

Mandibular Rehabilitation with All-on-Four Concept : A Case Report

Dr. Md. Jalaluddin¹, Dr. Purnendu Bhushan², Dr. Rajat Mohanty³, Dr. Monalisa Panda⁴, Dr. Urmi Agarwal⁵

Professor & Head¹, Senior Lecturer², Reader³, PG^{4,5}, Department of Periodontics^{1,4,5}, Department of Prosthodontics², Department of Oral & Maxillofacial Surgery³, Kalinga Institute of Dental Sciences, Bhubaneswar

Abstract

Aims & objectives: This case report aims at full arch rehabilitation of atrophic mandible with four dental implants based on 'All-on-four' concept.

Method: A 50 years old lady was treated with implant supported fixed prosthesis in lower jaw. Four implants were placed, anterior two implants at incisor region, and posterior two were placed inclined distally to have better stability, longer prosthesis, and reduced cantilever. After 12 weeks of osseointegration, implant supported hybrid prosthesis was delivered by taking in account of aesthetics and function. No post operative or second stage complications were reported. Patient was reviewed after one year with no clinical or radiographic changes or prosthetic complications.

Conclusion: All-on-four concept is one of the treatment choices for atrophic jaws meeting the patient satisfaction with aesthetics and function.

Key-words: All-on-four concept, dental implant, edentulous jaw, full arch rehabilitation.

Key Messages : Mandibular rehabilitation with all on four concept

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Introduction

Atrophic alveolar ridge is followed by tooth loss due to various local and systemic factors and severity increases over time. With increasing bone loss, rehabilitation becomes challenging and complex. Out of several prosthetic rehabilitation procedures for edentulous patients, dental implants are able to give prosthetic restoration fulfilling functional and esthetic demands of the patient.¹ Implant supported restoration has shown long term survival rates with minimal marginal bone resorption², improving the quality of life and achieving high level of patient satisfaction.³

Standard implant requires sufficient bone support, which is deficient in severely atrophic jaw. Extensive bone augmentation procedure prior to implant placement increases patient morbidity, extra cost, creates several complications and takes longer time period for the completion of the treatment.⁴ Placing tilted implants provides good cortical anchorage and implant stability. This also benefits for placement of longer implants and can reduce or redistribute the forces or stress acting over the implants with longer prosthetic base, thus reducing cantilever length in jaws.⁵

The 'All-on-four' concept uses rehabilitation of severely atrophic jaws providing function without any additional regenerative procedures. The protocol uses four implants in the anterior part of complete edentulous jaws to support a provisional, fixed and immediately loaded prosthesis. The two most anterior implants are placed axially, whereas the two posterior implants are placed distally and angled to minimize the cantilever length, and to allow the application of prostheses with up to 12 teeth, thereby enhancing masticatory efficiency.^{6,7} The present case report describes the surgical procedure of four implant placement in atrophic mandible by "All-on-four" technique following with prosthetic rehabilitation.

Case History

A 50 year old lady came to our department having atrophic edentulous mandibular arch for which she was wearing removable denture since

two years (Figure 1). She had lost all her mandibular teeth due to periodontal disease and caries and also had lost some of her maxillary teeth which were replaced by fixed bridge prosthesis. She had no systemic conditions and was not a smoker. She desired for fixed rehabilitation of mandibular arch for better aesthetics and the function.

On clinical and radiographical evaluation, there was severe bone atrophy in mandibular arch. After careful examination, we planned for placing four implants⁸ by using 'All-on-four' concept. Patient was explained for rehabilitation of her mandibular arch by placing implants followed by prosthesis after 12 weeks and informed consent was taken prior to procedure from the patient.

Preliminary study models, clinical photographs and Cone Beam Computed Tomography (CBCT) scans were obtained. Presurgical measurements of alveolar bone for implant placement planning were carried out (Figure 2). After giving local anaesthesia, a midcrestal incision from premolar to premolar was given for full thickness mucoperiosteal flap reflection and identify the mental nerve emergence (Figure 3). A malo guide was placed and vertical lines were guide for implant site preparation (Figure 4). Site preparation for two implants was done anteriorly at incisive area and for two posterior implants at an angle of 30° mesial to mental foramina. Four implants (ø4.0x11.5mm)⁹ were placed according to the standard surgical protocol with copious sterile saline irrigation (Figure 5), achieving a primary stability of 45 N/cm measured with a torque spring) for all four implants and multiunit abutments with metal cap were placed over the implants (Figure 6). Then it was sutured by 3-0 silk sutures. The implants were allowed to osseointegrate for 3 months. A post operative CBCT scan was taken to check the placement of implants (Figure 7). No post operative complications were reported and healing was inadvertent.

