CASE REPORT

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Implant-prosthetic rehabilitation using all on six concept – Case Reports.

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Abstract
Introduction: Periodontal disease has become a global health concern, affecting 20-50% of the population and negatively affecting the patient's quality of life by compromising function and aesthetics through rapid tooth loss. The implant prosthetic all on six concept offers a promising solution for rehabilitating these patients with fixed restorations immediately after tooth extractions. **Case Presentation:** Our manuscript presents two maxillary full-arch rehabilitation cases using the all on six concept. Both patients (female and male, 45 and 49 years) with chronic periodontal disease background were treated similarly: clinical and radiological examination; diagnosis; Cone bean-computed tomography examination for accurate treatment planning; extractions of all the maxillary teeth with pathological mobility; immediate implant placement (six implants) with a torque at least 35 N/cm; attachment of straight and angulated multiunit abutments torqued with 25 N/cm; PMMA provisional restorations (facilitated by enhanced primary stability); control radiographs after the osseointegration period (six months), and the realization of the screw-retained final restorations (zirconia-ceramics in case of the female patient and metal ceramics for the male patient); occlusal adjustments; periodic follow-up. **Conclusions:** Post-extraction implant placement and temporary restorations inserted in both full-arch rehabilitation cases improved masticatory function and enhanced physical appearance, increasing the quality of life. Achieving well-adapted and integrated prosthetic works requires thorough analysis and design. The all on six systems are a reliable alternative for complete dentures.
Keywords: all-on-six, implant-prosthetic, zirconia ceramics, metal ceramics, titanium.

Introduction

The incidence of periodontal disease has significantly increased in the last decades. This condition can occur in patients of all ages [1,2], affecting 20-50% of the global population in the past decades [3] and becoming a global health problem nowadays [2,4]. Most of the time, this disease, with aggressive progression, leads to massive tooth loss and edentulism. The rapid evolution of the disease can psychologically affect the patients, especially when healthy teeth are lost. Tooth loss due to massive alveolar bone resorption results in consequent physiognomic and functional disorders, making difficult the rehabilitation treatment [5]. The aesthetic and functional rehabilitation of the edentulous patient has been a concern for clinicians, creating the premises for the development of dentistry. The emergence and the continuous development of dental implants opened new perspectives and treatment solutions for edentulous patients when a removable prosthesis was undesired, refused, or ineffective [6]. Branemark laid the foundations for modern implantology by introducing endosseous implants made from biocompatible titanium and the concept of osseointegration [7,8]. These implants have gained popularity, enabling rehabilitation through fixed or removable (overdenture) prosthetic works [9,10]. The appliance of fixed prosthetic restorations following the insertion of four or six implants in the edentulous arches can be considered one of the most attractive treatment options for patients, resulting in superior biomechanical behavior than dentures [11,12]. Despite all this, contradictory data can be found in the literature regarding the effect of the patient`s periodontal background on the survival of dental implants. Periodontal disease is considered one of the major risk factors for implant failure [13]. Implant survival in severe periodontitis backgrounds can be conditioned by long transmucosal abutments or natural antagonist teeth [14].

This case report aims to present two implant-prosthetic maxillary rehabilitation of patients

with periodontal disease using the all-on-six concept.

Informed Consent

The patients gave informed consent for the clinical steps of the implant-prosthetic treatments and the publication of this paper. No experimental procedures were performed during the patient's rehabilitation. All the materials or equipment used were compliant, available from standard dental providers, and used in daily clinical practice. The case report was conducted according to the guidelines of the Declaration of Helsinki.

Case Presentation

Case 1

A 45-year-old female patient with pathological dental mobility, compromised aesthetics, and chewing difficulty presented for oral rehabilitation. Intraoral and radiological examinations were performed to establish the diagnosis. The intraoral examination revealed a maxillary and mandibular metal ceramic bridge with periodontally compromised abutments. The periodontal pocket depth and the Löe-Silness gingival index were recorded. The panoramic X-ray showed an advanced bone resorption. Based on the clinical examination and the radiological findings, the diagnosis of chronic periodontal disease was established. The possible treatment options were exposed and explained to the patient, who refused the rehabilitation with a denture, as it was not sure that it would have adequate stability and retention, therefore she desired a fixed implant-prosthetic restoration. A new CBCT examination was necessary to develop a complex rehabilitation plan consisting of bridge removal, extraction of all abutments (1.5, 1.2, 1.1, 2.2, 2.4, and 2.5), and immediate post-extraction implant placement (six maxillary implants). **Figure 1**. shows the planned positions of the six implants according to the bone quantity and quality. The clinical procedure consisted of an interdisciplinary approach.

