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Full mouth implant supported restoration – A unique case report

[1]Dr. Ramesh Chowdhary, MDS, Ph.D, Fellow and Diplomate (ICOI), Professor, Department of Prosthodontics, Chief, Branemark Osseointegration Centre India (BOCI), Bangalore -560040

[2]Dr. Sahana M S, MDS, Senior Lecturer, Department of Oral and Maxillofacial Surgery, D A Pandu Memorial R V Dental College, Bangalore- 560078

[3]Dr. Manjushree R, MDS, Senior Lecturer, Department of Paedodontics

Corresponding Author: Dr. Ramesh Chowdhary, MDS, Ph.D, Fellow and Diplomate (ICOI), Professor, Department of Prosthodontics, Chief, Branemark Osseointegration Centre India (BOCI), Bangalore -560040

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Abstract

Management of an edentulous patient with a full mouth fixed restoration using multiple implants has several benefits when compared to a conventional removable denture, comprising of augmented patient satisfaction, enhanced speech, aesthetics, function and self- esteem. The selection of an appropriate prosthesis for an edentulous patient is dogged to a great extent by the underlying residual bone volume along with the teeth being replaced. The aim of this case report is to present a beginner's experience in the rehabilitation of a completely edentulous patient who was not satisfied with his existing conventional complete dentures. The patient was rehabilitated using full-mouth implant-supported fixed prostheses. The ultimate treatment outcome provided the patient with esthetically and functionally effectual prostheses.

Keywords: Full-Mouth Rehabilitation, Implant Prosthesis, Fixed Implant Restoration.

Introduction

Edentulism is a devastating and irretrievable condition and is termed as the "final marker of disease burden for oral health" [1]. Even though the pervasiveness of complete tooth loss has deteriorated over the last decade, edentulism remains a major disease all over the world, particularly among older adults [2]. Maximum edentate individuals are elders who wear complete dentures in one or both jaws. Studies have proved that denture wearing endures to upsurge due to the rise in the aging population; a huge number of people still hinge on removable dentures for oral function [2]

Edentulism can lead unswervingly to impairment, functional restraint, physical, psychological, and social disability [3] . Edentulism was found to have a

substantial effect on residual ridge resorption [4], which additionally leads to a reduction in the alveolar bone height and the size of the denture bearing area. This decrease disturbs the facial height and facial appearance, which are transformed following complete tooth loss [5]. The reduction in the alveolar bone height and width also leads to significant variations in the soft-tissue profile, such as protrusion of the mandibular lip and chin [6]. An interpatient variation in these anatomic degenerative changes exists, and the origin of these is still uncertain. It is thought that a blend of both local and systemic factors may be contributors; these include age, gender, duration of edentulism, parafunctional habits, general health, and several diseases [7,8].

Smoking has its impact on general in conjunction with oral health of an individual. As far as oral health is concerned, it rises the danger of periodontal disease, oral precancerous and cancerous lesions, root caries, and peri-implantitis. It can lead to derangement of taste, staining of teeth and restorations, as well as hindered wound healing post extractions, periodontal procedures, and orthognathic surgeries. Smoking upregulates the expression of pro-inflammatory cytokines such as interleukin-1, which leads to augmented tissue damage and alveolar bone resorption.[5] Nicotine can have an effect on cellular protein synthesis and also can impair the gingival fibroblast's ability to adhere, thereby intervening with wound healing and/or aggravating periodontal disease.[9]

Therefore, Tobacco exhibits a negative effect on the result of almost all routine therapeutic procedures performed in the oral cavity. Smokers retort less positively than non-smokers to surgical periodontal therapy.[9]

Due to surge in life expectancy of edentulous population, clinicians are facing difficulties with the mounting need to offer patients with solutions to fabricate prostheses that will provide a replacement for loss of natural teeth which permits for optimal satisfaction and better quality of life. Patients have complained of excessive dissatisfaction due to dentures due to pain, discomfort, poor stability, and hitches in eating as well as conceded retention capability. An answer for such conditions is the implant supported fixed prosthesis.[10]

The prosthetic rehabilitation of a totally edentulous and atrophic arch with implant-retained dentures includes comprehensive planning and must not only provide precise vertical height and maxillary-mandibular relationship but also should be aesthetically acceptable. The practice of implant-supported overdentures is one of the treatment choices for the restoration of completely edentulous jaws when conventional dentures have reduced retention due to progressive atrophy of the alveolar bone [11-14].

