PLANNING FOR THE FUTURE: ALVEOLAR RIDGE PRESERVATION WITH "SOCKET PRESERVATION TECHNIQUE" AND DELAYED IMPLANT PLACEMENT IN ANTERIOR MAXILLA

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Abstract

Post-extraction alveolar ridge resorption is an inevitable biologic phenomenon which often leads to ridges which are deficient in height and width hampering future implant placement and aesthetics. Numerous preservation techniques along with a range of dependable bone-graft materials have made it possible to control this phenomenon to a certain extent. The "Socket Preservation Technique" combines advantages of flapless technique, atraumatic extraction and graft material to provide predictable ridge dimensions for successful implant theory in future. This purpose of this article is to a present "Socket Preservation" or "Socket Plug" technique employed in rehabilitating a horizontally fracture right maxillary central incisor.

Key Words: Socket Preservation, Socket Plug, Alveolar Ridge Resorption, Implant, Bone-Graft

INTRODUCTION

It is well documented in dental literature that every tooth extraction leads to alveolar bone resorption and atrophy of the respective region. Various ridge preservation techniques have been mentioned in history and modified overtime to limit this post extraction bone loss. "Socket Preservation" or "Socket" Plug technique is one such technique. Itconsists of atraumatic tooth extraction, placement of the appropriate biomaterials in the extraction site, preservation of soft tissue architecture employing a flapless technique, and placement and stabilization of the collagen plug[1]. This articleillustrates the steps used in this technique for a right maxillary central incisor.

CASE REPORT

A 42-year-old male patient reported to the outpatient department of prosthodontics with the chief complaint of fractured tooth following trauma. Intraoral examination revealed crown fracture with respect to right maxillary central incisor. Further clinical and radiographic evaluation revealed a fracture line immediately below the crest of the alveolar socket and no signs and symptoms of either periodontal or periapical infection. The fracture line was present immediately below the crest of alveolar socket. **(Figure I)** The patient was informed about the treatment plan and informed consent was obtained. Amoxycillin 500mg TDS was prescribed as pre-operative antibiotics prophylaxis.Local anaesthesia was administered using 2% lignocaine hydrochloride with epinephrine 1:200000. (Lox 2%, Neon Laboratories Ltd,India) The fractured crown segment was extracted followed by elevation and atraumatic extraction of root of the right maxillary central incisor. The socket was curated and condensed with β-tricalcium phosphate cylindrical bone-graftplug (R.T.R, Septodont Inc.)**(Figure II)**.3-0 silk sutures were placed. Post-Operative antibiotics and analgesics were continued for 5 days. Sutures were removed after 10 days. Provisional prosthesis was delivered to the patient for 6 months.

Fig I Horizontal Fracture with 11

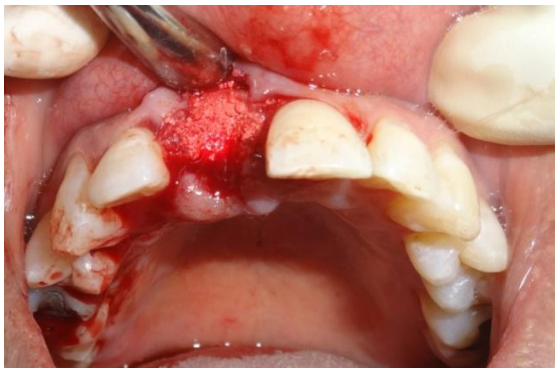

Fig II Socket augmented with R.T.R bone graft after extraction

Figure III Optimal Ridge contour 6 months post grafting

After a healing period of 6 months, optimal ridge height and weight was observed.(**Figure III**) Radiologic evaluation with Cone Beam Computed Tomography (CBCT) revealed adequate bone formation for endosseous implant. Local anaesthesia was infiltrated in the

Figure IV Implant placed with 11

grafted region and full thickness flap was raised. Osteotomy was prepared to receive an implant of 3.75* 11.5 mm (MIS SEVEN, MIS technologies, Israel).(**Figure IV**) Implant was placed and flap was sutured back. Post-operative antibiotics and analgesics were continued for 5 days. Sutures were removed after 10 days. Second stage surgery was done after 6 months followed by animplant level closed tray impression. A porcelain fused to metal cement retained implant crown was fabricated and cemented with glass ionomer cement.(**Figure V**) The implant crownwas cleared of any eccentric occlusal contacts. Patient was recalled for post-operative follow-up and maintenance.

