



# Socket preservation using a bio-scaffold material- A Case Report

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**Abstract-** Socket and ridge preservation are emerging as innovative techniques to minimize the post-extraction hard and soft tissue collapse. The exaggerated tissue loss in case of compromised sockets often presents an aesthetic and prosthetic dilemma to the clinician. Platelet Rich Fibrin (PRF) enhances the osteogenic differentiation and the healing process so can be utilised for socket preservation. Use of allograft in conjunction with PRF proved to be effective in minimizing soft/hard tissue loss and also helped in tissue gain.

**Keywords-** Socket preservation, Platelet rich Fibrin, Allograft

## INTRODUCTION

With the advent of implant dentistry, there has been an increased emphasis on preserving and maintaining the implant-bearing environment. Disruption to the oral environment by tooth extraction can compromise the integrated tissue morphology, inducing healing mechanisms similar to those of new tissue formation. Two very important components for the socket integrity - bundle bone and periodontal ligament fibres vanish by the 14th day after extraction.<sup>1</sup>

The pattern and degree of dimensional changes that occur in the alveolar ridge after tooth extraction has been documented in the literature for more than 50 years. There is a disproportionate resorption of the buccal plate compared to the palatal/lingual plate of the ridge with the buccal plate undergoing significantly

more resorption: the final outcome of this is not only narrowing of the ridge but a palatal/lingual shift of the mid-line of the ridge.<sup>2</sup>

Lekovic et al<sup>3</sup> reported that loss of width was three times greater than loss of height. At a recent consensus meeting where four systematic reviews were analysed, it was reported that the alveolar ridge undergoes a mean horizontal reduction in width of 3.8 mm and a mean vertical reduction in height of 1.24 mm within six months after extraction.<sup>4</sup>

Any material or technique that maximize the volume of bone or soft tissue after exodontia have the potential to improve treatment outcomes or at the very least simplify treatment delivery. Ridge preservation, or 'socket' preservation (as it is sometimes paradoxically referred to) involves placement of graft material within the socket; this can be combined with either a membrane and/or an advanced or rotated flap. The word 'preservation' often used to describe these techniques is somewhat of a misnomer; practitioners should not take the term 'preservation' literally. It is an implication that we are preserving or maintaining something in its original or existing state.<sup>5</sup>

Materials available for this purpose generally consist of matrix scaffolding materials and/or biologic agents. Matrix scaffolding materials are typically osteoconductive and are able to provide cell scaffolding and dimensional stability of the wound through space maintenance. These materials can be derived from allogeneic, xenogeneic, synthetic, or autogenic sources.<sup>6</sup> Biologic agents are molecular mediators with typical osteo-inductive properties to promote de novo bone formation. Matrix scaffolding materials and biologic agents can be used separately or together to achieve the desired surgical outcome.<sup>7</sup>

Another biological agent, that is platelet-rich fibrin (PRF) has become increasingly popular since its first introduction in 2001.<sup>8</sup> PRF is a platelet concentrate made of an autologous bio-scaffold of a dense fibrin matrix with naturally integrated growth factors which are released from the scaffold over a sustained period to promote healing of hard and soft tissues.<sup>10–12</sup> PRF has been shown to be a source of transforming growth factor  $\beta$ -1 (TGF $\beta$ -1), vascular endothelial growth factor (VEGF), and platelet derived growth factor (PDGF).<sup>11–13</sup> These growth factors are bound within the fibrin matrix, resulting in a slow, sustained release through the natural maturation and reorganization of the clot.<sup>9</sup>

This case report describes a simple yet effective procedure of socket preservation by combining allograft and PRF to make a strong foundation for the placement of implant.

## CASE REPORT

A 45 years old, female patient reported to the Department of Periodontology and Implantology, Subharti Dental College & Hospital, Meerut with the chief complain of pain in the left posterior region of the lower jaw since 5 days. The pain was dull in nature which aggravated on chewing food and relieved after taking pain relieving medication. Her past dental history revealed restoration of the same 6 years back.

On clinical examination, tooth number #36 was grossly carious (Fig. 1). Radiographic evaluation (RVG) showed root stump of #36 with poor bone support (Fig.2). Extraction of tooth was planned based on its gross carious involvement, periodontal status and radiographic findings.

The patient was duly informed about possible limitations and outcome of the procedure. After the patient gave consent, extraction of the root stump with socket preservation was done.