This case report highlights the success and healing of an Implant supported fixed restoration in a chronic smoker for a period of 1 year.

Case report

A 63-year-old man reported to us with a complaint of difficulty in managing his existing conventional complete denture. His medical history revealed that he is a chronic smoker since past 30 years.

Dental history revealed that he was edentulous since past 1 year, and was rehabilitated with a conventional complete denture for his missing dentition. The patient was not satisfied with removable prostheses due to its poor masticatory efficiency, and he was interested and opted for a fixed prosthesis in order to replace his missing dentition.

On intraoral examination, edentulous ridges of medium size, parallel walls with no undercuts and mucosal

covering was healthy and uninflamed in nature. However, the alveolar crest of the mandibular arch showed some irregularities. The panoramic radiograph and Cone beam computed tomography (CBCT) scans were performed for assessing the bone quality and quantity. The surgical and the prosthetic procedures were discussed in detail with the patient and he gave his consent for a definitive implant-supported fixed prosthesis.

The definitive treatment plan encompassed fabrication of an implant-supported fixed ceramo-metal prosthesis to rehabilitate both maxillary and mandibular edentulous ridges. Conventional procedures were trailed to fabricate interim removable dentures. The dentures were replicated and radiographic templates were set. Cone beam computerized tomography (CBCT) scan disclosed adequate height and width of bone at all implant sites. Provisional virtual implant simulation was executed as per the available bone height and width, along the long axis of the alveolar ridge. A CBCT Guided implant surgery with a fabrication of a stent for both the arches was planned for the placement of total Nine endosseous implants – Four implants in the mandible in the canine and second premolar regions and Five implants in the maxilla,1 in the incisor, 2 in the canine and second premolar regions.

The implant surgery was considered in two phases; Phase 1- Maxillary rehabilitation and Phase 2- Mandibular rehabilitation.

A clear acrylic resin surgical stent was fabricated on the diagnostic cast with gutta percha cones positioned over the proposed implant site. A second Panoramic radiograph was performed with stent in the patient's mouth to assess the height of the available bone accurately. A reduction guide was also fabricated to remove the bony irregularities on the mandibular crestal bone.

Surgical Phase

Patient was pre-medicated with appropriate oral antibiotics and analgesics. Local Anaesthesia was administered in the maxillary arch. The surgical guide was placed on the maxilla to confirm the exact implant positions. Five endosseous implants were placed in the 11,13,15,23 and 25 regions. Maxillary implants were placed with two distal implants in the posterior region which were tilted anterior to the maxillary antrum whereas in the mandible, the implants were positioned anterior to the mental foramen. The implants have to be inserted at an angulation of 30 - 45 degrees. The usage of the All-on-4 surgical guide supports in confirming the placement of the implants with accurate positioning, angulation and emergence. The implant positions were reconfirmed with another panoramic radiograph and the cover screws were placed. Satisfactory haemostasis was achieved. Later, local anaesthesia was administered in the mandibular arch following which, the full thickness mucoperiosteal flap was raised and the reduction guide was seated in position to remove the required amount of bone from the crestal aspect to clear the irregularities and create a uniform ridge. Once this was achieved, four endosseous implants were placed in 42,45,32 and 35 regions with the surgical stent in place to ensure the placement of the implants in the exact positions with the correct angulation.

Especially for the posterior implants. The Flap was closed after the cover screw placement and satisfactory haemostasis was achieved. Post-operative OPG was done to reconfirm the implant positions. Antibiotics and anti-inflammatory medicines were prescribed for the patient after the procedure. Furthermore, the patient was

instructed regarding the oral hygiene practices along with the use of a chlorhexidine mouthwash during the healing process. A soft diet was recommended to avoid excessive loading of implants during the six months healing period.

