Developing Implant Esthetics in Compromised Ridge

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INTRODUCTION

Traumatic tooth loss leads to alveolar resorption especially in sagittal direction, either due to direct loss of osseous structure because of injury or due to resorption of the alveolar crest that takes place after the loss of tooth. The alveolar process is often affected by the tooth loss, by a continuous resorptive process and has been seen to follow a predictable pattern, i.e., the labial aspect of the alveolar crest is the principal site of resorption, which first reduces in width and later in height.^{1,2} Shortage of bone can

prevent proper positioning of dental implants unless the volume of bone is increased before implantation. In the maxillary anterior area, this is also an issue of the esthetics. Several treatment modalities have been presented to augment the bone.

Guided bone regeneration (GBR) can maintain the bone volume and soft tissue contours. While this technique only requires a single surgical procedure, it is technically demanding.³ The GBR concept employs the same principles of specific tissue exclusion, but is not necessarily associated with

ABSTRACT:

Background: The article presents a case of anterior compromised edentulous ridge managed with ridge augmentation utilizing guided bone regeneration (GBR) technique and subsequently restored by implant supported prosthesis to provide esthetics.

Methods: Prior to implant placement, the horizontal ridge defect in the anterior maxilla was augmented utilizing guided bone regeneration technique with a mixture of alloplastic biomaterials, bioactive glass and medical grade calcium sulfate, covered with an absorbable bio-collagen membrane.

Results: After 6 months, upon exposure, it was observed that the augmentation was achieved. This was confirmed during the exposure for implant placement, which was restored with satisfactory outcome.

Conclusion: Guided bone regeneration is a predictable treatment modality for ridge deficiencies in the anterior maxilla which warrants high esthetic outcome. When combined with additional soft tissue augmentative procedures and prosthodontic rehabilitation, outcome often satisfies patient's esthetic expectations.

Key words: Maxillary anterior compromised ridge, Guided-bone regeneration, Implant esthetics

teeth. On the other hand, guided tissue regeneration (GTR) was first developed in the early 1980s by Nyman et al.⁴ This concept is based on the principle that specific cells contribute to the formation of specific tissues. Melcher described the concept of selective cell repopulation of defects to enhance healing.⁵

The present case report deals with a case of anterior compromised edentulous ridge managed with ridge augmentation using GBR technique and subsequently restored by implant supported prosthesis to provide esthetics as primary concern.

CASE REPORT

A medically and periodontally stable 25-year-old, non-smoking male reported to Department Of Periodontology, Army Dental Centre, Delhi Cantt and presented with a previously traumatic loss of tooth No. 11 (Figure 1A & 1B). The patient's primary concern was esthetics and he also wanted rehabilitation with a implant supported prosthesis. Evaluation of the edentulous space with bone mapping revealed Siebert's class III ridge defect i.e., loss in height and width of the alveolar ridge. The labio palatal width of the alveolar bone was measured to be just 3 mm at coronal crest which was quite inadequate for placement of implant.

The Treatment Sequence followed included:

- GBR at No. 11 site
- 6-month healing period
- Implant placement in No.11site
- 3-month healing period
- Guided soft-tissue growth
- Final implant No 11 crown restoration

Routine haemogram and urine analysis was carried out to exclude any contraindication for surgery. Clinical findings were correlated with radiological findings of Orthopantomogram and Radio- visiography for confirmation of type of osseous defect and compare the post-operative gain of alveolar bone (Figure 1C).

Surgical phase:

Local anesthetic induction was achieved using 2% lidocaine with 1:100,000 epinephrine infiltration. A palatally oriented horizontal incision was made in the edentulous No 11 ridge with a sulcular extension to the mesio-buccal aspects of tooth No. 21 and 12. To increase visualization, vertical incision

with a small right angle coronal modification was placed at the mesio-buccal line angle of No 12 and 21. A full-thickness flap was elevated past the mucogingival junction, and periodontal scoring took place near the base of the flap to facilitate the coronal advancement necessary for primary closure (Figure 2).