After 3 months, an alginate impression was made and a custom tray was fabricated with a window cut over the implant area (Figure 8). Only the metal caps over multiunit abutments were removed. Appropriate impression copings

for open tray abutment level impression were selected and fitted (Figure 9). These copings were splinted together with pattern wax intraorally to provide greater rigidity and better accuracy (Figure 10). The custom tray was tried in such a way that the impression copings should emerge from the window. The final impression was taken in that customized tray with a polyvinyl siloxane material and the tips of the impression copings could be felt and unscrewed, the whole impression was removed with the impression copings splinted together in its place (Figure 11). The metal caps were then replaced back over the multiunit abutment. The impression with implant analogues fitted to it was sent to laboratory for preparation of working model.

Then, in the next visit, jaw relation with fixed acrylic base was conducted (Figure 12). Then jaw relation with occlusal rim was carried out (Figure 13). A trial denture of teeth in wax was fabricated from laboratory, tried and checked for occlusion, esthetics and phonetics (Figure 14). After trial, it was sent back to the laboratory for final prosthesis. A final screw retained Hybrid prosthesis was delivered to the patient (Figure 15, 16). Patient was followed up for 12 months and panoramic radiographs were obtained (Figure 17). No clinical or radiographic bone changes were observed at implant sites. Patient had improved chewing and masticatory efficacy with no prosthetic complications. Patient face profile was also improved and a level of satisfaction was gained by patient (Figure 18, 19). Every six months, patient is being reviewed for oral hygiene maintenance.

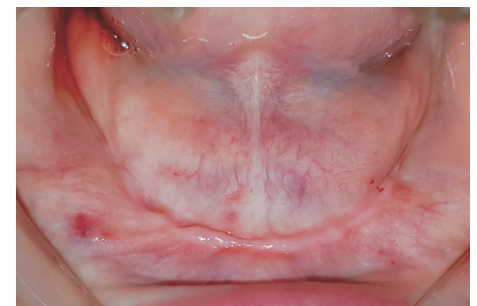


Figure 1: atrophic edentulous mandibular arch of the patient

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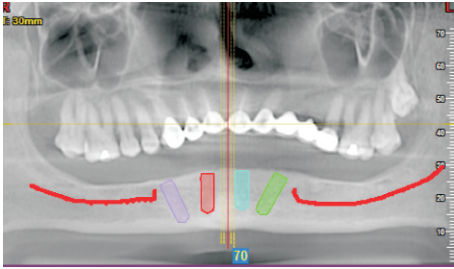


Figure 2: Presurgical implant planning in CBCT scan



Figure 8: custom tray was fabricated with a window cut over the implant area



Figure 14: trial denture of teeth in wax

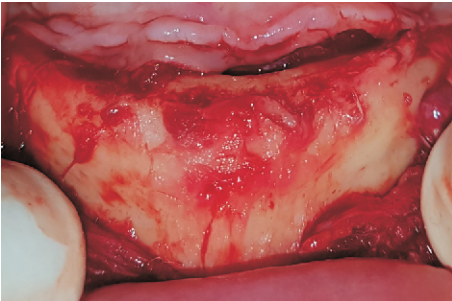


Figure 3: full thickness mucoperiosteal flap reflected and emergence of right mental nerve can be seen



Figure 9: impression copings placed for open tray impression



Figure 15: final screw retained Hybrid prosthesis

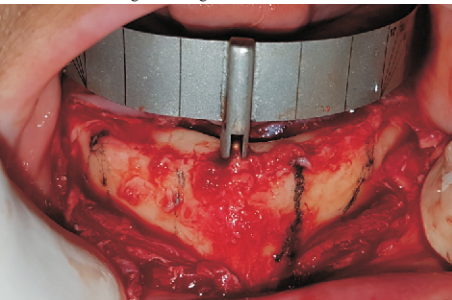


Figure 4: mandibular guide with vertical lines to guide for osteotomy preparation

