



GUIDED TISSUE REGENERATION IN ESTHETIC ZONE BY WHALE'S TAIL FLAP DESIGN USING INDIGENOUSLY PREPARED DFDBA AND AMNIOTIC MEMBRANE: A CASE REPORT

Periodontics

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ABSTRACT

Anticipation of complete reconstruction of lost periodontal tissues destroyed by periodontal disease is still a major challenge. Flap design in periodontal regeneration procedure should be such that to preserve maximum tissue and allow complete stabilization of the graft placed. Bone grafts are used in the treatment of various maxillomandibular bone defects, including Intrabony defects and Furcation defects. Allografts such as DFDBA, FDBA, amnion membrane, chorion membrane and amnion-chorion membrane are processed and stored according to standard protocols in central tissue bank, MAIDS New Delhi. The purpose of this case report is to describe and evaluate the efficacy of the "whale's tail" technique that was designed for the treatment of wide intrabony defects in the esthetic zone. Indigenously prepared DFDBA bone allograft and amniotic membrane used in the regeneration of osseous defect shows radiographic bone fill and pocket reduction from 7mm to 3 mm 18 months postoperatively.

KEYWORDS

Whale's tail technique, Intra-bony defect, DFDBA, Amnion membrane.

INTRODUCTION:

Maintaining the health of a tooth and its supporting periodontal tissue is the mainstay of periodontal treatment. The ultimate goal of periodontal therapy is the regeneration of the lost periodontal tissues. However, restoring the supporting tissue to their healthy level is the major challenge and hence periodontal regeneration has become one of the primary objectives of periodontal therapy¹.

When anterior teeth are present with deep osseous defects, an improvement of the prognosis of teeth as well as maintaining the esthetics poses an arduous task. Design of the periodontal flap in treating intrabony defects in the anterior region should be such as to preserve the gingival integrity and achieve primary closure of the flap for optimal results of the therapy¹. Periodontal regeneration can be done by specific surgical approaches to obtain primary flap closure and to preserve interdental tissue.

Bianchi and Bassetti described, in 2009, a surgical technique designed to preserve interdental tissue in guided tissue regeneration called the "whale's tail" technique².

Various biomaterials have been used to achieve periodontal regeneration. The autologous bone is considered the gold standard for grafting as it has very high osteogenic potential but it has its own limitations viz. limited availability and high donor site morbidity. Allografts offer greater availability and wider range of shapes and sizes without the need for additional surgery. The first modern bone allograft procedure was performed in 1879 by Scottish surgeon, Macewen. This paved the way for numerous bone allograft surgeries thereafter. It was in 1949 that the first tissue bank was set up to provide for these grafting surgeries (Strong 2000)³. Safe and cost effective bone allografts can be prepared from femur heads and placental membranes if a protocol of stringent donor screening and careful and meticulous processing under sterile conditions is followed, indicated by a negative bioburden and sterility test.

The purpose of this case report is to describe and evaluate the efficacy of the "whale's tail" technique that was designed for the treatment of wide intrabony defects in the esthetic zone. This surgical procedure involves elevation of a large flap from the buccal to the palatal side to allow access and visualization of the intrabony defect and was created specially to perform GTR while maintaining interdental tissue over grafting material. This case report highlights the use of indigenously prepared DFDBA bone allografts and amniotic membrane for the

purpose of osseous defect regeneration.

CASE DESCRIPTION:

A healthy 30-year-old male patient was referred from the department of orthodontics for periodontal evaluation. The patient initially reported with the chief complaint of spacing between his upper front teeth. The oral hygiene status of the patient was fair and he did not have any systemic problems.

A comprehensive periodontal examination was done. On clinical examination, a midline diastema was noticed. Grade 1 mobility was present and clinical signs of trauma from occlusion were not evident. Periodontal probing revealed 7-mm periodontal pocket in the maxillary right central incisor [Figure 1a]. Radiograph showed vertical bone loss in relation to the mesial aspect of the maxillary right central incisor [Figure 1b].



Fig. 1. a) Pre-operative probing depth 7mm

Fig. 1. b) Radiograph showing intrabony defect i.r.t 11,21.

The case was diagnosed as localised chronic periodontitis in relation to right maxillary incisor and Phase I periodontal therapy was carried out. Due to persistent deep periodontal pocket, it was decided to surgically manage the osseous defect.

As there was a wide intrabony defect in the esthetic zone, the "whale's tail" technique was planned as proposed by Bianchi and Bassetti. It was further decided to combine the technique with indigenously prepared DFDBA graft and amniotic membrane for a more predictable regenerative out-come. Patient gave his informed and written consent to the same.

