

## Triple Therapy for Socket Seal Surgery: A Case Report

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### ABSTRACT

Socket preservation at the time of extraction is one of the most significant procedures for future prosthetic considerations and for maintenance of the health. The most important aesthetic goals of socket preservation is maintenance or enhancement of the facial and interproximal gingival contours and height of the interproximal papilla thereby maintaining health, beauty and youth. This case report illustrates the use of epithelized connective tissue graft with an amalgamation of bone graft and doxycycline in socket preservation. Apart from this, platelet rich fibrin was used as a palatal bandage at the donor site to assess the wound healing. Socket preservation performed in left upper lateral incisor region with this tunnelling approach technique provided an optimum bone fill within the socket, thereby maintaining vertical bone height and stabilizing the marginal soft tissues at the desired site. The platelet rich fibrin used as a palatal bandage at the donor site aided in better wound healing at the graft procured site. Thus this technique can be used for obtaining a good bone volume, at the recipient site and may be applied in patients with thin gingival biotype.

**Keywords:** Socket preservation, Epithelised connective tissue graft, Bone graft, Doxycycline

In today's clinical practice there has been a lot of progress in the field of implantology. For any implant to be successful, the volume of bone plays a vital role. After tooth extraction, preserving the socket area for future prosthetic considerations must be our paramount concern. One of the most important aesthetic goals of socket preservation is maintenance or enhancement of the facial and interproximal gingival contours and height of the interproximal papilla thereby maintaining health, beauty and youth.

After extraction, significant alterations in the ridge dimension occur and the greatest amount of bone loss is in the horizontal dimension and occurs mainly on the facial aspect of the ridge. There is also loss of vertical ridge height, which has been described to be most pronounced on the buccal aspect [1-2].

This resorption process results in narrower and shorter ridge and the effect of this resorptive pattern is the relocation of the ridge to a more palatal/lingual position [3]. To overcome this dimension loss, socket preservation procedures are implemented. Basic socket preservation, although similar in all cases, varies with the method of socket closure. As a result there are number of different socket preservation procedures. In this case report we aimed to preserve the extracted site with Epithelized connective tissue graft with an amalgamation of bone graft (osseograft) and doxycycline for added therapeutic benefit. This procedure was done through tunnelling approach, in order to optimise bone fill within the extraction socket, thereby maintaining vertical bone height and helping to stabilize the marginal soft tissues at the desired site. Platelet rich fibrin is used as a palatal bandage at the donor site to assess the wound healing at the graft procured site.

## CASE REPORT

A 42 year old male patient reported to the Department of Periodontology, with a chief complaint of pain and loose tooth in relation to left upper front region. The pain was intermittent and aggravated on drinking fluids for past 3-4 months. History revealed that the pain was caused by trauma due to habit of biting needles. No relevant medical history was elicited. A comprehensive periodontal

examination revealed moderate plaque and calculus with Grade III mobility in tooth #10 along with gingival recession. Probing pocket depth of 5mm and clinical attachment loss of 7 mm was noted. Radiograph revealed bone loss till the apical third of tooth # 10, suggestive of severe chronic periodontitis with hopeless prognosis [Fig-1]. Extraction of tooth # 10 was planned, followed by socket preservation for future prosthetic considerations.



**Fig 1:** Pre-operative radiograph in relation to tooth # 10. **Fig 2a:** Atraumatic extraction in relation to tooth # 10. **Fig 2b:** Buccal tunnel till mucogingival junction.



**Fig 3a:** Socket filled with bonegraft and doxycycline. **Fig 3b:** Incision for graft procurement. **Fig 3c:** Epithelised connective tissue graft. **Fig 3d:** Graft placed and sutured



**Fig.4:** PRF placed at the donor site. **Fig 5:** Two days post- operative view donor site. **Fig 6:** Provisional prosthesis with acrylic teeth

Informed consent was obtained from the patient. Local anaesthesia (2% lignocaine) was administered. Atraumatic extraction was done with periosteal elevator with care taken to preserve the buccal bone and the gingival tissue [Fig-2a]. The socket was debrided and granulation tissue removed using Hu-Freidy 2R-2L Universal curette. A subperiosteal tunnel was prepared with 12C blade on the buccal side of the socket ranging towards the adjacent teeth including the mobilization of adjacent papillae upto 2 to 3 mm beyond the margin of the bone crest. The preparation of the buccal tunnel was extended upto the mucogingival junction [Fig-2b]. The interproximal tissue of the adjacent papillae was carefully elevated from the underlying bone using thin periosteal elevator.

