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Socket shield technique in immediate implant placement – A case report.

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Abstract

The extraction of a tooth leads to a cascade of events which results in resorption of the alveolar bone around the socket. The buccal bone loss that occurs post extraction leads to vertical and horizontal bone loss.

It requires complex hard and soft-tissue reconstruction to achieve esthetically pleasing results in such cases. In the socket-shield technique (SST) the root is bisected, and the buccal two-third of the root is preserved in the socket so that the periodontium along with the bundle bone and the buccal bone remains intact.

The root section preserves the Perio dontal attachment apparatus that includes Perio dontal ligament (PDL), attach ment fibers, vasculari zation, root cementum, bundle bone, and alveolar bone.

Keywords: Bone implant interactions, soft tissue-implant interactions, Guided tissue regeneration, Bone regeneration, Bone substitutes.

Introduction

Dental trauma is frequently occurring phenomenon, with anterior region of maxilla most commonly involved. Teeth which are subjected to dental trauma, some are not found at site of dental trauma or are not restorable, some teeth undergo pulp necrosis and root resorption. In todays, scenario, rehabilitation of anterior esthetics area can be dealt with immediate implant placement with good survival rate.[1]

It is well understood that bone resorption and soft tissue retracts occur after tooth extraction. Removal of tooth in anterior Esthetic maxillary region result in thin labial bone collapse and loss of inter bony scalloping and inter dental papilla. It is obligatory, to preserve the normal

bony anatomy and soft tissue design to attain a pro ductive Esthetic outcome in single implant Restor ation in anterior region.[2]

Tooth extraction causes alveolar bone resorption which is physio logical pheno Menon. A Systematic review stated mean horizontal alveolar bone reduction of 3.8mm and a mean vertical reduction of 1.2mm in 6 months following tooth extraction.[3,4] Immediate implant place ment alone does not prevent bone remodelling bone resorption.[3]

The clinical case illustrates the concept of socket shield technique (SST) in, Esthetic anterior region to attain predic table result in implant treatment. This method includes maintaining the buccal two-third of root in the socket, with pdl, buccal bone, bundle bone intact and immediate implant placement in close proximity to the root. This technique is also known as partial extraction therapy, root membrane technique, and partial root retention.[5]

The buccal bone owes its blood supply from the gingival and periodontium, after tooth extraction buccal bone gets deprived of blood supply from socket side resulting in loss of buccal bone.

The SST techniques preserves the periodontium on the buccal aspect and prevents the expected post extraction socket Remo delling, also conserve the soft tissue architecture.[6] Histo logical studies conducted on the animal model revealed maintenance of the buccal root with or without enamel matrix derivative (emdogain, Straumann, Basel, Switzer land), results in formation of new cementum, between root portion and implant placed.[7]

The aim of the current study is to evaluate success of dental implant in anterior Esthetic zone with immediate implant placement and improving soft tissue contours after tooth extraction.

Materials and methods

Inclusion and Exclusion Criteria

Patient who needed to replace single anterior tooth including central incisors, lateral incisors, canine in anterior maxillary region were included in the study. Tooth that has to be extracted for horizontal & vertical fracture, destructive caries, internal resorption, teeth not restorable by endo dontic treatment, Perio dontally healthy tooth and intact 4 walls following extraction socket were included in the study. The study was conducted in accordance with the Helsinki declaration of 1975 for medical studies, as revised in 2000. The study was approved by the ethical committee of the Himachal Pradesh University. The patient was informed and signed an informed consent explaining about the type of surgical intervention and possible complications. The exclusion criteria was according to conference imme diate dental implant loading on post extraction sockets. The general contraindication of implant surgery are psy chiatric problem, irradiation, Che motherapy, immuno com promised state, active periodontitis, uncontrolled diabetes, pregnancy and lactation, acute infection in implant placement site with presence of fistula, tooth with mobility, positive HIV & Hepatitis B & C, Smoker more than 0 cigarette per day, auto immune disorder like Sjogren syndrome, poly myositis, & individual under bis phos phonates therapy. All the implants placed with the torque lower than 35N/cm were excluded from the study. Patient underwent laboratory investigations before the surgical intervention.

