

CASE REPORT

Immediate implant with Sticky bone in spiffy zone “The Artistic way” – A Case report

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ABSTRACT

Background: Immediate implants have provided the opportunity to achieve better and faster functional results. PRF (Platelet rich fibrin) and Sticky bone graft possess inherent property of accelerating soft and hard tissue healing and regeneration especially in indecisive implant cases. GTR (Guided tissue regeneration) along with PRF serves as a reliable treatment modality as it promotes sustained osteogenic effect. They prevent the collapse of the socket by reducing the crestal bone loss and enhance the soft tissue aesthetics

Case Description: In this case report, a 25-year-old female patient reported with non-vital 11 and external root resorption. The mobile tooth was atraumatically extracted Flap elevation exposed fenestration defect. Immediate implant was placed in relation to 11 followed by placement of Sticky bone graft, PRF and GTR membrane in the defect space.

Conclusion: Immediate implant showcases several advantages over conventional implants. The success depends on careful case selection, diagnosis, asepsis, atraumatic extraction and preservation of labial cortical plate and good oral hygiene maintenance during follow-up period.

Clinical Significance: Successful placement of immediate implant in an aesthetic zone presenting with a fenestration defect, using platelet rich fibrin and sticky bone graft is the uniqueness of this case report.

Keywords: Guided tissue regeneration, Immediate implant, Platelet rich fibrin, Sticky Bone Graft, Case report.

INTRODUCTION

Tooth loss in anterior sites often represent a considerable challenge since it causes bone resorption and collapse of gingival architecture. The primary concern in replacing missing teeth in anterior region is more closely related to esthetic expectations from patient's perspective⁽¹⁾.

In earlier days, conventional implants were placed 5-6 months after extraction of teeth, giving time for the socket to heal. Severe bone resorption where only narrow-diameter implants could be placed is one of the major disadvantages of conventional implants. Hence, these areas may not be ideal for implant placement⁽²⁾.

Numerous techniques were introduced to reduce the overall treatment time and dimensional changes in the socket. Among them, the most promising and reliable method for functional and esthetic rehabilitation is the immediate implant placement in freshly extracted sockets. It has numerous advantages like decreased hard and soft tissue resorption, increased patient acceptance. It also shortens treatment time by 6-8 months and eventually results in superior functional and aesthetic outcomes⁽³⁾. Immediate implant, defined as "the placement of dental implant immediately into fresh extraction socket site after tooth extraction", is a predictable and acceptable procedure (*Schwartz et al., 2000*)⁽⁴⁾.

This technique in combination with various bone grafting techniques eliminates numerous periodontal defects. Various regenerative techniques were introduced for bone augmentation following immediate implant placement, the latest being the use of platelet derivatives, bone grafts and GTR membrane⁽⁵⁾.

Autogenous or autologous blood products (here, fibrin glue) is considered as the gold standard and expresses superiority over other materials. When this is combined with bone graft, sticky bone is formed. Sticky bone graft has the most supreme properties like osteoinduction, osteoconduction, osteogenesis, excellent biocompatibility, and biodegradability. When compared with synthetic materials which acts as scaffold for bone regeneration like polylactic and polyglycolic acids, sticky bone does not release any acid products. Also, it allows migration of appropriate cells into repair sites and helps in sustained release of growth factors helping in tissue regeneration⁽⁶⁾⁽⁷⁾.

Areas with intense bone loss which were previously unsuitable for bone augmentation have been made possible with latest available graft materials. There are many successful case reports of immediate implant using regenerative techniques. Hitherto, to the best of our knowledge, ours is a maiden attempt wherein sticky bone graft is combined with PRF and GTR membrane in immediate implant placement with fenestration defect in anterior region.

CASE DESCRIPTION:

A 25-year-old female, reported to department of periodontology with chief complaint of loose upper front tooth region and difficulty in mastication. Patient had no relevant medical history. Examination revealed incomplete root canal treatment in 11 (*Fig 1*).

Clinically, 11 was discolored with probing pocket depth of 2mm and grade I mobility. There was no bleeding on probing, clinical attachment loss and no tenderness on percussion in relation to 11.

