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Ridge Augmentation Using GBR Method -A Case Report

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Abstract:
Aims and objectives*: The aim of this case report was to restore height and width of maxillary left upper incisor region by using Osseograft and Periocol GTR membrane and to replace the missing incisor with fixed prosthesis in a 20 years old female patient.*
Case presentation:*A 20 years old girl presented with chief complaint of missing left upper anterior teeth causing aesthetic problem. Combined periodontal regenerative surgery and prosthetictreatment was performed.*
Conclusion*: The use of bone graft and GTR membrane is one of the easiest effective ridge augmentation method for augmentation of single edentulous region.*
Keywords*:Ridge defect, Ridge augmentation, Bonegraft, GTR membrane, GBR*

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I. INTRODUCTION:

Alveolar ridge resorption is a common consequence of tooth loss and frequently results in an unaesthetic deformity. A deformed ridge may result from trauma, advanced periodontal diseases, abscess formations etc.To provideadequate anatomic dimensions for the construction of an esthetic Pontic or the placement of dental implants, ridge augmentation procedures are performed. Small defect may be treated with soft tissue augmentation procedures, for larger defects and in those sites receiving dental implants, hard tissue modalities are used.

According to Seibert (1983)[1] ridge defects can be divided into three classes:
Class I: Loss of buccolingual width but normal apicocoronal height
Class II: Loss of apicocoronal height but normal buccolingual width
Class III: A combination of loss of both height and width of the ridge

Ridge augmentation procedure should be preceded by a careful surgical-prosthetic treatment planning by joint consultations involving the surgeon and the restorative dentist in order to attain an optimal esthetic result. Different techniques to correct ridge deformities have been recommended in the past. [2] The application of Guided Bone Regeneration (GBR) for supracrestal regeneration was introduced and described by Tinti C in 1998. The achievement of the GBR method is chiefly influenced by the prohibition of soft tissue cells in the course of bone remodeling by means of gradually functioning osteoblasts. GBR is a clinical procedure which rises the extent of alveolar ridge for fixed prothesis or implant placement by means of barrier membranes with or without bone substitutes.

In this article a class III ridge defect was augmented by GBR technique using Osseograft (Demineralized Bone Matrix Xenograft Granules with type I collagen) and Periocol GTR membrane.

II. CASE PRESENTATION:

A 20 years old girl presented with chief complaint of missing left upper anterior tooth and a depression in the gum causing aesthetic problem. Past dental history revealed extraction of broken left upper anterior tooth about one year back. There was no significant extra-oral finding present.

An intra-oral examination showed Plaque Index score 1, Calculus Index score1and Gingival Index score 1. Oral hygiene was good and gingiva appeared healthy. 21 was missing and there was class III ridge defect in that region(Fig1& Fig 2). Intra-oral Periapical radiograph (IOPR) showed bone defect in 21 region(Fig 3). The whole treatment plan was explained to the Patientand patient's relatives and their consent was taken in a consent form.

The initial preparation phase for treatment consisted of oral hygiene instructions, scaling and rootplaning. Occlusal therapy and re-evaluation were done 4 weeks after the completion of this first phase of therapy.Routine blood investigation was normal. Amoxicillin (500mg) 8 hourly was prescribed day before the

surgery and Ibuprofen (400mg) was prescribed one hour before the initiation of surgery.Before commencing surgical procedure, the patient was asked to rinse with 0.2% chlorhexidine mouthwash (preprocedural rinse). Extra-oral scrubbing was done with 7.5% Povidone-Iodine solution.

The area was anesthetized by infiltration anesthesia, 2% Lidocaine anaesthetic solution containing 1:200,000 Lidocaine Hydrochloride with Adrenaline.Number 11 surgical blade was used to make sulcular incision from distal surface of 12 labially and the incision was extended up to mesial surface of 11. Then crestal incision was given at the edentulous region slightly palatallyup to mesial surface of 22. Then again sulcular incision was extended labially up to mesial surface of 23(Fig4). Palatal flap was slightly elevated in the edentulous region only for placement of GTR membrane. Full-thickness mucoperiosteal labial flap was elevated and debridement and root planing were done with Gracey Curettes (Fig 5, Fig 6, Fig 7). Perforation of the cortical bone was done at the edentulous region before bone grafting for better migration of vessels to the augmented site. The area was irrigated with sterile normal saline solution. Periocol GTR membrane (Fig 10) was shaped properly for the edentulous region and placed inside the palatal flap partially. Osseograft (Demineralized Bone Matrix Xenograft Granules with type I collagen) bone graft material (Fig 8, Fig 9) was placed slightly excess in amount and then covered it with previously palatally placed GTR membrane(Fig.11).Then labial flap was sutured in its original position with the help of vicryl 4-0 resorbable suture material(Fig 12, Fig 13). Light cure dressing material (Barricaid) was applied for protection of the grafted site(Fig 14, Fig 15, Fig 16).

