

Walking through the Atrophic Jaw Bone

Benita P¹ and Balamurugan R^{2*}

¹Prosthodontist, Chennai, India

²Oral and Maxillofacial Surgeon, Chennai, India

***Corresponding Author:** Balamurugan R, Oral and Maxillofacial Surgeon, RYA Cosmo Foundation Hospital, Chennai, India.

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Abstract

This case report presents a 45 year old female patient who reported to the department of Prosthodontics with a chief complaint of missing teeth and desired to have a fixed prosthetic rehabilitation. History revealed that patient had an uneventful extraction due to chronic periodontitis. On examination, maxilla was completely edentulous and mandible was partially edentulous. Radiograph revealed atrophic maxilla which was further planned to augment with iliac crest bone. After a healing period of 5 months implants were placed in the maxillary and mandibular arches. A full mouth prosthetic rehabilitation was planned after 3 months with implant supported and tooth supported prosthesis.

Keywords: Atrophic Jaw Bone; Iliac Crest; Dental Implants

Introduction

Dental implants play an essential role in rehabilitation of partially or completely edentulous jaw bone. Adequate amount of bone volume is required for retention and stability of implants to obtain favourable outcomes. This remains challenging for the oral and maxillofacial surgeons as well as the prosthodontist in augmentation of the atrophic jaw bone. Among various bone grafts such as mandibular symphysis, ramus of the mandible, maxillary tuberosity, external oblique ridge, calvarial bone, tibia etc [1], iliac bone grafting is considered to be an ideal graft for providing successful reconstruction of segmental defects or larger defects reconstructed either as block graft or as a particulate bone graft. Large volume of bone grafts can be harvested from anterior rim of iliac, however various complications have been encountered after harvesting iliac bone graft such as hematoma, wound dehiscence, pain, infection and gait disturbances. In spite of these lingering complications, harvesting iliac bone continue to be the most preferred grafting procedure as dental implants placed on iliac bone grafts have a higher success rates ranging from 90% to 100% over 10 years follow up [2].

Case Report

The current case report presented a 45 year old female patient reported to the department of Prosthodontics with a chief complaint of missing teeth and desired to have a fixed prosthetic rehabilitation. History revealed that patient underwent removal of her teeth due to chronic periodontitis. On intra oral examination maxilla was completely edentulous and mandible was partially edentulous (Kennedy's class I) (Figure 1). Augmentation of atrophic maxilla with iliac bone graft was planned (Figure 2). After a healing period of 5 months the implants were placed in the maxillary and mandibular arches (Figure 3). After a period of 3 months, full mouth prosthetic rehabilitation was planned with implant supported and tooth supported crowns and bridges.



Figure 1: Preoperative image showing completely edentulous maxilla and partially edentulous mandible.

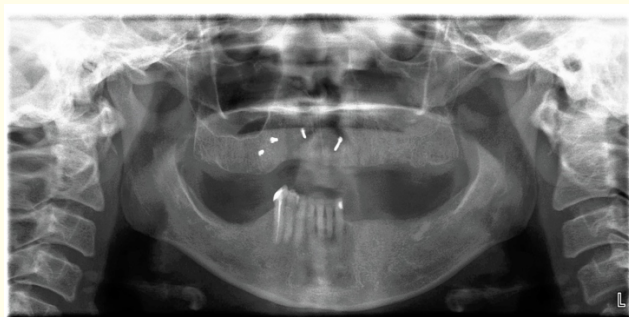


Figure 2: Orthopantomograph showing bone regeneration in maxilla which was grafted with iliac bone 5 months back.



Figure 3: Orthopantomograph showing placement of implants in maxilla and mandible.

Surgical phase

Intra oral (recipient site): Under nasotracheal intubation general anesthesia was administered. Standard painting and draping was done. Intra oral irrigation was done with povidone iodine and normal saline. Local anesthesia was administered along the vestibule of maxilla. Mid-crestal incision was placed in maxillary alveolar ridges and mucoperiosteal flap was elevated. The harvested corticocancellous bone blocks from the iliac crest was moulded and contoured to obtain ideal size and shape to augment over the atrophic maxillary bone. Following cortical perforations of the recipient bed, onlay blocks were fixed with 1.5mm diameter titanium osteosynthesis screws. Morcellized bone chips were grafted to fill the existing gaps between the onlay graft and alveolar bone. The mucoperiosteal flap was then secured with simple interrupted sutures. After a healing period of 5 months, bone regeneration in the augmented site was assessed using orthopantomograph. Further treatment was planned to place 8 implants in maxilla and 4 implants in mandible using Nobel implant system where a submerged approach was carried out for implants with different diameters and lengths to fit the augmented alveolar ridges which was finally secured with a cover screw (Figure 4).

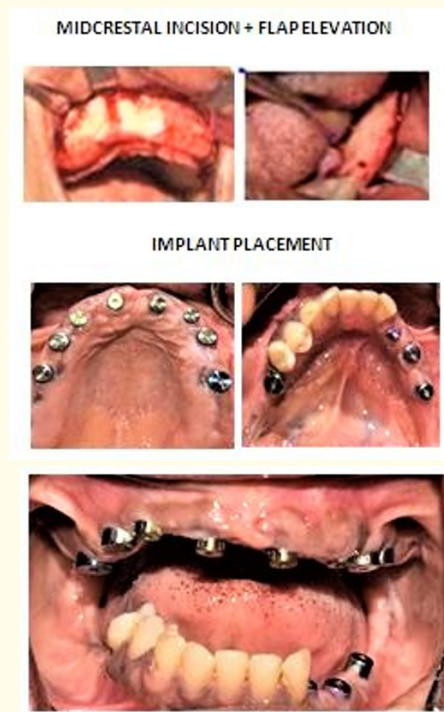


Figure 4: Surgical phase: 8 Implants placed in maxilla and 4 implants placed in mandible using Nobel implant system.