Fig V Cementation of Porcelain fused to metal crown with 11

DISCUSSION

Extraction remains a common treatment modality for traumatic horizontal fractures. Extraction of teeth leads to approximately 40 % and 60% reduction in bone height and width respectively in the first 6 to 12 month of extraction, rendering them difficult for aesthetically sound prosthetic rehabilitations[2].First step in socket preservation technique is atraumatic extraction followed by condensing a “bone-filler”material in this socket. Thus,conserving original ridge anatomy. Theincreasing desire of dentist, to optimize the extraction site for future implant placement and availability of various easy-to-use bone graftmaterials has made “socket preservation” a popular technique. Commonlyused graft material to provide a scaffold for bone formationare: Osteoconductive:autogenous bone, anorganic bovine bone, freeze-dried bone allograft and β- tricalcium phosphates; Osteoinductive:Demineralized Freeze-Dried Bone Allograft (DFDBA)[3].

The findings of a recent randomized clinical study on alveolar ridge preservation in 27 patients confirmed that synthetic bone substitute (StraumannBoneCeramic®, Straumann AG, Basel, Switzerland) and a bovine xenograft (BioOss®, Geistlich Biomaterials, Wollhusen, Switzerland), in combination with a collagen barrier (Bio-Gide®, Geistlich Biomaterials, Wollhusen, Switzerland), preserve bone levels up to 8 months after post-extraction grafting of the sockets. There was a reduction of less than 1.0 mm in the interproximal bone levels at 4 and 8 months post-surgery in both groups[4]. In the presentcase report, the graft material used was β-tricalcium phosphate coated with bovine collagen fibres. β-tricalcium phosphate is a

porous alloplastic graft. During reabsorption, it supplies calcium and magnesium ions and creates an ionic environment which induces alkaline phosphatase activation, bone synthesis[5]. Although autologous grafts have faster rate of resorption than alloplastic grafts, the later prove better in time stability[6].Irrespective of itscomposition any graft materialdelays the natural bone healing process so, clinician is often trading the volume of bone for new vital bone.Thus, while selecting a graft material the time required for complete resorption of graft material and amount of vital bone formed in this period should be considered. For example, if medium-term preservation is desired an alloplastic graft which resorbs slowly in comparison to autograftscan be chosen like in the present case.

The flapless ridge preservation techniquepreserves blood circulation, soft tissue architecture, hard tissue volume at the site. It causes decreased surgical time, minimal patient discomfort, and accelerated recuperation[7]. Patients are able to resume normal oral hygiene procedures immediately after the surgery. Drawbacks of raising a flap and placing a membrane for ridge preservation are prevented, such as reduction of keratinized gingiva, alteration of gingival contours, and migration of the mucogingival junction due to coronal displacement of the flap in an attempt to achieve primary closure[8].

A major limitation of this technique is the need for a buccal cortical plate. In the present case the patient had intact buccal plate and a non-infected socket which indicated the socket preservation technique to be used. Insockets lacking buccal cortical plate, a barrier membrane should be used to prevent infiltration of soft tissue. Acute infection in surrounding tissues is an absolute contraindication[1]. Histologic outcomes of this technique have shown complete integration of allografts into the newly formed bone after 3 months of healing, anorganic bovine bone showed partial integration with distinguishable graft particles remaining[9]. Alloplastic material contains synthetic hydroxyapatite which sometime shows a tendency for granular migration and incomplete resorption.

The “Socket preservation technique” or “Socket Plug” technique is a promising method to attain ideal ridge contours necessary to deliver a functionally and aesthetically sound prosthesis. However, the choice of socket preservation technique and preferred graft material will vary according to the each patient’s individual needs.

CONCLUSION

Socket preservation technique is based on imperative steps like atraumatic extraction, appropriate choice of filler graft material and flapless design. Thus making post extraction

healing highly predictable with optimum ridge contours for easier implant placement and restoration in future.

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