SURGICAL PROCEDURE:

After adequate local anaesthesia, two vertical incisions were performed from the mucogingival line to the distal margin of the lateral

incisor and mesial margin of the central incisor on the buccal surface (Figure 2a). A horizontal incision joined the vertical incisions at the apical aspect of the flap. In the coronal aspect of the flap intrasulcular incisions were made at buccal, interproximal and palatal sides. A full-thickness flap was elevated from buccal to palatal side through the diastema. The defect was debrided, the root scaling and planning was done (Figure 2b).

After thorough debridement, bone grafting was done using the indigenously prepared (Central tissue bank, Maulana Azad Institute of Dental Science, New Delhi) demineralised freeze-dried bone allograft (DFDBA) and Amniotic membrane (Figure 2c). The amniotic membrane was adapted and positioned to cover the defect and to ensure stability of the bone graft. (Figure 2d)

Thus, the flap was repositioned from the palatal to the buccal side, and its margins were sutured by interrupted silk sutures without tension, far away from the biomaterial (Figure 2e).

The surgical area was covered with Coe pack periodontal dressing (Figure 2f), postoperative instructions and prescription for 0.2% Chlorhexidine mouthwash were given for 15 days. Antibiotics and analgesics were also prescribed (Amoxicillin, three times a day) for one week. Healing was uneventful.



Fig. 2. a) Elevation of full thickness mucoperiosteal flap from buccal to palatal surface. b) Surgical exposure of the defect showing deep vertical bony defect. c) Indigenously prepared DFDBA and Amnion membrane. d) Placement of DFDBA and Amnion membrane. e) Simple interrupted sutures with 3-0 Silk sutures. f) Placement of COE-pack.

Sutures were removed after 14 days. One month follow-up of the patient showed reduced visible clinical signs of inflammation. Follow-up of the patient was done at 1 month, 3 months, 6 months, 12 months and 18 months.



Fig. 3. a) 18 months post-operative probing depth reduced to 3mm.

Fig. 3. b) Radiograph showing bone fill.

The probing pocket depth was reduced to 3 mm after 18 months (Figure 3a). Radiograph demonstrated complete fill of the defect (Figure 3b). The patient was referred to the department of orthodontics for management of the midline diastema.

DISCUSSION:

Management of Periodontal defects has shifted from periodontal resection to periodontal regeneration, which has led to the wide spread use of bone substitutes. Maintaining the integrity of tissue while providing regenerative therapy is the main objective in bony defects in anterior maxillary region. Papilla preservation to maintain the aesthetics is the main challenge for periodontal therapy. For these reasons, the papilla-preserving technique is often utilized in the surgical treatment of anterior teeth. Long term follow-up of these technique provides stable results. Although, the biomaterials beneath the incision line through papilla were still at a risk of exposure.

regenerative therapies in bony defects while maintaining the aesthetics in anterior maxillary region². The clinical outcome was documented to be stable for 18 months.

The systematic use of incisions distant from the defects and biomaterial margins drastically reduced the percentage of flap dehiscence and bacterial colonization of the biomaterials and it was possible to elevate a large flap from the buccal to the palatal side, placement of sutures distant from the regenerated defects, allowed the preservation of a large amount of soft tissue and resulted in good primary closure³. Study by Sanctis et al revealed that partially exposed barrier membrane demonstrates bacterial colonization and hence reduction in gain of clinical attachment level.⁵

Clinical findings obtained with this technique in terms of CAL gain (6 mm) and PPD reduction (3 mm) and radiographic bone fill were comparable with the results achieved with other clinical studies in which the same technique was adopted. (Bianchi et al., 2009², Kuriakose et al.⁶, 2015, Deshpande et al., 2016, Patil et al., 2019)

The use of bone grafts is recommended in intrabony defects to maintain space and to promote bone formation. For regenerative therapy, indigenously prepared DFDBA and amniotic membrane, were used. These allografts were procured and processed at the Central Tissue Bank, Department of Periodontics, Maulana Azad Institute of Dental Sciences following a stringent and strict protocol. The Bioburden estimation and sterility testing following gamma irradiation showed that these allografts were completely safe and cost-effective alternative for the biomaterials available in the market.⁷ The results obtained were in accordance with the study done by Patil et al.,⁸ in 2019 who used DFDBA along with Amniotic membrane in Whale's tail technique and obtained periodontal pocket probing depth (PPD) reduction and clinical attachment level (CAL) gain of 4 mm.

The drawback of this technique is requirement of midline diastema to aid in reflection of large flap from buccal to palatal side and in cases with high frenal attachment.

CONCLUSION:

The purpose of this case report was to describe use of whale's tail flap technique using indigenously prepared bone allografts (DFDBA) and amniotic membrane. The application of the "whale's tail" flap leads to clinically significant improvement of hard and soft tissue conditions of wide intrabony defects. The indigenously prepared bone allografts and amniotic membrane are highly efficacious, cost effective and safe if a strict protocol and stringent processing is followed.

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To overcome this, "Whale's tail" technique was introduced for