maxxeus™

Open Wound Approach for Socket Augmentation with Maxxeus Laminar Bone Membrane and Cortical Bone Allograft

Hsun-Liang (Albert) Chan, DDS, MS

Introduction

It is well known that extraction sockets undergo significant dimensional changes after exodontia. Approximately 50% of ridge width loss is expected at one year after extraction. Defective ridge volume can compromise successful implant placement and long-term functional and esthetic implant performances. Socket augmentation is effective in preserving ridge dimension and has become a common dental procedure. Type 1 socket (intact facial bone plate) can be predictively treated with various types of particulate bone grafts and a collagen plug. On the other hand, treatment of Type 2 (loss of facial bone with normal facial soft tissue level) and 3 sockets (loss of facial bone and facial soft tissue recession) can be challenging. Currently, these defects are mainly managed by resorbable or non-resorbable barrier membranes in combination with bone grafts. Resorbable membranes, e.g. collagen membranes, are not rigid enough to maintain or create space for bone growth, resulting in incomplete bone regeneration. Non-resorbable membranes, e.g. dense polytetrafluoroethylene (d-PTFE) membranes, function to passively exclude soft tissue ingrowth so as to allow for bone regeneration in the socket.[1-3] For larger bony defects, this type of membrane may require fixation with tacks or screws. Although d-PTFE membranes are claimed bacterial resistance because of submicron pore size, clinical experiences suggest infection is not uncommon after early membrane exposure or the intended open wound approach.

Laminar bone membranes (LBMs) were used for periodontal regeneration of mandibular furcations.[4] LBMs showed equivalent clinical outcomes, compared to expanded PTFE membranes, with advantages of not requiring membrane removal and fewer incidence/degree of wound exposure. They have also been used for guided bone regeneration with satisfactory results.[5-6]

Recently, Maxxeus reintroduced LBMs with improved mechanical properties. LBMs are made from thin sheets of cortical bone, which has been processed to be flexible without breaking. These rigid membranes are well suitable for procedures where space maintenance/creation is required. The grafts are packaged in saline and do not require reconstitution before use. Other major advantages include:

- Osteoinductive
- Space creation
- Minimally invasive (minimal soft tissue reflection is required)
- Resorbable: no need for retrieval
- No need to use fixation screws/tacks
- Easy to adjust size

Because of these advantages, LBMs are indicated for socket augmentation in cases with compromised facial bone. The effectiveness of using LBMs for open-wound socket augmentation will be presented in a case report below.

Case Report

A 45-year-old female came to the office for evaluation of tooth #19. She reported dull percussion and palpation pain on that tooth for a couple weeks. Medical history revealed non-contributory systemic diseases or conditions. Clinical examination showed erythematous buccal mucosa, with probing depth of more than 10.0 mm around the distal root and profuse bleeding on probing and pus formation (Figure 1). The tooth also had Miller's Class 3 mobility. The radiograph showed severe bone loss to the apex on the distal side (Figure 2). Based on the clinical and radiographic findings, the diagnosis of tooth #19 was a combined periodontal and endodontic lesion. A hopeless prognosis was assigned and the tooth was indicated for extraction and socket augmentation with use of Maxxeus cortical bone allograft (250-1000 µm) and LBM. After the inferior alveolar nerve/long buccal nerve block and infiltration anesthesia, tooth #19 was extracted without flap elevation. As expected, almost the entire buccal bone plate was resorbed. The buccal bony defect was measured 7.0 mm in height and

8.0 mm in width (Figure 3). After thorough debridement, a soft tissue pouch of 3.0-4.0 mm apical to the border of the buccal bone deficiency was made. On the lingual side, the other pouch of 3.0-4.0 mm apical to the lingual bone crest was created. A LBM (15.0 x 20.0 mm) was trimmed and tuck into the buccal pouch (Figure 4). Cortical bone allograft was tightly packed into the socket and against the membrane and the remaining bony walls. Overfill (15-20%) of the bone graft was achieved to compensate for bone consolidation during the healing period. The other end of the membrane was then tucked under the lingual flap afterward. The membrane was firmly secured by the modified cross-suturing technique with 5-0 polylactic and polyglycolic acids sutures and chromic gut sutures (Figure 5).

No primary closure was attempted. The advantages of this open wound approach are multi-folds, including (1) simple to perform, (2) minimally invasive, (3) avoidance of extensive flap releasing, and (4) time efficient. At 5 months, the site was ready for an implant surgery (Figure 6). After full-thickness flap reflection, complete regeneration of the ridge width, especially the buccal bone plate was demonstrated (Figure 7). An implant (4.8 x 10.0 mm) was placed in a 3-dimensional ideal position in one-stage approach with excellent primary stability (Figure 8). This case demonstrated the use of Maxxeus laminar bone membrane and cortical bone allograft in the open-wound approach for successful regeneration of the alveolar ridge.

Figure 1

Figure 2

Figure 3

Figure 4

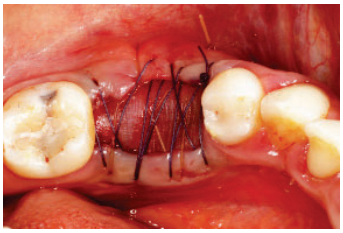

Figure 5

Figure 6

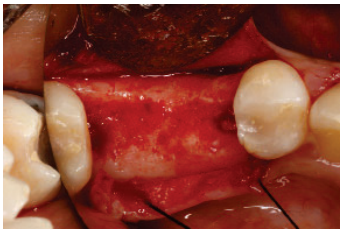

Figure 7

Figure 8

Hsun-Liang (Albert) Chan, DDS, MS is a full-time clinical associate professor at the Department of Periodontics and Oral Medicine, University of Michigan School of Dentistry and maintains partial-time private practice limited to periodontics and dental implants in Michigan.

Contact:
hlchan@umich.edu
734-763-9539

References

1. Arbab H, Greenwell H, Hill M, et al. Ridge Preservation Comparing a Nonresorbable PTFE Membrane to a Resorbable Collagen Membrane: A Clinical and Histologic Study in Humans. Implant dentistry 2016;25:128-134.
2. Barber HD, Lignelli J, Smith BM, Bartee BK. Using a dense PTFE membrane without primary closure to achieve bone and tissue regeneration. Journal of oral and maxillofacial surgery 2007;65:748-752.
3. Hoffmann O, Bartee BK, Beaumont C, Kasaj A, Deli G, Zafiropoulos GG. Alveolar bone preservation in extraction sockets using non-resorbable dPTFE membranes: a retrospective non-randomized study. Journal of periodontology 2008;79:1355-1369.
4. Scott TA, Towle HJ, Assad DA, Nicoll BK. Comparison of bioabsorbable laminar bone membrane and non-resorbable ePTFE membrane in mandibular furcations. Journal of periodontology 1997;68:679-686.
5. Fugazzotto PA. The use of demineralized laminar bone sheets in guided bone regeneration procedures: report of three cases. The International journal of oral & maxillofacial implants 1996;11:239-244.
6. Majzoub Z, Cordioli G, Aramouni PK, Vigolo P, Piattelli A. Guided bone regeneration using demineralized laminar bone sheets versus GTAM membranes in the treatment of implant-associated defects. A clinical and histological study. Clinical oral implants research 1999;10:406-414.