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Case Report

Preserving bone plate by socket shield technique: A Case Report

Hemant Gadge[1], Rahul Chhajlani[2] , Loveleen Gupta[3], Sumeet Jain[4], Nikita Rajpoot[5]

[1,4] Professor, Dept of prosthodontics, Sri Aurobindo college of dentistry, Sri Aurobindo university, Indore
[2] Professor ,Dept. of oral & maxillofacial surgery, Modern Dental college and Research Centre, Indore
[3] MDS prosthodontist ,private practitioner
[5] MDS prosthodontist, Dept of prosthodontics, Sri Aurobindo college of dentistry, Sri Aurobindo university, Indore

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ABSTRACT

Dental implants have became a standard treatment for replacing missing teeth. After tooth extraction and placement of implant, the resorption of the bundle bone can pose a significant complication with often negative cosmetic impacts. Studies have shown that if the dental root remains in the alveolar process, bundle bone resorption is minimal. This technique involves maintaining the facial segment of a root that is intended to be extracted and immediately replaced with an implant by decoronating the tooth, sectioning the root. The implant is then placed and Once healing is complete and osseointegration occurs, a prosthetic crown is placed. This paper outlines a comprehensive step-by-step procedure for performing the Socket Shield Technique in patients, focusing on the preservation of the buccal root plate and placing crown.

Introduction

The field of dental implantology has witnessed remarkable advancements, and the socket shield technique stands as a promising approach to preserve the integrity of the natural dentition during implant placement. Socket shield implantation involves retaining a portion of the root structure within the extraction socket, resulting in a protective shield effect for the surrounding periodontal tissues. This novel technique aims to reduce the risk of buccal bone resorption and gingival recession while increase the implant stability and esthetic outcomes.

The principle of socket-shield technique (SST) is as follows:

1. Preparation of the root of a tooth indicated for extraction in such a manner that the buccal/facial root section remains in situ with its physiologic relation to the buccal plate intact.[1]

2. The tooth root section's periodontal attachment apparatus (periodontal ligament, attachment fibers, vascularization, root cementum, bundle bone, and alveolar bone) remain vital and undamaged to prevent the expected post-extraction socket remodelling and to

* Corresponding author: Dr. Hemant Gadge, Professor, Dept of prosthodontics, Sri Aurobindo college of dentistry, Indore.
Email id- drhemantsaims@gmail.com Contact No.- 8668863709

support the buccal/facial tissues.

3. The prepared tooth root section acts as a socket shield (SS) and prevents the recession of tissues bucco - facial to an immediately placed implant.[1]

"Socket shield" was introduced in 2010 by Hurzeler and his colleagues. This technique is a version of partial extraction therapy that involves extracting the whole root except the facial segment with its healthy periodontal ligament that remains attached to the facial bundle bone, and immediately the implant is placed palatal to the facial shield [2]

Furthermore, this article will provide a classification, up-to-date review of existing literature on socket shield implantation, and various complications associated with this technique. Through the integration of our case report with the broader body of evidence, we aimed to offer valuable insights to dental practitioners seeking to incorporate socket shield implantation into their clinical practice.

Classification

It is classified in six types.

Type I: Buccal shield

- When the shield lies only in buccal part of the socket, (between proximal line angles of tooth). It is indicated in single edentulous site with both mesial and distal tooth present.

Type II: Full C buccal shield

- When the shield lies in buccal part and the interproximal part on both sides of the socket. This shield design is recommended - Existing implant on either side of the proposed site.

Type III: Half C buccal shield

- When the shield lies in buccal part and one of the interproximal part. This design is recommended when there is tooth on one side and implant or a missing tooth on the other side

Type IV: Interproximal shield

- When shield lies only in mesial or distal part of the socket. This design is indicated when there is buccal bone resorption requiring graft, and there is an adjacent side with missing tooth or an implant. Extraction of the complete tooth in such cases may lead to loss of the valuable interproximal bone

Type V: Lingual-palatal shield

- When the shield lies on the lingual or palatal side of the socket. This type of shield design has few indications but could be considered for maxillary molars

Type VI: Multiple buccal shields

- When it has two or more shield in the socket. It is indicated in cases with a vertical root fracture. There is evidence to show bone deposition in between fractured roots which could assist in holding the two fragments in place.

