Case Report

Management of Exposed Collagen Membrane after Socket Seal Surgery for Placement of Dental Implant

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Abstract

The predictable success of dental implants has revolutionised dentistry in many ways. Clinicians are becoming more vigilant in planning teeth extraction than ever before. This has led to the routine use of the concept of the socket preservation after tooth extraction and before the placement of dental implant. This routine use of collagen membrane use for socket preservation has uncovered a new situation of the exposed collagen membrane left intentionally or unintentionally which has to be dealt with frequently. The management of such exposed collagen membrane becomes vital for the success of socket seal surgery. This case report emphasises on the management of exposed collagen membrane after socket seal surgery and before placement of dental implant.

Keywords: Collagen membrane, guided bone regeneration, guided tissue regenerative, membrane exposure, socket preservation

Introduction

Periodontal disease, peri-apical pathology and mechanical trauma often result in bone loss before tooth removal.[1] Traumatic extraction has also been related with additional loss of bone. The dynamics and magnitude of these changes have been investigated in the dog model as well as in humans.[2,3] Following tooth extraction, the alveolar ridge undergoes remodelling process that results in an altered morphology of the bone, which is unfavourable for implant placement, making implant placement difficult. Most of the resorption occurs during the initial 3 months of healing although dimensional changes can be observed up to 1 year after tooth extraction, resulting in approximately 50% reduction of the buccolingual dimension of the alveolar ridge.[4-6] Such cases can be managed by preserving the alveolar ridge using bone graft before placing dental implants. Socket grafting maintains and preserves the ridge for implant placement. When the treatment of extraction sockets is done with bone grafting along with membranes made of glycolide and lactide polymers, the results in preserving alveolar bone in extraction sockets and preventing alveolar ridge defects become more predictable. These glycolide and lactide polymer membranes help in tissue integration, cell occlusivity, clinical manageability, space maintenance, biocompatibility and allow the exchange of fluids between the flap and the underlying healing site. However, these advantages can be diminished if the membrane is left exposed in circumstances such as presence of extraction site near mental nerve or in situation where complete approximation of the flap may increase tension. Hence, the challenge lies in managing such cases of exposed collagen membrane to achieve successful results.

Case Report

A systemically healthy male patient aged 24 years reported with a chief complaint of pain in the right lower back tooth region. The pain was moderate, intermittent and aggravated during chewing. On clinical examination, oral hygiene was good, gingiva appeared normal and probing depth was 14 mm mesially and distally in relation to 46 [Figure 1] with Grade II mobility and Grade I furcation involvement. Bleeding on probing was present in relation to 45, 46 and 47. Teeth number 45 and 47 also had Grade I mobility. The opposing tooth (tooth

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number 15) was found to be rotated, which was causing trauma from occlusion.

Radiography was taken to evaluate bone condition and bone loss pattern, especially in relation with 46. Radiography revealed bone loss till apical third with Grade II furcation involvement in relation with 46 [Figure 2]. Alveolar bone in relation with the other teeth appeared to be normal. After thorough investigation of clinical and radiological findings, a diagnosis of localised chronic periodontitis in relation to 46 due to trauma from occlusion was made.

Treatment

All surgical procedures were performed under local anaesthesia (2% lidocaine with 1:80,000 concentration of vasoconstrictor). Full-thickness periodontal flaps were reflected on both surfaces to expose the teeth to be extracted. Vertical-releasing incisions were given in relation with the adjacent teeth. Extraction was performed using periotome and forceps with minimal trauma to the remaining bone [Figure 3]. The tooth socket was curetted to remove soft tissue and to expose the alveolar bone lining the socket [Figure 4]. The socket was filled with Bio-Oss bone graft [Figure 5]. Condensation of the bone graft was not done because this action may block or inhibit vascularisation and mesenchymal cell participation inside the healing socket.[7] The granules were covered with two layers of Bio-Guide collagen membrane in such a way that no bone graft remained exposed [Figure 6], and the soft tissue was sutured over the membrane with vicryl 4-0 sutures and black-braided silk was used for vertical incisions [Figure 7]. The collagen membrane was purposefully left exposed as any attempt to completely approximate the flap would have resulted in increased tension.

