

Full-Mouth Rehabilitation of a Generalized Periodontitis Patient Using Dental Implants

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ABSTRACT

Full-mouth rehabilitation with implant-supported prosthesis is not only the most sophisticated technique but also one of the most challenging topics in contemporary implant dentistry. Clinicians encounter challenges when providing oral rehabilitation to a patient who suffered considerable loss of alveolar bone and soft tissue as a result of severe periodontitis. A bone graft or gingival surgery is often needed when replacing loose natural teeth with a fixed prosthesis supported by dental implants. Here in this case report, a patient underwent full-mouth rehabilitation with an implant-supported fixed prosthesis. In this case, a 41-year-old male patient came with mobility in all teeth, and comprehensive periodontal treatment was performed as the first line of management; however, the patient showed no positive clinical response, indicating periodontal treatment failure. Poor oral hygiene care, smoking, alcoholism and uncontrolled diabetes mellitus worsened this case. There was persistent 3rd degree mobility, with 70% radiographic bone loss, and his HbA_{1c} was 10%. So, based on the 2018 classification of periodontitis, the patient's condition was in Stage IV & Grade C. Following attainment of adequate glycemic control (HbA_{1c} 5.5%), the treatment plan included cessation of tobacco and alcohol use and extraction of all teeth in both arches with immediate fixture placement from Osstem Implant System (Osstem Implant Co., Ltd., Seoul, South Korea), (13 implants; 6 implants on maxilla and 7 on mandible) followed by allograft bone (SureOss chip, Osstem Implant Co., Ltd., Seoul, South Korea) placement and successfully carried out to restore oral function and aesthetics.

Keywords: Dental implant, full-mouth rehabilitation, periodontitis, allograft.

INTRODUCTION

In order to provide retention and support for a fixed or removable dental prosthesis, a dental implant is implanted into the oral tissues beneath the mucosal and/or periosteal layer within the jawbone. One of the well-researched methods of treating partial or complete anodontia is dental implantation.¹ Complete rehabilitation with dental implants has strong success rates, which are strongly correlated with preoperative planning. A major issue with full-arch implant-supported prostheses is getting the passive fitting just right. After all screws have been tightened, a perfect passive fit is attained when the opposing surfaces of the implants and the framework intaglio are in maximum spatial congruency, with no strains in the components- as long as the implant and framework surfaces are made precisely plain.² The success of implant rehabilitation in the posterior jaw regions is influenced by various factors such as the location and extent of the edentulous area, the status of the remaining teeth, the patient's compliance with oral hygiene,

potential parafunctions, the state of the opposing arch, implant surface characteristics and bone regenerating capacity³⁻⁷ particularly the quality, height, and width of the residual bone⁸. Because of the strong masticatory pressures that have evolved in these locations, replacing missing parts with a regular or wide implant is the gold standard.⁹

The goal of current implantology guidelines is to achieve the best possible functional and aesthetic outcomes with prosthetic restorations. To get benchmark results, a number of characteristics have been proposed, including sufficient bone height, width, and sagittal projection; sufficient amount and quality of soft tissue; preservation of the buccal sulcus; and sufficient papillae and gingival contour. The use of short implants, vertical ridge augmentation techniques, or cantilever prostheses are some remedies for insufficient ridge height.^{10,11} While short implants have a similar short-term survival rate, other writers claim that their long-term effectiveness is less known, particularly in the posterior maxilla, where bone density is lower.¹² Vertical augmentation and cantilever prostheses increase patient injury, abutment loosening and less predictable outcomes, leading to the "All-on-Four" technique for rehabilitation in edentulous jaws.¹³

Clinical studies have shown that using only four implants for a complete fixed rehabilitation of the maxilla can be successful, but there is evidence to suggest that, for prosthetic treatment of the edentulous maxilla, using more implants may be advantageous because the stresses on most implants were lower in the "All-on-Six" planning than in the "All-on-Four" planning.¹⁴ In this case, we use "All-on-Six" in the maxilla and seven implants on the mandible. The purpose of this article was to report a case of full-mouth prosthetic rehabilitation on six endosseous implants on the maxilla and seven endosseous implants in the mandible. For these patients, we provided an implant-supported, fixed, screw-retained prosthesis that improved both their aesthetics and oral function.

CASE REPORT

A 41-year-old male patient visited our dental facility with loosening of all teeth in both arches for 1 year. He was an alcoholic, smoker and diabetic patient. On examination (Fig. 1), the patient revealed a straight face profile.

Figure 1: Extraoral feature of the patient shows a straight face profile.

