

Efficacy of Socket Shield Technique for Immediate Implant Placement in Maxillary Anterior Region: A Case series with Review.

Abstract:

The socket-shield technique is the most crucial treatment modality for esthetic enhancement and ridge preservation technique but it has been less discussed and documented. This case series describes the placement of implants immediately following extraction of a non-restorable which are all fractured and hopeless maxillary teeth and using this technique and functional and esthetic outcomes of the treatment was a successful event. In this review, immediate implant were placed using socket shield protocol to treat ten patients with non-restorable teeth. Dissection was performed along the long axis of the roots in a mesiodistal direction; and atraumatically the buccal fragment of the root was left attached to the bone while the palatal fragment was extracted. Implants were placed after sequential osteotomy drilling. A customized healing abutment was fabricated chair side to create an emergence profile. During the prosthetic phase, patients had follow-up visits after 4 weeks and after 6 months. The definitive prosthesis was cemented using a cement-retained porcelain fused to metal.

Key-words: Socket shield Technique, Immediate Dental Implant Loading, Ridge preservation.

Introduction:

A functional unit of a tooth is composed of periodontal ligament, alveolar bone and cementum. Following an extraction of a tooth this functional unit gets disrupted which causes remodelling of hard and soft tissues which further leads to resorption of alveolar ridge.[1]

Various literature concludes that the resorption is more evident and faster on the buccal cortical plate than palatal/lingual plate because of its lower thickness and compromised vascularity for the loss of periodontal membrane.[2]

According to several studies, an average of 5-7mm of alveolar width is reabsorbed within the first 12 months following tooth extraction.[3]

Immediate placement of implant in the fresh extraction socket is a well-recognized current trend of treatment option with an increase in number of patients. Literature reports that this type of immediate implants causes gingival recession of at least

1mm postoperatively after placement and loading of the implant which generally becomes worse in thin gingival biotypes. This increases the risk of aesthetic failure postoperatively in the maxillary anterior region.[4]

To overcome this complications and negative consequences of immediate implant placement several methods were tried but neither of these methods completely prevented the changes in peri-implant osseous and soft tissues that occurred postoperatively in the maxillary anterior region.[5]

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Socket shield technique or partial root preservation technique has been suggested by many authors in the literature to overcome and reduce this complications postoperatively. In this technique the buccal portion of the root is kept intact with the bone and the implant is placed on the lingual aspect of that buccal fragment in order to maintain vascularity of the tissues in contact with the buccal fragment and prevent the alveolar ridge from collapsing which provides a more promising result postoperatively. The objective of this study was to address the efficacy of the socket shield technique in maxillary anterior region.

Case Series Preoperative Phase:

In this retrospective review, we have done a case series of immediate implant placement with socket shield technique on 10 patients. The Patients reported to us mainly aged between 25 to 50 years with fractured and non-restorable tooth in the maxillary anterior region.

All the patients were non-smokers and maintain moderate oral hygiene status and most of the patient had high aesthetic demand. Figures 1 & 2 display the preoperative presentation for some cases before tooth extraction. Clinical Examinations revealed, most of the patients had caries free adjacent teeth and it has good periodontal condition. All the treatment option were thoroughly explained to the patient with each of the pros and cons. Treatment options included that of removable partial denture, conventional three unit bridge, resin bonded bridge and implant supported prosthetic restoration. Pre-operative OPG with Ball Bearings or IOPAR were taken for all the patients. All the patient opted for the implant supported prosthetic treatment for their advantages and high aesthetic benefit. Signed Consent was taken from each of the patients.

Immediate Implant Placement Using Socket Shield Technique:

Partial extraction therapy (Socket shield technique) followed by immediate placement of implant was done for all the patients with the aim of best preservation of soft and hard tissue in the region of extraction and maintenance of the gingival biotype in the region. Surgical technique followed was similar in all 10 cases.

Local anesthesia was administered to the fractured fragment, which was further hemisected mesiodistally into shorter buccal fragments and longer lingual fragments (FIGS 1 & 2). An illustration of the buccal bone and the remaining root section of the tooth is shown in (FIG 3).