The patient was prescribed amoxicillin 500 mg thrice daily for 7 days, along with analgesic (ibuprofen 400 mg 3–4 times a day as required) to manage post-operative pain. After 24 h of the procedure, topical application of Betadine® solution with a cotton swab to the site twice daily for 1 month was advised. The patient was told to refrain from chewing from the right side and to perform gentle plaque removal from the site for the 1st week to avoid dislodgement of the barrier. After 1 week, the patient was instructed to perform meticulous plaque control at the site using gentle brushing and chemical plaque control with 0.12% chlorhexidine.

The patient was recalled after 1 week for suture removal and 3 weeks and 12 weeks for follow-up.

Figure 1: Pre-operative probing depth.

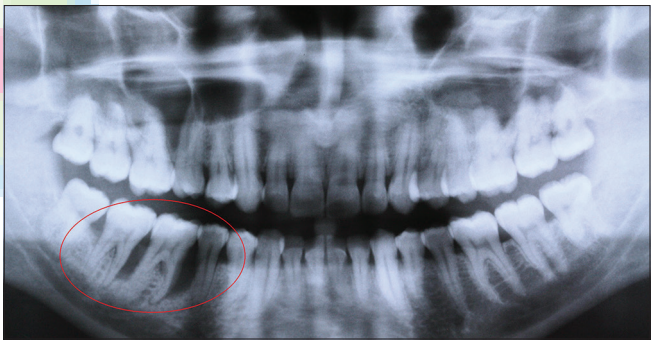

Figure 2: Diagnostic radiograph.

Figure 3: Extracted tooth number 46.

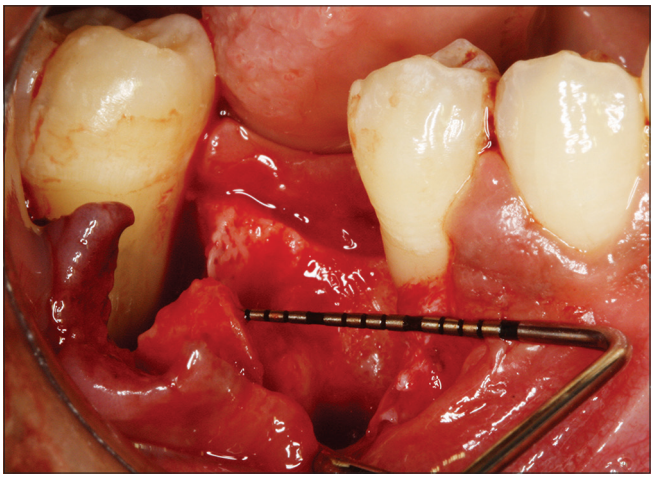

Figure 4: Extraction socket.

Observations

The collagen membrane was intact at 1-week follow-up and the patient had no sign of infection at the site and healing appeared to be normal. After 3 weeks, the sutures were resorbed and the site appeared to have adequately healed. The healing was uneventful with expected overlying tissue found at 12 weeks [Figure 8].

Discussion

The use of osseointegrated implants requires the assessment of the available bone volume since previous extraction may lead to different pattern of bone remodelling and resorption. Investigations have revealed that significant alveolar bone volume will be lost because of resorption after tooth extraction which can jeopardise the long-term aesthetic and functional success.[8]

Taking into account the amount of bone loss and mobility of the tooth, it was uncertain that regenerative therapy may yield desired results. As the patient insisted on placing an implant as a subsequent prosthetic replacement, it was decided to extract the tooth in question and go for immediate reconstruction of large osseous defect resulting from extraction of tooth to prepare for placement of an endosseous implant after healing.

The rationale for using Bio-Oss and Bio-Guide was based on the understanding that post-extraction bone resorption could be reduced or eliminated by (1) minimising trauma to the surrounding tissues during tooth removal, (2) preparing and grafting a bleeding socket with an ideal osteoconductive material and (3) use of absorbable collagen material that would act as matrix for connective tissue growth. This combination offered the potential for guided bone regeneration.

