

SOCKET PRESERVATION WITH PRF: A CASE REPORT

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Abstract

Tooth extraction whether traumatic or atraumatic, results in alveolar bone loss both in height and width. An average of 40-60% of original height and width is expected to be lost after extraction, most of which takes place within the first year. Socket Preservation is a procedure in which graft material or scaffold is placed in the socket of an extracted tooth at the time of extraction to preserve the alveolar ridge. In this case report, it is described how the socket of the upper molar teeth is preserved with PRF. PRF plugs also maintains the soft tissue contour of the ridge.

Key words: Extraction, Socket preservation,

INTRODUCTION: Soft tissue contour depends on the underlying bone anatomy, following tooth extraction, sockets undergoes a remodelling process that influences the implant rehabilitation treatment of the edentulous areas. Socket preservation procedure following tooth extraction will reduce the need for any further ridge augmentation technique prior to implant placement and will conserve the existing bone. The aim is to preserve the original bone dimensional contours by limiting the normal post extraction resorptive process.

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The rate of reduction of residual alveolar ridges is greater in mandibular (0.4mm/year) than in maxillary arches (0.1mm/year), 1mm in vertical bone 2-2.5mm in horizontal bone resorption corresponding to 2mm soft tissue recession.

Socket Preservation differs from Ridge Augmentation; in Socket Preservation, the graft or scaffold is placed inside the tooth socket immediately after extraction, whereas the Ridge Augmentation grafting procedure is done to bring back the lost bone after the bone has resorbed and there is insufficient ridge height or width for further treatment procedure.

INDICATIONS⁽¹⁾ :

1. Immediately after tooth removal in extraction socket site prevents immediate bone resorption.
 2. Preparation of healthy soft and hard tissue bed for future dental procedures
 3. When immediate implant placement is contraindicated and delayed implant placement is more appropriate, especially in esthetic cases.
 4. Maintains contour and integrity of the socket.
- Without socket preservation, residual bones could lose volume resulting in loss of facial vertical and horizontal dimension and changes in facial soft tissue aesthetics.

CONTRAINDICATIONS:

1. Severe and uncontrolled diabetic patients
2. Patients undergoing radiation therapy on the oral cavity
3. Infected extraction site with acute condition
4. Patients with severe gum disease

5. Patients with disease contraindicating placement of scaffolds
6. Heavy smokers
7. Deciduous teeth socket
8. Patients having allergic reactions to synthetic materials.

CLINICALASSESSMENT:

1. Careful radiographic evaluation.
2. Evaluation may be enhanced using Cone beam CT.
3. Decision-making on type of extraction required.
4. Bone sounding, confirm the condition of labial, buccal and palatal bone height.
5. Quality and quantity of gingival tissues around the tooth should be evaluated to assess the need for connective tissue grafting.

Keys to successful extraction- socket grafting according to

Dr. Carl Misch⁽¹⁾:

1. Atraumatic tooth removal.
2. An evaluation of the remaining walls of bone following the extraction, and evaluation of the size of the defect.
3. Asepsis and complete removal of granulomatous tissue.
4. Ensuring adequate blood supply to the graft site.
5. Graft containment and soft tissue closure.
6. Choice of an appropriate graft material.
7. Ensuring adequate time for healing.

There are a varied number of techniques that collectively fall in the category of socket seal procedures. These are:

1. Connective tissue grafts—Langer and Calanga (1980).
2. Socket seal or free gingival graft—Landsberg and Bichacho (1994).
3. Biocol or resorbable hemostatic plug technique—Sklar (1999).
4. Guided bone regeneration using resorbable/non-resorbable membranes.
5. Alloderm or acellular dermal graft—Misch (1998).

6. Prosthetic pontic socket plug. – Removable—Misch (1998), Kois And Kan (2001) – Fixed—Kois (1998), Spear (1999), Sklar (1999).
7. Combination epithelized subepithelial connective tissue graft—Stimmelmayer (2010).
8. Modified socket seal surgery with composite graft approach—Misch and Misch (1999).

