Implant-Supported Fixed Prosthesis in Aesthetic Zone: A Case Report

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Abstract

The aim of this article is to present the clinical application of implant placement in the aesthetic zone using bone graft and leukocyte-platelet-rich fibrin to obtain desirable results. A 27-year-old male patient reported with a chief complaint of missing tooth in the anterior region due to trauma and wants to replace it with a fixed prosthesis. The patient had been undergoing orthodontic treatment for the last 3 years. After proper treatment planning, endo-osseous implant followed by alloplastic bone graft was placed and platelet-rich fibrin membrane was placed on the labial bony surface as the labial plate was thin. After 6 months, the prosthetic procedure was done.

Keywords
► bone graft
► dental implant
► platelet-rich fibrin

Introduction

Placement of implant in aesthetic zone is a challenging procedure because of aesthetic concern and unfavorable bone morphology. Better prognosis of implant therapy in terms of aesthetics is the key element. It is as important as survival rate especially in anterior maxilla. The factors that are objectively evaluated and contribute to successful treatment outcome are patient's healing capacity, the level and condition of the soft and hard tissues around implant, and the provisional and final prostheses. In addition to above, aesthetic perception also significantly affects the success.1

The gingival contour, interdental papillae, and gingival margin that match with adjacent tissues are important factors from aesthetic point of view.2 The interdental papilla should fill the space between teeth and implants and position of the crest of the bone should be within 5 mm of the proposed contact point of the final restoration.3

The emergence profile is only achieved when we place implant in correct three-dimensional position. If the implant is not located centrally with minimum distance of 1.5 mm between the implant and the adjacent natural tooth, there will be loss of interdental papilla.4 Placement of implant labiopalatally is also important, otherwise there will be over-contouring of prosthesis that cannot be corrected later on.4

When placed labially, there will be a decrease in buccal bone and recession later on. If palatally placed as required, a modified ridge lap design of Pontic will not be able to give and there will be difficulty in maintenance.

The apicoronal position of the implant is also important. If placed too apically, it leads to bone resorption and gingival recession; if placed too coronally, it may be unaesthetic due to the visibility of the implant shoulder.5 For optimal implant aesthetics, the implant should be placed 1.5 to 3.0 mm below the cementoenamel junction.

For an ideal aesthetics in implant, sufficient bone should be present all around the implant otherwise corrective presurgical planning should be done.6

Guided bone regeneration with the help of barrier membranes, grafts, or distraction osteogenesis can help in correction of bony defects. To gain adequate amount of bone around...
implant, guided bone regeneration is an ideal method.\textsuperscript{7} In aesthetic areas when defects are observed, immediate implant placement has shown better results.\textsuperscript{8} This case report illustrates implant placement in the maxillary anterior region using leukocyte-platelet-rich fibrin (L-PRF).

**Case Report**

A 27-year-old male patient reported to the Department of Prosthodontics and Crown & Bridge, with the chief complaint of missing upper front tooth back due to trauma; patient was undergoing orthodontic treatment for the last 3 years. Intraoral examination revealed missing teeth in region of 21 with slight midline deviation (\textbullet\textsuperscript{Fig. 1}). After proper discussion on various treatments, patient opted for implant prosthesis. Diagnostic impressions were made and casts were fabricated with dental stone (Kalabh, Mumbai). Intraoral radiograph (orthopantomogram) was done for bone-mapping to assess bone height and width (\textbullet\textsuperscript{Figs. 2 and 3}).

Implant surgical procedure was planned after thorough medical and dental history. Implant (Adin, Israel) measuring 3.3 \times 9.5 mm in dimension was selected for cement-retained prosthesis in region of 21. Diagnostic wax-up was done and surgical stent was fabricated on the cast so as to use it as a guide for implant placement.

**Surgical Procedure**

Papilla preservation incision was given and mucoperiosteal flap was elevated under local anesthesia (Cadila, Gujarat, India) and the osteotomy site was prepared using the surgical stent for the initial and sequential order of calibrated drills (\textbullet\textsuperscript{Fig. 4}). An endo-osseous implant (Equinox myriad, Switzerland) was inserted into the osteotomy site with a torque of 35 to 40 Ncm for primary stabilization and cover screw was placed. As the buccal plate was thin, xenograft was placed over the buccal bone, and over its platelet-rich fibrin (PRF) membrane was placed (\textbullet\textsuperscript{Fig. 5}).

**Preparation of the L-PRF Membrane:** Precisely, 10 mL of the patient's own blood was taken and centrifuged in centrifugal machine (PRF Duo) at 3,000 rpm for 13 minutes, and L-PRF membrane was obtained on gauge piece. L-PRF is a platelet concentrate consisting of leucocytes, growth factors, proteins, and cytokines. The membrane was stabilized with sutures.

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Postoperative Care

For postoperative confirmation of the implant location, radiograph was taken (Fig. 6). Medications were prescribed and patient was given operative instructions. The patient was recalled after 1 week for follow-up and healing was uneventful.

Prosthetic Phase

Patient was recalled after 6 months. Under topical anesthesia (Lidayn Global Dental, Delhi, India), the cover screw was removed after giving incision in a cross manner and the gingival former was placed (Fig. 7). After 2 weeks, the gingival former was removed and impression was made after placing impression coping with closed-tray impression technique. Gingival former was placed back after removal of impression. The impression was poured in dental stone.
Discussion

Alternate treatment to the implant-supported fixed partial prosthesis in single missing anterior tooth includes removable partial denture prosthesis, fixed partial denture prosthesis, and Maryland bridges. Removable partial denture prosthesis sometimes leads to loss of alveolar bone around abutment teeth and the satisfaction rate is 75 to 90%. In fixed partial dentures, since we have to prepare the adjacent abutment teeth, there is unnecessary reduction in vital tooth structure. In case of Maryland Bridge, there is less loss of vital tooth structure but there are more chances of failure and debonding. Therefore, implant was considered to be the best option in this clinical case.

As the buccal plate was thin, PRF membrane was placed in this case. In the wound healing, there is blood clot formation with the help of platelets and growth factors. In the above case report, for better wound healing, PRF was used as growth factors.

L-PRF consists of leukocytes, growth factors, proteins, and cytokines.

The L-PRF has trimolecular structure with slow release of growth factor and platelet without thrombin, which forms a flexible network. It promotes angiogenesis and fast wound healing for longer period of time.

A fibrin network acts as a growth factor and helps in proliferation and regeneration of tissue. Fibrin, along with graft material, acts as a scaffold for the restoration of bony defects. To improve the guided tissue regeneration, PRF as natural blood clot, bone morphogenic protein is used as a secure technique.

Platelet-derived growth factor and transforming growth factor α and β are rich in PRF. These are continuously released up to 28 days. It stimulates the wound healing.

During neovascularization, tissue cicatrization is increased with PRF. This enhances wound healing without any complication like pain and pus formation. PRF is widely used in periodontics such as gingivitis, periodontal defects, and oral lesions. Dermal fibroblasts, gingival fibroblasts, and keratinocytes are proliferated in presence of PRF, which leads to formation of extracellular matrix collagen. Ingress of bacteria is stopped and it promotes healing.

Conclusion

In the anterior region of maxilla, because of aesthetic zone, sometimes implant placement becomes challenging for the prosthodontist. Proper diagnosis and treatment planning in the form of location of implant, prosthetics materials, and maintenance of prosthesis are very important for better prognosis of the treatment.

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None identified.

References


Fig. 8 Final prosthesis.