

The Rehabilitation of Edentulous Mandible with the Use of All-on-Four Implants concept: a case report

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ABSTRACT:

This case report presents a case of the "all-on-4" implant treatment concept of the highly resorbed mandible ridge. The use of 2 angled implants directed toward the midline of the mandible at 30 degree angle provided the advantage of increased implant length and adequate insertion torque for prosthetic rehabilitation. In this case, the Toronto bridge framework was prepared with cast metal alloy in conventional manner & PFM crown were cemented onto the framework to enhance esthetic and to reduce cost factor.

Keywords: Rehabilitation, All on Four concept, Implants, Toronto bridge

Introduction

Edentulism is a crippling and irreversible disease and is defined as the "final oral health marker of disease burden." Although the prevalence of complete tooth loss has decreased over the last decade, edentulism, especially among older adults, remains a major disease worldwide.

Artificial devices known as dental prosthesis are therefore necessary to repair or replace one or more missing natural teeth in order to restore the damaged, unsightly, or dysfunctional tooth.

Among many approaches for the rehabilitation of edentulism being developed, implants play a major role. There are many concepts for full mouth rehabilitation, but All-on-four implant concept outreach due to its cost factor, anatomy advantages and having good success rate over others. It was described by Paulo Malo and coworkers in 2003. It is the concept of positioning four implants to support a provisional, fixed, and immediately loaded full-arch prosthesis both in maxillary and mandibular anterior portion of fully edentulous jaws. The two most anterior implants are placed axially, and the posterior implants are placed in an angled position to maximize implant length and avoid anatomic structures (ie, mental nerve and anterior border of the maxillary sinus).

CASE PRESENTATION

A 53-year-old man, reported to the Department of Prosthodontics with completely edentulous mandible and Fixed denture prosthesis in maxilla from 13 to 26 with periodontally compromised teeth in 24, 25 region. His past medical history was uneventful.

The alveolar bone resorption was found in the panoramic radiograph (Fig 1) in both maxillary and mandibular region. The CT scan confirmed the mandibular resorption and mental foramina close to the residual ridge.



Fig 1. CBCT mandible

To rehabilitate the lower jaw, "All-on-Four" approach was planned. Treatment plan was explained to the patient and patient agreed to this and consent was taken.

A full thickness crestal incision was performed under local anesthesia (2 % lignocaine with 1:80,000 adr (Ligocain-ADR, Searle, Chandigarh) from the right first molar area to the left first premolar.

In the midline area, 2 mm osteotomy was performed to place the implant positioning guide (fig 2) followed by placement of two anterior implants in axial direction in the incisive area and two posterior implants (Noris Medical Dental implant solutions) in premolar area, following the diagonal of the rectangle at an angle of 30° mesially to the mental foramina (fig 3).

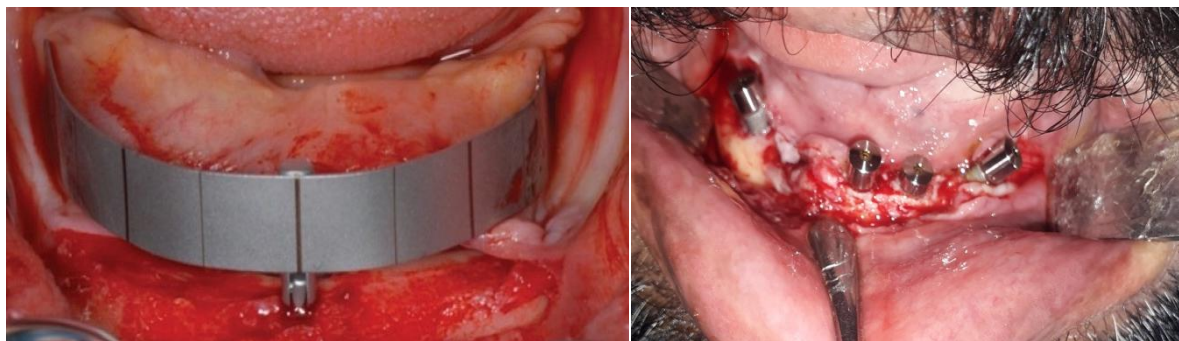


Fig 2 & 3. Full thickness flap with implant angulation mandibular guide & Implant Placement with Gingival former in place

Soft tissue management was done and sutures (3-0 MERSILK, Johnson & Johnson Pvt Ltd, H.P) were placed securely. After 3 months of healing period, patient was recalled. Open tray pick up impression was planed and impression copings were secured to the implants. Splinting was done with pattern resin (Gc pattern resin, GC Corp, Tokyo Japan) and dental floss (ICPA Health Products. Ltd, Mumbai) (Fig4.) followed by making of open tray impressions (Fig 5) with Addition silicon(Gc Flexceed, Gc Corp, Tokyo, Japan). Open tray impression was as favoured for better recording of details and accurate implant angulation and implant analogues were attached to copings and master cast was prepared.