Surgical procedure: Prophylactic antibiotic therapy preceded the surgical procedure performed under local anesthesia by a dentoalveolar surgeon with competency in implantology. After the tooth extraction, a full-thickness vestibular mucogingival flap was reflected. The implants were inserted with the desired parallelism and angulation (in mesiodistal and labiolingual directions) using successive drills and parallel pins under saline irrigation and suction. The insertion torque was at least 35 N/cm. After the implant placement, the mucogingival flap was sutured tension-free, and the multiunit abutments were screwed to the implants with 25 N/cm torque. The quality of the bone support and the atraumatic surgery (tooth extraction and the preparation of the neo alveoli by under-drilling) resulted in optimal primary stability (insertion torque higher than 35 N/cm), allowing immediate loading. The sutures were removed after ten days.

Prosthodontic approach: The open tray technique (one step) was used for impression taking using elastomeric materials (A-silicone). After 48 hours, a screw-retained provisional PMMA (poly (methyl methacrylate) restoration was attached to the multiunit abutments to restore function and aesthetics during the osseointegration period (**Figure 2**). The marginal fit of the interim restoration was checked. The occlusal contacts were verified and adjusted rigorously until they were equilibrated.

After six months of osseointegration, a new control radiograph was performed, and the final restoration was done. Following the removal of the provisional restoration, the impression of the implants was made using the open tray technique, with splinted impression copings. For enhanced precision, the rigidity of splinting was necessary (**Figure 3**). A custom tray was used to record the position and angulation of the implants with the multiunit abutments. The same vertical dimension and centric relation were recorded as with the provisional restoration. Zirconia-ceramic implant-supported fixed restorations were

digitally planned on a titanium frame with multiple abutments (**Figure 4a**). After the try-in of the titanium frame, a new interocclusal record was done, and the shade of the restoration was defined (A1). The dental technician covered the titanium frame with a bright opaquer (**Figure 4b**) to allow the realization of full aesthetic final restorations from zirconia ceramics (A1). These aesthetic crowns with palatal and occlusal holes for the retaining screws of the final restoration were cemented on the abutments of the titanium frame (**Figure 5a**) by the dental technician. The final restoration was screwed through the multiunit systems with 20 N/cm torque, ensuring superior aesthetics (**Figure 5b**). The holes were covered with composite material. The final occlusal adjustments were made for uniform distribution of occlusal forces. The scheduled regular follow-ups of the patient were set to three months, six months, and yearly.

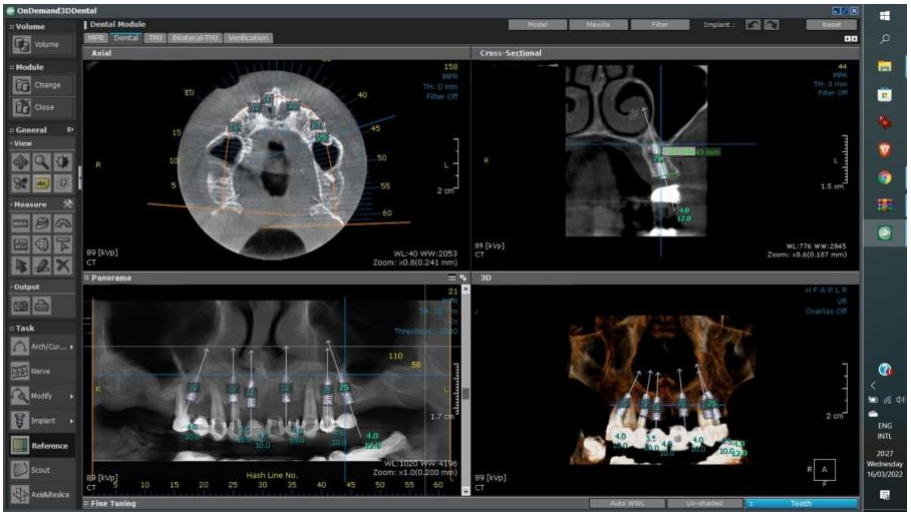

Figure 1. Implant insertion planning on the CBCT.