Prosthetic Phase

Patient was followed up after a week for suture removal and the healing was uneventful. After 3 months, Patient was recalled for the second stage surgery and Prosthetic phase. The implant sites were fully healed and free of any signs of inflammation. Small Incisions were placed and the cover screws were removed. Transmucosal healing abutments were positioned on all the implants. Two weeks later, healing abutments were removed and the multiunit abutments were positioned in the patient's mouth. Following which, the implant sites were prepared for Open tray impression technique. The Open tray Impression copings were attached to the implants. A panoramic radiograph was made to confirm the complete seating of impression copings and the open tray impressions were made for both the arches using addition silicone impression material. The impressions were removed with impression copings in the accurate implant positions in the impressions. Implant analogs were attached to the impression copings and casts were poured. The following week was the jaw relation which included recording the Occlusal Vertical Dimension by making two marks on the face (chin and nose) to measure the height, which was preserved during the bite registration process. Facebow transfer was made and centric relation record was maintained.

Later, the jigs were fabricated for trial, which was done to determine the precision of the impression. Jigs of both the arches were tightened in the patient's mouth and a radiograph was attained to ensure a complete and passive seating. Subsequently the wax patterns for the metal frameworks were fabricated. A screw retained prostheses design in the form of Malo's Bridge was selected to permit easy retrievability and maintenance. The screws were tightened sequentially confirming a passive fit. A radiograph was made to check the complete seating of the framework. A new centric relation record was prepared using Alu-Wax as an inter-occlusal bite registration material. The metal frameworks were given to the laboratory for porcelain veneering. The metal ceramic restorations were fixed on the implants, and occlusal adjustments were made with the help of a T-Scan to remove all the occlusal interferences. A canine guided occlusion with posterior discussion during excursions was delivered. After glazing, final tightening was done with the suggested torque. The screw access holes were packed with Teflon material and later was filled with resin composite. The patient felt comfortable and aesthetically pleased after the prosthesis insertion. Oral hygiene instructions were reinforced as the patient was a chronic smoker and was given a separate instruction on the avoidance of smoking. He was asked to report on a regular follow up basis that is after a day, a week, a month, 3 months and a year. The patient did not revert back with any complications on these multiple visits.

Discussion

Conventionally, 4 to 5 implants in the mandible and 5 to 6 implants in the maxilla with distal cantilevers has been a prevalent approach among the implant clinicians [15-22]. The literature endorses a minimum of four implants for a fixed restoration but additional implants should always be placed for biomechanical advantages and to evade cantilevers. An upsurge in the antero-posterior

spread and additional number of supportive implants escalate the predictability of an effective result.[22]

Even though immediate loading is being more appreciated by patients and restorative dentists, studies restrain at numerous places that chances of failure are amplified in cases of immediate replacements. Hence, a two stage surgical technique was shadowed in this case. On the other hand, cement retained implant restorations are achieving status as they are simple, esthetic and economical. But such restorations are tough to retrieve and any residual cement in the soft tissues surrounding the implant may lead to peri-implant disease. A screw retained prostheses design was selected in our study to allow stress-free retrievability and maintenance [22,23].

The "all-on-4" concept is grounded on the principle that four implants, a combination of two straight anterior and two tilted posterior, placed within the premaxilla (Malo et al., 2005) or anterior mandible, would deliver enough support to uphold a full-arch fixed prosthesis (babbush et al., 2011).[24,26]

A recent study also emphasizes on the importance of a balanced occlusion in an all-on-4 protocol [24]. Hence, exact positioning of the teeth allowed the patient to not only accept the occlusal scheme but also appropriately position the implants and dodge forces that leads to stress on both the prosthetic and implant components. The wish for a predictable prosthesis, predominantly for fixed partial dentures, led to the development of the concept of "prosthetically guided implantology." This concept institutes the accurate implant position during the diagnostic stage according to intended definitive restoration. The significance of this approach was analyzed by tallarico and meloni in a latest multicenter study [25]

The concept of malo‟s bridge has great success rate and it eradicates requirement for bone grafting which is aggressive, expensive and uncomfortable for patient. Technique is well endured and of lesser duration. All in a one-day procedure is achievable, not only the surgery but also the positioning of teeth with immediate function. Old-style techniques frequently involve multiple surgeries and can take over a year to complete. The bridge is aseptic, easy to maintain and clean. Classically about half the price of alternative procedures which require bone grafting and the placement of more than four implants. Implants follow a dense bone structure. Longer implants can be placed by tilting them posteriorly that also aids in refining anchorage. Tilting expands a-p spread of implants ensuing in more stable prosthesis. A-p spread augments load distribution for prosthesis. Shorten cantilever (maximum of 7 mm for maxilla and 1.5–2.0 mm a-p spread for mandible) decreases prosthetic fracture/instability and marginal bone height stability. Marginal bone height of implants is maintained with rigid prosthesis. (chan and holmes 2015).[26]