Case Report

This report describes the meticulous treatment planning and surgical procedure but also delivers the long-term follow-up and radiographic assessments to evaluate the efficacy and sustainability of this innovative implant protocol. We present a detailed account of a clinical case where the socket shield technique was performed to

replace a missing tooth in a patient with a compromised buccal bone wall.

Clinical evaluation was done and thorough medical and dental history was recorded. Intra oral periapical radiograph, CBCT was done to assess the tooth structure and surrounding bone for viability and feasibility of the socket shield technique.

Procedure:

Topical anaesthesia was applied and then local anesthesia (lignocaine hydrochloride and adrenaline injection IP) was given.

Incision:

Crestal incision was made and extended on buccal side to expose the surgical site for adequate vision.

Flap Reflection:

A full-thickness mucoperiosteal flap was gently reflected buccally and palatally to expose the surgical site. adequate flap thickness was maintained to ensure proper blood supply for flap healing and bone healing. (Fig 1)

Fig - 1

Osteotomy and socket shield preparation:

A conservative osteotomy using a long shank[2] bur was initiated through a central channel in the remaining root structure. Carefully root sectioning was done longitudinally. By ensuring its preservation, a minimal 1-2 mm thickness of the buccal root plate was maintained. After root section and preserving the sectioned root, osteotomy was done up to 3.75 * 11mm width and length for which implant was planned. (Fig 2)

Fig 2

Implant Placement and graft:

An implant size of 4.2 *11.5 was placed slight palatally, achieving torque of 35N/cm^2. (Fig 3,4)

The gap between the implant and buccal shield was filled with (osseo - graft) [3] bone graft material and the graft was covered by resorbable GTR membrane to promote guided tissue regeneration.(Figure5)

Fig 3

Fig 4

Fig 5

The flap was approximated by interrupted sutures. Proper tension for flap closure and stabilization was ensured. (Fig 6)

Fig 6

Radiographic and Clinical Evaluation:

Radiographic and clinical evaluations was done immediately after implant placement. (figure 7)

Fig 7

Postoperative Care and Follow-up:

Postoperative care instructions was given, including pain management, oral hygiene practices. The follow-up appointments were scheduled to monitor healing, bone remodeling, and the implant's integration. Patient was recalled after 10 days for suture removal.

Prosthetic Rehabilitation:

Once adequate healing and osseointegration were confirmed, proceeded with prosthetic restoration using appropriate components and restorative materials. After 4 months healing period following the socket shield procedure, started the prosthetic phase. An open tray impression was made to accurately capture the implant position and surrounding soft tissues. The jig trial was done with an impression coping to verify the implant's position, occlusion, and emergence profile. (Fig 8,9,10)

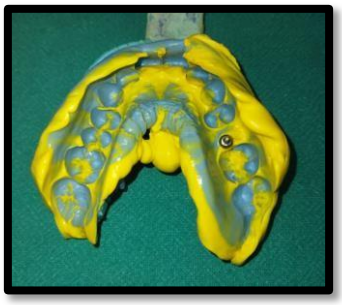

Fig 8

Fig 9

Fig 10

After the jig trial, the bisque trial was done. (Fig 11)

Fig 11

After placement of prosthesis, high points were checked and occlusal adjustment were done. Post-operative RVG was done after placement of crown. The follow-up was planned and was informed to patient.

Conclusion

It may be concluded that retaining the buccal aspect of the root in conjunction with immediate implant placement is a viable technique to achieve osseointegration without any inflammatory or resorptive response[6]. In this case 1 week, 1 month and 6 months follow up has been done for clinical and radiographic evaluation. Proper case selection, meticulous technique execution, and close postoperative monitoring contribute to the success of this innovative approach in preserving both function and esthetics.

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