Review Article

# SOCKET SHIELD TECHNIQUE- A SMARTER WAY TO ACHIEVE ESTHETICS: A REVIEW

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**Abstract**

After the tooth has been extracted, the alveolar bone undergoes a remodelling process, which leads to the horizontal and the vertical bone loss. The dental rehabilitation is complicated by these resorption processes, mainly in connection with dental implants .The "socket shield technique" has established the potential which helps in preventing buccal tissue from resorption. It is assumed that retaining a root fragment attached to the buccal bone plate in this technique can avoid tissue alteration after tooth extraction. And also helps us to suggest that by leaving a buccal root segment in place, the resorption of the buccal bundle bone can be avoided. By doing so, the biological integrity of the buccal periodontium remains intact. Socket shield is the technique where the retention of the inflammation-free root fragment is used to prevent the buccal bone resorption; and it is commonly used in immediate implantation for better esthetics. The other connection of this method is with the immediate implant placement. In order to preserve the original dimension of the bone various methods of guided bone regeneration have been described. But all these procedures are cost-intensive and technique-sensitive. However, in comparison to this, the socket shield technique is cost-effective and less technique sensitive. It helps avoid the resorption of the bundle bone by leaving a buccal root segment in place.

**Keywords:** Socket Shield; Bone Trephine; Buccal Tooth Fragment; Immediate Implant.

## Introduction

Resorption of the alveolar ridge following tooth extraction continues to be a reason of major concern for practitioners. Various researches prove that buccal part of the ridge is more compromised as it is mainly supplied by the periodontal membrane of the tooth. Hence, after extraction, the buccal cortical plate starts resorbing at a faster rate than the palatal/lingual plate leading to its partial or total resorption. This process causes dimensional changes in the ridge and the aesthetic region is most affected by this process.[1]

Healing of extraction sockets is categorized by Bone formation within the socket and a simultaneous loss of the alveolar ridge width and height outwardly. The restoration-oriented three-dimensional positioning of the implant is compromised by the alteration of the ridge contour. An optimal support and stability of surrounding hard and soft tissues is required.[2] The important factors in consideration to the esthetic region and also for successful pink esthetic outcomes are the height and thickness of facial and interproximal bone walls. These are constituted by the color, shape, and character of the marginal peri-implant mucosa and the presence of interdental papilla. Diverse techniques such as immediate implant placement and ridge preservation procedure have been projected to maintain the ridge dimension to a certain amount. However, even after applying these methods to extraction sockets we cannot totally preserve the coronal part of facial bone walls which were comprised almost entirely of bundle bone.[2]

The main anticipation of patients regarding implants in the aesthetic zone apart from a low cost-benefit ratio and time efficiency is the aesthetic outcome, especially in the long term. Not only on the white aesthetics of the prosthetic restoration, but there is a strong focus on the red aesthetics as well. These red aesthetics are made up by the color, shape, and character of the marginal gingiva. Subsequent to immediate implant placement in the aesthetic zone, these gingival tissues are subjected to certain volumetric changes as they undergo a remodelling process. Resorption mainly of the buccal tissues in horizontal dimension is a major problem which a clinician will encounter while using this technique. There is hardly any volumetric loss. Small differences in the red–white aesthetics can be visually perceived and therefore it becomes necessary to have a complete long-term tissue preservation. The obviousness of the hard and soft tissue appearance after reconstructive surgical interventions is limited.[3] This is mainly because the horizontal and vertical bone augmentations are frequently accompanied by successive tissue shrinkage.

