ®star, Dentaurum, EU) and returned to the master cast with dies. Thereafter, it was tried in the mouth (Figure 1C). After trying in the metal framework and taking a control bite in wax, the fixed components were sent to the laboratory for ceramic application and sintering in the esthetic zones of the restoration (Noritake Super Porcelain EX-3, Kuraray Noritake, Noritake Dental International, Japan). After ceramic firing, the fixed components were positioned on the model in the articulator (Amann Girrbach Artex Dental Semi-adjustable Dental Zinc alloy Articulator for preculate plaster model in scale, Germany, EU) and then directly tried in the patient's mouth (Figure 1D). The ceramics were then glazed in a furnace.

In the second phase, the glazed fixed framework was secured to the supporting teeth using a paste for temporary bonding (Tempbond non-eugenol temporary cement, Kerr Corporation, Orange, USA), and a pick-up impression of the partially edentulous lower jaw was made. After preparing the master cast and its duplications, a wax model of the CPD skeleton was created, invested, and cast. The cast skeleton was processed (Figure 1E), and

the skeleton and fixed framework were tried in in the patient's mouth (Figure 1F). A wax rim was created on the terminal saddle mesh, and the exact vertical dimension of occlusion was established. Thereafter, artificial teeth (Company—artificial teeth) were arranged on the skeleton, the waxed skeletal prosthesis with embedded teeth was tried in the patient's mouth (Figure 1G), and the waxed prosthesis was processed and prepared for delivery. In the delivery phase, the fixed framework was cemented (ITENA Total-Cem, UK), and the completed CPD was simultaneously inserted. At the 24-h follow-up, the patient was trained on separating the attachments and removing the lower CPD from the mouth.

After completing the rehabilitation of the lower dental arch, the treatment for restoring the partially edentulous upper jaw was initiated. An impression was made using additional silicone, and a framework was designed for the upper jaw. The exact vertical dimension of occlusion was re-established (Figure 1H, artificial teeth were set in wax (Acry-Rock RUTHINIUM, Veneto, Italy, EU), and the waxed denture was tried in. Thereafter, the wax denture was processed to obtain the upper CPD that was fitted in the patient's mouth (Figure 1I) (5).

Patient satisfaction and positive therapeutic effects were observed during the 18-month follow-up.

Figure 1. *A) Retraction cords in the sulci of the prepared mandibular teeth; B) Milled metal framework with matrixes of precise attachments in position; C) Try-in of the metal framework in the mouth; D) Try-in of the metal-ceramic framework in the mouth E) The metal skeleton separated from the metal-ceramic framework; F) Metal skeleton and metal-ceramic framework positioned in the mouth; G) Try-in of the waxed partial prosthesis in the mouth; H) Re-established exact vertical dimension of occlusion; I) Photograph 18 month after prosthetic rehabilitation with upper and lower cast partial dentures.*

DISCUSSION

Kennedy class II/1 partial edentulism represents a severe form of partial edentulism for which various therapeutic approaches can be considered. From a clinical perspective, this case report highlights two points (3).

First, despite the availability of advanced technology such as dental implants, the patient selected the "conventional approach" of a mobile restoration that is potentially inferior to conventional or implant-supported fixed restorations for the rehabilitation of his toothlessness.(6-10) This can be explained by the patient's poor financial condition, which did not allow him to choose implant placement in the partially edentulous jaw. Furthermore, the patient had a previous experience of wearing partial dentures, with which he was quite satisfied.

Second, some aspects of the presented prosthodontic solution for the patient's partial edentulism are debatable. In partially edentulous patients, a unilateral free saddle can lead to considerable discomfort due to insufficient cushioning or uncontrolled settling of the free denture saddle on the supporting tissue (11-14). This problem can be significantly alleviated by placing a dental implant in the edentulous region.(9,10) We attempted to significantly alleviate or eliminate the potential problem of the terminal free saddle settling on the large surface of the supporting tissues by installing two additional connecting attachments on the bar on the opposite side of the jaw (Figures 1C and 1D). Inserting a connecting attachment can strengthen the prosthesis structure and prevent settling of the free saddle of the prosthesis on the edentulous ridge (3).

However, selecting a suitable material that meets all these requirements was challenging. The hardness and strength of the alloy are two closely connected physical parameters that significantly affect the biomechanics of the terminal free saddle of the CPD (15-18). An increase in alloy strength is usually accompanied by an increase in hardness, and alloys that are too hard are usually undesirably brittle. Therefore, in this case, it was desirable to increase the alloy strength and decrease its hardness. Hence, the specified Remanium® star alloy was used to fabricate the framework of the lower partial prosthesis, as its estimated strength and hardness were satisfactory.

A skeletal prosthesis with an increased number of retention attachments achieves satisfactory prosthetic rehabilitation of the patient's orofacial system without changing the existing neutro-occlusal relationship of the teeth.

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Author Contributions

Conceptualization & investigation; Writing – original draft, review, & editing: SDP. The author has read and approved the published version of the manuscript.

Statement of Ethics

Written informed consent was obtained from the patient for publication of this case report and the accompanying images. All procedures were performed in accordance with the ethical standards of the institutional and national research committee and the 1964 Declaration of Helsinki.

Statement of Competing Interest

The authors declare no relevant conflicts of interest.

Statement of Data Availibility

All relevant data supporting the findings of this case report are included within the article. Additional information is available from the author upon reasonable request, in accordance with patient confidentiality requirements.

Statement of Generative AI Use

No generative AI was used.

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