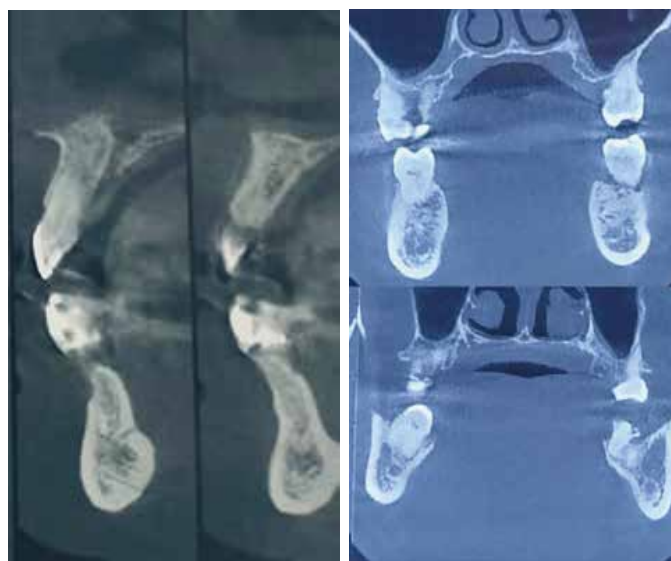


Figure 2: Intraoral features show class I malocclusion and gingival recession.



Intraoral features (Fig. 2) include class I malocclusion according to Angle's classification. Generalized Grade III tooth mobility and gingival recessions were observed.

Figure 3: CBCT shows bone condition.



Following thorough investigations by CBCT and Orthopantomogram, the decision was made to place six implants in the maxillary arch and seven in the mandibular arch. CBCT confirmed adequate bone quantity and quality. The ridge height and width were measured and found to be within normal clinical limits (Fig. 3).

And an orthopantomogram was done that showed teeth # 11, 13, 14, 15, 16, 17, 21, 22, 23, 24, 25, 26, 27, 31, 32, 33, 34, 35, 36, 37, 38, 41, 42, 43, 44, 45, 46, and 47 teeth were present and severe horizontal bone loss across all quadrant were observed (Fig. 4).

Figure 4: OPG shows generalized severe periodontitis with interproximal bone loss.



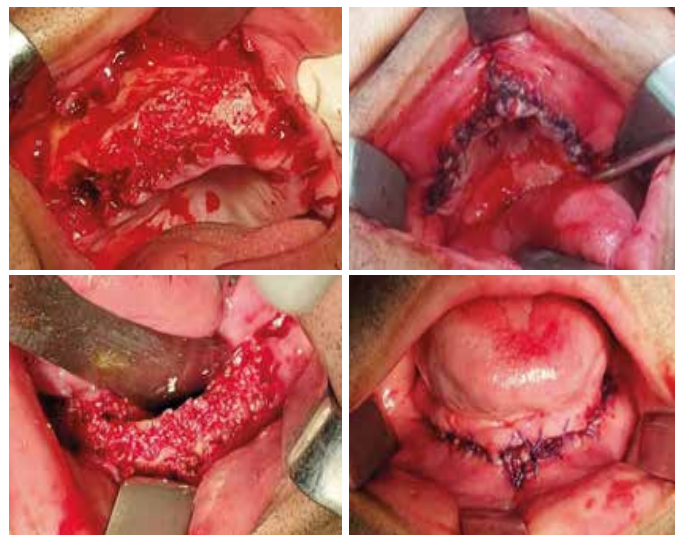
During preoperative surgical preparation, GA fitness tests were performed, and bite registration was obtained. By taking all aseptic measures, all teeth were extracted under general anesthesia, and all sockets were curetted. Then, implants were immediately placed after tooth extraction. The maxilla received six implants: right 1st molar (7x5mm), right 1st premolar (10.5x4mm), right lateral incisor (10.5x4mm), left lateral incisor (11.5x4.5mm), left 1st premolar (8.5x4.5mm) and left 1st molar (7x5.5mm). The mandible received seven implants and was positioned on left 1st molar (8.5x5mm), left 1st premolar (11.5x4mm), left canine (13x4.5mm), left lateral incisor (13x4mm), right central incisor (13x4mm), right 1st premolar (11.5x4.5mm), and right 1st molar (8.5x5mm) regions immediately after extraction (Fig. 5).

Figure 5: Implant fixture placement immediately after extraction.



A bone allograft was also placed in both the maxilla and the mandibular extracted socket, and the surgical wound was closed with 3-0 Vicryl. (Fig. 6).

Figure 6: All sockets were covered by bone allograft before the wound was closed with sutures.



After 1 day of postoperative instruction, the patient was discharged and asked to return in 7 days for follow-up. An orthopantomogram was also performed, which showed implant placement without abnormality (Fig. 7).

Figure 7: Seven days postoperative panoramic radiograph of implant placement.



