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Rehabilitation of Atrophic Maxillary Arch with Different Fixed Treatment Modalities - A Case Series

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Abstract

Implant rehabilitation of the edentulous jaws have shown remarkable success. Severe maxillary atrophy requires the clinicians to modify the surgical and prosthetic approach for the rehabilitation of edentulous patients. The case report explains 2 different scenarios of implant supported rehabilitation of edentulous atrophic maxillary arches using different protocols. The patients had severely atrophied maxillary ridges and were treated with All-on-6 implants and with basal implants respectively.

Keywords: Atrophic maxilla, atrophic mandible, implant rehabilitation, basal implants.

Introduction

Restoring the edentulous maxilla or mandible with implants has become a normal predictable treatment today. Rehabilitation of edentulous maxilla with implants has shown higher success rates of 84–92 %, when sufficient bone is available. But, atrophy in maxilla is not an uncommon finding and conventional implant placement gets complicated in such situations. In maxilla, the centripetal pattern of alveolar resorption, pneumatisation of maxillary sinuses, presence of nasal fossae and nasopalatal duct, poor bone quality complicates the implant placement. [1]

In the recent years treatment of severe maxillary atrophy with implants has achieved important successes. The All-

on-4® treatment concept was introduced by Nobel Biocare AB, Göteborg, Sweden. This protocol using only four implants has produced good short-term outcomes, with a survival rate of 98.2% and marginal bone level of 0.6 mm at 6-month follow-up. Since this first report, several other authors have reported good short- and medium-term outcomes for patients undergoing this treatment. Moreover, recent systematic reviews have confirmed these results for maxilla and mandible rehabilitation. The All-on-6 treatment protocol is used to minimize the length of the cantilever. It is a deviation from the All-on-4 treatment modality.

The resorption of the posterior maxillary region after extraction of tooth has led to the pneumatisation of the maxillary sinus which has made the placement of implants in the posterior region without perforating the sinus challenging. In 1980, Boyne and James [2] reported the first sinus lifting procedure and since then, many modifications of the technique have been reported. Recently, Lundgren [3] and colleagues reported that elevation of the sinus membrane per se and insertion of implants in the residual bone allowed new bone to fill the created compartment in the antral sinus.

Such extensive surgical procedures also have their own indications and contraindications. To avoid these procedures the other feasible option for replacement in atrophic jaws is to change the implant design. Two very successful implant designs and protocols have been demonstrated in the past few decades for replacement in atrophic jaws which are Mini Dental Implants and Basal Implants. Basal implants are dental implants that use the basal cortical portion of the jaws for implant retention. These implants are uniquely and specifically designed for the sole purpose of gaining anchorage from the basal cortical bone and have gone through several changes and modifications in the past several decades. The current basal implant has a sophisticated yet simple design, surgical protocol and is a prosthetic friendly system. These properties have led several practitioners around the globe to include basal implantology in their practices and so far this system has delivered fairly successful results. [4]

Case Report 1: All-On-6 Treatment Protocol

A 57 year old female patient visited the department of Prosthodontics with a chief complaint of missing teeth in the maxillary arch. Intraoral examination revealed partially edentulous maxillary and mandibular arches. Prognosis of maxillary teeth was poor (Fig 1). The patient was given 3 different treatment plans; a single maxillary removable complete denture, 2 implant retained maxillary complete denture or Implant supported hybrid denture. The patient opted for total extraction of the maxillary teeth followed by implant supported hybrid denture. CBCT of the maxillary arch revealed the amount and nature of the bone and the proximity of the vital structures were evaluated. Virtual implant position was assessed using NNT programming.

Fig 1: OPG

The maxillary posterior region revealed excessive loss of bone height and pneumatisation of the maxillary sinus which made axial placement of the implants in the area difficult. A sinus lift procedure was not considered to prevent surgical morbidity and additional expenditure to the patient and also to avoid a longer healing period.

Implants sizes were picked utilizing NNT programming and virtual planning of implant was completed.

Implants utilized were provided by ADIN INDIA:

13 region - 3x10mm	23 area – 3.3x10mm
15 region - 3.3x10mm	25 area – 3.3x10mm
17 region – 3x10mm	27 area – 3.3x 10mm

After the administration of local anaesthetics the teeth, extraction of teeth were completed followed by curettage and thorough irrigation of socket using augmentin. The implant was placed in 13 area immediately. Additional implants were put in 15 (mesially tilted) and 17 (distally tilted) region and cover screws were placed.

Extraction of teeth 23, 25 and 27 were completed and implants were set. The implant was axially placed in the 23 region, mesially tilted in 25 region and distally tilted in 27 region. Suturing was done with 3-0 vicryl and OPG was taken. Recuperating time of 10 weeks was given and CBCT fov 11/5 was taken to evaluate the angulation of implants for prosthetic segments. CBCT revealed Angulation of tilted implants were.