CLINICAL CASE:

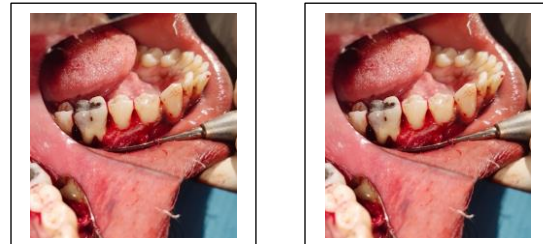
A 26 year old patient male with a noncontributory medical history, presented to our clinic with chief complaint of loose teeth and difficulty in chewing in lower left back teeth region since 5 years. The tooth was deemed hopeless, Clinical

examination revealed that the tooth was periodontally compromised with a pocket depth of 10 mm distobuccally and grade II mobility (Fig. 1) . Tooth was sensitive upon vertical percussion or vestibular palpation. The tooth was found to give no response when electric pulp vitality test was conducted. and referred for extraction with socket preservation for future dental implant placement. After tooth was atraumatically removed with the forceps technique (Fig.2), the extraction socket was filled with PRF. Primary closure was achieved (Fig.3). Follow-up is taken at one week and 6 months.

Preoperative Clinically



Fig 1 Deep periodontal pocket with36

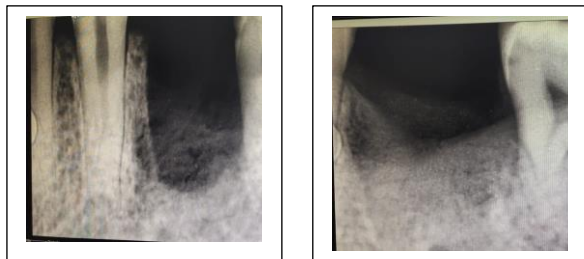


(Fig:2) SUTURING



(Fig:3)

Preoperative Radiograph



Six Month follow up Radiographically

CLINICAL PROCEDURE INITIAL THERAPY

Initial therapy consisted of detailed oral hygiene instructions. Full mouth scaling and root planing was performed using hand curettes and an ultrasonic device under local anesthesia. Trauma from occlusion was evaluated by examining the obvious presence of fremitus in centric occlusion or in working or balancing excursions. Six to eight weeks following phase I therapy, a periodontal re-evaluation was performed to confirm the suitability of the site for this periodontal socket seal surgery.

PREOPERATIVE PROTOCOL

Following thorough cleansing of the teeth, the patient was instructed to use 0.2% chlorhexidine as a mouthrinse. Patients vital signs were determined and assessed before commencing surgical treatment. To minimize vasoconstriction, a local anesthetic (lidocaine 2%), with minimal epinephrine concentration, i.e. a maximum of 1:100,000, was administered in the extraction site.

TOOTH REMOVAL

A sharp #15 surgical blade was used to sever the dentogingival and dentoalveolar connective tissue fibers around 36. To achieve a forceless extraction, a slow, gentle rotational-pulling force was preferred until the periodontal ligament fibers were torn completely and to minimize the amount of mechanical pressure applied to the buccal bone. Thumb support against the labial aspect of the alveolus and a check on the state of the soft tissue walls of the fresh extraction socket to ensure intactness was done

SOCKET PREPARATION

The fresh socket was debrided thoroughly of granulation tissue and residual periodontal ligament fibers followed by a thorough evaluation of the remaining bony housing. The socket bony walls were decorticated with a half round bur further in their apical part (except for the labial wall) to increase the participation of endosteal bone-forming cells in the wound. The epithelialized inner layer of the gingival walls at the socket orifice is removed gently by a sterile water-cooled high-speed coarse diamond bur to expose the vascularized lamina propria.

