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Comprehensive Full Mouth Rehabilitation Utilizing Dental Implants and Natural Teeth: A Case Report

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ABSTRACT

Edentulism poses significant functional, aesthetic, and psychological challenges, particularly in older patients and in regions where access to advanced surgical procedures may be limited. Full-mouth rehabilitation using dental implants is an effective treatment option; however, extensive implant placement and adjunctive surgical procedures are not always feasible. This case report describes a hybrid full-mouth rehabilitation approach combining implant-supported prostheses with the strategic retention of natural mandibular teeth. A 65-year-old male patient presented with complete maxillary edentulism and partial mandibular edentulism. Eight implants were placed in the maxilla and two implants in the mandible, while six remaining mandibular teeth were preserved through endodontic treatment and post-core restoration to support the final prosthesis. Digital imaging, cone-beam computed tomography, and guided treatment planning were used to optimize implant positioning and prosthetic design. The definitive restorations achieved stable osseointegration, satisfactory occlusion, improved mastication, and favorable aesthetic outcomes. The patient reported a marked improvement in oral function and quality of life during follow-up evaluations. This case highlights the clinical feasibility and benefits of a hybrid rehabilitation strategy that integrates dental implants with preserved natural teeth, reducing surgical complexity while maintaining functional and biomechanical stability. Such an approach may represent a practical and cost-effective alternative for managing complex edentulism, particularly in patients with anatomical, medical, or resource-related limitations.

Keywords: Edentulism, Full-mouth rehabilitation, Dental implants, Hybrid prostheses, Resource-limited settings, Implant-supported restoration, Oral health innovation, Patient-centered care.

1. Introduction

Edentulism, the loss of teeth, profoundly impacts oral health, functionality, and psychological well-being. It disrupts essential functions, such as mastication, speech, and aesthetics, often diminishing quality of life (1,2). Among affected individuals, partial and complete

edentulism is not merely a clinical issue, but a public health concern, particularly in resource-limited regions where access to advanced dental care remains inadequate (3,4). The prevalence of edentulism increases with age and is often associated with socioeconomic disparities, limited healthcare access,

and poor oral hygiene practices. These challenges necessitate innovative approaches to oral rehabilitation that are both effective and adaptable to diverse clinical and resource settings (5).

Full-mouth rehabilitation with dental implants is a widely recognized solution for addressing edentulism. Implant-supported prostheses offer superior functionality and aesthetics compared to removable dentures, providing patients with long-term stability and comfort (6). However, traditional approaches to full-mouth rehabilitation often involve complete reliance on implants, necessitating extensive surgical interventions, such as sinus augmentation, guided bone regeneration, or immediate loading protocols (7). While effective, these procedures may not always be feasible or cost-effective for patients in regions with constrained healthcare infrastructure. This case report explores an alternative approach that combines the use of implant-supported prostheses with the strategic retention of natural teeth, offering a novel and practical solution in complex edentulism cases (8).

The retention of natural teeth in prosthetic rehabilitation has been shown to provide several benefits, including preserving alveolar bone, maintaining periodontal health, and improving the stability of prosthetic components (9,10). Studies have emphasized that retaining even a few natural teeth can significantly enhance the long-term outcomes of rehabilitation procedures by maintaining proprioceptive function and reducing the mechanical load on implants (11-13). In this case, the combination of natural teeth and implants allowed for a more conservative approach to treatment while ensuring optimal functional and aesthetic results. This hybrid strategy is particularly relevant for regions with limited access to advanced technologies, as it minimizes the need for complex surgical interventions without compromising treatment quality (14,15).

The integration of advanced technologies, such as cone-beam computed tomography (CBCT), virtual treatment planning, guided implant surgery, and CAD/CAM prosthetic fabrication, has improved the precision and predictability of full-mouth rehabilitation procedures (9,13,15). However, reports describing hybrid rehabilitation approaches that combine implant-supported prostheses with the strategic preservation of natural teeth remain limited, particularly in resource-constrained clinical settings. In the present case, the

retention of six mandibular teeth helped preserve proprioception and biomechanical stability while reducing the need for extensive surgical interventions. This case highlights the importance of individualized treatment planning and interdisciplinary collaboration in managing complex edentulism and demonstrates how advanced digital techniques can be integrated with conservative clinical strategies to achieve favorable functional and aesthetic outcomes.

