Case Report

International Journal of Dental and Health Sciences
Volume 05, Issue 05

GUIDED BONE REGENERATION- STAGED TECHNIQUE AS AN ADJUNCT TO THE IMPLANT PLACEMENT FOR THE BONE AUGMENTATION OF THE LABIAL BONE DEFECT IN THE AESTHETIC ZONE: A CASE REPORT

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ABSTRACT:

Dental implants have become the most common treatment modality preferred by the patients for the replacement of missing teeth. In some clinical situations, when teeth were lost due to trauma, infection or periodontal disease, absence of adequate bone in edentulous area is the common finding that affects aesthetics especially in the anterior region. It further affects the initial implant stability and long term prognosis of the dental implants. In such cases, bone augmentation should be considered along with dental implant. Guided bone regeneration (GBR) is a frequently used procedure for bone augmentation either by simultaneous or staged approach. When the ridge anatomy does not allow for an ideal three dimensional implant placement, a two-step procedure is recommended where the bone augmentation is followed by the implant placement. In this case report, the GBR- staged technique was used as an adjunct to the implant placement for the bone augmentation of the labial bone defect in the maxillary anterior region.

Keywords: Implant, GBR-staged approach, Barrier membrane, Customised healing abutment, Aesthetic zone

INTRODUCTION:

Bone augmentation is required when there is insufficient bone or any ridge defect for implant placement. There are many techniques of bone augmentation for supporting dental implants like Guided Bone Regeneration (GBR), Onlay veneer grafting, Interpositional inlay grafting, Ridge splitting technique and Distraction osteogenesis.[1] Guided bone regeneration is most commonly used procedure for bone augmentation.[2,3] The bone regenerates via osteoconductive property of graft material that allows osteogenic cell populations originating from the parent bone to inhabit the bone defect area. The use of barrier membrane along with GBR helps to stabilize the graft material and prevents non-osteogenic cell populations from the surrounding soft tissues to grow into the defect area.[4] There are 2 technique of GBR- simultaneous and staged approach.

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When the ridge anatomy does not allow for an ideal three dimensional implant placement, guided bone regeneration-staged approach is recommended. Many studies had shown that bone regenerate using GBR before implant placement and the implant placement should be done after five to nine months of GBR procedures.[5,6] Here, in this case report GBR staged approach in missing anterior tooth region was performed along with the use of resorbable barrier membrane.

CASE DETAIL:

A 22 year old patient with chief complaint of missing tooth in upper front region reported to the Prosthodontic Unit of Faculty of Dental Sciences, Institute of Medical Sciences, Banaras Hindu University. Past dental history revealed that patient had undergone extraction of 21, ten days back due to pain in that tooth. There was no relevant medical history or adverse oral habits. On clinical examination, there was missing 21 with soft tissue defect & oral hygiene status was poor. The treatment planning related to implant procedure (preferred by the patient) was done to replace the missing tooth after completion of oral prophylaxis. An informed consent was taken. (Figure 1 a & b) Radiographic examinations were done using IOPAR and 64-slice dentascan to assess available bone for implant placement. In dentascan examination, there was 12.7 mm vertical hard tissue defect labially that may compromise initial implant stability. (Figure 2) Therefore, implant placement using GBR staged approach was planned.

Surgical Procedure

Prophylactic antibiotic was provided by administration of 2 g of amoxicillin orally 1 hour prior to surgery. Under local anesthesia (2% Lidocaine with adrenaline), mid-crestal incision was given in the edentulous area along with crevicular incision around adjacent teeth and flap was reflected. After flap elevation, labial defect was measured using periodontal William's probe. There was wide defect 7mm in width and 13mm in length. GBR procedure was performed using sticky bone formation (Cerabone xenograft + I-PRF), compacted in defect area and covered with A-PRF membrane. After that Periocol (synthetic collagen membrane) was also placed, secured and stabilised using tack screw. Flap was closed using interrupted sutures and an IOPAR examination was done. (Figure 3-5) Antibiotic regimes and analgesic was prescribed to patient for 5 days. After 1 week, sutures were removed and an acrylic provisional crown (without any centric and eccentric contacts) was bonded to adjacent teeth using Superbond C & B (dental adhesive resin cement) for a 6 month period so that patient will not remain without tooth for such a long period. (Figure 6) Oral hygiene instructions were given.