Decortication of the ridge was performed using a round bur to achieve bleeding points. Synthetic alloplast Bio active glass (PERIOGLASS) mixed with medical grade calcium sulfate was placed on the ridge to augment it buccally and coronally (Figure 3). An absorbable bio-collagen membrane (PROGUIDE) trimmed and used to cover the grafted area and secured with two sutures secured with soft tissue towards mucogingival junction at its apical aspect (Figure 4). The membrane was pulled down coronally to be secured with sutures with soft tissues from palatal side (Figure 5). After 6 months of uneventful healing, the available alveolar bone width was measured to be approximately 8 mm with a resultant gain of 6 mm. Sequential osteotomy was carried out till the implant length and width was achieved as per manufacturer's instructions. IOPA radiograph was taken to confirm the angulation. A 2 stage endosseous implant measuring 3.25 X 9.5 mm was wrenched using appropriate torque (Figure 6A & 6B). After implant placement, flap was closed using simple interrupted 3-0 silk sutures. Suture removal was done after 10 days and post operative healing was uneventful.

Prosthetic phase:

Four months after stage I surgery, the implant was uncovered and gingival former was placed for 02 weeks. Abutment was replaced subsequently and a closed tray impression was performed to fabricate temporary acrylic crown to shape the gingival contours. Temporary prosthesis was in place for 04 weeks. A definitive abutment and provisional crown were attached to the implant to assist in esthetic profile development before final restoration (Figure 7). Following the gingival reshaping, it was noticed that the gingival zenith was slightly apical to the adjacent central incisor. The patient was not ready to undergo additional soft tissue augmentation procedures. Hence, a zirconia crown with gingival porcelain to mimic soft tissue deficiency was fabricated and cemented in place (Figure 8 & 9). Written oral hygiene instructions were given to the patient with scheduled recall visits at 1, 3 and 6

Figure 1: A) & B) Pre-Operative intra-oral photograph of the patient; C) Pre-operative digital periapical radiograph

Figure 2: Recipient site exposure

Figure 3: Defect coverage with a mixture of perioglass and medical grade calcium sulphate

Figure 4: Bio-resorbable membrane covering the grafted site

Figure 5: Soft tissue closure

6A

6B

Figure 6: A) & B) Two-piece implant placement (AB 3.25 x 9.5mm)

Figure 7: Temporary acrylic prosthesis in-situ

Figure 8: Fabrication of zirconia crown with gingival porcelain

10A

Figure 9: Zirconia crown prosthesis in-situ

10B

Figure 10: A) & B) A comparison of pre-operative and post-operative smile

months respectively. After 1 year of clinical loading, the implant remained stable (Figure 10 A & 10B).

DISCUSSION

Among the different methods, guided bone regeneration (GBR) is the most popular and best documented for the treatment of localized bone defects in the jaws, probably due to its relative simplicity of use while allowing the placement of endosseous implants in areas of the jaw with bony defects and/or insufficient bone volume. Highly predictable success rates can be achieved using GBR; in fact, it has been shown that success rates of implants placed at GBR treated sites and sites without bone augmentation are comparable.⁶

Guided Bone Regeneration (GBR) has been used at the bone defect site to promote osseous regeneration and to preserve a large percent of grafted material which are placed and act by process of osteogenic, osteoconductive or osteoinductive activity.⁷⁻⁹ Prevention of soft tissue migration to the grafted site is a necessary factor for creation and maintenance of space adequate enough for regeneration of bone.

GBR can be achieved by application of either resorbable or non resorbable membrane. Non resorbable barriers may provide predictable regeneration due to their inherent structural integrity but use of these membranes typically requires a second surgical procedure for their removal. Additionally, membrane exposure may necessitate premature removal, resulting in less than optimal results.¹⁰ It would be desirable therefore, to use a resorbable membrane, but maintains its barrier function for as long as possible. Resorbable membranes with a rapid resorption profile may not exclude the connective tissue long enough for bone to completely fill the defect. In the present case, medical grade calcium sulphate has been moulded and applied as a membrane over the bone grafts and a resorbable bio collagen membrane used over it which was adequately covering the defect site.

Although it relieves supracrestal deficiencies, GBR best resolves space-making defects, which occur within an envelope of bone.^{11, 12} The intact surrounding walls provide viable cells, blood supply, containment for graft particles, and a buttress to support the regenerative barrier and prevent collapse. Predictability of augmentation is directly proportional to the amount of bone that is enclosing the space. Ridge augmentation in the case under

discussion was not having intact walls. Therefore 100% regeneration and augmentation was neither expected nor achieved. But we could predictably achieve the bucco-palatal width adequate enough for placement of implant.

This clinical case presentation demonstrates the combination of grafting procedure by GBR followed by implant placement in one localized compromised case. The problem encountered in this case was long time period involvement and frequent visit by the patient

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