Treatment of total edentulousness by fixed implant-supported prostheses

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CASE REPORTS

ABSTRACT

Total edentulousness presents considerable obstacles to patients in terms of aesthetics, function, and general well-being [1]. Fixed implant-supported prostheses have emerged as a possible treatment option, providing more stability, comfort, and chewing efficiency than typical removable dentures [2]. To obtain predictable and effective outcomes, it is critical to use good case selection, detailed treatment planning, and interdisciplinary teamwork [3]. Considerations for bone quantity and quality, occlusal systems, and maintenance methods are also highlighted in order to maximize long-term prosthetic success and patient happiness [4].

This case report presents the interdisciplinary management of implant-prosthetic treatment and demonstrates the effectiveness of dental implants in the oral rehabilitation of completely edentulous patients, with a focus on the all-on-six treatment approach.

Keywords: fixed prosthesis, full mouth rehabilitation, implants

INTRODUCTION

Prosthodontics is a specialised discipline of dentistry that focuses on the restoration and replacement of lost or damaged teeth and their supporting components [5]. Its major goal is to improve oral function, aesthetics, and general health through the use of different prosthetic treatments such as crowns, bridges, dentures, and dental implants. Dental prosthetics combines innovative vision with scientific precision to provide patients with long-lasting, comfortable, and visually appealing dental restorations, ultimately improving their oral health and quality of life.

Fully edentulous arches are now frequently restored using dental implants due to the widespread usage of these devices to replace missing teeth. Fixed or detachable overdenture prostheses can be used to perform full arch rehabilitation [6].

Through the years, a variety of methods, procedures, and materials have been developed to address the complicated challenges involved in treating resorbed jaws with dental implants while avoiding critical anatomical features. Shorter implants are used, as well as alveolar distraction osteogenesis, directed bone regeneration, intraoral and extraoral autogenous bone transplants, and nerve relocation. However, the high prices, lengthy time requirements, and inherent issues connected with these techniques frequently limit their broad application [7].
The All-on-X concept is a novel approach to full-arch dental rehabilitation, particularly for patients with substantial tooth loss or impaired dentitions [8]. It involves the strategic placement of dental implants to support a fixed prosthesis, typically consisting of a full set of teeth. Fixed implant restorations are a viable treatment option for completely edentulous patients. Long-term clinical studies have demonstrated that this form of oral rehabilitation can be effective for many years. According to Agliardi and colleagues, six implants can be considered a predictable, cost-effective, and time-efficient solution for rapidly restoring completely edentulous dental arches, avoiding bone grafting treatments. The all-on-six treatment approach demonstrates the best biomechanical behavior and represents a viable option for atrophic jaw rehabilitation [9].

CASE REPORT

A 48-year-old patient sought specialized consultation at the Clinical Center for Dental Medical Assistance of “Titu Maiorescu” University, Faculty of Dental Medicine reporting difficulties in chewing, speaking, and dissatisfaction with aesthetic appearance. The patient exhibited subtotal edentulism across both dental arches and requested fixed prosthetic treatment.

The patient disclosed a medical background of hypertension, under the management of a cardiologist, and was currently taking Furosemide 40mg and Sortis 20mg medications.

Clinical examination (Figure 1) revealed subtotal edentulism in both maxilla and mandible, with loss of vertical dimension of occlusion. The remaining teeth exhibited significant mobility and coronal fractures.

Paraclinical examinations revealed:

- Radiographically: bone resorption with loss of dental support structures and apical reactions to the remaining teeth.
- Laboratory analyses: LDL cholesterol 150mg/dL, C-reactive protein 2mg/L (with other values within normal parameters).
- Blood pressure: 135/85 mmHg at the initial consultation.

Throughout the consultation, the patient denied any allergies and reported smoking habits (2 packs/day). Subsequent to a comprehensive discussion outlining various treatment modalities, the patient consented to a complete oral rehabilitation involving the placement of 6 implants in the upper arch and 6 implants in the lower arch, followed by fixed prosthetic restorations.