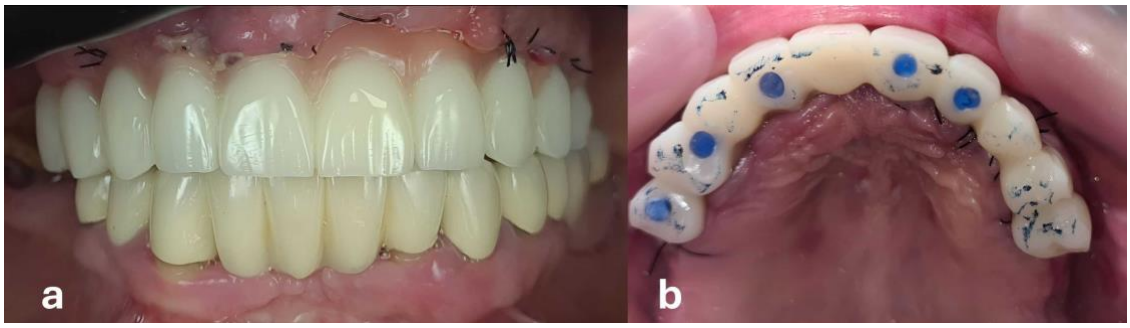

Figure 2. PMMA provisional restorations: (a) aesthetic and (b) functional rehabilitation during the osseointegration

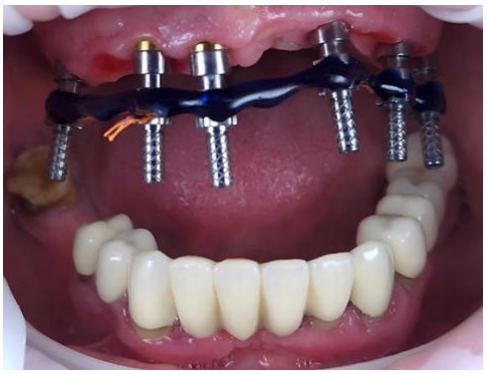

Figure 3. Splinted impression copings for the open-tray impression

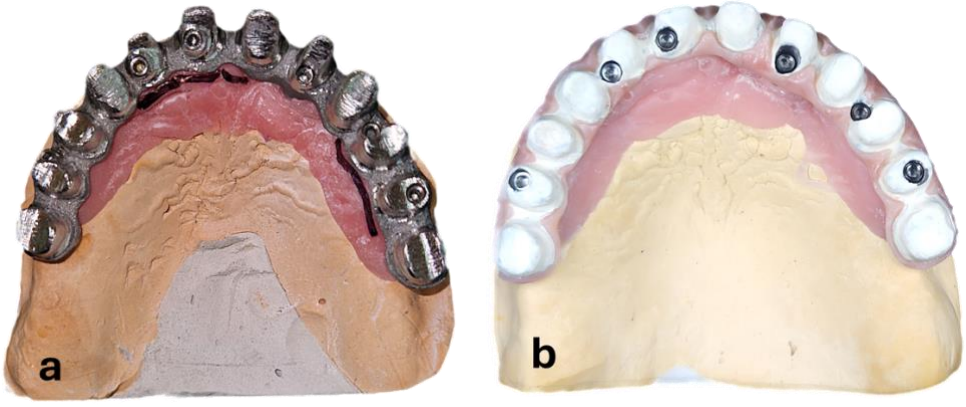

Figure 4. The working cast: (a) titanium frame with multiple abutments; (b) titanium frame with a bright opaquer