PREPARATION OF PRF

Immediately before the surgical procedure, 10 ml of blood was drawn from the subject's antecubital vein (Fig.4) The blood sample was collected in glass-coated plastic tubes not containing any anticoagulating agent. The blood-containing tubes were immediately centrifuged at 1,000 gm for 10 minutes. The centrifuged blood mass presented with a structured fibrin clot in the middle of the tube, between the red corpuscle layer on the bottom and the acellular plasma on top. The fibrin clot could easily be removed from the tube and shaped freely, and was used immediately after its collection. PRF was compressed between two tongue blades in order to take the form of a consistent membrane (Fig.5)



(Fig:4) PRF



(Fig5)

POSTOPERATIVE TREATMENT

Periodontal dressing was placed over the surgical area, and antibiotics (amoxicillin 500 mg every 8 hours for 7 days) and oral analgesics (ibuprofen 400 mg, every 4 hours as needed for pain) were prescribed. A 0.2% chlorhexidine mouthwash was prescribed every 12 hours for 2-week duration post surgically. Patient was instructed not to use a toothbrush or mechanical cleansing at the surgical area. Only a soft diet is advised for the first 2 weeks of the healing process. Sutures were removed 7 to 14 days post surgery and healing was found to be satisfactory. The patient did not report any untoward consequences. The patient was assessed after 6 months.

Discussion:

The resorption of the alveolar ridge following tooth extraction is a physiological phenomenon. The preservation of the morphology of the extraction socket has become critical due to increase bone volume in order to accommodate implant and thus improve implant stability. Bone graft materials have played an important role in regenerative 2 dentistry for many years⁽²⁾.

There are three distinct properties of graft materials: Osteogenicity (ability to directly deposit bone by the viable osteoblasts present in the bone graft), osteoconductivity (ability of the graft to act as passive scaffolding that supports new bone formation and ingrowth of capillaries), and osteoinductivity (ability of differentiating factors that facilitate the recruitment and differentiation of mesenchymal stem cells and specifically induce them to form osteoblasts which deposit the new bone).

Among these the focus is on the osteoinductive property. The osteoinductive bone grafts contain the growth factors responsible for these stimuli, which are of the family of bone morphogenetic proteins, transforming growth factors, insulin-like growth factor, platelet-derived growth factor and epidermal-derived growth factors.

Today's concept in tooth extraction shall routinely consider the maintenance of the existing extraction socket dimensions with some sort of bone replacement material. This procedure has been called ARP or preservation.

Traditionally, ARP includes the use of particulate alloplasts, xenografts, autografts, and membranes

manufactured from various materials, including that are bioabsorbable or non-resorbable, naturally derived or synthetic. Most of these materials have been shown not only to be osteoconductive but also many of them are associated with a number of disadvantages, such as increased overall cost, the requirement for a second surgical site and the use of animal-derived products.⁽³⁾

Till date, the rich and readily available autologous source of growth factors is from platelets derived from the peripheral blood. They contain a number of different growth factors which are released into the tissue after injury. These include TGF- α , PDGF, IGF, AND FGF, which act as a differential factors on regenerating tissues. The PDGF is angiogenic and is known to stimulate the reproduction and chemotaxis of connective tissue cells and matrix deposition.⁽⁴⁾

Alveolar Ridge Preservation Technique

The alveolar ridge preservation (ARP) procedure adhered to previously published criteria (Ucer and Khan, 2023)⁽⁵⁾. after a thorough clinical and radiological evaluation of the tooth and ridge conditions. The initial surgical step involved tooth extraction performed under local anesthesia. A minimally invasive extraction technique was employed, with careful attention to preventing damage to the socket walls. The sockets were meticulously degranulated to remove any remaining soft-tissue debris. Subsequently, the sockets were immediately grafted using PRF. Venous blood was drawn from the antecubital fossa of the patient and was centrifuged according to Choukroun's method to yield autologous PRF that was minced into uniformly sized bits.

PRF has been successfully used in conjunction with socket augmentation, alveolar ridge grafting, GBR procedures, maxillary sinus grafting, treatment of periodontal and peri-implantitis defects, and soft-tissue grafting in dentistry. Although a PRF membrane does not act as a true barrier membrane, it contributes directly to repair and regeneration at all stages of wound healing.

In this case report, the post operative radiograph shows mature bone has formed in the extraction socket for implant placement(Fig.6).

CONCLUSION:

The socket preservation technique seems to show important results concerning bone volume conservation and favorable architecture of the alveolar ridge in order to obtain ideal functional and esthetic prosthesis after implant rehabilitations.

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