## Clinical Concept

Submucosal root retention can almost reduce bone resorption with the emergence of root submergence technique (RST).[4] Based on this perception, the preservation and stabilization of the coronal and buccal bundle bone, can be done. This is made possible by the retention of the periodontal membrane by retaining a coronal tooth fragment (so-called “socket shield”), along with adequate amount of blood supply (Figure:1). A complication-free healing can only be achieved by paying special consideration to wound stabilization. The stabilization of the clot with a criss-cross suture is optimized by placing a collagen cone with integrated collagen membrane (Parasorb Sombrero®, Resorba, Nurnberg, Germany) into the tooth socket. Depending on the individual treatment plan of a patient, there are two options one is to either wait for two to six months to allow for the formation of new bone, followed by implantation, or to leave the site without subsequent second procedure.[1]

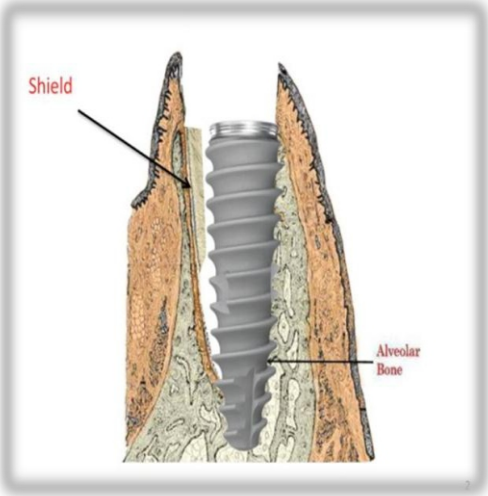


**Figure 1:** *Socket Shield*

**Indications**

1. This technique is mainly used to prevent buccal bone resorption.
2. It is used in immediate implantation for better esthetics.
3. It is used as a part of the (delayed) late implantation approach.
4. For the optimisation of pontic support in crown-bridge reconstructions.
5. It is also used improve the prosthesis base for removable dentures.

**Contraindications**

1. General contraindication for oral surgical procedures.
2. Local contraindications of the treatment include an absence of buccal lamella, which develops for instance after vertical root fractures or periodontitis.[1]
3. Inflamed /infected root.

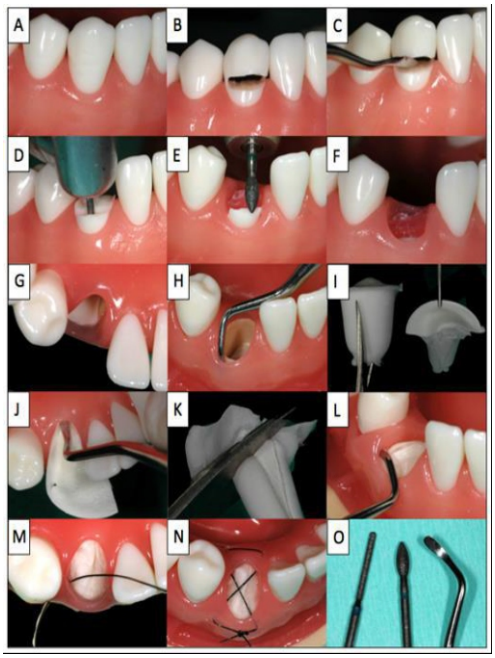


**Figure 2:** *Step-by-step design of the planned procedure using a model illustrating the extraction and treatment of tooth 43*

**Procedure**

Step-by-step design of the planned procedure using a model illustrating the extraction and treatment of tooth 43(A)

Firstly, the hopeless tooth is split supragingivally (B) and then the crown fragment is cautiously dislocated and removed using a suitable instrument (C). Then, the root is separated vertically in a ratio between 1:3 and 2:3 (D). The smaller, buccal root fragment is retained and the larger lingual root fragment is extracted. It is done in such a way that it leaves behind the bone and soft tissue to the greatest possible amount. The bone is reduced to the height of the buccal socket shield (E,F) and the overlying gingiva present over the retained buccal root fragment is tunnelled by 2 mm (H) in order to allow the insertion of the collagen cone (I,L) into the tooth socket and residency of the membrane part of the collagen cone under the buccal mucosa. Finally, the collagen cone is protected with a criss-cross suture (M,N). For this interference, only the following instruments are required: gingival scissors, periotome, Black's excavator, needle holder and surgical forceps as well as diamond drill (O). After the procedure has been carried out, the patient is asked to rinse with 0.2% chlorhexidine mouthwash two to three times daily for one minute over a period of at least ten days. Mechanical oral hygiene is avoided during this time in the affected area and only restarted after the follow-up examination and suture removal is done i.e, after ten days. Anti-inflammatory drugs (e.g., Mefenacid 500mg tid) as needed are prescribed. Typically, no antibiotics are prescribed (exemption: systemic diseases, shielding *etc.*).[1]

**Discussion**

Extraction of tooth is followed by the alveolar ridge atrophy after which has a negative impact on the successive prosthetic or implant restoration along with the aesthetic outcome.[5] A number of scientific studies on the preservation of the socket have been published in the recent years. All of these studies have been true to the motto "when we take something out, we should put something back in",[6] this is in compliance with those cases where freshly extracted teeth sockets were filled and enclosed with various bone substitutes and membranes.