The advantages of the all-on-4® concept are as follows

- Angled posterior implants avoid anatomical structures
- Angled posterior implants allow longer implants anchored in better quality bone
- Reduces posterior cantilever
- Eliminates bone grafts in the edentulous maxilla and mandible in majority of cases
- High success rates
- Implants well-spaced, good biomechanics, easier to clean
- Immediate function and aesthetics
- Final restoration can be fixed or removable
- Reduced cost due to less number of implants and avoidance of grafting in the majority of cases

But it is also very technique sensitive and needs intricate pre-surgical preparation such as cad/cam, surgical splint.[27]

Implant supported fixed restorations can aid as an exceptional treatment modality for edentulous patients, also in cases of chronic smokers. The prosthetic therapeutic triumph needs a meticulous pre-surgical analysis centred on prosthetically driven implant position, prudent selection of prosthetic materials, prosthesis design and appropriate maintenance with a lucid understanding of patient anticipations and limitations.[22]

Conclusion

The results of this procedure and the several advantages of immediate loading, the reduced morbidity, the high patient satisfaction and comparatively low costs should be taken into consideration when a decision among the alternative treatment options for an edentulous jaw has to be made.

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Legends Figures

Fig. 1: Edentulous Maxillary and Mandibular arches

Fig. 2 : Surgical Guides for Maxilla and Mandible

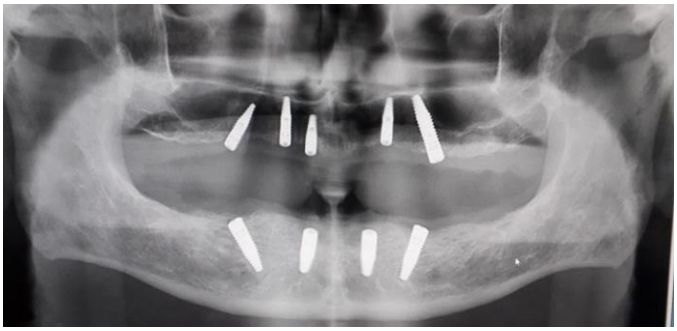

Fig. 3: Placement of Implants in the both the arches.

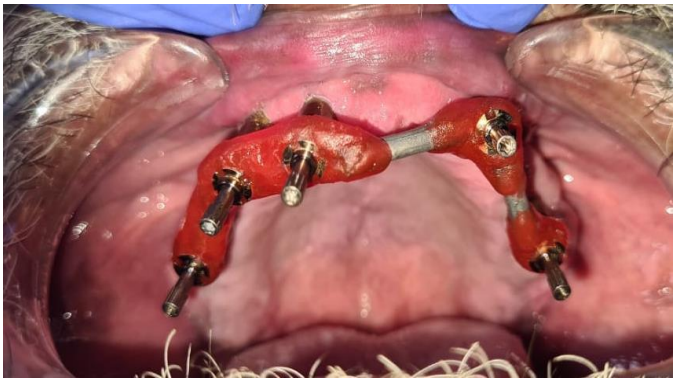

Fig. 4A

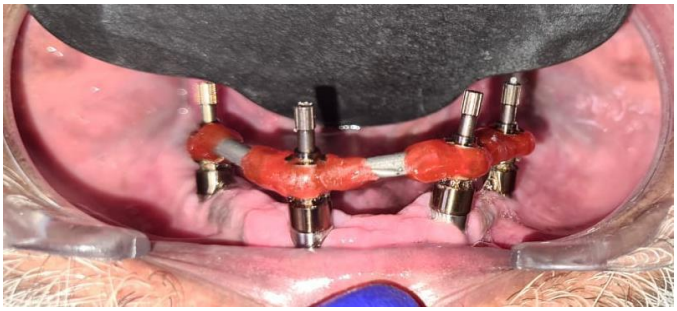

Fig. 4a & 4b: Jig Trial for both the arches

Fig. 5: Wax Try-in

Fig. 6: Metal bar Try-in

Fig. 7A

Fig. 7a & 7b: Final insertion of the Malo's Bridge Prosthesis

Fig. 8: One Year Followup