A Case Report

Patient presented with the crown fracture in right central incisor, with Ellis and Davey's class III tooth fracture (figure-1,2). The endo dontic treatment for the tooth was not possible. History of attempted Root canal treatment #11. Therefore, surgical procedure of immediate implant

placement was planned having socket shield technique & flapless implant placement was done at the site of tooth #11 for both patients. The preoperative probing gingival sulcus depth was 0.5mm.

Medical, family, and psycho-social history including relevant genetic information were irrelevant.

Figure 1: Pre-operative anterior view of 11 showing Ellis & Davey's class III fracture. Original

Figure 2: Pre-operative radiograph showing root structure of 11. Original.

Surgical procedure

For the surgical procedure the patient received prophylactic antibiotics. Cap. Amoxicillin 500mg and Tab Metronidazole 400 mg or Tab Erythromycin 500mg once a day for 3 days, if allergic to penicillin, starting 1-day prior surgery and for the following 7 Days. Local Anesthesia was performed using Infiltration 2% lidocaine 1:1,00,000 concentration of epinephrine. Tooth #11 was decoronated in a horizontal fashion without flap elevation with a coarse-grained diamond bur (figure.3) approximately 1mm apical to the gingival margin in accordance with the Hurzeler et al.[8] The root was sectioned vertically using long shank bur (figure.4) and osteotomy drills for implant was used to prepare implant bed. All the root fragments except the buccal shield was removed. The buccal part is then reshaped such that the shield width is about 1.5–2 mm. The buccal shield should not be mobile after the implant bed is prepared which also signifies intact periodontium.

After preparation of implant bed, Adin implant with (3.5D X 10L), inserted in implant bed slightly apical to the preserved root fragment. The implant was placed 3 to 4mm apical to the gingival margin. Primary stability was achieved from macro thread- sign at the apical third of implant with torque achieved minimum (35 Ncm) and no clinical mobility. The gap between the implant and buccal shield was filled with, Freeze- Dried, Irradiated Amnion and Freeze-Dried, Irradiated Demineralized Bone Granules (Tata Memorial Hospital Tissue Bank, Mumbai). After implant placement two simple inter rupted suture placed to close the surgical site # 11 (figure.5,6)

After surgery, the following regimen was administe red

1. Antimicrobial prophylaxis: Cap Amoxicillin 500mg TDS (Ronemox) and Metronidazole 400mg TDS (Flagy) for 7 days.
2. Anti-inflammatory drug: Tab Ibuprofen 400mg and Tab paracetamol 325mg (Combi flam) for 7 days.
3. Inj. Diclofenac sodium, 3ml, 25mg/ml, I.M & Inj Dexamethasone sodium phosphate, 2ml, 4mg/ml, I.V given immediately postoperatively.
4. Tooth cleaning with toothbrush and dentifrice and administration of 0.2% chlorhexidine was performed Bid for 21 days.

Figure 3: Horizontal sectioning of the tooth was done at gingival level #11 in a horizontal fashion. Original

Figure 4: Vertical sectioning of root, was done #11, while buccal fragment of root (Buccal shield) measuring about 1.5- 2mm was left intact along with periodontium. Original

Figure 5: Placement of Adin implant on the implant bed prepared for 11 (3.5D x 13L) in the osteotomy site #11. Original figure

Figure 6: Simple interrupted suture were placed 11. Original

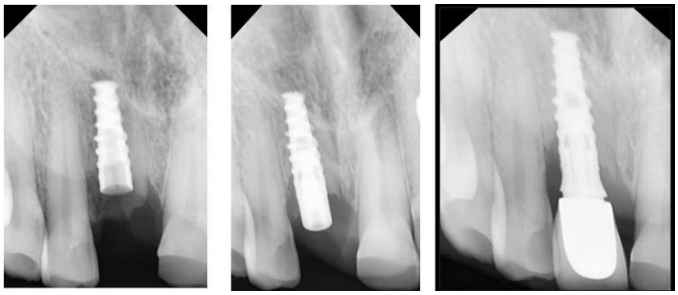

Figure 7: A) Rvg taken after immediate implant place ment 11. B) After 2 month of implant placement. Original

