

Maxillary Edentulous with Four-Implant-Supported Fixed Restorations: A Case Report

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Abstract

In the era of a dental implant, the possibility of fixed restoration as full edentulism treatment was achieved by using a dental implant.

All-on-four implant treatment is a concept that requires four implants only instead of replacing each missing teeth in one jaw. This treatment provides many advantages over traditional removable denture. Four implants were placed anteriorly to provide immediate full-arch fixed denture.

This concept results less morbidity, less financial burden, and more comfortable post-treatment pain for the patient. This article described the step-by-step of loading four implants in the maxilla, supported by fixed metal ceramic prosthesis.

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Introduction

Full edentulism is a major problem for most people. This particular condition creates various problems, including functional and aesthetic problems. Patients cannot eat comfortably, speak clearly, or smile confidently. Dentures are made to restore the patient's ability of chewing, speaking, and aesthetic functions. All-on-four implant treatment provides many advantages over traditional removable denture, including overcoming the limitations of the alveolar ridge bone, reduce the bone graft application, and immediate loading of denture¹. Tilting of posterior implants from the procedure of all-on-4 concept are able to achieve good bone anchorage without interfering mental foramina in severely resorbed mandible, and also an alternative to sinus floor augmentation^{2,3}.

All-on-four implant treatment was carried out by placing two anterior implants axially and posterior implants in angled position at a maximum angle of 45° to maximize implant length and avoid vital anatomy structure^{4,5}. The All-on-four implants treatment make use of the

high density bone in the anterior region^{6,7}. After inserting implants, the temporary prosthesis was loaded immediately. Below we provide the step-by-step of all-on-four case report in an elderly woman.

Case Report

A 75-year-old female patient came to the dental office to replace her full-mouth bridge in upper jaw that fall down, because all the abutment teeth had extensive carious lesion. She has been using an upper removable complete denture for the last few months and no longer want to use it because it was impractical. She demanded a fixed denture so she does not need to removed and put on the denture. After further anamnesis and medical history review, she was suggested about implant-supported denture treatment plan. A full analysis of clinical examination along with panoramic and 3D cone beam computed tomography examination were executed before the implant treatment for fixed metal ceramic prosthesis treatment plan. The bone density according to Misch classification was D1 (1672,29 Hounsfield Unit/HU). Four implants in the anterior region was planned for there was not enough space in the posterior, where the remaining alveolar bone was too close to the floor of sinus cavum. The details were as follows;

Surgical procedure

Patient was given local anaesthesia with

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4% articaine hydrochloride and epinephrine 1:100,000 (Septanest, Septodont, France) prior to surgical procedure. The first operation was done in the right anterior region and was continued a month later for left anterior region. Crestal incision was made and the full-thickness flap was reflected. Four implants (TS III SA, Osstem Implant Co., Busan, Korea) were placed with details as follow; region 13 was given implant fixture of 3,0 mm diameter and 11,5 mm height, region 14 was given implant fixture of 3,5 mm diameter and 10 mm height, region 22 was given 3,0 mm diameter and 10 mm height, and region 23 was given implant fixture of 3,5 mm diameter and 10 mm height. After implant placement, the flap was sutured, cover screw was inserted and the interim removable complete denture was inserted. The interim removable complete denture was aimed as a guide for tooth arrangement of future prosthesis. Patient was then prescribed with antibiotic and analgesic for 5 days. After 3 months loading, patient was recalled for healing abutment insertion.

Impression copings were placed for final impression step. Final impression was carried out using closed tray method and polyvinylsiloxane material. Interocclusal record was made using bite registration material (O-Bite, DMG, Germany) with desired vertical dimension. Selected shade was made according to patient's natural colour. Zirconium silicate material (Ceramage, Shofu, Japan) was chosen for laminating chrome cobalt framework because it was light weight compared to feldspathic porcelain. The occlusal scheme for this case was mutually protected occlusion. Final prosthesis was tried before final cementation (Figure 1, 2, 3, 4, 5, 6).



Figure 1. Pre-treatment condition with tooth remnants before receiving implant treatment.

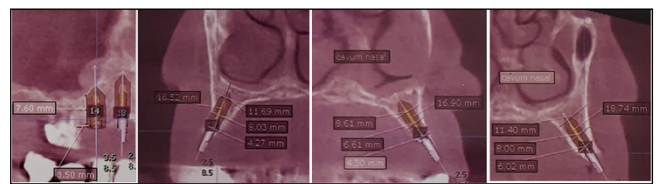


Figure 2. Pre-treatment plan of implant position from cone beam computed tomography radiograph of region 14, 13, 22, 23 (left to right).