### Surgical procedure-

Local anaesthesia was administered and atraumatic extraction of the root stump was done using luxators. The extraction socket walls (Fig :3) were prepared using a surgical curette to debride it off the remnant granulation tissues. 10 ml of venous blood from the patient was collected in a tube without an anticoagulant and immediately centrifuged at 3,000 revolutions per minute (rpm) for 10 minutes for preparing the PRF. Following three layers: upper straw-coloured acellular plasma, red-coloured lower fraction containing red blood cells (RBCs), and the middle fraction containing the fibrin clot were obtained (Fig: 5). PRF and Demineralised Freeze-Dried Bone Allograft were mixed together (Fig. 6) and placed in the extraction socket (Fig. 7) and covered by PRF membrane (Fig. 8). Cross-over sutures using 3-0 non-resorbable silk material was placed (Fig. 9). The patient was prescribed with antibiotics and analgesics. Oral hygiene and post-operative instructions were reinforced and the patient was followed-up after a week for suture removal and re-evaluation. Assessment of healing in the extraction socket was done at 3 months (Fig 10) & (Fig 11) subsequently.



Figure 1: Pre operative view #36



Figure 2: Pre Operative IOPA #36



Figure 3: Extraction socket #36





Figure 4 : Root stumps

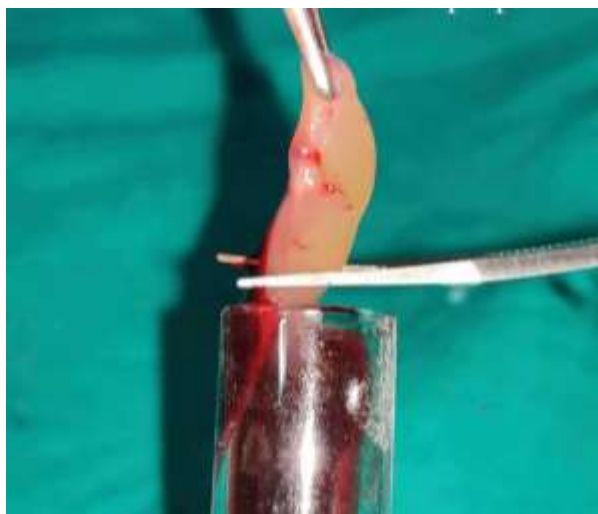


Figure 5: Platelet rich fibrin prepared



Figure 6: Prf mixed with DFDBA





Figure 7: Placement of graft in the socket



Figure 8: Placement of PRF membrane



Figure 9: Sutures placed



Figure 10: Immediate post-operative RVG



Figure 11: 3 months Postoperative view

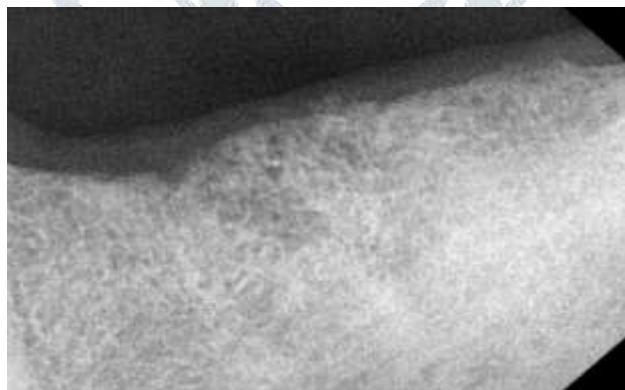


Figure 12: 3 months Postoperative RVG

## DISCUSSION-

The bone loss as a result of chronic periapical infection or severing of the blood vessels after any tooth extraction procedure is inevitable. The resorption process involves and affects

the buccal plate more than the lingual plate.<sup>10</sup>

DFDBA has both osteo inductive and osteoconductive properties. Placement of the graft not only aids in bone formation but may also physically provide bulk which may prevent tissue collapse. Ten Heggeler et al <sup>11</sup> has suggested that with respect to socket preservation, the allograft performs best. Hence, we used allograft in our case and were able to prevent loss of hard tissue dimension and some gain in hard tissue and prevented soft tissue collapse. Wood's et al conducted a histological study comparing FDBA and DFDBA in cases of socket preservation, and found significantly higher percentage of vital bone in the DFDBA group compared to the FDBA group.<sup>12</sup>

PRF when mixed with graft material functions as a biological connector between the elements of graft particles and acts as a matrix which supports angiogenesis, capture of stem cells and migration of osteoprogenitor cells to the center of the graft. In addition, PRF membrane used as a protective cover over the grafted socket is particularly important when wound closure is impossible or difficult with the sutures alone.<sup>13</sup>

The advantages of use of PRF includes less surgical time, elimination of techniques and potential healing difficulties as compared to GBR procedures. Clinical and histological findings also suggest that filling PRF in a fresh extraction socket provides an alternative for implant site preparation by enhancing the natural coagulation process, stabilizing the clot and aids in socket healing.<sup>14</sup> Hence, PRF with bone graft for this case was an effective method for laying a foundation of sound bone and tissue for implant placement.

## CONCLUSION-

Grafting of an extraction socket with an osteoinductive material appears beneficial for the patient in terms of quality and quantity of bone formed and could improve the prognosis of subsequent implantation. In the present case report, indigenously developed DFDBA material combined with PRF showed promising results as an osteoinductive material.



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