After 6 months, soft tissue was healthy in 21 and dentascan was again done to confirm bone formation. There was adequate bone for implant placement. (Figure 7-8) Under aseptic conditions and local anesthesia, second surgical procedure was performed. Tack screw that was used to stabilize implant was removed. After that osteotomy was performed upto 3.2mm diameter drill size (according to ADIN surgical protocol) and followed by implant placement 3.5 X 13 mm (ADIN Dental Implant System LTD., Israel). Initial implant stability was 50 Ncm torque, checked using torque ratchet. Implant was covered using cover screw. Flap closure was done using interrupted sutures & an IOPAR was done. (Figure 9-10) Medicines were prescribed to patient as in first surgery. 0.2% Chlorhexidine mouth wash was also prescribed to patient twice a day. After 1 week, sutures were removed. Patient was recalled after completion of 3 months of implant placement for prosthetic phase.

Prosthetic Procedure

Prosthetic procedure was started by removal of only a small portion of tissue in mid-crestal region under local anesthesia. Cover-screw was removed & mild gingivoplasty was performed for soft tissue contouring according to the zenith of adjacent teeth. After that healing abutment was placed and customised using flowable composite. After 1 week, implant stability was checked using resonance frequency analysis (RFA) by Osstell-mentor (Gotenberg, Sweden). RFA measured ISQ (Implant stability Quotient) 67 that was adequate for loading. Following this, healing cap was removed, open tray-impression coping was placed and space around it was filled using flowable composite and impression making was completed using polyvinyl-siloxane (Addition silicone). Abutment screw was secured using Teflon tape and Zirconia crown was cemented using glass-inomer cement provided implant protected occlusion. (Figure 11-13)

DISCUSSION:

GBR has been successfully applied for increasing the width and height of the alveolar ridge before implant installation and in the treatment of peri-implant bone defects in experimental animals and in clinical cases.[7] Recently, it has been further applied in preserving extraction sockets, in the adjunct to immediate implant placement or in the treatment of fenestration or dehiscence of implants at sites compromised by insufficient bone. Here, in this case the initial implant stability could not be achieved due to labial bone defect, so GBR staged approach was performed. GBR was done using xenograft (Cerabone). Resorbable synthetic collagen membrane (Periocol) was used to maintain the space for osteogenesis and to prevent invasion of non-osseous cells into the grafted area. After 6 months of GBR, bone gain was confirmed

by dentascan followed by implant placement as 6 months are adequate for osteogenesis to be completed.[5,6] Buser showed that GBR procedures produced a horizontal ridge width gain of 1.5–5.5 mm. Studies by Feuille using GBR techniques demonstrated a mean ridge width gain of 3.2 mm (range, 2.2–4.2 mm). Success rates for GBR techniques have been seen upto 81-97%, almost similar to those of block grafts.[8]

In the context with barrier membranes (resorbable or non-resorbable), non-resorbable membranes do not undergo the enzymatic degradation hence they require a second surgical intervention in order to be removed and regeneration procedure may failed if these membranes get exposed before second surgical intervention. Due to these problems, resorbable membranes are used more frequently in dentistry for guided bone regeneration (GBR) and have been tested showing various degrees of successful bone regeneration, including collagen type I, polyurethane, polyglactin, polylactic acid etc.[9]

Here, in this case we have got adequate bone for implant placement after GBR and after 3 months of implant placement loading was done. Natural emergence profile was achieved by customising healing abutment after mild gingivoplasty to create the proper contour needed. Impression coping was also customised for impression making. Achievement of the good result is dependent on the amount of keratinized mucosa, available bone height, thickness of bone and shape of the implant prosthetic components. Flowable composite was used for customisation that reduces gingival trauma by eliminating the intra-oral use of resin monomer that avoids chemical or thermal insult to the tissues. It is a relatively easy method for accurate duplication of soft tissue profile.

One method of preserving soft and hard tissue is through immediate implant placement followed by an immediate provisional restoration if there is good primary stability.[10] However, this is not always possible. With delayed loading, soft tissue collapse occur that results in flat anatomical contour & there is need of either gingivoplasty or soft tissue contouring using provisional restoration or modification of impression techniques to create natural emergence profile.[11,12]

CONCLUSION:

Now, missing tooth with either horizontal or vertical ridge defect not provides any hindrance for implant placement. Adequate bone gain can be achieved by guided bone regeneration technique and biological barrier membrane either in staged approach or simultaneous approach for implant placement. Along this, by modifying the impression procedure we can achieve Now, missing tooth with either

horizontal or vertical ridge defect not provides any hindrance for implant placement. Adequate bone gain can be achieved by guided bone regeneration technique and biological barrier membrane either in staged approach or simultaneous approach for implant placement. Along this, by modifying the impression procedure we can achieve natural emergence profile in aesthetic region.