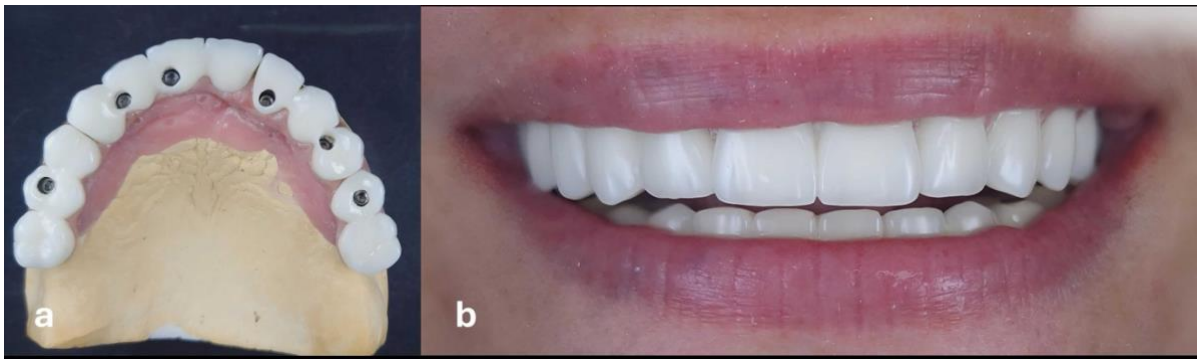

Figure 5. The final restoration: (a) palatal and occlusal holes for the retaining screws; (b) the screwed aesthetic restoration after fixation

Case 2

The second case involves a 49-year-old male patient with advanced chronic periodontal disease requiring rehabilitation of the maxillary arch to improve self-confidence and life satisfaction. The clinical diagnosis was established based on clinical and radiological examinations. The possible treatment options were presented to the patient, who considered that the best choice for his status was a fixed implant-prosthetic approach. CBCT imaging (**Figure 6**) helped establish the treatment plan: multiple tooth extractions and immediate implant placement. A five-day preventive antibiotic therapy was implemented one day before the surgery.

Surgical procedures: Tooth extractions were performed under local anesthesia, followed by the preparation of the alveolar sockets for the implants following the same protocol as in the first case. The implant placement ended with the attachment of the straight and angulated

multiunit abutments (**Figure 7**) to each implant. The insertion torque of the implants and the multiunit abutments was the same as in the first case. The sutures were removed after ten days.

Prosthodontic approach: Due to the optimal primary stability (higher than 30 N/cm), a provisional fixed prosthesis (PMMA) was realized 48 hours after surgery to enhance the patient's quality of life during the healing period (**Figure 8**). The occlusal relations were carefully examined and adjusted until multiple, symmetric, and simultaneous contacts were obtained without interferences. After six months, the osseointegration was confirmed radiologically, and the impression was made using a custom open tray and elastomeric impression materials (A-silicone) as in the first case. The impression copings were splinted for accuracy and rigidity, contributing to a high-quality impression. The facebow registration and interocclusal records were used to articulate the casts.

An implant-supported, screw-retained, fixed metal-ceramic restoration was digitally planned. The metal frame was performed with palatal and occlusal holes for the fixation screws. The intraoral try-in confirmed the proper adaptation of the framework. After the try-in, the new interocclusal record was performed with A silicone bite registration material. The color of the ceramic material was determined (A3). The final restoration was applied intraorally, and the screws were tightened using a dynamometric key with a torque of 20 N/cm. After the screws were fixed the access holes were closed with composite material. Masking the holes was more difficult than in the first case due to the dark color of the metal structure. New occlusal adjustments were performed to the restoration (**Figure 9**). The patient was instructed to maintain correct oral hygiene. The scheduled regular follow-ups were set for three months, six months, and yearly.