Postoperative care during the initial weeks of healing may affect the outcome of GBR [3]. 0.2% Chlorhexidine and Hyaluronic acid mouthwash after the operation are recommended to reduce infection and improve soft tissue healing [4]. Postsurgical medications should also be prescribed, including antibiotics starting on the day before initiation of surgery and lasting for 7 days (500 mg amoxicillin 8 hourly), analgesics (400mg ibuprofen 8 hourly for 3 days). Patients should be informed in detail with written postoperative instructions after the operation.

Patient was instructed to report after 24 hours of surgery and then after 7 days, 1 month, 2 months and 6 months(Fig 17). After 6 months there was reduced labial concavity and IOPAR showed some bone formation in 21 region(Fig 17). The missing tooth was replaced with fixed prosthesis.

III. DISCUSSION:

Localized alveolar ridge defect is common after prolonged edentulism. Replacement of missing anterior maxillary tooth with ridge defect is challenging, because of the high esthetic demand in this region.[5]Esthetic outcome of fixed prosthesis depends on three-dimensional emergence profile of the pontic which is highly dependent on harmony between soft tissue and prosthesis. Therefore, surgical or mucogingival alteration of hard tissue and soft tissue is essential in the defected area of the ridge to rehabilitate the prosthesis.[6]

Based on a series of experimental studies, a biological principle of healing was discovered by Nyman &Karring in the early 1980s.The work of these investigators was aimed at regenerating lost periodontal tissues.[7,8,9]They developed a technique, utilizing barrier membranes, which prevented undesired cells from accessing the wound and at the same time, allowed cells with the capacity to form the desired tissue to access the wound space. This technique was termed guided tissue regeneration (GTR).[10,11]Soon thereafter, guided tissue regeneration was applied for the regeneration of bone tissue which was known as guided bone regeneration (GBR).

A large series of animal experiments [12,13,14] and human clinical studies [15,16,17,18] have documented guided bone regeneration to be a successful method for augmenting bone in situations where there is inadequate bone volume for the placement of endosseous dental implants or fixed prosthesis. The criteria required to select appropriate barrier membranes for guided bone regeneration encompass biocompatibility, integration by the host tissue, cell occlusiveness, space-making ability and adequate clinical manageability.[19] The barrier membranes used for GBR procedures can be classified as nonresorbable or resorbable. In this case report Periocol-GTR (Fibrillar Sterile Collagen of Fish Origin) resorbable membrane was used. Bone grafts and bone substitutes can be classified into four groups, according to their origin: autografts, from the same individual; allografts, from another individual within the same species; xenografts, from another species; and alloplasts, synthetically produced. In this case report xenogenic demineralized bone matrix (Osseograft) was used which consists of type I collagen that is prepared from bovine cortical bone samples of 250 μm. 'Barricaid" (a polyether urethane dimethacrylate resin), a light cured dressing material was applied for better protection of wound site for two weeks. After six months follow up there was sufficient width and height gain achieved (Fig 17).

IV. CONCLUSION:

Regeneration of lost alveolar ridge is a challenging situation specially in maxillary anterior region. GBR is one of the most useful technique. Following PASS principle (Wang HL 2006) (20) (Primary wound closure, Angiogenesis,Space maintenance and Stability of the clot) successful GBR methods can be performed

by using different types of GTR membranes and bone graft materials. This is a small attempt to perform a GBR technique with simultaneous use of Periocol GTR membrane, Osseograft bone grafting material and light cured periodontal dressing (Barricaide). Two important limitations need to be considered here. First, no re-entry surgery was performed here and second, only 6 months follow up was possible for this case. Further work needs to be done to establish whether GBR is the best method for small defect augmentation.

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Fig 1

Fig 2

Fig 3

Fig 4

Fig 5

Fig 6

Fig 7

Fig 8

Fig 9

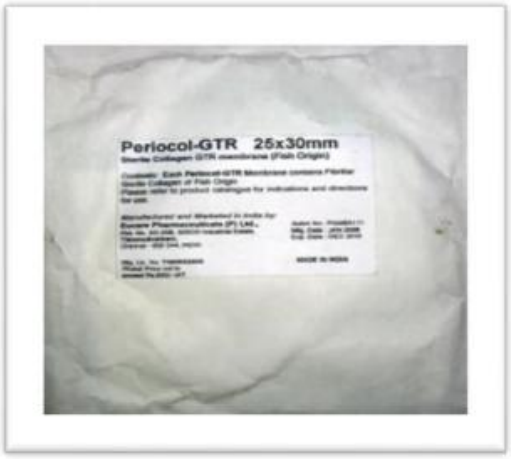

Fig 10

Fig 11

Fig 12

Fig 13

Fig 14

Fig 15

Fig 16


After 1 week of post operative view
After 1 month of post operative view
Initial IOPA showing bone defect in edentulous area
Final IOPA (after 6 months) showing increased radioopacity
After 6 months final image showing reduced

Fig 17


After 1 week
After 1 month
Initial Radiograph
After 6 months
After 2 months
After 6 months

Fig 17