2. Case Presentation and Clinical Procedures

2.1 Patient Information and Diagnostic Assessment

A 65-year-old male patient presented to the Prosthodontics Department of Tehran Medical University Hospital seeking comprehensive full-mouth rehabilitation. The patient presented with complete maxillary edentulism and partial mandibular edentulism, with six remaining natural teeth in the mandibular arch. The patient reported difficulty in mastication, reduced oral function, and dissatisfaction with aesthetic, which had negatively affected his quality of life and motivated him to seek definitive oral rehabilitation.

The patient's medical history was thoroughly reviewed before treatment planning. No significant systemic diseases, medication use, allergies, or conditions contraindicating implant surgery were reported. The patient was a non-smoker and did not present with any relevant medical conditions that could compromise osseointegration or prosthetic rehabilitation. His dental history revealed advanced periodontal disease and extensive dental caries, which had resulted in progressive tooth loss over several years. The maxillary arch had been completely edentulous for approximately five years before implant rehabilitation, while several compromised mandibular teeth remained at the time of treatment planning.

A comprehensive clinical and radiographic examination was performed, including intraoral assessment, panoramic radiography/orthopantomography (OPG), and cone-beam computed tomography (CBCT). The initial intraoral clinical presentation demonstrated complete maxillary edentulism and partial mandibular edentulism prior to definitive prosthetic rehabilitation (Figure 1). The OPG and CBCT examinations were used to evaluate the available bone height and width, bone quality, proposed implant sites, and the relationship of the planned implants to important anatomical structures,

including the maxillary sinus and the inferior alveolar nerve.

Radiographic evaluation confirmed the feasibility of implant placement in the maxillary arch at positions 12, 13, 14, 16, 22, 23, 24, and 26, and in the mandibular arch at positions 36 and 46. The remaining mandibular teeth were diagnosed as compromised, but restorable and were planned for endodontic treatment followed by post-core restoration before definitive prosthetic rehabilitation. Based on the clinical and radiographic findings, the final diagnosis was complete maxillary edentulism and partial mandibular edentulism associated with previous periodontal disease and extensive dental caries.

The treatment plan was designed as a hybrid full-mouth rehabilitation approach combining implant-supported prostheses with strategic preservation of the remaining mandibular natural teeth. This plan aimed to restore masticatory function, aesthetics, occlusal

stability, and patient comfort while reducing the need for extensive surgical procedures. Ethical approval for this case report was obtained from the Institutional Review Board of Tehran Medical University. Written informed consent was obtained from the patient for treatment, clinical documentation, and publication of clinical photographs and case details.

2.2 Treatment Planning

Based on the clinical and radiographic findings, a comprehensive full-mouth rehabilitation plan was established. The treatment plan was designed to restore function, aesthetics, occlusal stability, and patient comfort while preserving the remaining mandibular natural teeth whenever clinically feasible. The initial intraoral condition of the patient, including complete maxillary edentulism and partial mandibular edentulism, was used together with radiographic findings to guide the treatment plan (Figure 1).



Figure 1: Initial intraoral clinical presentation demonstrating complete Maxillary edentulism and partially edentulous mandibular arch prior to definitive prosthetic rehabilitation

The panoramic radiograph and CBCT assessment were used to evaluate available bone volume, implant angulation, and the relationship of the proposed implant sites to vital anatomical structures. Eight implant sites were planned in the maxillary arch at positions 12, 13, 14, 16, 22, 23, 24, and 26, while two implant sites were planned in the mandibular arch at positions 36 and 46, corresponding to the mandibular first molar regions. The implant distribution was selected to provide adequate support for the definitive prostheses while minimizing the need for more extensive surgical procedures, such as sinus augmentation or guided bone regeneration.

The six remaining mandibular teeth were considered strategically important for the final rehabilitation. These

teeth were planned for preservation to support the mandibular prosthesis, maintain proprioceptive function, improve biomechanical load distribution, and reduce the number of implants required. However, due to their compromised condition, endodontic treatment followed by post-core restoration was planned before the definitive prosthetic phase.

The final prosthetic plan consisted of an implant-supported fixed prosthesis in the maxillary arch and a hybrid mandibular prosthesis supported by both implants and retained natural teeth. This combined approach was selected to provide functional stability, improve mastication, enhance aesthetics, and achieve a conservative full-mouth rehabilitation outcome.

2.3 Endodontic and Pre-Prosthetic Preparation

Before proceeding to the definitive prosthetic phase, the remaining six mandibular teeth were managed through endodontic and pre-prosthetic preparation. Root canal therapy was performed for the retained mandibular teeth to eliminate pulpal or periapical pathology and prepare them for use as stable abutments in the final mandibular prosthetic rehabilitation.