C) Well Osseo integrated implant and buccal shield 11 after 1 year follow up. Original

Figure 8: The gap between the implant and buccal shield was filled with, Freeze- Dried, Irradiated Amnion and Freeze-Dried, Irradiated Demineralized Bone Granules (tata memorial hospital tissue bank, Mumbai). Original

Figure 9: Shows porcelain fused to metal crown (PFM) wrt 11 & Gingival sulcus probing depth was 0.5mm after 1year follow up. Original

Clinical and Radiographic Measurements

The clinical parameter of the patient were evaluated which included pain, evaluated using Visual analogue scale (VAS) after 24 hours, 72 hours, and follow up period of 7 days & 15 days using Visual analogue scale.[9] Implant stability was assessed Implant mobility was assessed immediately, and postoperatively at a follow up period of 3 and 6 months with two rigid instruments which were used to apply a labio-lingual force and a score was given using Modified Miller's Mobility index.[10]

Assessment of healing of gingival margins in the area of implant placement preoperatively, around the implant post operatively at a follow up period of 7 days, 15 days, 1, 3, 6 and 12 month(figure.7,8,9) The overall gingival health was evaluated using a gingival index given by apse et al.[9] Any Radiolucency indicative of peri-implantitis around the implant and bony interface, accessed at 3 month and 6 month of implant place ment.[11,12]

Results

Patient on VAS scale pre-operatively scored (2) & post operatively after 24-hour (scored-4), 3rd day (scored-0) 15th day (scored-0) 1month (scored-0) respectively. Implant stability assessed immediately post-operatively, 3month, 6 month & 1 years (scored-0) respectively, using modified millers' mobility index. Mucosal health assessed after 3-month, 6 month, & 1 year using apse et al mucosal health of peri-implant tissue (scored-0).

Complications

Exposure of the most coronal portion of the socket shield was noted in both the socket shield #11 & #11 two month after surgical procedure which was managed by reduction of the exposed root portion with a diamond bur coupled to a high-speed handpiece. Both healed satisfactory and restored. No migration of Buccal shield, peri-implantitis was noted.

Discussion

Malmgren and co-workers in the 1980s as well as Casey and Lauciello were the pioneers of this ridge pre servation concept.[13,14] The submergence of tooth root portions is not a new concept. The fracture of the crown and root portion have been experienced by the clinicians. The socket-shield case series reported here required preparation of the Bucco facial root portion such that the canal contents with the apex be removed. The purpose of retaining this carefully designed and prepared facial root section is to maintain the root's periodontal attachment to the facial bundle bone that is prone to collapse post-extraction**.** The technique is not without failure, yet the survival rate of using the socket-shield technique is consistent with implants placed into extraction sockets. Though, cost, morbidity, technique sensitivity, failure, infection, and so on. One technique does not supersede another. Patients are not to be treated epidemio logically. The main duty of the clinician is to practice evidence-based treatment, and when appropriate, properly inform the patient that a said treatment may still be under evaluation. It is also the duty of the responsible clinician

and scientist to pioneer ever improving treatment moda lities patients and the profession.

Based on the socket shield technique the various shield classification has been proposed, in the literature. It is proposed that the classification of SST technique will help in understanding the clinical application of this technique depending on the position of the shield in socket.[15]

It is a minimally invasive surgical procedure, aimed at pre serving a part of the root to help in maintaining hard and soft tissue contours. It minimizes the need of soft and hard tissue grafting procedures and hence shortens the overall treatment duration. Limitation of the techni que the clinician has to be trained & there should be no mobility of the shield during the surgery, if shield is mobile procedure cannot be attempted. This technique is not recommended for tooth out of arch and large periapical pathology.

Conclusion

The SST is growing among the clinicians across the globe. The technique is very promising for the pre servation of hard and soft tissues in cases of post-extra ction immediate implant placement in anterior aesthetic zone. Patient was satisfied with the treatment outcome as aesthetics outcome was fulfilled for the patient.

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