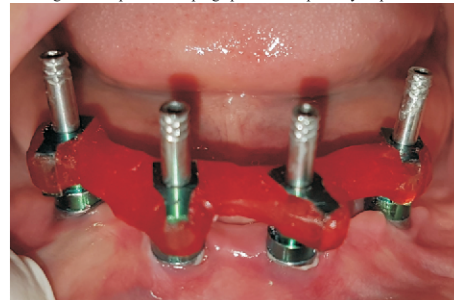


Figure 10: Impression copings were splinted together with pattern wax



Figure 16: final screw retained Hybrid prosthesis delivered to the patient



Figure 5: Implants placed two anteriorly straight & two posteriorly tilted

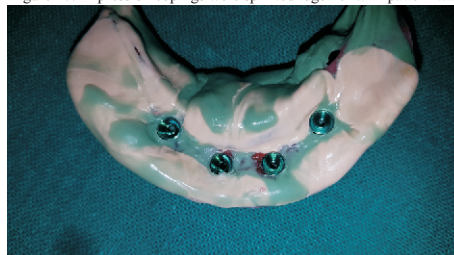


Figure 11: final impression taken with custom tray and polyvinyl siloxane material



Figure 17: Panaroramic radiograph of 12 months follow-up



Figure 6: Implants with multiunit abutments and metal cap over it

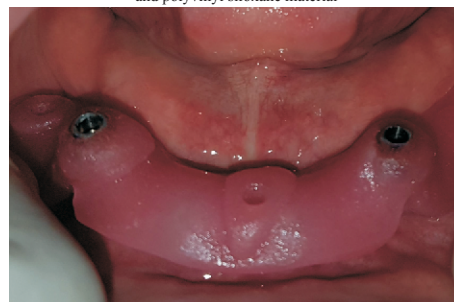


Figure 12: jaw relation with fixed metal base



Figure 18: patient's face profile before the treatment



Figure 19: patient's face profile after the treatment

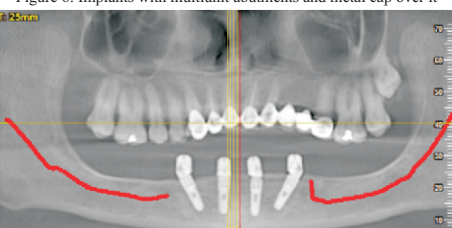


Figure 7: Immediate post-op CBCT scan showing the placement of four implants



Figure 13: jaw relation with occlusal rim

Discussion

Various new approaches for rehabilitation of atrophic jaws are being executed for minimizing time consumption, cost, morbidity, enhancing patient satisfaction and comfort with maximizing aesthetics and function. Moraschini et al⁸ in a systematic review, reported 94.6% survival rate of osseointegrated dental implants over a 10 year follow up study, with minimal marginal bone resorption. The "All-on-four" is the concept that can be a treatment choice providing predictable rehabilitation for severely atrophic alveolar jaws without any additional regenerative procedures.^{9,10}

In 'All-on-four' technique, two implants are placed in front of mental foramina that are tilted in a distal direction to avoid injuring the mental nerve. This method increases the polygonal length for prosthesis, thus decreasing the cantilever extension.^{11,12} There should be rigid linkage between the distally placed implants and other implants so that there will be greater geometrical disposition of the prosthesis, leading to a more biomechanically stable system.¹³ Tilted implants increases the primary stability by providing cortical anchorage. Occlusal load and stress is reduced due to tilted implants rather than straight implants.¹⁴

Patzelt et al¹⁵ in a systematic review reported that 'All-on-four' concept of dental implant is a safe, cost-effective treatment choice for atrophic edentulous arch, decreasing treatment time, patient morbidity and increasing overall quality of life. Soto-Peñaloza et al¹⁶ in a systematic review reported 99.8% survival rate of 'All-on-four' concept of dental implant over a 24 months of follow up.

Implant supported fixed prosthesis is an interdisciplinary approach that requires proper treatment planning from surgical phase to prosthetic phase. All-on-four concept with tilted implants is an advanced approach to bypass the conventional augmentation procedures and providing a predictable rehabilitation achieving patient satisfaction, reasonable cost and less treatment time. There is optimum use of resident bone by preserving vital anatomical structures, gaining cortical stability, use of longer implants and longer prosthesis.

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2019 Events

March 1-3, 2019 5th Global AAID Conference Leela Ambience Convention Centre	March 3-6, 2019 24th Dental South China Dental South China, Gunagzhou
March 12-16, 2019 38th IDS Cologne, Germany	March 30-31, 2019 Expodent Chennai Chennai, India
April 11-14, 2019 16th Istanbul Dental Equipment & Material Exhibition Idex, Istanbul	April 13-14, 2019 3rd International Dental Lab Expo & Conference Hyderabad, India
May 15-17, 2019 International Exhibition for Medicine Bulmedica, Buldental	May, 2019 4th International Dental Show Sunway Pyramid Convention Centre, Malaysia
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