The angulations of the implants placed were:

14 region 24 degree

17 region 36 degree

24 region 32 degree

27 region 35 degree.

Multiunit abutments were planned to make the prosthetic angulation straight. Two abutments of 15^{o} angulation and four 30^{o} angulation for anterior and posterior implants respectively. Second stage surgery was arranged following a healing period of 11 weeks. The cover screws were removed and multiunit abutments were placed to make prosthetic angulation straight and parallel. Multiunit compatible healing caps were placed and sutured with 3-0 Black braided silk. The patient was reviewed after 7 days and the healing caps were replaced with Multiunit compatible open tray impression copings. All the impression copings were splinted using J wire and Pattern resin to give an unbending nature to the impression. A tray less impression procedure was adopted as patient had a reduced mouth opening. After splinting low viscosity addition silicone material (DENTSPLY AQUASIL) was injected around the impression coping and allowed to semi set. Incremental development of addition silicone putty (DENTSPLY AQUASIL) and muscle trimming were done. Guiding pins of impression copings were expelled and the impression was carefully removed. Gingimask was added to simulate the soft tissues on the cast, and impression was poured with die stone. Sheffield test was done to re affirm the precision of impression. Cobalt-chrome metal framework was fabricated. Sheffield was repeated with Framework and jaw relation was recorded and teeth arrangement was done, followed by try in of wax denture. Maxillary Hybrid complete denture was fabricated and screwed onto patient's mouth (Fig: 2) Post operation OPG was taken after 3 months and 6 months (Fig: 3).

Fig 2: Final prosthesis

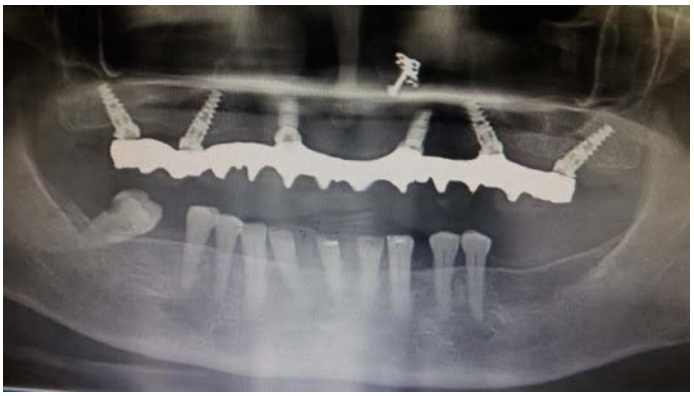

Fig 3: OPG taken after 6 months follow up

Case Report 2: Rehabilitation With Basal Implants

A 70 year old male patient reported to the department of Prosthodontics with a chief complaint of missing upper dentition. Intraoral and radiographic examination (Fig: 4) revealed severely atrophied maxillary arch. The remaining mandibular natural teeth exhibited bone loss. Basal strategic implants were planned for the patient after a recovery time of 3 weeks following periodontal surgery on the mandibular natural dentition. A combination of 10 KOS and BCS implants were planned based on CBCT records.

Fig 4: Pre-operative OPG

The 10 basal implants were placed on the maxillary arch; 5 on the right side and 5 on the left side and the abutments were screwed in. The impression copings were attached to the implants and the impression was taken with elastomeric impression material was made on the same day. A pattern resin framework was fabricated on obtained cast and was tried in the patients' mouth.

A trial denture in wax was fabricated and was tried intraorally. A sectional hybrid denture was fabricated in the laboratory and was screwed onto the implants intraorally (Fig: 5).

Fig 5: Prosthesis cementation

Discussion

There are several treatment modalities available for the rehabilitation of atrophic ridges. One of them is the surgical augmentation of the atrophic ridges followed by placement of implants. But Menini et al [5] reviewed that the survival rates of implants placed on reconstructed jaws are less than those placed on native bone. The placement of implants on the native bone has a long term success rate. But implants can be placed on atrophic maxilla avoiding additional surgical procedures with the use of modified implant designs and also by changing the angulation of the implants.

In severely atrophied maxillary arches the floor of the maxillary sinus appears to descend down making it difficult for the placement of implants. There are different treatment modalities by which we can circumvent this situation and place an implant in the posterior region to avoid a long cantilever and improve the prognosis of the prosthetic treatment.

One of the method by which we can place an implant in the posterior maxilla with reduced bone height is by placing the implants at an angulation. Changing the

angulation of the dental implants in the posterior regions of an atrophied maxilla was demonstrated as early as 1999 [6]. The tilted position of the posterior implants distribute the occlusal forces to a wider area and will counteract the transverse forces acting on them. Tilting of the implants also reduced the length of the cantilever significantly, thereby producing a better load distribution and reducing the stress levels on the implants. The stress patterns seen at the bone-implant interface when using tilted implants were significantly less than axial implants [7]. According to Menini et al, the short term success rate of tilted implants in the maxillary arch was found to be 98.62% [6].