Upon thermal pulp testing, 11 showed no response. IOPA revealed trabecular changes and peri-radicular radiolucency suggesting external root resorption in 11 (*Fig 2*).

Based on the clinical findings, the case was diagnosed as non-vital 11 with External root resorption. Since the prognosis of the tooth was poor. Extraction of 11 followed by immediate implant placement 3.75mm x 11mm (ADIN) and bone augmentation using sticky bone graft was planned.

THERAPEUTIC INTERVENTION:

Pre-Treatment:

Treatment plan was explained to the patient. After getting written informed consent, oral prophylaxis was done. Buccolingual width was estimated as 4mm and the length of edentulous span was 7 mm, ideal for implant placement.

Surgical procedure:

Pre-procedural mouth rinse with 0.2% chlorhexidine followed by local anesthesia using lignocaine with adrenaline was given in the surgical site. The mobile tooth was atraumatically extracted (*Fig 3*). The width and height of the extracted tooth was measured using UNC-15 probe (*Fig 4*). Full thickness mucoperiosteal flap was elevated with vertical releasing incision extending till the mucogingival junction. After flap elevation, defect was noticed involving the facial aspect of 11 suggesting fenestration (*Fig 5*), 5x5 mm of bone defect was measured using UNC-15 probe (*Fig 6*). Hence, immediate implant placement followed by bone augmentation in defect area using Sticky bone graft, PRF and GTR membrane was planned. Granulation tissue surrounding the defect was completely removed and irrigated with saline. Immediate implant of 3.75mm x 11 mm (ADIN) was placed in relation to 11 (*Fig 7*). Adequate primary stability was achieved. Post-op RVG revealed proper angulation of implant.

Preparation of Sticky Bone graft:

Sticky bone graft was prepared as per Sohn's protocol (2010). 5 ml of blood was collected from antecubital fossa, centrifuged at 2700 rpm for 12 mins at room temperature. The uncoagulated upper layer, termed as Autologous Fibrin Glue (AFG), was aspirated using needle and mixed with B-OstIN bone graft. After 5 minutes, the mixture becomes a cohesive mass with a putty like consistency called "Sticky bone graft" (*Fig 8*).

Preparation of PRF:

Platelet rich fibrin membrane was prepared as per *Choukron et al (2001)* protocol. 10 ml of blood was withdrawn from antecubital vein and immediately transferred to REMI – 8C centrifugation machine in anti-coagulant test tube. Centrifugation was done at 2700 rpm for 12 minutes. The test tube was carefully taken out so that the platelet clot formed does not muddle. The middle buffy coat layer in the test tube which is the PRF clot was gently removed using a tweezer, squeezed well between gauze to get the membrane (*Fig 9*).

Bone Augmentation using Sticky Bone graft, PRF and GTR membrane:

The prepared sticky bone graft was placed and well condensed to fill the defect space (*Fig 10*). PRF membrane was positioned over the graft (*Fig 11*), The surgical site was covered with 5 x 5 mm GTR membrane (Colo-Guide) (*Fig 12*). Flap approximated and sutured with 5-0 Vicryl suture (ETHICON) and periodontal dressing (Coe pak) given (*Fig 13*). Post

operative instructions were given. Amoxicillin 500mg-TID, Flagyl 400mg-BD, Hifenac P-BD, Pantoprazole 20 mg-BD were prescribed for 3 days along with Chlorhexidine mouthwash 0.2% for 2 weeks.

Follow up and outcomes:

2 weeks review revealed incomplete epithelial formation with graft exposure (*Fig 14*). RPD was delivered for esthetic reasons. After 1 months, surgical site showed satisfactory healing (*Fig 15*). Temporary rehabilitation was done for esthetics (*Fig 16*). Complete epithelial formation with no evidence of peri-implantitis or graft exposure was seen 6 months post operatively, RVG revealed no evidence of bone loss (*Fig 17*). Implant had good stability when flap was elevated. Cover screw was removed and healing cap was placed.

After a week, healing cap was removed. Epithelial cuff formation was present. 15-degree angulated abutment was placed and open tray putty impression was taken. In a week's time, PFM crown was delivered to the patient (*Fig 18*).