A high osteoconductive property by bovine bone mineral has also been shown in a recent comparative study in human extraction sockets.[9] The treatment of extraction sockets with membranes made of glycolide and lactide polymers is valuable in preserving alveolar bone in extraction sockets and preventing alveolar ridge defects.[10] The treatment of extraction sockets with a combination of bovine porous bone mineral and guided tissue regeneration is of more benefit in preserving alveolar ridge dimensions following tooth extraction than treatment

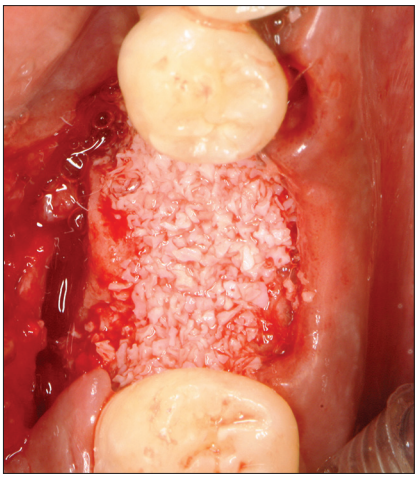

Figure 5: Socket filled with Bio-Oss.

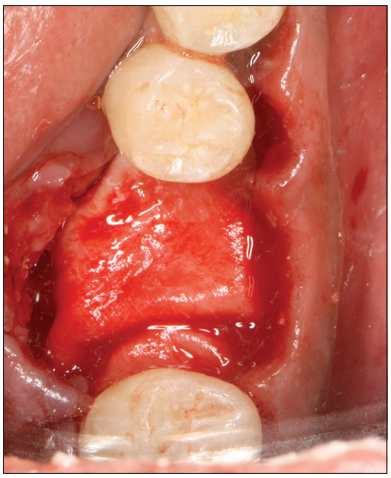

Figure 6: Double-layered Bio-Guide membrane in place.

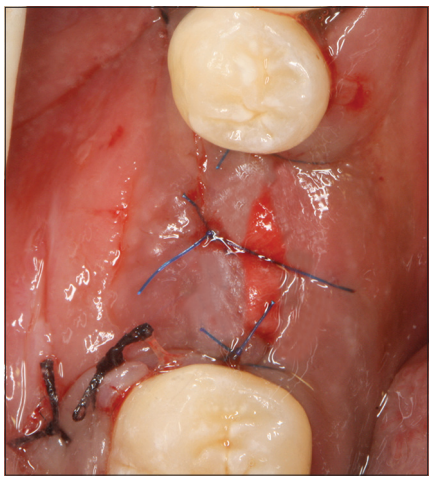

Figure 7: Exposed collagen membrane.

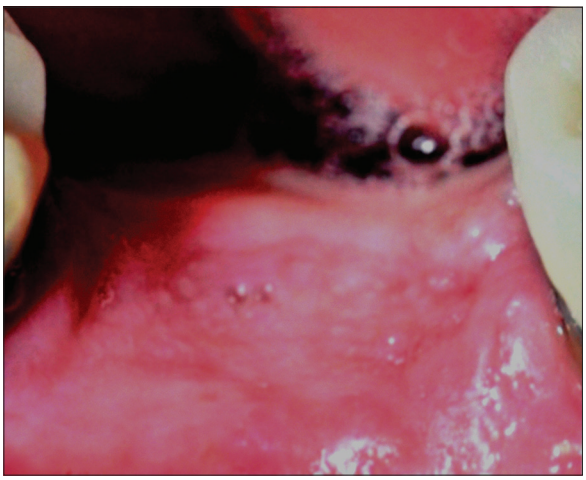

Figure 8: Healing after 12 weeks.

with a combination of bovine porous bone mineral and the autologous fibrinogen/fibronectin system.[11]

The collagen membrane was purposefully left exposed as any attempt to completely approximate the flap would have resulted in increased tension. The primary concern with leaving a barrier exposed relates to the potential for site infection and premature barrier loss, which will lead to diminished success. The avoidance of site infection has been closely related to stringent infection control during healing using topical and/or systemic antimicrobials. Many studies have also concluded that resorbable barriers do not require their coverage to achieve favourable clinical outcomes at extraction sockets.[12] If meticulous infection control is performed, the exposed collagen membrane does not hamper the outcome of socket seal surgery.

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Conflicts of interest

There are no conflicts of interest.

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