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Anterior Tooth Replacement with an Immediate Loading Implant Using Autogenous Bone Graft and Guided Bone Regeneration -A Case Report

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Abstract: *Dental implant restoration has been considered to beone of the most reliable methods for treating partial orcomplete edentulism[1–3].But the availability of adequate bone volume for dental implant placement is often diminished due to trauma, pathology, periodontal disease, congenital defectsetc[4.] There are various bone augmentation techniques available for the reconstruction of such bony defects for implant placement, but they have drawbacks like prolonged waiting period for graft acceptance and surgical reentry for implantation.*
Here a case is documented which demonstrates the usage of autogenous bone graft harvested from mandibular symphysis region and reconstruction of the bony defect in the maxillary anterior region through guided bone regeneration technique with simultaneous implant placement .In the follow up we are able to achieve good bone regeneration and osseointegration, thus reducing the waiting period by grafting and placing implants simultaneously.

Key words:*bone augmentation, graft acceptance, autogenous,symphysis, guided bone regeneration.*

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I. Introduction

Generalized or localized bone defects of the alveolar ridge, due to atrophy, periodontal disease, trauma sequelae, congenital defects, and pathology may provide insufficient bone volume which may render implant placement impossible or incorrect from a functional and esthetic point of view. A variety of bone augmentation procedures have been proposed to augment the local bone volume of deficient sites, such asautogenous bone grafts, guided bone regeneration and alveolar distraction osteogenesisetc .Among which guided bone regeneration (GBR) is the most commonly performed procedure for bone augmentation[5].In this case report simultaneous dental implantation using autogenous intraoral jaw bone graftwhich is considered to be reliable for the reconstruction of atrophic alveolar ridges[6] is done through guided bone regeneration .The concurrent bone grafting and placement of dental implantsalso effectively minimizes treatment timewithout increasing complications or reducing the success rate.

II. Case Report

A twenty three year old male reported with thechief complaint of missing right maxillarycentral incisorfor past three years wanted to have the replacement of his toothwith fixed prosthesis (fig 1,2).The patient hada non- contributory medical history. On intraoral examination the labial platehad undergone severe resorption insufficientfor implant placement. On preoperative imaging with computed tomography (CBCT), severe atrophy of the anterior maxilla with buccolingual dimension of 1.2mm was revealed (fig 3).So autogenousmandibular symphyseal block graft was planned for ridge augmentation and to facilitate implant placement

Figure 1 PreopExtraoral View, Figure 2 Intraoral View

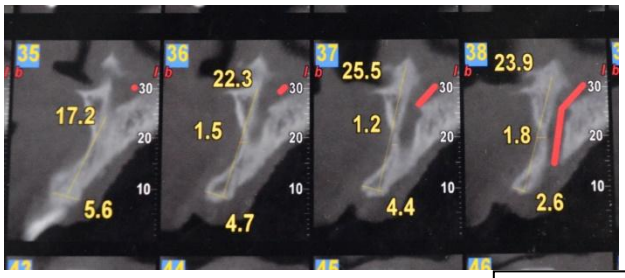

Figure 3 CBCT

The proposed treatment involved installation of single piece implant of size (3.5 mm × 14 mm) in the maxillaryright central incisor region and simultaneous reconstruction of the anterior maxilla throughsymphysis bone graft.

The patient received antibiotic prophylaxis one hour prior to surgery. Following intra and extraoral antisepsis and local anesthesia (2% lignocaine), a crestal incision was executed along the maxillary alveolar ridge from the mesial side of tooth 12 to the mesial side of tooth 21 extending as sulcular incision on either side (fig 4).A full-thickness mucoperiostealflap was reflected till the mucogingival junction to expose the native bone .The osteotomy site was prepared using customosteotomes (fig 5) and Implant was placed using a palatal approach and locked at its apical one third (fig 6). Due to the severely attenuated thickness of theedentulous space in maxilla, labial 2/3rd of the threads of implants were exposed which was to be covered by the bone graft.

Figure 4.Incision andFlap Elevation, Figure 5. Osteotomy,Figure 6.Implant Placed By Palatal

Donor site preparation

A vestibular incision was made in the mandibular labial sulcus region adjacent to the donor area and a full thicknessmucoperiostealflap was reflected at thefacial side. After exposing the symphysis region a straight fissure tungsten carbide bur and straight hand piece were used to outline a rectangle shaped graft of 1×.5×.5 cm size. The superior aspect of the rectangle bone graft was 3- 5 mm below the tooth apex, and the integrity of the lower border of the mandible was maintained. Laterally, the osteotomy was performed 5mm anterior to the mental foramen. Subsequently chisel and mallet was also used to free the block graft from the site.The closure of the donor site was done by suturing the area (fig 7).

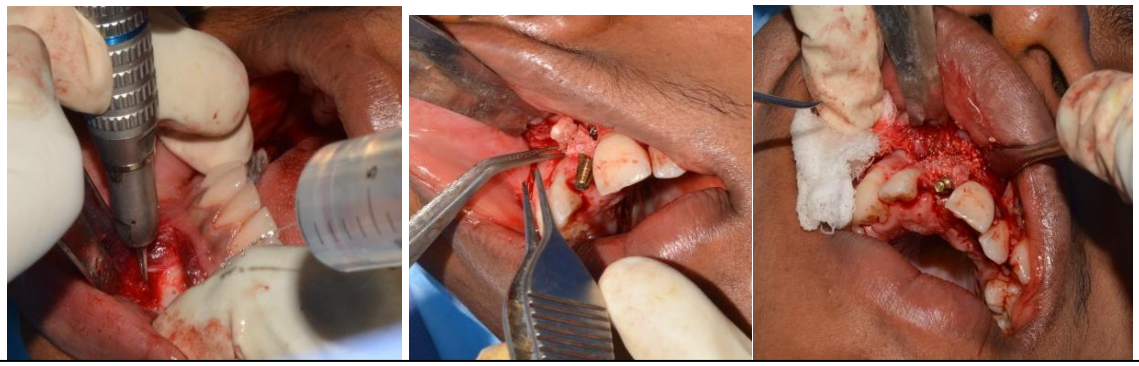

Figure 7 Symphyseal Bone Harvesting, Figure 8 Bone Chips Placed Over Exposed Thread, Figure 9 Xenograft