Dissection was carried out using a long shank root section straight bur connected to a high speed handpiece (Komet Dental, Germany) mesiodistally to the long axis of the root. The palatal fragment was removed atraumatically from

its socket, and the buccal fragment was attached to the buccal bone. By using a long shank round bur (Komet Dental, Germany), the buccal fragment was brought down to bone level so the root fragment's crest on the gingival part descends 2 mm below the gingiva's tip. Afterwards, the extraction socket was thoroughly curetted and a copious irrigation of saline was performed to ensure that no infectious remains remained. A sharp and straight probe was used to determine the stability of the buccal fragment. The diameters of the implants used ranged from 3 to 4.2mm, while their lengths ranged from 11 to 13mm following sequential drilling for osteotomy implants (Adin Touareg-S). A radiograph was taken after each implant was placed. A primary stability was gained from implants inserted from the apex down to the tooth surface, and no bone graft material was used in any of the ten cases. Custom healing abutments are prepared at the chairside to support a natural coronal profile of the tooth. A post-surgical periapical radiograph was taken to confirm the seating of the healing abutment. All the 10 Patients were prescribed a preoperative antibiotic of Amoxyclav 625mg thrice and 400 mg dose of ibuprofen should be taken twice a day the day before the surgery. Patients were advised to continue both medications for 3 days postoperatively. The follow-up visits for patients were after 1 Month. Healing went smoothly, and the esthetic result was satisfactory.

Prosthetic Phase

The healing abutment was removed after 6 months and then the implant site was thoroughly rinsed with chlorhexidine solution. The impression abutment was placed and secured tightly. Closed tray impression were taken for all the 10 cases with single step vinyl polysiloxane light-putty impression technique. The impression posts were injected with light-body material, while the tray was loaded with putty impression material. Light-body impression material was injected around impression posts while putty impression material was loaded in the tray. Patients' trays were removed and checked for details. To create the impressions, lab analogues of matched sizes were used; impressions were disinfected and sent to the lab to be poured into type IV gypsum. After the porcelain-fused-to-metal crowns were fabricated, they were placed in the patient's mouth and checked for fit and proximal contact. First, centric occlusion was checked, then eccentric occlusion using articulating paper (40 micron thickness) and Shim stock foil (8 micron thickness). Occlusal adjustments were done using finishing burs. After all the check is correct the crown were cemented with definitive cement. Post cementation instruction and oral hygiene maintenance instructions were thoroughly given.

Discussion:

According to Hurzeler *et al.* an immediate implant placement followed by the retention of the buccal aspect of the root allowed osseointegration without inflammatory or resorption

responses.[2]

Socket shield is a cost effective but still a technique sensitive procedure which prevents the resorption of bundle bone postoperatively. As a guiding structure the, the buccal shield protects the buccal bundle bone during the placement of the implant in the optimal position if there is a slight palatinal shift. There is a potential for socket-shield technique to improve aesthetic outcomes by reducing the necessity for an invasive bone graft around the implant.[6][7]

Mitsias *et al.* showed the histological evidence with healthy periodontal ligament with increase in contact between the bone and implant (76.2%) and without any buccal bone resorption after 5 years of implant placement with socket shield technique.[8]

Gluckman *et al.* concluded that implants placed with socket shield technique in the maxillary region has a survival rate of 96.1% following restoration in long term period of about 4 years.[9]

In 2019, a systematic review by Mourya *et al.* concluded that socket shield technique is showing promising results, root thickness of 0.5-1.5mm showed successful results with reduced bone resorption and improved aesthetic outcomes. On a long-term basis, grafts between implant and shield have little effect.[10]

By placing the implant directly on the natural tooth fragment (shield), physiologic preservation of the labial and buccal bone structures can be secured and lamellar bone resorption can be prevented.

Socket shield technique is a cost effective option, a single surgical procedure is performed, healthy perimplant tissues are preserved, buccal shield act as a guiding structure without formation of fibrous tissue around the implant, offers a feasible option for patients with previous endodontic pathology and vertically fractured teeth for implant treatment. This technique is associated with very few complications but it has got some disadvantages like it is very technique sensitive and resorption may occur due to long term periodontal or endodontic infection or inflammation of the retained root.[11]

In our experience, the immediate implant placement with socket shield technique is a minimally invasive and cost effective technique which helps in alveolar ridge preservation and gingival recession postoperatively.

Patient consent form was signed and taken from each of the patients.

