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Regenerative treatment modalities with implant placement in a diabetic patient with aggressive periodontitis: A case report

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Abstract

The fundamental change that has swept periodontal therapy is unprecedented - from "saving the tooth" being the end goal to a holistic approach focused on aesthetics, function and longevity of implants even if it means extraction of "maintainable" teeth is truly a paradigm shift in dentistry. Success of an implant osseointegration depends on the quality and quantity of interfacial bone, both of which are compromised in patients of periodontitis and diabetes.

Material and Method: In this case report, a diabetic 34 year patient with severely mobile lower anterior teeth that had hopeless prognosis was treated with immediate implant placement along with freeze dried bone allograft mixed with i-PRF for regeneration and delayed loading.

Result: After 6 months of surgery, excellent bone regeneration was seen around the implants. This was followed by screw retained prosthesis placement in that area.

The one year follow up after the prosthesis was delivered showed minimal bone loss and good functional and aesthetic maintenance of the implants.

Conclusion: Prosthetic rehabilitation of medically compromised patients with periodontitis is a possibility with implants with an in-depth knowledge of the tissue reaction to various regenerative modalities.

Keywords: implants, periodontal therapy, i-PRF, aggressive periodontitis, diabetes

1. Introduction

The directives that governed periodontal therapy have been forever changed, with a shift from the customary course of action of obligatory saving teeth toward one where the dentist will prioritize improving esthetics and function with dental implant restorations instead of just conserving "maintainable" teeth.

Success of an implant osseointegration depends on the quality and quantity of interfacial bone, both of which are compromised in patients of periodontitis and systemic diseases. Clinicians come across increasing number of medically compromised patients who elect implant surgery for their oral rehabilitation.

Diabetes Mellitus is a group of metabolic disorders characterized by an increase in plasma glucose levels. It is one of commonest systemic disease that affects the periodontium. In fact, periodontitis is now recognized as the 6th complication of diabetes [1]. In the last decade, diabetes affected approximately 140 million individuals and it is expected to affect over 220 million by 2010 and more than 300 in 2025 [2]. It is characterized by increased susceptibility to infections, bone loss and poor wound healing.

Generalized aggressive periodontitis is a rapid destruction of periodontium in otherwise systemically healthy individuals generally of a younger age group but patients may be older. Aggressive periodontitis may be diagnosed based on the age of onset, distribution of lesions, severity of destruction, rate of progression and response to therapy. A positive family history is also associated with such patients [3].

For the success of Dental implants in such patients, correction of alveolar bone defects is imperative. Numerous modalities like bone grafting including sinus lift, distraction

osteogenesis, bone splitting, and guided bone regeneration (GBR) have been used to correct alveolar bone defects [4]. FDBA was introduced to periodontal therapy in 1976 [5]. It provides an osteoconductive scaffold for bone growth and elicits resorption when implanted in mesenchymal tissues [6]. Platelet concentrations have been utilized in dentistry for over three decades as a regenerative tool capable of releasing supra-physiological doses of growth factors responsible for inducing tissue regeneration derived from autologous sources. Recently, i-PRF has shown the potential to contain an increased number of growth factors responsible for tissue regeneration capable of inducing fibroblast behavior [7]. Thus, the purpose of this case report is to judge the efficacy of using regeneration modalities with immediate implants in a medically compromised patient with aggressive periodontitis.

2. Case presentation

A 34 year old male patient reported to the Department of Periodontology, Subharti Dental College, with a chief complaint of mobility in his lower front teeth. He gave a medical history of diabetes mellitus for the past 5 years and he was on medications for the same.

2.1 Intraoral examination

Intraoral examination revealed calculi deposits, severe gingival inflammation, grade III mobility and pathologic migration in 43, 31, 32 and missing 41, 42. (Figure 1).

2.2 Radiographic examination

Radiographic examination revealed vertical bone defects and bone resorption in relation to 31, 32, 33, 43, 46, 36.

Based on the history and clinical examination, a diagnosis of localized aggressive periodontitis was made. Because of mobility, the prognosis of the mobile teeth was deemed hopeless.

Immediate implant placement along with freeze dried bone allograft mixed with i-prf for regeneration and delayed loading were planned after extraction of the mobile teeth.

3. Clinical procedure

3.1 Preoperative phase

Phase 1 therapy was carried out at the first visit. The patient was prescribed antibiotics- amoxicillin and clavulanic acid combination to be started 24 hours prior to surgery. 0.2% chlorhexidine mouth rinses were advised simultaneously. Patient's glycemic control was ascertained by HbA1c levels which were less than 5%.

