

## Management of Osseous Defects in Aggressive Periodontitis by Using Equine Xenograft and Equine Pericardial GTR Membrane: A Report of Three Cases Using Different Techniques

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### Abstract

**Aim:** Successful treatment of aggressive periodontitis is considered to be dependent on early diagnosis, targeted antimicrobial therapy and modifying the tissue architecture that is conducive to long-term maintenance. Osseous defects present a challenge in periodontal practice and successful treatment depends primarily on selection of the correct technique and materials.

**Case Series:** This case series presents three cases treated with different techniques and with same materials. The defect was filled up with a equine based bone graft substitute Collagen granules Bio-Gen (Bioteck®, Italy) and covered with a restorable pericardial derived equine based Biocollagen GTR membrane (Bioteck® Italy). Treatment for the endo-perio lesion is also managed where required. The results in all four cases discussed here are satisfactory and have shown long-term stability emphasizing the importance of selection of technique and material.

**Conclusion:** There are different techniques and a variety of newer materials available for elimination of osseous defects. The key to successful management of such defects is correct diagnosis, early intervention and proper selection of technique and materials. Use of equine based xenograft with pericardial originated GTR bioresorbable membrane showed significant improved outcomes in treating aggressive periodontitis.

**Keywords:** Aggressive Periodontitis; Guided Tissue Regeneration (GTR); Equine Xenografts

### Introduction

Aggressive periodontitis by definition comprises a group of rare, often severe, rapidly progressing forms of periodontitis often characterized by an early age of clinical manifestation and a distinctive tendency to aggregate in families. The 1999 international classification workshop identified clinical and laboratory features and further sub-classified as aggressive periodontitis into localized and generalized forms [1]. Localized aggressive periodontitis cases generally present isolated osseous defects, which need early intervention to improve prognosis.

The regeneration of periodontal tissues lost due to destructive inflammatory process has been the ultimate goal of any periodontal therapy. However, despite the development of a wide range of regenerative surgical techniques, this goal remains difficult if not impossible to achieve. Two techniques with the most successful documentation of periodontal regeneration are osseous grafting and guided tissue regeneration [2].

The use of bone graft substitutes for treating bony defects resulting from periodontitis has been reported, evaluated and reviewed since the era of iliac bone grafting. However evidence of true periodontal regeneration has not been conclusive in case of bone grafts. As a result newer materials are constantly being researched with the aim of finding a material, which will be able to help in regenerating the lost periodontium. Periodontal regeneration by GTR has been defined within the concept of “new attachment”. Guided tissue regeneration (GTR) describes procedures attempting to regenerate lost periodontal structures through differential tissue responses. It typically refers to regeneration of periodontal attachment by barrier techniques in which epithelium and the gingival corium from the root is excluded in the belief that they interfere with regeneration [3].

Use of GTR through the use of equine barrier and equine bone graft material showed a favorable clinical outcome and an effective periodontal therapy in the regenerative treatment of intrabony defects [17]. Also, these equine collagen membranes and equine bone acts as an effective therapy for guided bone regeneration in the treatment of bone defect consequent to removal of periapical cyst in clinical and histological report [18].

Some previous literature reports [13-16] were found, in which the efficacy of bioabsorbable membranes alone or combined with graft materials were evaluated and compared for regenerative purposes. However, to our knowledge, there are no available studies comparing the efficacy of using an equine bioabsorbable collagen barrier (Biocollagen®) alone or combined with equine graft (Bio-Gen®), in treating intrabony defects of aggressive periodontitis.

### **Case Report 1**

A 30 year old male patient reported to Chandra Dental College and Hospital, Safedabad, Barabanki, U.P. (India) with the chief complaint of pain and bleeding of gums in relation to lower left back tooth region since 20 days. Patient gave a history of food impaction and history of bleeding while brushing in the same region since one year, which subsided on its own after sometime without any treatment. For radiographic examination OPD done (Figure 1) and clinical examination there was a periodontal pocket of 8 mm on the distal aspect of mandibular first molar (Figure 2) and 6 mm pocket on the distal aspect of mandibular first premolar (Figure 3). There was no tenderness or pus discharge at the time of examination. Based on history, clinical findings and radiographic evaluation a diagnosis of Localized Aggressive Periodontitis.

