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Abstract

A dental implant is the most accepted treatment option to replace the badly decayed tooth or missing tooth. The jumping gap left after the placement of the implant in the socket will require augmentation of bone graft material. In this case report, the extracted root stumps are used as an autogenous tooth graft material after its preparation. And PRF is mixed with graft material for additive advantage. So, the present case report discusses the feasibility of the use of autogenous tooth graft material along with PRF for the better osseointegration of the implant.

Keywords: Dental implant; Badly decayed tooth; Autogenous tooth graft; PRF

Introduction

To restore the missing teeth several strategies are adopted but dental implant therapy along with bone graft materials become the preferred treatment modality for rehabilitation of missing tooth. Among several strategies of placement of the implant, the immediate implant placement after the extraction of decayed root stump in the posterior region has been widely discussed in the literature. It is instigated by Schulte and Heimke in 1970 [1]. Moreover, it can evade the resorption of buccal bone and reduce the duration of treatment time. Bone deficiency occurs in most implantation sites. Concurrently, immediate implant placement in the posterior region requires an augmentation of bone substitute, because of dehiscence of the buccal wall caused by apical or chronic periodontal disease [2]. Autogenous bone, allograft, xenograft, and alloplastic are the various bone graft
materials that are presently used in dentistry for the augmentation of bone. Osteogenic potential, osteoinduction and osteoconduction property of Autogenous bone make it a superior bone graft material. Although, the creation of a second surgical site at the donor area, additional injury and inadequate amount of harvested bone is the main drawback. Allograft has an inadequate osteogenic effect and it’s very expensive. Xenografts are prepared from animal sources so graft rejection rates are very high so not accepted by patients [3].

In literature, the use of tooth graft material was widely discussed. It was prepared from compromised teeth and can be effectively used in bone defect area and yield a good clinical result by bone formation at defect site [4–8]. While planning for the placement of the implant in the extraction socket, compromised teeth can be used as a graft of choice Because of their autogenous nature and less rate of graft rejection. In 2008, tooth graft was first reinforced and used as a bone substitute in guided bone regeneration [9]. The total inorganic, organic composition and water content of the enamel and dentin are comparable to the composition of alveolar bone. The histological section reveals that the composition of the demineralised extracted tooth is much similar to bone, so it is material of choice as a bone substitute and moreover, it helps in osteoconduction and osteoinduction [5]. The present article focuses on the outcome and feasibility of immediate implant placement followed by placement of autogenous tooth graft material mixed with Platelet-rich fibrin (PRF).

Case report

A 25-year-old male patient reported to the Department of Periodontology & Oral Implantology with decayed root stumps concerning tooth 37. The periapical radiograph revealed an inadequate amount of alveolar bone and no sign of periapical pathology around the decayed root and clinically, sufficient amount of interocclusal space so it was decided to extract the roots and place an endosseous implant immediately in bone followed by placement of tooth graft material around the defect site.

Surgical procedure

On the day of surgery oral antibiotics and analgesics were given to the patient before the surgery. The inferior alveolar nerve block was given using lignocaine with adrenaline. As the conservation of alveolar bone is crucial for placement of implants, atraumatic extraction of tooth carried out using a periosteal and straight elevator and root was luxated using a wedge principle and pulled out of the socket (Figures 1 and 2).

Figure 1: Pre-operative view.
Both mesial and distal roots were washed with distilled water. Root planing was done with the help of Gracey's curettes (Figure 3). Then extirpation of pulp was carried out with 15,20,25,30 no. K files sequentially (Figure 4).

Roots were cut into pieces (Figure 5, 6) and crushed with distilled ice in a grinder then treated with 2% HNO3 solution for at least 20 min. After that cold distilled water was used to clean the tooth granules (Figure 7) and autogenous tooth graft mixed with PRF (Figure 8) is ready for use [10].

Debridement of the socket was done with bone curettes and osteotomy was done in the inter-radicular bone under the copious irrigation and a new apex was prepared apical to root apex (Figure 9) and then an ADIN implant of size (5 × 11.5 mm) was placed.