DISCUSSION

The goal of modern dentistry is to restore patient's lost teeth to normal contour, function, comfort, aesthetics, speech, and health. Immediate implant placement into freshly extracted sockets is one such treatment protocol which is gaining popularity in recent years. The success of this technique is influenced by various factors since it is technically challenging. Atraumatic tooth extraction, thorough degranulation, implant stability and proper hygiene are the key factors for successful immediate implant placement. This case report showed successful placement of immediate implant in bone defect area with bone augmentation using Sticky bone graft, PRF and GTR membrane.

Immediate implant placement is nearly contraindicated in case of fenestration defects since the facial bone can often be missing due to chronic infections⁽¹⁾. Meticulous treatment planning and use of appropriate bone and tissue regenerative materials is necessary to eliminate failure in esthetic zone with such defects. *Iasella et al. 2003* compared healing of normal socket with freeze dried bone allografts augmented sockets and stated that augmented sockets decreased in width by an average of 0.5 mm comparing normal sockets⁽⁸⁾. *Nevins et al. 2006* confirmed in a clinical study using computerized tomographic scans that the ridges of nongrafted extraction sockets showed more than 20% loss of crest height.

Immediate implant placement following tooth extraction combined with bone grafting technique eliminates peri-implant bone defects. Sticky bone graft has properties of both bone regeneration and formation. It is more economical and a simple procedure⁽⁷⁾. *Waleed et al in 2018* showed sufficient recovery of vertical dehiscence defect using sticky bone and CGF- enriched fibrin membrane around dental implants in narrow maxillary ridge and stated that combination of PRF mixed with CGF and bone graft enhances the rate and density of newly formed bone⁽⁹⁾. *Romesh et al in 2019* reported successful implant placement three months following predictable bone formation in extracted defect site of canine using sticky bone graft⁽¹⁰⁾.

PRF is rich in growth factors which help in differentiation and migration of cells, which helps in osteoinduction and osteoconduction⁽¹¹⁾. *Huang et al in 2017* suggested that stimulation of osteogenic differentiation in the human pulp cells is done by PRF which releases growth factors, thus helping in periodontal regeneration⁽¹²⁾.

Chang et al. in 2013 stated that PRF promotes the expression of phosphorylated extracellular signal-regulated protein kinase (p-ERK) and stimulates the production of osteoprotegerin (OPG) which in turn causes proliferation of osteoblasts⁽¹³⁾. PRF membrane unlike other regenerative materials has numerous advantages like increased vascularity⁽¹⁴⁾, wound stability, better esthetics, improved healing, enhanced graft adhesion, reduced scarring and minimal immune response⁽¹⁵⁾⁽¹³⁾. GTR membrane provides a space required for regeneration. They prevent epithelial cells penetration to the site and can also act as hemostatic agents⁽¹⁶⁾. A bovine derived, resorbable, nonfriable GTR membrane (Cologide) composed of type-I collagen was used in our case. *Becker et al. in 1994* reported a 93.3% 5-year implant survival rate with clinically insignificant crestal alveolar bone loss for immediate implants that were augmented with barrier membranes⁽¹⁷⁾.

Combined use of Sticky bone graft, PRF and GTR membrane potentially improves regeneration, promotes osseointegration, accelerates tissue healing, minimizes bone loss, soft tissue esthetics.

Radiographic examination is essential not only to determine the alveolar bone quantity, quality for implant placement but also to find the clinically un-identifiable possible pathological conditions like fenestration defects. Hence, pre-operative radiographic examination and treatment planning by CBCT must be done mandatorily to avoid chairside staggers and failures in indecisive cases. This is where radiographic examination plays an indispensable part in immediate implant treatment planning.

In our case, placement of immediate implant along with Sticky bone graft, PRF and GTR membrane resulted in a successful esthetic soft-tissue coverage.

Clinical significance:

Successful placement of immediate implant in an aesthetic zone presenting with a fenestration defect, using platelet rich fibrin and sticky bone graft is the uniqueness of this case report.