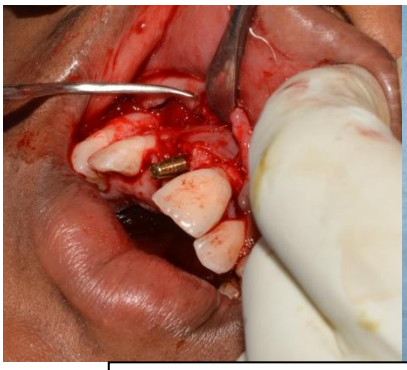


Figure 10 Collagen Membrane Placed, Figure 11 Temporisation

In the implant site, the block graft was crushed into bone chips using bone roungeur and placed over the exposed implant for developing better contour(fig 8).Particlulatexenograft(Biooss)was also placed around the bone chips to eliminate the gapsandpores(fig 9), following which the grafts were protected using membrane barrier of collagen(fig 10).The flap was repositioned without tension, and absorbable sutures were placed for closure . Once the bleeding was controlled, a provisional restoration was placed on the implants using composite resinwithout any occlusal contact either in centric or eccentric position. The patient was also ensured not to bite with the anterior teeth(fig 11).


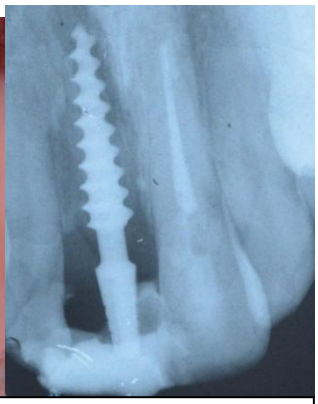

Figure 12.Osseointegrated Implant After 5 Months, Figure 13 IOPA After 5 Months

Following surgery, the patient was given a course ofbroad spectrum antibiotic for five days, analgesic,antiinflammatory and 0.12% chlorhexidinegluconate rinse for plaque control.

In the fifth postoperative month, intraoral periapical radiograph (IOPA)was obtained to evaluate the graft and osseointegration of the implant(fig12,13) .Both osseointegration and bone regeneration were found to be adequate and the final fixed prosthesis was delivered(fig14). The patient was followed up at regular intervals for a period of twelve months after the surgery and implant placement (fig 15).

Figure 14.After Crown Cementation, Figure15. Post Op Extra Oral View

III. Discussion

Literature shows more than 77% of anterior maxilla requires bone grafting due to high esthetic demands[5].Lekohm et al in a study reported that the percentage success with implants placed over mature bone is greater than over grafted bone[10] However it poses drawbacks like prolonged waiting for graft intergration and second surgery for implantation .In the present case since the patient wanted immediate replacement of his lost tooth and restore his esthetics, an alternative was to perform grafting, and implantation simultaneously . There are a number of publications reporting favorable results for surgical correction of alveolar bone defect done at the time of implant placement[8]. Literature also shows grafting and implantation in a single step to be a safe and effective technique[9,10] So in the present case we adopted the technique of simultaneous alveolar ridge defect correction and through guided bone regeneration.

The donor site of the bone graft in ridge augmentation depends on the size of the defect involved. In most of the cases intraoral autograft is preferred because of its long term stability[7] and autogenous bone grafting in the exposed threads of implants is suggested as the gold standard.

In the present case we have selected chin graft because it offers a large amount of corticocancellousautograft, easy to access among all the intraoral sites and can be easily harvested under local anesthesia and on an out -patient basis. However certain complications like paresthesia in the lower lip,shallowing of the vestibule,pulpal damage in the anterior mandibular incisors and post operative swelling[7] have been reported.

According to Simion et al[11]histomorphologic analysis of the regenerated bone shows that the density of the regenerated bone has a direct correlation with the density of the preexisting bone .When bone of cortical characteristic is obtained the percentage of osseointegration is 63 while 39.1% when spongy bone is formed. Studies reported that the success rate of implants placed in regenerated bone as 97%[12.]Here the cortical nature of the harvested bone coupled with the cancellous nature of the recipient site with good vascularization could have provided an idealsituation for the success of graft.

During the procedure xenograft in the form of particulate hydroxyapatite was used which has advantages like they provide a framework for bone regeneration, do not lengthen the healing time ,it is widely available and is recommended for augmenting the labial bone defect[5]

Eventhough we were not able to achieve adequate primary stability we immediately provisionalised the implant on considering the esthetic demands,age and the condition of the patient. We were also able to achieve adequate osseointegration after 5 months of healing period.

IV. Conclusion

In summary, successful bone augmentation and implant survival can be achieved when performing a simultaneous implant placement and ridge correction procedure through guided bone regeneration(GBR) using autogenous bone graft at single-tooth site. The success of this case can be attributed to patient'scooperation and his condition. Thus selection of case and its site of grafting has to be decided judiciously to enhance the success rate of implant as well as the graft.

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