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FIGURES:

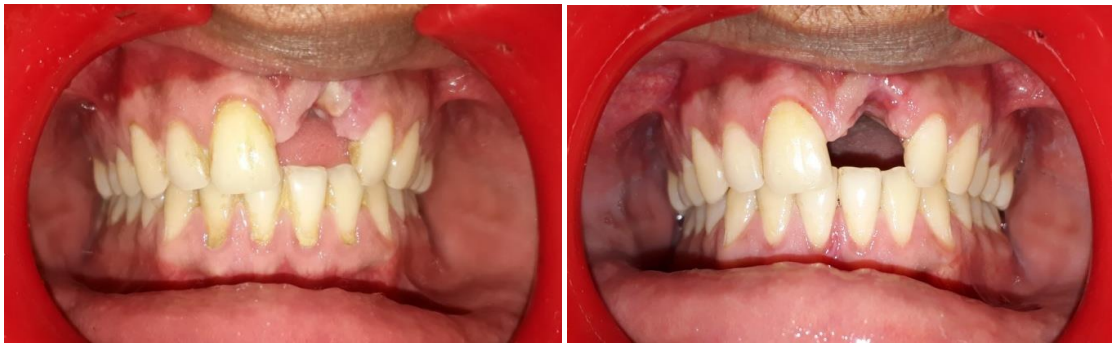

Figure 1.(a) Showing missing 21 with soft tissue defect and poor oral hygiene (b) After oral prophylaxis.

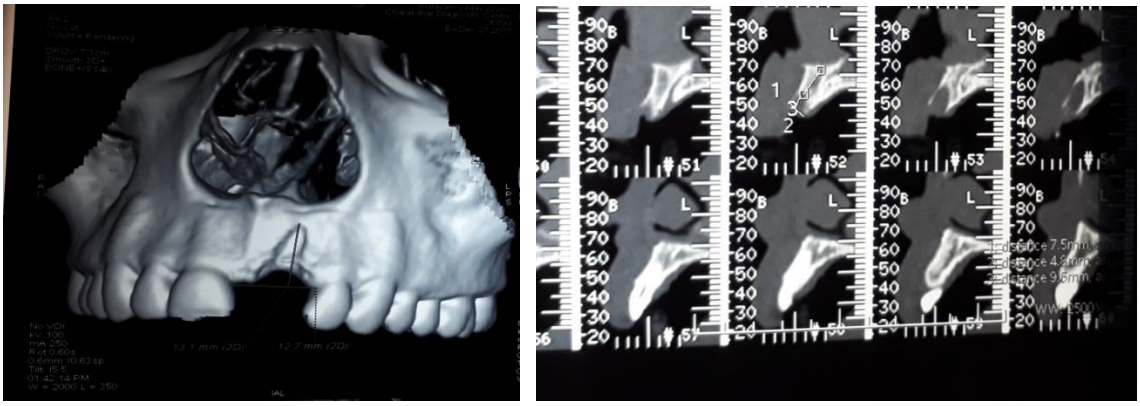

Figure 2. 64-slice Dentascan images before implant placement showing labial defect in 21.

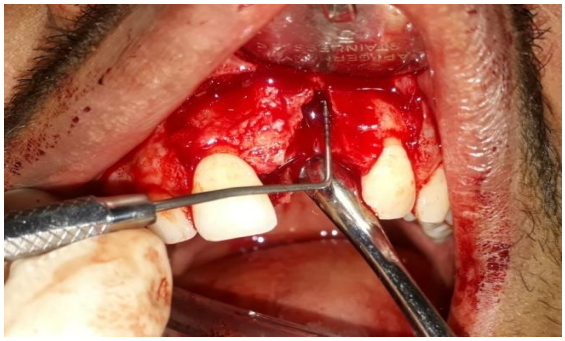

Figure 3.(a) Showing hard tissue defect labially upto 13mm in 21 (b) width of extraction socket upto 7mm.

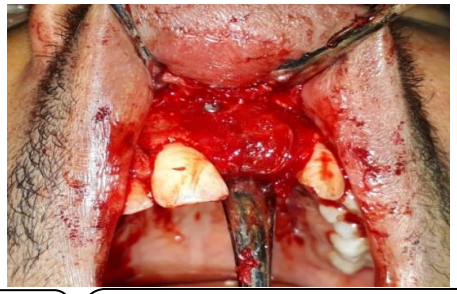

Figure 4. Sticky bone graft & A-PRF membranes placed.

Figure 5. (a) Periocol (synthetic resorbable collagen membrane) stabilised using tack screw (b) IOPAR examination.

Figure 6. Provisional acrylic crown bonded to adjacent teeth using superbond given for a period of 6 months after GBR.

Figure 7. Soft tissue contour after 6 months .