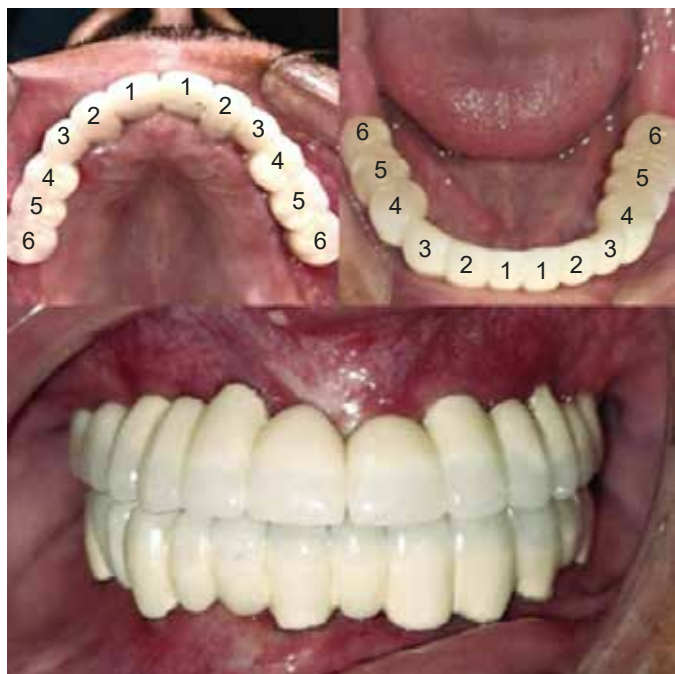
The patient was asked to come after 12 months for a prosthetic procedure.

Fabrication and final prosthesis:

At the 12-month follow-up, the patient remained asymptomatic. Radiographic evaluation via OPG revealed no abnormalities or peri-implant radiolucency. To initiate the restorative phase, the cover screws were removed, and healing abutments were placed. Following a 2-week period of soft-tissue maturation, rigid abutments were fixed in the fixtures (Fig. 8).

Figure 8: Final abutment placement over the implant fixture.

Then, impression coping was done for making the ceramic prosthesis in the lab, similar to the vertical height register, which was taken before extraction. Multiple trials were pursued to secure occlusion before providing the final prosthesis. Finally, a prosthesis was given to the patient after 4 days (Fig. 9).

Figure 9: Full mouth rehabilitation by implant-supported ceramic prosthesis.

DISCUSSION

The biology of a recovering tooth socket is a complicated process. By selecting the proper implant width and length and making use of the remaining cortical bone, primary stability of implants can be achieved. Early implant placement in a healing socket that is only a few weeks old is not well-studied, despite the fact that immediate implant placement at the moment of tooth extraction is commonly recognized and supported by

research.¹⁵ Following full mouth extractions, a three-week waiting time may have an impact locally at the extraction sites as well as systemically in the bone marrow and peripheral stem cells. Broken limbs have been demonstrated to have a systemic effect on circulating (peripheral) stem cells, possibly as a result of increased osteoblastic progenitor cells in the bone marrow.¹⁶ Also, it was shown that three weeks following the injury, there was an increase in the number of circulating osteoblastic stem cells.

In a systematic review¹⁶, there are numerous studies examining the early installation of implants; nevertheless, no particular report or suggestion exists regarding the ideal timing for finishing the early implantation of dental implants following extractions. Separating the extraction visit from the implant installation visit has several benefits, such as minimizing operating time, reducing surgical complexity, and improving surgical stent fitting. Additionally, a three-week period for socket repair is far shorter than the two to three months typically required. The patient was given a full arch fixed restoration up to the first molar. Excessive cantilever has been shown to adversely affect implant-supported prosthesis biomechanics and to cause overloading, which raises the risk of prosthesis and/or abutment screw fracture.¹⁷

Furthermore, a full-arch prosthesis supported by implants with greater length and quantity resulted in reduced stress concentration under the simulated load. This is particularly significant when ceramic is used. For the distribution of stress and strain, reducing the number of implants during recovery is more detrimental than reducing their length.^{18,19} So, our team chose to use a six-implant-supported full-arch fixed prosthesis in the maxilla and seven-implant supported full arch fixed prosthesis in the mandible.

Accurate placement of dental implants and selecting the prosthetic construction type for retention is crucial for full arch implant-supported rehabilitation. Some benefits of cement-retained prostheses include reduced construction technology, compensation for implant placement in the absence of parallel axes, and passive prosthesis fitting because of the cement gap between the abutment and the structure. Nevertheless, additional problems with this type of fixation could include limited maintenance service availability and the potential for peri-implantitis to develop due to excessive cement in the peri-implant region, particularly in soft tissues.²⁰ Thus, the majority of clinicians concur that screw retention should be preferred in full-arch implant-supported prosthetics. Screw retention, more critically, entirely removes cement from the peri-implant tissues, ensuring that the prosthesis can be maintained and removed for sanitary treatments and monitoring. The final step is crucial because artificial gingiva in

prosthetic fabrication makes it challenging to regulate excess cement.^{21,22}

Limitation

Several limitations must be acknowledged in this case. First, the patient was in a high-risk group, which is responsible for peri-implant complications. Second, the patient had a history of periodontal treatment failure, which suggests a challenge in maintaining the prosthesis in the long run. Finally, the patient lived abroad, so long-term follow-up of the prosthesis was not possible.

CONCLUSION

In full-arch implant-supported rehabilitation, dental implant location accuracy is critical, particularly when the final restoration lacks ceramic gingiva. The lack of cement in peri-implant tissues and the availability of maintenance services are two benefits that screw-retaining prostheses have over cement-retained structures. Multiunit abutments offer passive prosthesis fitting by sealing the implant neck and establishing a more robust and extensive hemidesmosomal bond. During the peri-implant tissue's stability, intraoperative installation reduces the need for repeated screwing and unscrewing.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of the article.

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