Following completion of root canal therapy, post spaces were prepared, and post-core restorations were fabricated for the remaining mandibular teeth. The purpose of the post-core restorations was to reinforce the compromised teeth, restore adequate coronal structure, and provide suitable support and retention for the planned mandibular prosthesis.

After post-core placement, the mandibular teeth were prepared prosthetically to achieve proper alignment, path of insertion, interarch space, and prosthetic support. The prepared mandibular teeth were evaluated clinically to confirm their suitability for incorporation into the final hybrid mandibular prosthesis. This pre-prosthetic phase allowed the retained natural teeth to be integrated with the mandibular implants, contributing to improved stability, load distribution, and long-term functional performance of the definitive restoration (Figure 2).

2.4 Surgical Phase

Following completion of diagnostic assessment, treatment planning, and preparation of the remaining mandibular teeth, the surgical phase was initiated.

Guided implant surgery was performed using a prefabricated surgical stent based on CBCT-guided virtual treatment planning. This approach allowed accurate control of implant position, angulation, and depth while minimizing surgical trauma and avoiding vital anatomical structures, including the maxillary sinus and inferior alveolar nerve.

A total of ten dental implants were placed. Eight implants were inserted in the maxillary arch at positions 12, 13, 14, 16, 22, 23, 24, and 26, and two implants were inserted in the mandibular arch at positions 36 and 46. The implant positions were selected according to the available bone anatomy and prosthetic requirements to achieve favorable biomechanical support while reducing the need for extensive augmentation procedures.

Dental implants from the Neobiotech S-III Implant System were used in this case. Implant diameters ranged from 4.0 mm to 5.5 mm, depending on the available bone volume and the planned prosthetic design. Primary stability was achieved during implant placement, and the implants were positioned according to the prosthetically driven treatment plan.

After implant placement and healing, the healing abutments were removed, and suitable straight and angled multi-unit abutments were selected according to implant angulation, restorative space, and prosthetic path of insertion. Angled abutments were used in selected areas to improve the emergence profile and facilitate passive fit of the final prosthesis. The abutments provided a stable foundation for the subsequent prosthetic procedures (Figure 2).



Figure 2: Intraoral view highlighting the placement of multiple dental implants in the upper and lower jaws. Implant abutments have been affixed to the implants, providing a stable foundation for the subsequent prosthetic phases. This step is critical for achieving precise alignment and long-term functional success

2.5 Prosthetic Phase

After the surgical and healing phases, the prosthetic phase was initiated. The healing abutments were removed, impression copings were connected to the implants, and preliminary alginate impressions were

obtained for study casts and fabrication of custom trays. Custom impression trays were fabricated for both maxillary and mandibular arches to accurately record the implant positions and the prepared remaining mandibular teeth (Figure 3).



Figure 3: Custom impression trays used during the prosthetic phase

The custom trays were modified using an open-tray design to provide access to the impression copings during the definitive impression procedure. The impression copings were splinted to improve impression accuracy and minimize distortion. Definitive

impressions were then made using polyvinyl siloxane impression material. After complete polymerization, the impression copings were removed with the impression, and the impressions were carefully inspected for accuracy (Figure 4).



Figure 4: Definitive implant impressions obtained using an open-tray impression technique with splinted impression copings for the maxillary and mandibular arches during the prosthetic phase

Implant analogs were attached to the impression copings, and definitive working casts were fabricated using dental stone. These casts were used for prosthetic

planning, verification of implant positions, and fabrication of the prosthetic framework (Figure 5).

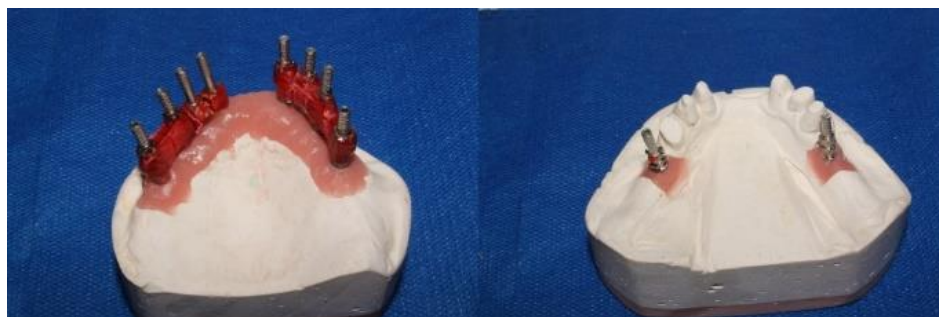


Figure 5: Definitive casts used for prosthetic fabrication

Occlusal rims were then fabricated to establish the

vertical dimension of occlusion (VDO) and vertical

dimension of rest (VDR). These records were used to determine the proper interarch relationship, facial support, phonetics, and functional occlusion. After verification of the maxillomandibular relationship, the records were transferred to a semi-adjustable articulator using a facebow transfer to reproduce the patient's mandibular movements and guide framework fabrication.