3.2 Surgical treatment

Prior to commencement of the surgery, signed consent was obtained from the patient. The area was anesthetized with articaine with adrenaline. Multiple extractions were done in relation to 43, 31, 32 (Figure 2). 10ml of patient's blood was withdrawn and i-prf was formulated in a centrifuge at 700 rpm for 3 mins (Figure 3). Full thickness mucoperiosteal flap was raised in the mandibular anterior region. One (Impact^R) 3.75*11.5 implant was placed in 42 region and a 4.2*10 implant was placed in the 32 region. They were then covered with freeze dried bone allograft granules (Tata Memorial Institute FDBA) mixed with the i-prf made (Figure 4). The flap was approximated and sutured with polyglactin 910 suture material (Lotus[®] 3-0 polyglactin 910) (Figure 5).

In the first visit, prior to extraction, impression was made for the fabrication of Maryland bridge to be used as immediate temporary prosthesis after implant placement. It was fixed

with the support of adjacent teeth after 10 days of the surgery (Figure 6).

The antibiotics were continued for 5 days after surgery. The patient reported mild discomfort on the first day post-surgery.

3.3 Second stage surgery

The patient was recalled after 6 months. The healing was uneventful. There was no obvious redness or swelling in relation to the surgical site.

Radiograph of the implant site showed adequate bone formation and complete replacement of the graft material with bone (Figure 7). Full thickness mucoperiosteal flap was raised in the mandibular anterior region. The implant site was completely covered with regenerated bone and osteotomy was done to expose the cover screws (Figure 8). Cover screws were removed and gingival formers were placed and sutured for 14 days.

After the completion of 14 days, the gingival formers were removed and a healthy gingival collar was formed around the implants. Transfer coping were attached to the implants and an open tray impression was made with addition silicone (Figure 9). Implant analog were attached to the impression and sent to the laboratory for the fabrication of a screw retained prosthesis. After trial, it was delivered (Figure 10). Patient was recalled for regular follow-ups, his 1 year post-operative radiograph shows minimal bone loss.

4. Discussion

Loss of supporting bone in patients of periodontitis is an important concern in the placement and longevity of implants. Diabetes mellitus has the potential to further complicate this by predisposing patients for periodontitis. Hyperglycaemia inhibits osteoblastic differentiation and alters the response of the parathyroid hormone that regulates the metabolism of phosphorus and calcium [8]. In addition, it produces a deleterious effect on the bone matrix and its components and also affects adherence, growth and accumulation of extracellular matrix and delays healing [9].

In the past few years, various studies have demonstrated the loss of bone around implants in patients with aggressive periodontitis leading to implant failure. Wu *et al.* [10] conducted a study over a period of 18 months in a patient with generalized aggressive periodontitis who showed absence of inflammation or marginal bone loss around the placed implants. Implant survival rates were 100% in the healthy patients and 97.6% in the generalized aggressive periodontitis patients in a study by Mengel *et al.* [11] with a five year follow up.

Although the use of pre- or peri-operative antibiotic prophylaxis in implant dentistry in systemically healthy patients is controversial, there is general agreement in advocating the use of antibiotics in compromised, e.g., diabetic patients undergoing implant therapy [12]. Thus, the antibiotic selected for prophylaxis should be bactericidal and of low toxicity, e.g., penicillin or amoxicillin [13]. Systemic antibiotics are indicated in aggressive periodontitis since the pathogenic bacteria like *Aggregatibacter actinomycetemcomitans* and *Porphyromonas gingivalis* have been found to be tissue invasive and mechanical therapy is insufficient to eliminate the bacteria from these sites [14].

Besides antibiotic prophylaxis, it has been reported that the use of a chlorhexidine digluconate (0.12%) rinse at the time of placement reduced the failure rate from 13.5% to a remarkable 4.4% in type 2 diabetic patients [15].

Polyglactin 910 has been proven clinically excellent because it does not allow adherence of plaque and is well suited for handling. In addition, it shows no intensive local reaction [16]. In this case, the mineralized freeze dried bone graft used, has given excellent results in achieving bone regeneration around implants. Albrektsson *et al.* [17] successfully performed vertical alveolar ridge augmentation without the need of resorbable membrane, leading to 100% implant success and survival over 12 months.

The use of i-PRF in combination with particulate bone grafts to promote the biological and physical properties of the materials is being promoted by clinicians and researchers alike. The combination has shown benefits, such as improved angiogenesis and handling ability by combining the small bone granules into a bulk material to use in bone grafting surgery. Further use of i-PRF demonstrated that it was effective in regaining gingival thickness, reducing periodontal pocket depth, and attachment loss in periodontal tissue regeneration [18].