**Figure 2:** Extraction of root stump.

**Figure 3:** Root planning.

**Figure 4:** Pulpectomy.

**Figure 6:** Root cutting with the disc.
Primary stability was >45 Ncm, which was attained by twisting the implant beyond the socket apex and then gingival former was placed (Figure 10) and prepared tooth graft was placed in jumping gap between the implant and buccal/lingual socket wall (Figure 11),

Figure 6: Root cutting into small pieces.

Figure 7: Mashed tooth graft.

Figure 8: Tooth graft mixed with PRF.

Figure 9: Initial drill.

Figure 10: Implant placement with gingival former.

Figure 11: Packed tooth graft material (occlusal view).
and 3-0 black silk interrupted sutures were given (Figure 12) and a radiograph was taken after the completion of surgery (Figure 13).

**Figure 12:** Suture given.

![Figure 13: IOPA after placement of implant.](image)

Post-operative instruction was given to the patient and asked to report after 2 weeks. After 14 days IOPA was taken and sutures were removed (Figures 14 and 15). For the prosthetic crown, the patient was recalled after 3 months and PFM crown over the implant was given. The patient was recalled at a monthly interval for oral hygiene.

**Figure 14:** After suture removal at 14 days.

![Figure 15: IOPA at 14th day.](image)

The clinical and radiograph at 3 months reveals good osseointegration and maintenance of bone around the implant.
and peri-implant tissue was clinically healthy (Figures 16 and 17).

**Figure 16**: Healing at 3 months.

![Figure 16](image1.png)

**Figure 17**: IOPA at 3 months.

![Figure 17](image2.png)

**Discussion**

To replace the missing tooth, implant therapy is considered as the primary treatment modality to full fill both aesthetic as well as a functional requirements. To reduce the duration of treatment time and resorption of alveolar bone, immediate placement of the endosseous implant into extraction socket has been widely discussed.

The success of immediate placement of implant depends on tooth extraction without any trauma required to preserve the greatest quantity of alveolar bone and primary stability of the implant so at least 3 mm of sound bone apical to the extraction socket should be there to place an implant. Before implant placement, the extraction socket must be evaluated to see any pathology [11–13].

In this case report, the inter-radicular septum and mesial socket wall of the mandibular molar were used to anchor the implant and the implant was placed 3 mm apical to the extraction socket for apical anchorage.

Selection criteria for immediate placement of implant include the following: a) sufficient height and width of the inter-radicular septum (b) no clinical signs of acute periodontal abscess (c) healthy periodontium and good oral hygiene, (d) regular observation after surgery (e) patient compliance [13].

Micro-movements between the implant and the surrounding bone should be avoided to allow successful healing to occur. The main goal of regenerative osseous therapy is the direct growth of the autogenous bone around the implant surface, So Stimulation of new bone formation in the socket was attained by autogenous tooth graft materials.

Autogenous tooth graft material was prepared according to Murata et al method [10]. Atraumatic extraction, pulp extirpation, root planning, root cutting and grinding with distilled ice, Decalcification with a 2% HNO3 solution and rinsing with cold distilled water are the key step for the preparation of tooth graft.
The gap between the implant surface and the socket wall is augmented with autogenous tooth graft material mixed with PRF. The volume of graft required is equal to the space between the implant surface and wall of the socket [14].

PRF helps in wound healing and acts as a biological mediator, which attracts the stem cell, helps the migration of osteoprogenitor cells and helps in the growth of blood vessels. Moreover, PRF releases high concentrations of growth factors like TGF, PDGF, VEGF which have added a synergistic effect with autogenous tooth graft [15]. So, while placing an immediate implant root pieces can be used as autogenous tooth graft material combined with PRF to get better stability and good osseointegration.

Conclusion

Immediate implant placement in the posterior mandibular region using autogenous tooth graft material made by extracted tooth along with PRF stimulate the new bone formation, reduce the process of alveolar bone resorption and shorten the duration of treatment time, which can be an acceptable method.

References