A metal-ceramic framework was designed for both

arches. The maxillary prosthesis was planned as an implant-supported fixed prosthesis, while the mandibular prosthesis was planned as a hybrid prosthesis supported by both implants and retained natural teeth. The metal framework was tried intraorally to verify passive fit, occlusal relationship, VDO, VDR, and interarch alignment before ceramic application (Figure 6).



Figure 6: Metal framework try-in during the prosthetic phase demonstrating verification of passive fit, occlusal relationship, vertical dimension of occlusion, and interarch alignment prior to definitive ceramic application

After confirming the framework fit, ceramic veneering was performed. The ceramic shade was selected using the VITA shade guide, and B1 was chosen according to the patient's aesthetic preference. A ceramic try-in was then performed to evaluate aesthetics, marginal adaptation, occlusion, phonetics, and patient satisfaction. After confirmation, glazing was completed to improve surface smoothness, durability, and aesthetic appearance.

In the final prosthetic phase, the selected implant abutments were secured according to the manufacturer's recommendation using a torque value of 30 Ncm. The torque was rechecked after approximately five minutes to ensure abutment stability. The definitive fixed

prostheses were then placed, consisting of a three-part prosthesis in the maxillary arch and a five-part prosthesis in the mandibular arch to accommodate both implants and retained natural teeth.

Temporary cementation was performed initially to allow clinical evaluation of occlusion, contact points, aesthetics, phonetics, patient comfort, and oral hygiene accessibility. After a 10-day observation period, the patient's satisfaction and functional adaptation were confirmed. The temporarily cemented restorations were then removed, cleaned, and definitively cemented for long-term function and stability. The final prosthetic outcome demonstrated satisfactory aesthetics, occlusion, and full-mouth rehabilitation (Figure 7).



Figure 7: Final prosthetic outcome following full-mouth rehabilitation

2.6 Follow-Up and Maintenance

Following placement of the definitive prostheses, the

patient was scheduled for regular follow-up visits at 10 days, 1 month, and 3 months. At the 10-day follow-up,

the patient's adaptation to the prostheses was evaluated, including occlusal contacts, mastication efficiency, phonetics, patient comfort, oral hygiene accessibility, and soft tissue response. No mechanical complications, occlusal discrepancies, or soft tissue irritation were observed. After confirming patient satisfaction and functional adaptation, definitive cementation was completed for long-term prosthetic stability (Figure 7).

At the 1-month and 3-month follow-up visits, clinical evaluation showed stable peri-implant and periodontal soft tissues, satisfactory occlusion, and favorable prosthetic function. The implant-supported maxillary prosthesis and the hybrid mandibular prosthesis supported by both implants and retained natural teeth remained stable. Clinical and radiographic evaluations confirmed successful osseointegration, absence of prosthetic complications, and maintenance of functional and aesthetic outcomes.

The patient was instructed regarding oral hygiene maintenance for both implants and retained natural teeth. Oral hygiene instructions included careful brushing around the prosthetic margins, use of interdental cleaning aids or super floss beneath the prosthetic components, and regular professional maintenance visits. The patient was also advised to attend periodic follow-up appointments to monitor peri-implant tissue health, periodontal status of the retained mandibular teeth, occlusion, prosthetic stability, and long-term function.

3. Discussion

This case report highlights the successful full-mouth rehabilitation of a 65-year-old male using a combination of implant-supported prostheses and retained natural teeth, showcasing a novel approach to managing complex edentulism. The integration of advanced imaging technologies, guided surgical techniques, and a hybrid treatment strategy underscores the potential for innovative solutions to address functional and aesthetic challenges, even in resource-constrained settings.

3.1 Significance of Combining Natural Teeth and Implants

The hybrid approach of combining natural teeth with implant-supported prostheses offers distinct advantages over conventional methods (10,11,14,15). By preserving natural teeth, the treatment minimized surgical interventions, reduced overall costs, and maintained

periodontal proprioception, which enhances the stability and functionality of the prosthesis. (12,13,16,17) This approach also helped preserve alveolar bone in the mandibular arch, reducing the risk of resorption commonly associated with fully edentulous cases (18-20).