For wound closure, the socket was filled with demineralised bone graft (osseograft) mixed with 100mg doxycycline pellets in the ratio 1:4 (doxycycline: bone graft) [Fig-3a]. From the donor site a partially epithelized connective tissue graft was harvested from the hard palate for soft tissue augmentation. The first incision was made using no.15 blade approximately 4 to 5 mm beyond the margin of the palatal gingiva and traversing the widest horizontal diameter of the socket orifice. This incision marked the epithelized part of the graft. The following two horizontal releasing incisions placed parallel, both mesial and distal to the margin of the palatal gingiva [Fig-3b]. Subsequently, a split flap was prepared beyond the epithelized part of the graft (the apical margin) and horizontal releasing incisions were placed. The complete graft was elevated using another internal incision directly over the bone involving the epithelized portion and the connective tissue pouch and extended mesially, distally, and apically [Fig-3c]. After the graft was harvested it was then placed in the recipient site and tucked into the prepared pouch like tunnel using a guiding sutures so that the connective tissue part of the graft was placed on the buccal side of the socket under the adjacent papillae, and the epithelized part was placed over the socket orifice like a lid of the socket [Fig-3d].

At the donor site the epithelized portion was tucked and covered with PRF membrane, procured according to Choukroun et al [4]. The membrane was tucked and sutured with Mersilk [Fig-4]. Antibiotics (Amoxicillin, 500 mg tid), analgesics (Aceclofenac 500 mg & Paracetamol 100mg) was prescribed for 7 days and patient reviewed after two days [Fig-5]. Post-operative instructions such as avoid brushing at surgical site and mouth rinse with 0.2% chlorhexidine solution rinse was

advised for 2 weeks. A provisional prosthesis in the edentulous area was splinted with an acrylic tooth [Fig-6].



**Fig 7 - Five months post-operative recipient site**

The dimensions of the alveolar ridge were evaluated horizontally and vertically directly after extraction (baseline), after socket grafting, and 5 months after the procedure using a Castrovejo Bone caliper. The tips of the caliper were placed 1 mm apical from the hypothesized margin of gingiva of the adjacent mesial and distal teeth on buccal and palatal sides. Measurement of horizontal width of alveolar socket immediately after extraction (baseline), directly after socket seal surgery and after five months was noted to be 5.1mm, 6.2mm and 5.3mm respectively. The positions of both the interdental papillae and the midbuccal gingival margin in relation to the incisal edge of the adjacent teeth were evaluated and recorded for the vertical dimensions of the ridge. The distance between the inter-incisal line of the adjacent teeth and midbuccal gingival margin was 9.6mm at baseline, 9.1mm after socket seal surgery, and 9.2mm 5 months postoperative [Fig 7].

## DISCUSSION

After extraction, significant alterations in the ridge dimension occurs and these changes range from an average vertical bone loss of 1.5 to 2mm to an average horizontal volume reduction of 5 to 7 mm in the first 12 months after extraction [5]. To overcome this dimension loss, socket preservation procedures are implemented. This case report exhibits the combined epithelized connective tissue graft through a tunnelling approach for maintaining the hard and soft tissue volume at the extraction site. This study was done in accordance to the study done by Stein et al who showed that additional augmentation in buccal area using tunnelling procedure could improve maintenance of soft and hard tissue volume with the dimensional gain horizontally of 8.7mm (baseline), 9.5 (after socket seal surgery) and 8.2mm after 5 months[6].

The increase in the vertical position of midbuccal gingiva in the recipient site was also in accordance to study by Stein et al in which the vertical dimensions was 10.8mm at baseline, 10mm after socket seal surgery and 10.3 mm 5 months postoperative [6]. Maintenance of the alveolar ridge volume may be due to the increased blood supply to the buccal and interdental extension of the graft over the socket. This was similar to Stimmelmayer et al study, who used combined epithelised connective tissue graft [7]. The socket was filled with a blend of doxycycline and bone graft (1:4 ratio). De-mineralized bone matrix (DBBM) Osseograft, was used as bone fill as it acts as an excellent scaffold for the growth of new blood vessels and osteogenesis.

Doxycycline mixed with osseograft added therapeutic benefit as its action does not limit to antimicrobial activity alone, but includes the host modulating properties such as anti-collagenase, anti-inflammatory, inhibition of bone resorption and promotes reattachment [8]. Golub and his co-workers found Doxycycline inhibits collagenase and other host derived matrix metalloproteinase, which are released as the periodontal disease progresses [9]. According to previous study done by Takahashi et al, doxycycline has been found to be highly effective in inhibiting biofilm formation by various periodontopathogens [10]; thereby, avoiding infection at the extracted site.

## CONCLUSION

This is one of the few studies in which the blend of bone graft, doxycycline and epithelised connective tissue graft for socket preservation was performed. PRF an healing adjunct used at the donor site promoted wound healing, graft stabilization, wound sealing, and haemostasis. The release of growth factors from PRF led to optimize its clinical application and promote better and faster wound healing. The epithelized part of the graft, covering the socket orifice and the bulk of the connective tissue graft placed under the adjacent papillae ensured proper closure of the socket and enhanced the gingival contour thereby contributing to the blood supply at the graft site.

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