Iliac bone harvesting technique (donor site): Standard painting and draping was done on the iliac site. Local anesthesia was administered along the iliac region. Markings were placed and incision was carried out over the markings along the iliac crest. Further dissection was carried out through skin, subcutaneous tissue, scarpas fascia, muscle and perichondrium to expose the iliac bone. Two vertical and one horizontal stop cuts were placed. Medially based trap door was created. Corticocancellous bone blocks were harvested in adequate amount to augment the atrophic maxilla. The site was washed with povidone iodine and normal saline. Suturing was done in layers. Perichondrium and muscle was sutured with 2-0 vicryl. Epidural catheter was placed in situ for delivery of analgesics which was removed after 7 postoperative days. Subcutaneous layer was sutured with 5-0 vicryl and skin suturing was done with 3-0 prolene. Betadine ointment was applied over the sutured site and pressure dressings were placed (Figure 5).



Figure 5: Steps in Iliac bone harvesting.

Prosthetic phase

After 3 months of implant placement the cover screws were replaced by healing abutments and impressions were made to fabricate the fixed prosthesis. Metal trial was performed and implant supported crowns and bridges were placed in maxilla and tooth supported prosthesis in mandible (Figure 6) was delivered to the patient (Figure 7).



Figure 6: Prosthetic phase: cover screws replaced by healing abutment, impression coping, final impression, metal trial, implant supported prosthesis in maxilla and tooth supported prosthesis in mandible.



Figure 7: Preoperative and postoperative image.

Discussion

Autologous bone grafts are most widely preferred grafts and also remains to be the gold standard [3] technique to reconstruct or to augment the atrophic edentulous jaws. Intra oral bone graft is an ideal choice for reconstruction of smaller defects that are less than 6mm as a block or particulate bone grafts. In cases of large defects bone grafts harvested from intra oral site seems to be inappropriate as it cannot provide adequate volume of bone to augment the size of the defect present. In our study we have utilised the extra oral site for harvesting bone. The bone was harvested from anterior iliac crest, which gained a generous volume of bone to reconstruct the atrophied maxilla in both horizontal and vertical dimensions with an ease of implant placement, minimal donor site morbidity and a relatively short duration of surgery and recovery period [4]. However, it offers various disadvantages such as high bone resorption and soft tissue dehiscence.

In a study by Sethi., *et al.* [5] out of 173 patients 13 patients reported back with bone graft dehiscence due to soft tissue breakdown approximately 2 weeks after the grafting procedure which resulted in loss of bony contour. While, Nguyen., *et al.* [1] presented with 42.5% of bone resorption after 5 years of follow up. He also emphasized that the bone resorption was consistent during first year after reconstruction although the amount of bone gained during the process of harvest was generous. The key factor influencing the postoperative bone resorption was the anatomical origin of harvesting bone. Fourcade., *et al.* [6] reported that graft harvested from iliac crest of endochondral origin showed increased rate of resorption when compared to cranial or intra oral site which was a membranous origin.

Kang., *et al.* [7] in his study compared the autologous bone grafts harvested from iliac crest with grafts harvested from intra oral site, which revealed that there was no differences in the implant stability and bone density between the two grafts site. However, slow bone resorption was evident in iliac bone grafts when compared with intra oral bone grafts which showed a vertical bone reduction within 6 months of bone grafting. Our case showed no such evidence of any bone resorption. Controversy remains high on this concept, whether the implants must be installed immediately after graft augmentation or a healing period for the augmentation must be given after bone grafting. The hypothesis is that after revascularization and bone healing the osseointegration of implants will be more stable and favourable [1]. Kang., *et al.* [7] reported that dental implants should be placed during bone augmentation as it reduces the number of surgical intervention and duration required for healing. But this technique was reported to have poor implant stability and prosthetic orientation.

The success rates of implants placed on augmented iliac bone graft ranged from 90% to 100% over 10 years of follow up [1]. Fretwurst., *et al.* [8] reported that out of 150 implants placed on the augmented iliac graft, 7 implants failed with 95% success rate recorded

over a period of 12 to 165 months. Nystrom., *et al.* [9] in his study reported that out of 334 implants installed on iliac bone graft, showed failure of 27 implants with a success rate of 90% over 11 years of follow up while, Moses., *et al.* [10] observed 4 implants placed on iliac bone graft and claimed that none of the implants failed over 17 years of follow up.

Conclusion

Iliac bone grafts must be considered as a prime choice to augment the atrophic jaw as it provides greater and adequate bone volume both in horizontal as well as in vertical dimensions. Regardless of the complication possessed by iliac bone graft postoperatively, the success rates were found to be high when compared to bone grafts harvested from other sites.

Conflict of Interest

The authors declare that they have no conflict of interest.

Declaration of Patient Consent

The authors certify that they have obtained written informed patient consent for the surgery under general anesthesia and has given his consent for images and other clinical information to be reported in the journal with an understanding that names and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed. ORCID ID: 0000-0002-9288-6448.

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