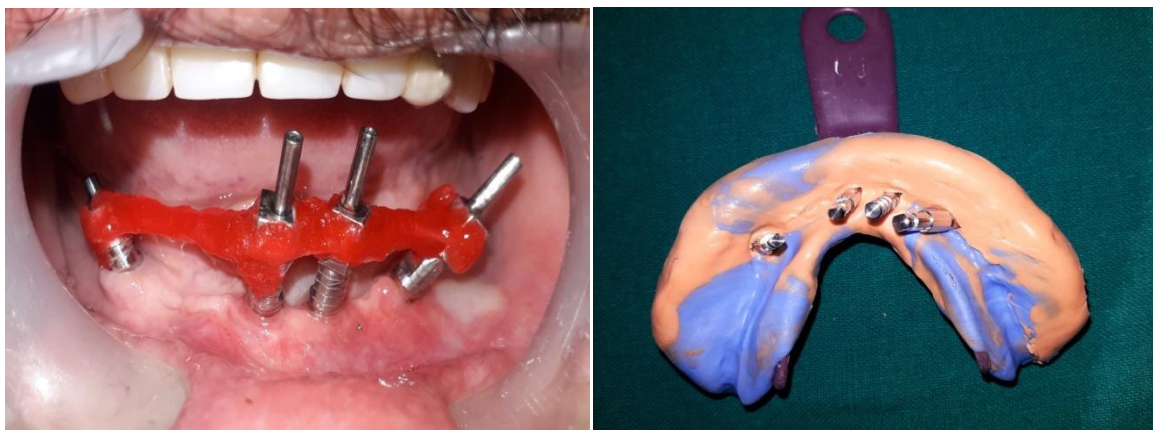


Fig 4 . Splinting of impression copings & Fig. 5 Open tray impression with implant analogues in place

Two straight multi-unit abutments were placed on the anterior axial implants, and a 30-degree multi-unit abutment were placed on each of the posterior implants to change the angulation for parallelism. Prosthesis should follow parallel path to each other. Castable cylindrical abutments were used over multiunit abutments and height adjustment was done in accordance to vertical jaw relation. Wax pattern (Fig 6) was prepared and casting of framework was done in conventional manner by use of Co-Cr alloy. The framework (Fig 7) prepared was tried intraorally and required adjustments were done. The sheffield test (one screw test) was done to check the passivity of the framework and it was found to be satisfactory.

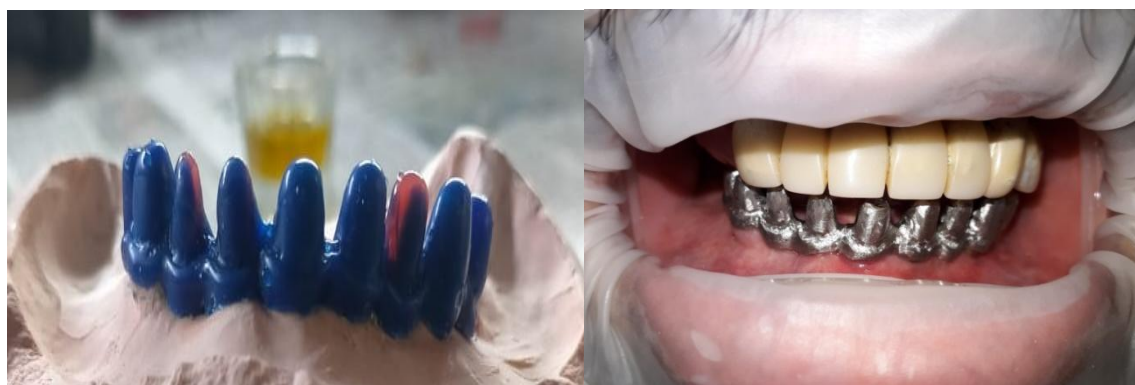


Fig 6 & 7 . Prepared wax pattern over cast & Processed metal framework try in intraorally

To simulate the lost gingival tissue and to enhance aesthetics with better emergence profile Pink porcelain (Vita VMK 95, VITA Zahnfabrik, Badhackingen, Germany) (Fig 8) was used and try in was done. Another impression with framework screwed intraorally was made to prepare individual crowns over the prepared framework replicated cast. Access holes present in framework were used to tighten the framework. Teflon tape was used to block access holes and Metal ceramic crowns (Fig 9) fabricated were cemented individually over the framework to enhance aesthetics. Since three months patient is under regular follow up. This completed the phase 1 of treatment in which only mandibular rehabilitation was completed. This was done so as per the patients desire, patient wanted to go for rehabilitation of maxillary arch at later stage because of financial issues.