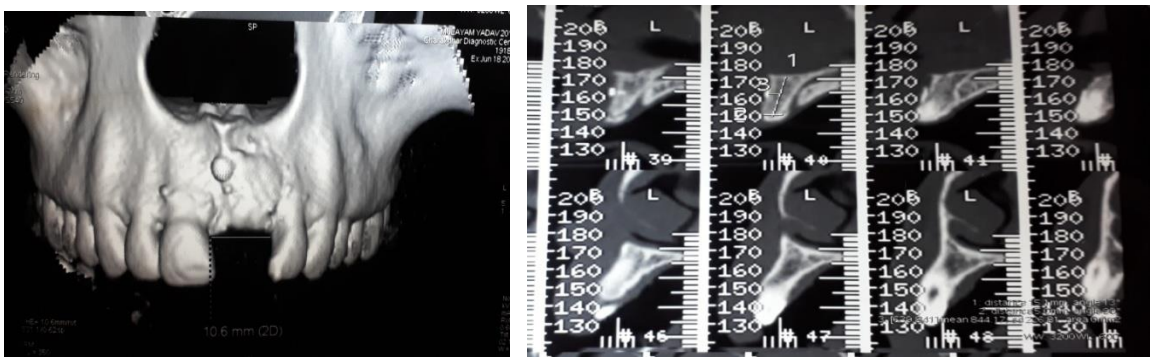

Figure 8. Dentascan images after 6 months of GBR showing adequate bone for implant placement.

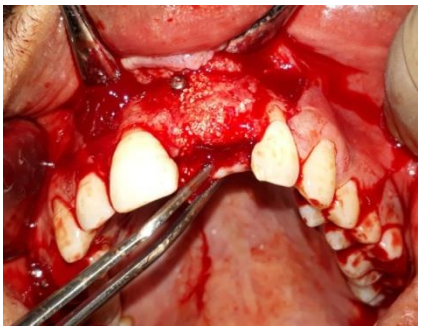

Figure 9. Full thickness flap reflected showing adequate bone for implant placement.

Figure 10. (a) Implant (ADIN Dental Implant System LTD., Israel) of size 3.5X13 mm was placed (b) IOPAR examination.

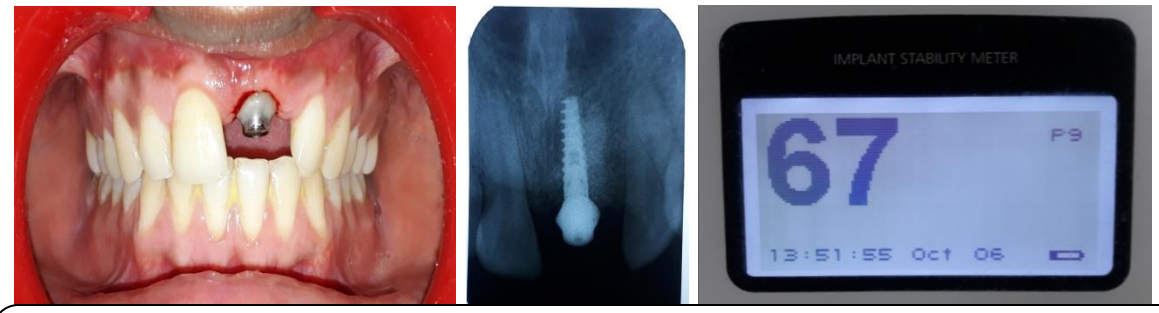

Figure 11. (a) After 3 month of implant placement, second stage surgery was performed using customized healing abutment (b) IOPAR examination (c) implant stability was checked using resonance frequency analyser (Osstell mentor).

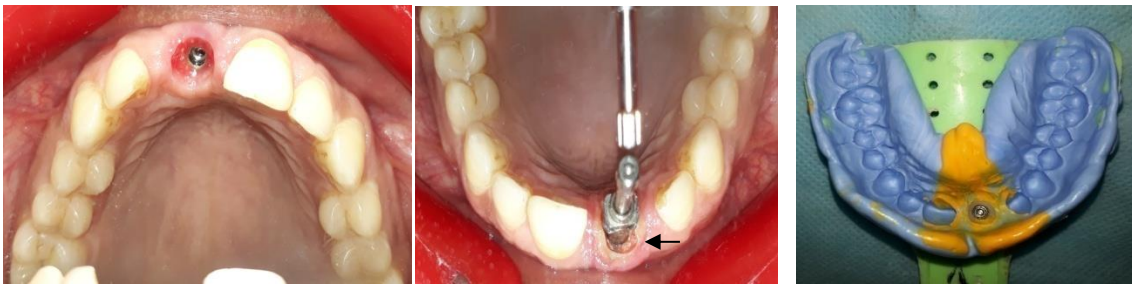

Figure 12. (a) Soft tissue contour after 2 week of healing (b) impression coping was placed, space around it was filled using flowable composite (c) final impression.

Figure 13. (a) & (b) Final prosthesis (Zirconia crown) was cemented using glass inomer cement (c) IOPAR examination.