After phase I therapy and endodontic treatment in 34 and 36, three different procedures were planned to correct the osseous defects. After debridement (Figure 4 to 6) The defect was filled up with a equine based bone graft substitute Collagen granules Bio-Gen (Bioteck®, Italy) and covered with a resorbable pericardial derived equine based Biocollagen GTR membrane (Bioteck® Italy), and sutures given (Figure 7 to 9).

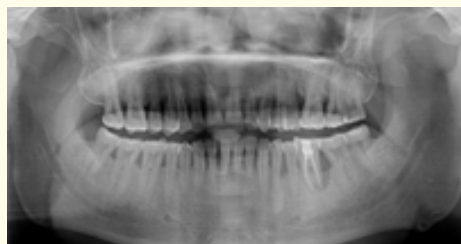


Figure 1: Preoperative radiographic view.



Figure 2: Pre-operative clinical view in 36,37.



Figure 3: Pre-operative clinical view in 34,35.



Figure 4: Flap reflection.



Figure 5: Vertical defect exposure in 36,37.



Figure 6: Vertical defect exposure in 34,35.



Figure 7: Bone graft placement.



Figure 8: GTR membrane placement.



Figure 9: Suturing.

Figures Case Report 1

### Case Report 2

A 30-year-old male patient reported to the OPD of Periodontics, Chandra Dental College, Safedabad Barabanki U.P., India, with chief complaint of swelling of gums and discomfort in right lower back region. The swelling was present since the last four days. Oral hygiene status of patient was fair. Swelling was seen in relation to tooth 46 (Figure 1). Grade II mobility was evident in the 46, with pain and difficulty in mastication. Tooth was tender on percussion and vitality test was negative. Periodontal examination revealed a clinical probing pocket depth of 4 to 7 mm (mean 5.5 mm), with class II furcation involvement as measured with a probe (Figure 2). IOPA radiograph revealed periapical radiolucencies in mesial root and furcation area of 46 (Figure 3). Based on history, clinical findings and radiographic evaluation a diagnosis of Localized Aggressive Periodontitis, with endo perio lesion.

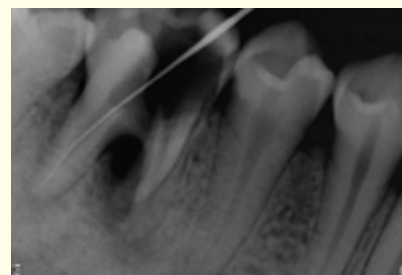
After phase I therapy and endodontic therapy completed in 46, procedures were planned to correct the osseous defects. After debridement (Figure 4 to 6) The defect was filled up with a equine based bone graft substitute Collagen granules Bio-Gen (Bioteck®, Italy) and covered with a resorbable pericardial derived equine based Biocollagen GTR membrane (Bioteck® Italy), and sutures given (Figure 7 to 9).



**Figure 1:** Preoperative clinical view of swelling in 46.



**Figure 2:** Class II Furcation involvement as measured with a probe.



**Figure 3:** IOPA X ray revealed periapical radiolucencies in mesial root and furcation area of 46 showing Type 2 endo-perio lesion (Simon 1972).



**Figure 4:** MTA and GIC to seal the floor and Metapex extruded in the canal for repair of periapical radiolucency after obturation with GP points.



**Figure 5:** Vertical defect and furcation exposure in 46.



**Figure 6:** Bone graft placement.



**Figure 7:** GTR membrane placement.



**Figure 8:** Suturing.



**Figure 9:** Post-Operative Radiograph after 40 days.

Figures Case Report 2



### Case Report 3

A 36 year old male patient reported with the chief complaint of bleeding and swelling of gums in relation to right upper tooth since 20 days. On examination there was a periodontal pocket of 8 mm on the mesial aspect and 7 mm on the distal aspect of maxillary right central incisor and 6 mm on buccal aspect (Figure 1). There was no tenderness or pus discharge. Radiograph revealed infrabony defects on both the mesial as well as distal aspect of 11 with Endo treatment done (Figure 2). Based on history, clinical findings and radiographic evaluation a diagnosis of Localized Aggressive Periodontitis, with endo perio lesion.