Figure 6. Initial situation on the CBCT

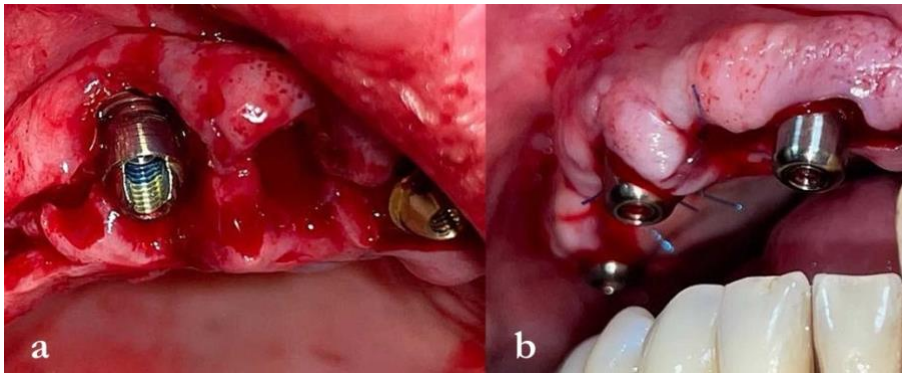

Figure 7. Surgical procedure: (a) multiunit abutment placed on the implant; (b) healing abutment placed on the multiunit abutment

Figure 8. PMMA provisional restorations: (a) aesthetic and (b) functional rehabilitation during the osseointegration

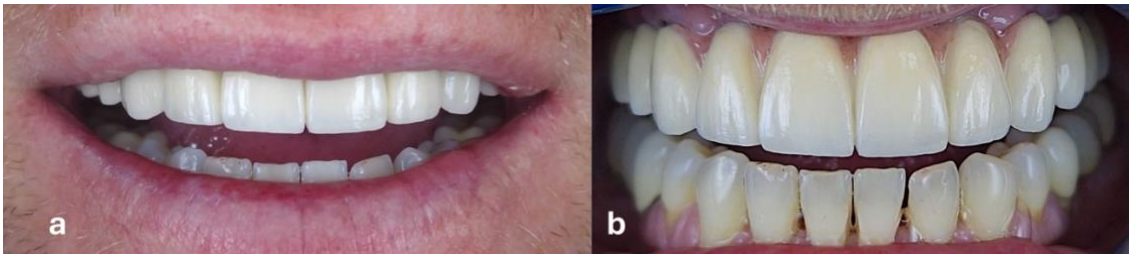

Figure 9. Final metal-ceramic restoration screwed to the multiunit abutment: (a) extraoral view; (b) intraoral aspect.

Discussions

Cone beam-computed tomography is essential for implant-prosthetic rehabilitation, becoming mandatory during the planning process [15]. All-on-four therapy is indicated for rehabilitating edentulous dental arches with limited bone support, offering shorter treatment time and significantly increasing quality of life [16,17]. However, the presence of distal extensions results in an uneven distribution of forces, leading to complications in the prosthetic works and around the implants [18,19]. The development of the all-on-six systems surpasses the unfavorable effects of the cantilever, screw loosening, and implant overload, offering effective prosthetic rehabilitation with a uniform distribution of the masticatory forces and superior aesthetics [20]. These all on six systems are considered less stressful than the all-on-four systems

[22,23]. According to Bhering et al [21], in moderate bone loss of the jaws, as in our two cases, the best biomechanical behavior is obtained without cantilever elements. The multiunit abutments were used to unify prosthetic work's insertion path by correcting the implants' divergence [15], simplifying the restorative procedure. In addition, the all on six restorations demonstrated superior hygiene conditions, one of the most important patient-related factors in peri-implant bone maintenance. Furthermore, modern prosthetic restorations and techniques (sintering or CAD-CAM techniques) allow the fabrication of more precise, well-adapted restorations, increasing the implant survival rate and reducing local inflammation or periimplantitis [24,25]. The early placement of the provisional restoration in the presented cases was conditioned by the immediate implant stability [26], reduced the treatment time, improved aesthetics during healing, and, reduced the alveolar bone resorption [27]. Numerous studies affirmed the long-term success of these treatment approaches [28-30]. The two patients presented in this manuscript benefited from personalized rehabilitation, resulting in a natural smile and a better quality of life [30].

Conclusions

Post-extraction implant placement and temporary restorations inserted in both full-arch rehabilitation cases improved masticatory function and enhanced physical appearance, increasing the quality of life. Achieving well-adapted and integrated prosthetic works requires thorough analysis and design. The all on six systems are a reliable alternative for complete dentures.

Conflict of Interests: None to declare.

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