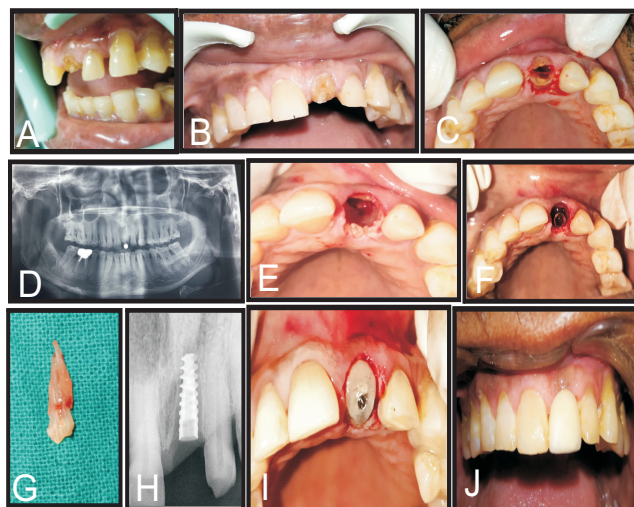


Fig 1: (Case 1)
A,b - Lateral View(pre Op), Frontal View (pre Op). C- Preoperative Opg. D- Hemisection Of Buccal And Lingual Root. E- Longer Lingual Root Extracted. F- Shield Was Reduced 2mm Below Gingival Tip. G- Implant Was Placed After Osteotome. H- Radiographic Verification Of The Implant. I- Customised Healing Abutment Placed After 4 Weeks. J- Definitive Prosthesis Intraorally.

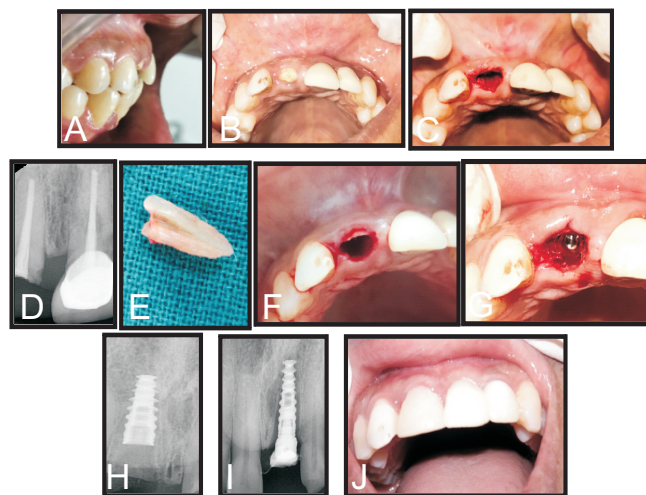


Fig 2: (case 2)
A,b - Lateral View(pre Op), Frontal View (pre Op). C- Preoperative Opg. D- Hemisection Of Buccal And Lingual Root. E- Longer Lingual Root Extracted. F- Shield Was Reduced 2mm Below Gingival Tip. G- Implant Was Placed After Osteotome. H- Radiographic Verification Of The Implant. I- Customised Healing Abutment And Radiographic Verification Of The Implant After 4 Wks. J- Definitive Prosthesis Intraorally.

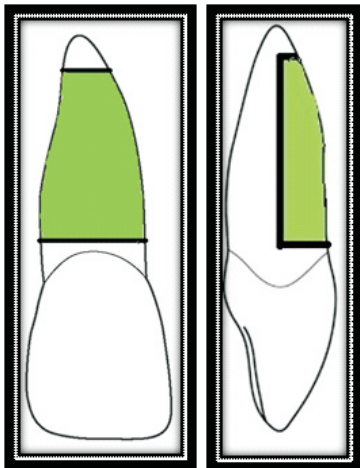


Fig 3 Socket Shield Schematic, Showing Remaining Root Section In Facial And Transverse View.

Conclusion:

Restoring implants following tooth loss and ridge collapse is a continuing challenge. Buccal cortical plates are thin in the maxillary anterior region and therefore prone to fracture. A secondary grafting procedure is necessary as a result of this unfavourable environment for implant placement. The socket shield technique may be a potential alternative to surgical augmentation for ridge defects.

Consent:

We obtained written informed consent from patients for publication of this article and accompanying images.

Limitations of Our Study:

Less number sample size is the limitation of this study.

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