RIDGE PRESERVATION USING β-TCP AND BOVINE COLLAGEN IN AGGRESSIVE PERIODONTITIS

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ABSTRACT

Atraumatic tooth extraction and various socket preservation techniques using a wide range of materials have been introduced to minimize bone resorption after tooth extraction. This paper reports the management of an aggressive periodontitis case with extraction with ridge preservation by using a combination β-Tricalcium phosphate and Bovine Collagen in the form of pre-fabricated cones.

Key words: Tooth Socket; Alveolar Bone Loss/Prevention; Collagen; Bone Substitutes

Introduction

Changes in the ridge dimensions after tooth extraction often result in bone resorption that complicates restorations with implant or any fixed prosthesis both functionally and esthetically. Ridge preservation after tooth extraction is crucial to achieve optimal prosthetic results during and after implant placement. Alveolar ridge resorption has long been considered an unavoidable consequence of tooth extraction. While the extent and pattern of resorption is variable among individuals, there is a progressive loss of ridge contour as a result of physiologic bone remodeling. Over the long term, prosthetic complications, loss of function, and inadequate bone for the placement of dental implants may result. Post-extraction bone loss is accelerated in the first 6 months, followed by a gradual modeling (change in size or shape) and remodeling (turnover of existing bone) of the remaining bone, with as much as 40% of the alveolar height and 60% of alveolar width lost in the first 6 months. Loss of ridge height results in prosthetic instability as the crest of the ridge approaches muscle attachments and mobile mucosa. In extreme cases, there may be involvement of the maxillary sinus or nasal cavity, requiring extensive reconstructive surgery for traditional or implant-supported prosthetics. Vital structures, such as the mandibular neurovascular bundle, may become vulnerable due to exposure and impingement of the overlying denture. In the horizontal plane, bone loss occurs largely at the expense of the buccal or facial bone. Ultimately, esthetic tooth replacement with implants is complicated by loss of tissue contours.

Augmentative measures may thus be required to guarantee optimal prosthetic replacement of the lost tissues. Augmentative bone treatment may result in extensive surgical interventions and increased treatment costs. Alveolar ridge prophyaxis immediately upon tooth extraction may reduce such sequelae for both, the treating dentist and the patient. Attempts to reduce alveolar bone resorption have included the placement of natural roots, root analogues, and immediate implants into the extraction socket, sometimes in combination with membrane or graft techniques. This paper reports the management of an aggressive periodontitis case with extraction with ridge preservation by using a combination β-Tricalcium phosphate and Bovine Collagen in the form of pre-fabricated cones.

Case Report

A 34-year old male patient diagnosed with generalized aggressive periodontitis was randomly selected from the outpatient pool attending the dental clinic. Routine intraoral examination was performed during the initial visit and patient was emphasized on oral hygiene maintenance and was scheduled for a second appointment during which a full mouth series of intraoral periapical radiographs, panoramic radiographs, complete hematologic examination, intraoral photographs and study models were planned. Complete intra-oral examination of the patient revealed minimal amount of deposits on the tooth surface, which were not correlated to the amount of periodontal attachment loss. Radiographic assessment revealed a characteristic arch shaped bone loss involving the incisors and molars. Various treatment plans ranging from access flap debridement, extraction of hopeless teeth, pre-implant ridge preservation or fixed and removable prosthesis were explained to the patient. Upon patient’s approval informed consent was obtained and surgical procedure was planned. Thorough full mouth scaling and root planning was performed and the patient education was emphasized on routine mechanical and chemical plaque control.

Surgical procedure: During the second appointment local anesthesia containing adrenaline was administered and full mouth access flap debridement was done in four divided appointments. A total of four grade III mobile teeth with poor prognosis (Figure 1) were extracted from three patients using periostomes to prevent damage to the remaining bony structure. Two vertical releasing incisions were made buccally in the extracted tooth region extending till the mucogingival junction and the flaps were mobilized. The socket was completely degranulated to remove the diseased soft tissue remnants and later slightly decorticated to initiate healthy bleeding. Pre-fabricated resorbable cones (RTR cones) made up of a combination of β-Tricalcium phosphate (β-TCP) and bovine collagen were placed in the bleeding sockets (Figure 2) and
were completely covered with the help of coronally advanced flap (Figure 3). Wound closure was accomplished with 4-0 non resorbable suture. Medications prescribed for postoperative use by the patients included amoxicillin 500mg Tid for 5 days. Chlorhexidine mouthwash of 0.2% strength was prescribed for use after surgery. Sutures were removed after a period of 10 days and showed good approximation of the tissues. The area was then irrigated with povidone iodine solution. After a healing period of 5-6 months the preserved socket site was radiographically analyzed and showed about 80-85% of internal socket bone fill (Figure 4), minimal but not significant amount of resorption of the alveolar bone height and significantly less horizontal resorption of the alveolar bony ridge. The augmented sites were then scheduled for single stage implant surgical procedures.

Discussion
After tooth extraction, the alveolar ridge will commonly decrease in volume and change morphologically. These changes are usually clinically significant and can make placement of a conventional bridge or an implant-supported crown difficult. If bone resorption is significant enough, then placement of an implant may become extremely challenging. Postextraction maintenance of the alveolar ridge minimizes residual ridge resorption and, thus, allows placement of an implant that satisfies esthetic and functional criteria. Recent advances in bone grafting materials and techniques allow the dentist to place implants in sites that were considered compromised in the past.9

To prevent alveolar bone loss and support efficient placement of dental implants, different bone substitutes such as autografts, allografts, xenografts, synthetic biomaterials and osteoactive agents have been proposed.8 In order to avoid harvesting an autograft, and thereby eliminating additional surgical procedures and risks, bone grafting materials and substitutes or alternative filler materials are to be used for ridge augmentation.8,12 Bone replacement grafts,13 a combination of bone grafts and collagen membranes,14,15 prefabricated collagen root form plugs16 were studied earlier and showed significant gain in the bone fill and bone density. However the advantage of using pre-fabricated cones with a combination of these materials is that they attain a three dimensional stability, prevent the post operative complications such as displacement of the membrane and acts as better osteoconductive materials with ample resorption time for complete bone fill.

Conclusion
In conclusion the maintenance of the dental alveolar bone after extraction depends on the attentive surgical procedure and the use of materials capable to maintaining the socket space and thus helps in bone tissue healing. Thus, it seems prudent to prevent alveolar ridge destruction and make efforts to preserve it during extraction procedures.

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