After phase I therapy and endodontic therapy completed in 11,12, procedures were planned to correct the osseous defects. After debridement (Figure 3, 4) The defect was filled up with a equine based bone graft substitute Collagen granules Bio-Gen (Bioteck®, Italy) and covered with a resorbable pericardial derived equine based Biocollagen GTR membrane (Bioteck® Italy), and sutures given (Figure 5 to 8).



Figure 1: Preoperative clinical view.



Figure 2: Pre-operative radiographic view in 11,12.



Figure 3: Circumferential defect in 11,12.



Figure 4: Circumferential defect.



Figure 5: Bone Graft material and GTR membrane placement.



Figure 6: Sutures Given.



Figure 7: Coe Pack Placement.



Figure 8: 3 Months Post-Operative.

Figures Case Report 3

### **Surgical Technique**

A mucoperiosteal flap was raised from 12, 11 and 21 region utilizing the simplified papilla preservation flap to ensure maximum coverage of the grafted site. The flap was extended to include one tooth on either side of the defect site so as to allow adequate reflection without giving a vertical incision. After complete removal of the granulation tissue and complete debridement, a circumferential defect of 8 mm was present around 11 (Figure 3 a,b). The bone graft substitute (equine derived Bio-Gen®) was placed in the defect to fill it completely (Figure 4) and then covered with a resorbable GTR membrane (equine bioabsorbable collagen barrier (Biocollagen®, Bioteck Italy) (Figure 5). The flap was sutured approximating it on both buccal and palatal aspects to completely cover the membrane, then interrupted sutures given and coepack applied (Figure 5,6).

### **Post-surgical treatment and follow-up**

The patient was given plaque control instructions that included use of 0.12% Chlorhexidine rinse twice daily and to avoid tooth brushing in the operated quadrant. The sutures were removed 10 days following surgery. The Chlorhexidine rinse was advised for 2 more weeks. The patient was advised to brush in the operated segment using a soft toothbrush. The patient was put on regular recall at 1, 3, 6, 9 and 12 months. The symptoms of bleeding and swelling had disappeared. There was reduction in probing depth at the three month recall and by the 3 month recall the patient was comfortable with no recurrence of symptoms.

### **Pre surgical protocol**

The initial preparation phase for treatment consisted of oral hygiene instructions, scaling and root planning. Occlusal therapy and re-evaluation was done 4 weeks after the completion of phase I therapy.

### **Surgical Technique**

The surgical procedure was carried out under local anaesthesia (2% lidocaine with epinephrine 1:80,000). Intrasulcular incision was given. A full thickness mucoperiosteal flap was raised ensuring maximum coverage of the grafted site. The flap was extended to include one tooth on either side of the defect site so as to allow adequate reflection. After complete removal of the granulation tissue and complete debridement, The defect was filled up with a equine based bone graft substitute Collagen granules Bio-Gen (Bioteck®, Italy) and covered with a resorbable pericardial derived equine based Biocollagen GTR membrane (Bioteck® Italy. The flap was then sutured using resorbable sutures, approximating it on both buccal and lingual aspects to completely cover the membrane. Periodontal surgical pack was placed to leave the area undisturbed for a period of 2 weeks.

### **Post-surgical treatment and follow-up**

The patient was given plaque control instructions that included use of 0.2% Chlorhexidine rinse twice daily to help control plaque control and to avoid tooth brushing in the operated area for one week. The periodontal dressing was removed at the end of one week and the area was reevaluated. The surgical site was gently debrided and irrigated with saline and redressing was done. Both periodontal dressing and sutures were removed at the end of two weeks post operatively. The patient was advised to brush in the operated segment using a soft toothbrush. The patient was put on regular recall at 1, 3, 6 and 9 months. The symptoms of pain, bleeding, food impaction and swelling had reduced slowly over a period of 6 months. There was reduction in probing depth at the three month recall and by the 6 month recall the patient was comfortable with no recurrence of symptoms like swelling. At the 6 month recall, radiograph showed significant bone fill, evident as increase in radiopacity.

### **Discussion**

Aggressive periodontitis results in a very rapid and severe attachment loss which needs immediate corrective measures to arrest progression and prevent further loss. An infrabony defect results when the junctional epithelium is apical to the alveolar crest. These kinds

of defects are frequently found in areas of the mouth where the cortical bone is thick and is separated by large volume of cancellous bone. The most common location of infrabony defects is the mesial interproximal location between maxillary and mandibular second molars. Since the mandible widens anteroposteriorly, the incidence of infrabony defects increases in the posterior region [3]. Most of the defects in the case series presented here were in mandibular molars. Literature supports the concept that periodontal pockets associated with intrabony lesions are at higher risk of disease progression in patients who do not receive timely and systematic periodontal therapy [4].