The other method by which an implant can be placed in the posterior region of an atrophic maxilla is by elevating the floor of the maxillary sinus and creating space for the implant without perforating the sinus floor. Although Tatum was the first to be credited for augmentation of maxillary sinus for implant placement, it was Boyne's paper which described the use of autogenous bone graft that created a landmark for maxillary sinus lift procedure [8]. Francoise Tilotta [9] described a minimally invasive technique to elevate sinus membrane using trephines and the osteotomes with stops. The guard prevents the instruments from invading the sinus and the repeated impaction movement, with or without grafting material, causes a greenstick fracture of the sinus floor, resulting in membrane elevation.

The reduction in volume of the maxillary sinus following elevation of the floor does not affect the functions of the sinus. However, maxillary sinus lifting procedures are accompanied by a very low complication rate with the most frequent intraoperative complication being sinus membrane perforation (4.8 to 58.0 %) and postoperative complications (3.0 %) such as infections and/or postoperative maxillary sinusitis. Sinus mucosa perforations are usually well tolerated and regenerate over the bone graft postoperatively. Such perforations can be corrected either by closing them with resorbable barriers, such as collagen sponge, fibrin adhesive, resorbable membranes or by folding the sinus mucosa after a more extended elevation. Post-operative complications such as sinusitis occur in previously unhealthy sinuses; therefore a thorough preoperative screening of maxillary sinus status is mandatory [9].

The other viable option for implant placement in atrophic jaws is to change the design of the implants. The other successful implant designs and protocols demonstrated in the past few decades are Mini Dental Implants and Basal Implants. Basal implants are exclusively and specifically designed for the sole purpose of gaining anchorage from the basal cortical bone and have gone through several changes and modifications in the past several decades. The modern basal implants have a sophisticated yet simple design and these properties have led several practitioners around the world to include basal implantology in their practices and so far this system has delivered fairly successful results [10, 11, 12 & 13].

Conclusion

Restoration of the dentition using fixed prosthetic solutions is the best way to enhance the patient's quality of life. The placement of implants in an edentulous arch requires many modifications of the arch or the implants or both. Placement of the implants at an angulation and placement of basal implants are successful treatment modalities which can be used to overcome the obstacle to rehabilitate an atrophic maxillary arch using implants.

References

1. Sorni Marco, Guarinos Juan et al (2005) Implant rehabilitation of the atrophic upper jaw: a review of the literature since 1999. Med Oral Patol Oral Cir Bucal 10:E45–E56

2. Boyne P, James RA.Grafting of the maxillary floor with autogenous marrow and bone. J Oral Surg 1980; 38:13–616.
3. Lundgren S, Andersson S, Gualini F, Sennerby L. Bone reformation with sinus membrane elevation: a new surgical technique for maxillary sinus floor augmentation. Clin Implant Dent Relat Res 2004; 6:165–173.
4. Gupta AD, Verma A, Dubey T, Thakur S. Basal osseointegrated implants: classification and review. International Journal of Contemporary Medical Research. 2017;4(11):2329-35.Chiapasco Matteo, Casentini Paolo, Zaniboni Marco. Bone augmentation procedures in implant dentistry. Int J Oral Maxillofac Implant. 2009;24(Suppl):237–259.
5. Menini.M, Signori.A, et al. tilted implants in the immediate loading rehabilitation of the maxilla: a systematic review . J Dent Res. 2012;91(9):821–827. doi: 10.1177/0022034512455802.
6. Bellini CM, Romeo D, et al. A finite element analysis of tilted versus non-tilted implant configurations in the edentulous maxilla. Int J Prosthodont. 2009;22:155–157.
7. Hammerle CHF, Jung RE. Bone augmentation by means of barrier membranes. Periodontology. 2000;2003(33):36–53.
8. Smiler DG, Johnson WP, et al. Sinus lift grafts and endosseous implants. Dent Clin North Am. 1992;36:151–186.
9. Francoise, et al. Gradual and safe technique for sinus floor elevation using trephines and osteotomes with stops: a cadaveric anatomic study. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2008;106:210–216. doi: 10.1016/j.tripleo.2007.12.030.
10. Yadav R. S, Sangur R, Mahajan T, Rajanikant A. V, Singh N, Singh R. An Alternative to Conventional Dental Implants: Basal Implants. Rama Univ J Dent Sci, 2015;2:22-28.
11. Misch, Carl E. Contemporary Implant Dentistry. St. Louis: Mosby, 1993.
12. Ihde Stefan. Principles of BOI- Clinical, Scientific, and Practical Guidelines to 4-D Dental Implantology. Springer, Heidelberg; Germany, 2005.
13. Niswade Grishmi, Mishra Mitul. Basal Implants- A Remedy for Resorbed Ridges. WJPLS 2017;3:565-572.