Similar studies have demonstrated the clinical benefits of retaining natural teeth in rehabilitation procedures. For instance, Benic and Gallucci (2011) emphasized the importance of integrating natural teeth into implant-supported restorations to enhance prosthetic stability and maintain alveolar bone health (8,21,22). However, these studies are often limited to specific populations or clinical contexts, and few have explored this strategy in regions with limited access to advanced dental care. Our case contributes to this growing body of evidence by demonstrating the feasibility and effectiveness of such a hybrid approach in a low-resource setting.

3.2 Comparison with Standard Procedures

Standard approaches to full-mouth rehabilitation typically rely on implant-supported prostheses alone, often requiring extensive surgical procedures, such as sinus augmentation or guided bone regeneration to achieve optimal outcomes (23,24). While these methods are well-established and effective, they may not always be practical or affordable for patients in underserved regions.

In contrast, our method strategically retained existing natural teeth, reducing the need for complex surgical interventions and streamlining the rehabilitation process. This approach is particularly beneficial for older patients with systemic health concerns that may limit the viability of invasive procedures. Moreover, the use of advanced technologies, such as CBCT imaging and CAD/CAM fabrication, ensured precision in planning and execution, bridging the gap between traditional practices and contemporary innovations (25).

In the present case, the treatment plan was intentionally designed to minimize surgical invasiveness and avoid extensive augmentation procedures whenever possible. Careful CBCT-based evaluation of the available bone volume allowed strategic implant positioning within the existing anatomical limitations, thereby eliminating the need for sinus lift surgery and extensive bone grafting procedures. Prosthetically driven implant planning enabled optimal implant angulation and distribution to maximize biomechanical

support while preserving the remaining alveolar bone. In addition, the preservation of six mandibular natural teeth reduced the number of implants required and contributed to improved proprioception and load distribution. Compared with conventional fully implant-supported rehabilitation protocols, which frequently require sinus augmentation and guided bone regeneration in severely resorbed arches, this conservative hybrid approach reduced surgical morbidity, treatment complexity, overall treatment time, and financial burden while still achieving satisfactory functional and aesthetic outcomes. Similar findings have been reported in the literature, where strategically planned implant placement and tooth-implant-supported prostheses demonstrated favorable long-term clinical performance with reduced surgical intervention.

3.3 Clinical Implications and Contributions

This case report provides critical insights into the practical application of hybrid treatment strategies in dental implantology. It highlights the importance of personalized treatment planning, which considers both the patient's clinical needs and the regional healthcare context. Our findings suggest that hybrid approaches can:

- Improve access to care by minimizing surgical complexity and costs.
- Enhance long-term outcomes by leveraging the biomechanical and functional benefits of retained natural teeth.
- Serve as a viable alternative in settings with limited access to advanced surgical and prosthetic resources.

Furthermore, the integration of digital technologies in this case, such as CBCT imaging and CAD/CAM fabrication, demonstrates how technological advancements can be adapted to resource-constrained environments. By enhancing precision and efficiency, these tools help ensure predictable outcomes, even in challenging clinical contexts.

3.4 Limitations

While the outcomes of this case were favorable, several limitations must be acknowledged:

1. **Regional Accessibility:** The techniques and materials used in this case, including CBCT imaging and CAD/CAM fabrication, may not be readily available in many resource-limited settings. Efforts

to disseminate such technologies and train clinicians on their use are essential to replicate these results in similar contexts.

2. **Financial Implications:** Although the hybrid approach reduced the overall cost compared to a fully implant-supported prosthesis, it still required significant financial investment. Exploring cost-effective alternatives, such as locally manufactured materials or simplified workflows, could further improve accessibility.
3. **Follow-Up Duration:** The follow-up period for this case was relatively short, limiting the ability to assess long-term outcomes, such as implant survival rates, prosthetic stability, and patient satisfaction over extended periods. Future studies with longer follow-up durations are needed to confirm the durability of this approach.

4. Conclusions

This case demonstrates the potential of combining natural teeth and implant-supported prostheses for full-mouth rehabilitation, offering a practical and effective solution for managing complex edentulism. By addressing the unique challenges of resource-limited settings, it underscores the importance of personalized, multidisciplinary approaches in modern dental care. The insights gained from this case provide a foundation for further exploration and innovation in dental implantology, with the ultimate goal of improving patient outcomes and accessibility worldwide.

For similar cases, integrating advanced technologies, such as 3D imaging and virtual treatment planning, can greatly enhance the precision of implant placement, reducing complications and improving both aesthetic and functional results. Clinicians are encouraged to consider retaining natural teeth when feasible, as this can help preserve alveolar bone structure and improve the stability of the prosthesis.

Conflict of Interests

The authors declare that there is no conflict of interest regarding the publication of this case study.

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