Morris HF [19] and Farzard P [20] concluded that, although there is greater failure risk in a diabetic patient, preservation of suitable levels of glucose in the blood along with other measures, improve implant survival percentages in these patients.

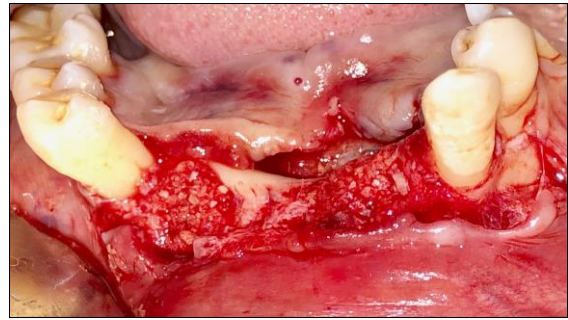


Fig 4: Implant site covered with freeze dried bone allograft granules.

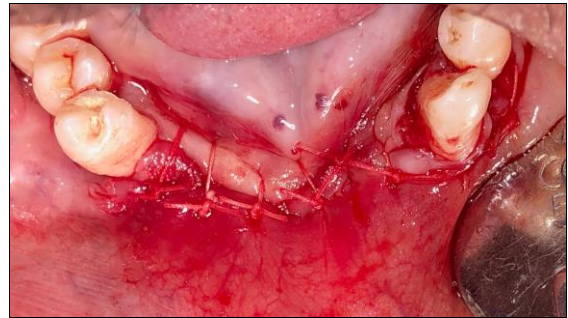


Fig 5: Sutures given with polyglactin 910 suture material



Fig 1: Pre-operative view showing pathologic migration in 43, 31, 32 and missing 41, 42



Fig 6: Maryland bridge



Fig 2: Extraction of mobile 43, 31, 32

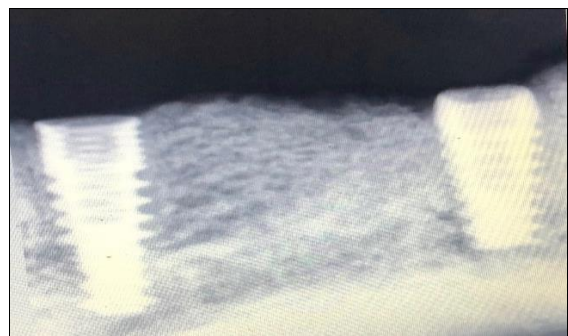


Fig 7: Radiograph of the implant site showing adequate bone formation.



Fig 3: i-Platelet rich fibrin

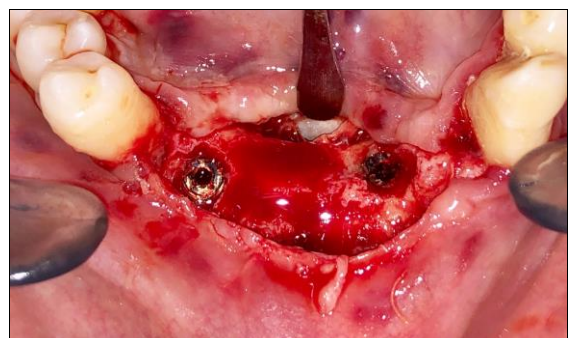


Fig 8: Full thickness mucoperiosteal flap raised and implants uncovered

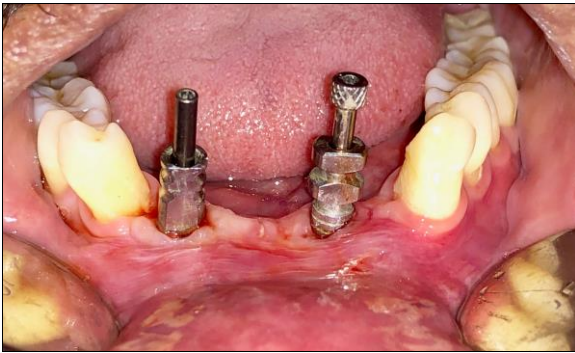


Fig 9: Transfer coping for open tray impression



Fig 10: Final restoration

5. Conclusion

Thus, though studies with long term follow up with a larger size are needed to prove the obtained results, i-PRF with bone grafting and regular maintenance has shown to be effective in treating patients with aggressive forms of periodontitis.

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