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Conflict of Interest: Nil

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Fig 1: Pre-Op non-vital tooth 11

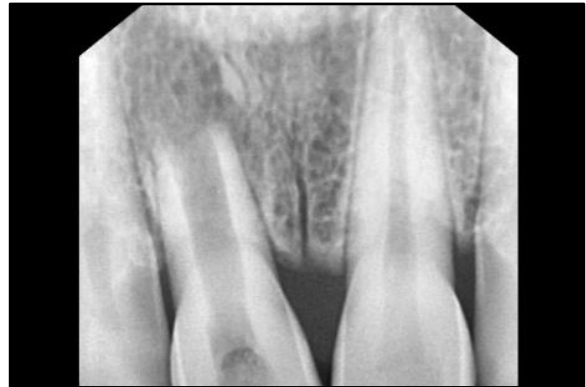


Fig 2: IOPA of 11 revealing external root resorption



Fig 3: Atraumatic extraction of 11



Fig 4: Extracted tooth measured with UNC-15 probe

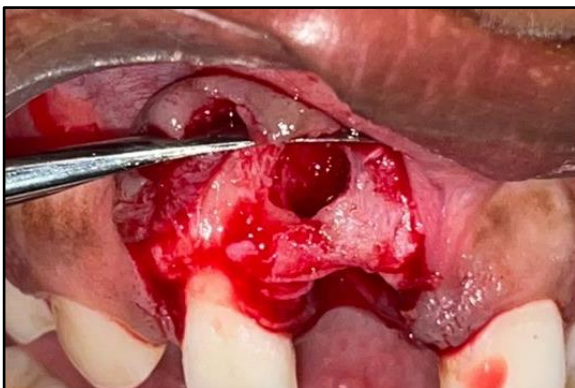


Fig 5: Full thickness mucoperiosteal flap elevation shows fenestration defect involving facial aspect of 11

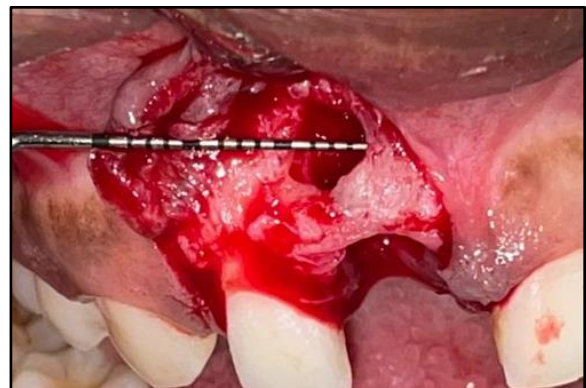


Fig 6: 5x5mm of defect was measured using UNC-15 probe

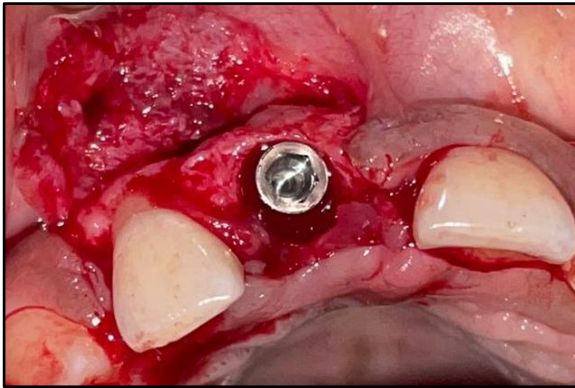


Fig 7: Immediate Implant placed in rt 11



Fig 8: Sticky bone graft prepared using Sohn's protocol (2010)



Fig 9: Platelet Rich Fibrin prepared using Choukron's protocol (2001)



Fig 10: Sticky bone graft placed and well condensed into the defect.



Fig 11: Platelet Rich Fibrin membrane placed over sticky bone graft.



Fig 12: GTR membrane placed over Platelet Rich Fibrin membrane and sticky bone graft.



Fig 13: Flap was approximated using 5-0 Vicryl Suture.



Fig 14: Two weeks post-op revealed incomplete epithelial formation.



Fig 15: 1-month post-op revealed complete epithelial formation



Fig 16: Temporary prosthetic rehabilitation done in rt 11



Fig 17: 6-months post-op revealed complete epithelial formation and satisfactory wound healing



Fig 18: Prosthesis (PFM Crown with gingival ceramic) delivered