During the initial phase of treatment, the remaining teeth (1.3, 2.3, 3.3, and 3.4) were preserved and treated to facilitate the use of a provisional prosthetic solution until the complete implant osseointegration, anticipated within a period of 6 months.

Following meticulous 3D virtual planning, data pertaining to the optimal positioning and inclination of the implants were meticulously analyzed. This analysis facilitated the fabrication of template surgical-precision resin cylindrical guides featuring titanium perforations (Figure 2), fixed and stabilised with the help of fixation screws, ensuring precise implant placement during the surgical procedure for the maxilla [10]. The surgery was performed under local anesthesia, were placed 6 implants for the upper jaw in the regions 15, 14, 12, 22, 24, 26 and 6 implants for the lower jaw in the regions 46, 44, 42, 31, 34, 36.

The sutures were removed two weeks postsurgery, followed by the provisional removable denture delivered to the patient four weeks thereafter. Following implants insertion, a six-month interval was allocated for osseointegration. The implant sites were examined to ensure full healing and for evidence of irritation. Second-stage surgery was performed and healing abutments were placed. Scan abutments were positioned into the implants to enable a digital impression for fabrication of a provisional PMMA prosthetic structure. This provisional restoration was retained in the oral cavity for three months, allowing tissue healing subsequent to the extraction of the remaining teeth.

**FIGURE 1.** The initial intraoral situation. A. Occlusal view – maxilla; B. Occlusal view – mandible
After 3 months from the extraction of the remaining teeth the provisional prosthetic restoration was removed.

One of the most important aspects of implant prosthodontics is transferring the implant location from the mouth to the final cast. To establish a passive fit of the prosthesis, a correct implant impression is critical since variations might generate both biologic and technological problems [11].

Primary impression was taken with irreversible hydrocolloid and primary casts were poured upon which custom-made open trays were fabricated. Open tray coping abutments were then connected intraorally to the multi-units and splinted into a verification jig using dental floss and pattern resin. After the setting time, the verification jig was separated into multiple sections in order to reduce polymerization shrinkage of the acrylic resin. Then same resin (in a smaller amount) was used to fill the gaps between separated segments, this way generating a lower contraction. Functional impression was performed with a polyvinyl siloxane putty and light body impression material (addition silicone) using wash technique (Figure 7) for the fabrication of the master cast.
The final full arch prostheses, made out of monolithic Zirconia, were clinically verified with one screw test for passive fit. Final tightening was done with recommended torque. The screw access holes were sealed with teflon tape and resin composite.

**DISCUSSION**

Dental implantology has lately seen a dramatic and exciting transition, fueled by technical developments that are driving the subject into new areas of research [12]. Implant-supported prostheses provide alternatives for correcting complex edentulous circumstances that are often impossible to achieve with traditional prostheses [13].

Numerous clinical studies and systematic reviews have demonstrated the high predictability and success rates of dental implants in the treatment of edentulous patients. For instance, a meta-analysis by Pjetursson et al. reported cumulative
implant survival rates of 95.6% for fixed implant-supported prostheses in the edentulous maxilla and 97.3% in the edentulous mandible after 10 years of follow-up [14]. These findings underscore the reliability and long-term stability of implant-supported prostheses as a treatment modality for complete edentulism.

While implant-supported prostheses offer excellent outcomes, they are not without challenges. In his study, van Steenberghe confirmed that prosthetic and implant-related complications, such as screw loosening, prosthetic fracture, and peri-implantitis, can occur and compromise treatment success. Factors such as inadequate bone volume, improper implant positioning, and occlusal overload may contribute to these complications. Therefore, meticulous treatment planning, precise surgical execution, and diligent maintenance are essential to minimize the risk of complications and optimize long-term outcomes [15].

CONCLUSION

Given the manifold advantages and benefits associated with the All-on-X treatment protocol, particularly when combined with guided implant placement and restoration, we confidently advocate for its consideration as a viable alternative for the comprehensive rehabilitation of edentulous jaws.

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