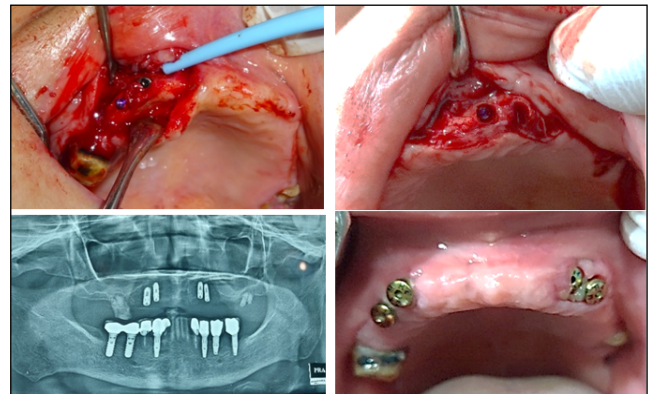


Figure 3. Implant loading in the right region (13, 14), followed by left region (22, 23) a month later. Lower picture: the panoramic radiograph after implant loading and healing abutment insertion.

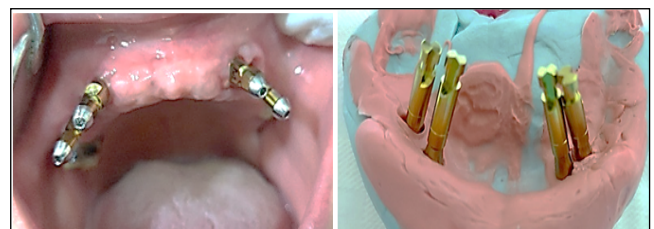


Figure 4. Left: Impression coping was inserted for final impression step. Right: The impression coping was re-inserted to the impression.

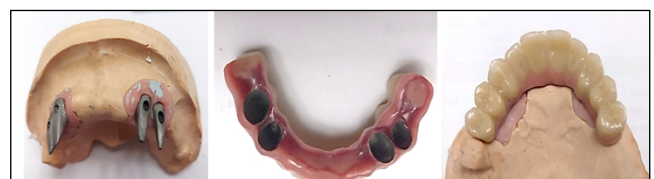


Figure 5. Ten-unit zirconium silicate veneered to metal framework.



Figure 6. Try-in step of abutments and final prosthesis. Right: Final profile face after insertion.

Discussion

All-on-four implants treatment is a concept of rehabilitation procedure requiring only four implants on a full edentulous jaw followed by assigning a full-arch fixed prosthesis to these implants. The implants providing stable support to the fixed restoration on them. These four implants reinforce a full-arch denture, which contains up to fourteen artificial teeth. In this case we use ten units artificial teeth as a full-arch prosthesis. The concept of leaving four occlusal unit was known as shortened dental arch (SDA). This concept was introduced by Kayser in 1981, where there was reduced or absence of the molar and/or the premolars. The SDA as a treatment modality has been considered to be successful when there are 20 well distributed teeth⁸⁻¹⁰. In this case, the patient is considered to geriatric patient. Moreover, muscles throughout the body begin to atrophy, leading to decreased elasticity and increased tension and stiffness.¹¹ Therefore, the needs of artificial teeth were only to replace anterior and premolar teeth and resulting to reduce the cantilever arm length of the prosthesis

The implant placement surgery was done conventionally, divided into two times surgery, for right upper anterior region and left upper anterior region, because we avoiding too large trauma injury, if we did simultaneously¹². The healing process was done perfectly, without any complications. The suturing was opened two weeks after operation and the second operation was performed a month after the first operation. The patient always used chlorhexidine mouthwash everyday during healing period. Two months after the second operation, panoramic photo was taken for osseointegration examination.

Cover screws were opened and changed with healing abutments for three weeks in performing gingival profiles. Impression was taken with closed tray by using four impression coping and sent it to the laboratory. Inter occlusal relation was measured and bite registration was done for optimal appearance of patient's face and the colour of the crown was chosen as similar as the opposing teeth.

After the laboratory process, four pilars abutment were created for supporting the fixed restorations. Ten units composites veneered over a titanium framework were built and polished.

The pilars abutment were inserted to the fixture and the fixed restoration was cemented to the abutment. Slightly occlusal adjustment was done until the patient felt comfortable. Tooth brushing and using mouthwash daily has to be done as usual.

Occlusal adjustment for this case was mutually protected occlusion. Anterior guidance is recommended in lateral and protrusive excursions. This is because implant does not have a periodontal ligament support, vertical, physiologic mobility within the socket that a natural tooth has¹³⁻¹⁵. This occlusal adjustment was suggested in order to prevent catastrophic implant failure.

Conclusions

All-on-four implant treatment provide immediate full-arch fixed denture. This concept results less morbidity, less financial burden, and more comfortable post treatment pain for the patient.

Declaration of Interest

The authors report no conflict of interest.

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