



ORIGINAL RESEARCH PAPER

Prosthodontics

SOCKET-SHIELD TECHNIQUE-A REVIEW

KEY WORDS: Alveolar bone preservation, extraction socket, immediate implant placement, socket shield.

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ABSTRACT

Atraumatic extraction, socket preservation technique, and immediate implant placement decrease the alveolar bone resorption by maintaining the postextraction socket. The buccal bone loss that occurs postextraction leads to vertical and horizontal bone loss. It requires complex hard and soft-tissue reconstruction to achieve esthetically pleasing results in such cases, hence socket shield technique is followed. This article describes the socket-shield technique.

INTRODUCTION

Extraction of tooth changes the dimension of the alveolar ridge, which has a direct effect on future implant prosthesis and its emergence profile, especially in the anterior region. Trauma during extraction and loss of periodontal ligament were the lead cause of alteration; therefore, many techniques were introduced to prevent the resorption of alveolar bone. Atraumatic extraction, socket preservation, grafting, and immediate implant placement prevent alveolar resorption by preventing the collapse of cortical plates and maintaining the dimension. Socket-shield technique shows the significant result in maintaining the postextraction alveolar bone.

Araújo and Lindhe suggested that following tooth extraction, the blood vessels in periodontium to the thin bone walls are severed, thereby causing facial bone plate resorption. Thus, it can be assumed that retaining a root may alter the occurrence of facial bone resorption. Many studies showed that the retention of the decoronated root, vital or endodontically treated as root submerge technique, can preserve the alveolar bone. Recent studies also proved that the placement of the implant in contact with retained root surface preserved the buccal bone and led to good emergence profile.

Hürzeler et al. were the first to demonstrate the socket-shield technique in a study on one beagle dog. Hemisection of mandibular premolar was performed and a buccal fragment of distal root was retained 1-mm coronal to the buccal bone plate. The immediate implant placement was done lingually to the retained root piece with or without contact with root fragment. No complications were seen, and the histologic study shows that the newly formed cementum was seen in the area between the titanium implant and retained root fragment. Modification of original technique was done by many researchers by preserving the palatal bone and proximal bone. The promising result of these study shows socket-shield technique as a feasible alternative treatment option for thin buccal plate region area and periodontally healthy teeth.

Socket-shield technique is also known as partial extraction therapy, root membrane technique and partial root retention.

According to Salama et al, height of interdental papilla has limitations in vertical soft tissues height in addition to the proximal limitations. The vertical soft tissues height is different in different restorative scenarios. In addition to this, Tarnow et al. suggested that there should be minimum of 3 mm inter- implant distance to have an ideal interdental papilla.

Classification

It is proposed that the classification of socket-shield technique will help in understanding the clinical application

depending on the position of the shield in socket. This classification is required so as to help in understanding the preparation design and role of shield, in treatment planning various clinical scenarios.

Type I: Buccal shield

A case can be classified as 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

A case can be classified as 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 for the following clinical scenarios:

- Existing implant on either side of the proposed site
- Missing tooth on either side without an implant
- Having implant on one side and missing tooth on the other side.

Type III: Half C buccal shield

A case can be classified as 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

A case can be classified as 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

A case can be classified as 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.

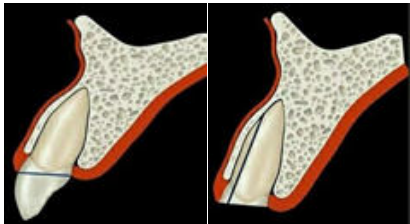
Type VI: Multiple buccal shields

A case can be classified as 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.

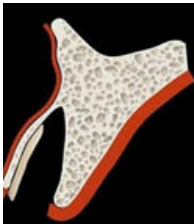
Procedure

The socket shield technique used for immediate implant placement

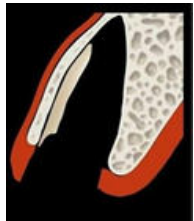
- Step 1: Cut the crown horizontally at the gingival level



- Step 2: Bisect the root vertically in such a manner that palatal half is removed along with the apex.



The length of the shield should be kept at two-third of the root length. This step requires lot of practice, patience, and time. The buccal part is then reshaped such that the shield width is about 1.5–2 mm. The shield should be trimmed to the bone level. A bevel or S-shaped profile on the inner side of the shield is given to accommodate the restorative components.



- Step 3: Placement of implant in correct three-dimensional (3D) position.

The optimum space between shield and implant is 1.5 mm or more. A bone graft is suggested if the gap is more than 3 mm. A provisional crown or a customized healing abutment given immediately after the implant placement will help in maintaining the soft-tissue contours. The choice of prosthesis for the final restoration is a screw-retained crown or a cement-retained crown with restorative margin that can be easily accessed for cement clean up.



Advantages of socket-shield technique

It is a minimally invasive surgical procedure, aimed at preserving 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. Even in cases with adjacent implants, the interdental papilla can be preserved by preparing interdental socket shield. This is a highly promising technique in terms of maintaining esthetics and provides a solution for esthetically critical cases such as high lip line and maxillary anteriors. This technique not only preserves but also helps to maintain the hard and soft tissues, in future, as long as the shield is intact.

Limitations of the socket-shield technique

The clinician needs to be specially trained and need to have a high degree of clinical skills. The procedure requires a little more time and patience to avoid mobility in the shield. If the

shield becomes mobile during surgery, it is removed, and the conventional immediate implant placement or the grafting procedure is to be done. The case selection is very important for the success of the procedure. The socket shield technique is not recommended in mobile teeth, teeth which are out of the arch and teeth with large periapical lesions. The intactness of the shield plays an important role in the success of the treatment.

CONCLUSION

Socket-shield technique shows the promising result in the preservation of postextraction socket and holds significant value in implant placement and also to achieve best possible esthetics.

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