A periodontally compromised patient is considered to have poor prognosis when there is moderate to advanced bone loss around one or more teeth leading to tooth mobility of grade II or I. Furcation involvement in difficult to maintain areas, doubtful patient cooperation and presence of coexisting systemic or environmental factors also lead to poor prognosis. Poor prognosis depends on a large number of factors that can interact in an unpredictable number of ways. Prognosis of individual tooth is determined after the overall prognosis and is affected by it.

In patients with poor prognosis, the following points should be considered:

- Should surgical treatment be undertaken?
- Is it likely to succeed?
- When prosthetic replacements are needed are the remaining teeth capable of supporting the added burden of prosthesis?

In the following conditions decision to save the tooth may be taken:

- When endodontic treatment (if necessary) can be performed and the tooth can be sealed with well fitted single tooth restoration with adequate ferrule.
- When vertical osseous defects can be grafted predictably.
- When patient is psychologically motivated to keep his/her teeth and has been informed of various options.
- When patient has very good compliance and maintains good oral hygiene.

Numerous factors must be considered in the treatment planning process when cases present with advanced periodontal disease. The procedure is selected based the clinical findings and in cases with poor prognosis the ultimate decision must be made considering all the presenting factors in that particular case.

With proper management and adequate maintenance even hopeless prognosis teeth can be maintained for a long time.

Despite advent of numerous alloplastic materials, Autogenous grafts continue to be the gold standard among graft materials with documented excellent regenerative potential proven earlier with histologic evidence [5]. Alloplastic bone graft substitutes are widely used treatment options for the correction of osseous defects [6,7]. In this case series, all The defect was filled up with a equine based bone graft substitute Collagen granules Bio-Gen (Bioteck®, Italy) and covered with a resorbable pericardial derived equine based Biocollagen GTR membrane (Bioteck® Italy), and sutures given. There was significant reduction in probing depth and evidence of bony fill on the radiograph.

Endoperio lesions are fairly common conditions that are often difficult to diagnose and if not treated completely can recur. However with proper diagnosis and treatment planning, these lesions can be completely eliminated to give predictable results. At times, a properly done endodontic treatment is sufficient to eliminate the infection. Whenever secondary periodontal involvement exists, it requires periodontal therapy to achieve success. These lesions generally have a vertical osseous defect and periodontal regenerative therapy gives excellent results [8].

In Case 1, tooth 36, could be successfully conserved by a proper endodontic therapy and subsequent complete debridement. Postoperative follow up showed a functional tooth with elimination of periodontal pocket and bony fill evident radiographically. In Case 2, the defect in 46, there was Grade II furcation involvement. The tooth was first treated endodontically. After thorough debridement, a bone graft substitute was placed to fill the defect. In Case #3, the bone loss was quite extensive in 11. The tooth was grade I mobile and required splinting to stabilize it to enhance healing with circumferential defect. After debridement, a bone graft substitute was placed to fill the defect.

All three cases in this case series had isolated infrabony defects as a result of the extensive destruction associated with Aggressive periodontitis. The regenerative surgeries carried out to eliminate these defects resulted in successfully conserving the teeth with improved overall long term stability.

### Conclusion

Aggressive periodontitis is associated with severe and rapid destruction of the attachment apparatus leading to infrabony osseous defects. The treatment plan for these patients must address these defects with the aim of providing a stable environment to prevent recurrence. Newer treatment modalities are being introduced and researched all over the world providing the clinicians with a wide range of options to achieve a more predictable regeneration of the periodontium.

### Foot Notes

1. \*Biocollagen®, the product support bone remodelling phase, Lyophilized Equine bioabsorbable collagen membrane, 25 x 25 x 0.2 mm, Bioteck, Torino, Italy.
2. †Bio-Gen®, bone tissue of animal Equine origin “xenograft”, deantigenized for total reabsorption, Bio-Gen Mix, Cortical-Spongy, GR. 0.5 size 0.5 – 1 mm, Bioteck, Torino, Italy.

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