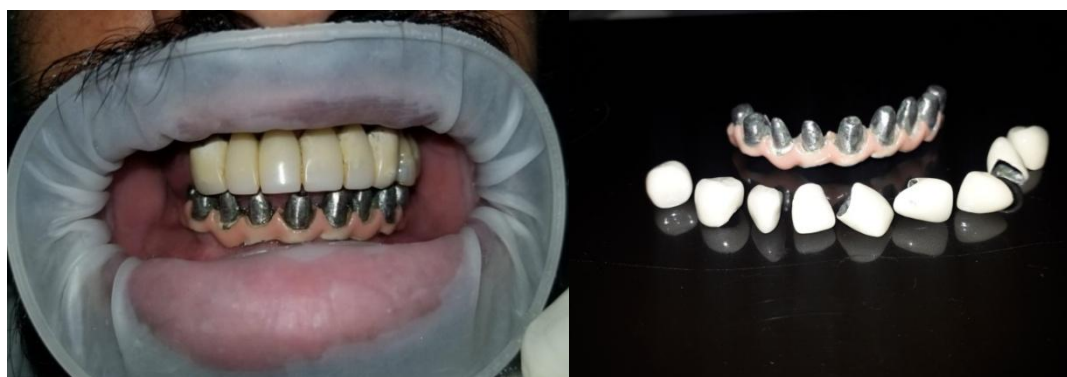


Fig 8 & 9. Framework with pink porcelain in place & processed final prosthesis



Fig10 & 11. Final cemented prosthesis & Radiograph

Discussion

The prevalence of complete tooth loss & edentulism remains a major disease worldwide, especially among older adults because of the impact of various factors like education, economic circumstances, lifestyle, oral health knowledge and beliefs, and attitudes to dental care. It directly lead to impairment, functional limitation, physical, psychological, and social disability. Due to improper chewing of food as tooth loss present affect the general health in several ways leading to increase in the risk of cardiovascular diseases and gastrointestinal disorders increasing the chronic inflammatory changes of the upper gastrointestinal, gastric mucosa, and pancreatic cancer, with higher rate of duodenal or peptic ulcers. Absence of teeth also leads to greater alveolar ridge resorption, and changes in tmj.

Dentistry has fixed many of the problems that come over time with dentures and there are a number of great reasons to consider them such as cost-effective, easy to maintain. But as being said, dentures are not without some drawbacks, as may become loose over a period of time or make clacking noises that create a rather embarrassing moment for the wearer, generation of less masticatory forces.

Although dentures are a tried and tested remedy for many patients who lack multiple teeth, the degree of comfort or trust that contributes to full satisfaction with care is not always given. Fortunately, developments in dental science and technology have led to the development of a better alternative for multiple teeth replacement that offers much greater outcomes. When the patient is able to perform an adequate oral hygiene, fixed implant restorations will be a suitable and comfortable treatment option.

Among various procedure in fixed implant restorations to overcome Anatomical limitations such as inferior alveolar canal close to crest, locational changes in foramen over age etc and cost factor 'All-on-Four' concept is best alternative over others. The procedure involve placing two posterior implants in front of mental foramina tilted with distal direction to avoid injury to the inferior alveolar nerve and decreases the cantilevers, Enabling a complete fixed prosthesis to increase the polygonal area and providing adequate molar support. The mean distance of prosthesis support obtained in the mandible is 6.5 mm, while in the maxilla it is 9.3 mm (Krekmanov et al).

Cortical anchorage and primary stability is increased in this technique which allows longer implants to be used. The decrease in stress around anterior implants in a complete fixed prosthesis over tilted posterior implant is also advantageous over straight implants placement (Bevilacqua et al) which is analyzed in many studies conducted over period of time in three-dimensional finite element analysis. In accordance to Kayser and Witter the anterior and premolar teeth are the strategic part of the dental arch and are essential for satisfactory oral function and oral comfort so rehab till premolars is considered satisfactory and functional.

Conclusion

In contrast to advanced surgical techniques without using removable prostheses, the "All-on-4" treatment concept seems to be an alternative choice for rehabilitating edentulous jaws. It is a cost-effective method that decreases recovery times, morbidity and a higher quality of life for patients. This concept should be taken into account when a decision among the alternative treatment options for an edentulous jaw has to be made.

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