The prevention of alveolar ridge resorption should be done with only minimal material requirements, should be cost-effective and minimally invasive. However, all of these requirements are not met with any of these available material. Moreover, even by using complicated techniques for ridge preservation the goal of complete preservation of the alveolar ridge after tooth extraction has not been achieved.[7] A substitute technique for alveolar ridge preservation is to retain root fragments *in situ* covered by the mucosa.[8] In cases of de-crowned root fragments it is seen that not only adequate bone volume is preserved but also the vertical bone growth is seen in a coronal direction.[8] Hence, it is seen that the complete alveolar ridge preservation is achieved mainly by retention of root fragments . It is observed that the lingual portions of the bundle bone are thicker and therefore less prone to atrophy. However, all the delicate anatomical structures, such as blood vessels and nerves, are found especially in the lateral tooth area of the lower jaw, thereby making the general lingual socket shield technique too challenging and risky. The largest possible

osseous implant bed was formed by reducing the buccal socket shield to a thickness of less than 1 mm and its corono-apical extension to one third of the former root length. Whereas, the dentin-implant interface was minimized,[9] as the long-term behaviour of this has not been studied sufficiently.

The partial extraction which is carried out after the socket shield has been preserved is technique-sensitive and it poses a risk of dislodgment of the buccal root fragment, or even the buccal lamellar bone. In order to prevent the perforation of the buccal mucosa during the healing period the root fragment should be condensed along its vertical axis to the level of the height of the alveolar ridge. Even after this preventive measure if the root fragment become exposed, then the height reduction and tissue freshening can be done during follow-up visits. The buccal shield should be thinned to a height of less than 1 mm in its horizontal dimension to ensure that the previous tooth socket is filled with a maximum amount of bone and only minimal dentin when the socket is reopened. An attempt should be made to achieve an implant position where all boundaries are formed by bone. According to current and established principles of osseointegration,[10] it is seen that only direct bone-implant contact without fibrous tissue or other dental materials is acknowledged as a successful implant interface. Following this criteria complete osseointegration of the implant will be achieved and on the other hand the formation of a fibrous tissue sheath around the implant,[11] can be avoided.

It is beyond doubt that the buccal shield protects the veracity of the buccal bundle bone. It also serves as a guide when placing the implant in the optimum position with a slight palatinal shift during the re-entry procedure. Future controlled studies should focus on this treatment modality by eliminating the use of any additional materials like a collagen sponge, so that the technical efforts are lessened. It should also be ascertained, that the root fragments should be removed or persisted, as it may lead to long-term remodeling or resorption effects.

**Conclusion**

Preferably, the method used for the prevention of alveolar ridge resorption should be cost-effective and least invasive. In order to retain the original measurement of the bone following extraction a number of methods of guided bone regeneration have been proposed. All of these procedures are cost-intensive as well as technique-sensitive. In contrast,to this the presented socket shield technique prevents the resorption of the bundle bone as it leaves a buccal root segment (socket shield) in it's place. It is cost-effective but still technique-sensitive.

**References**


1. Markus Glocker, Thomas Attin and Patrick R. Schmidlin. Ridge preservation with modified "Socket Shield" Technique- A methodological Case Series. *Dent. J.* 2014, *2*, 11-21.
2. Chih-Long Chen, Yu-Hwa Pan. Socket shield technique for ridge preservation: A case report. *Journal of Prosthodontics and Implantology.* Volume 2, Number 2, 2013.
4. Bäumer, Daniel, Otto Zuhr, Stephan Rebele, David Schneider, Peter Schupbach, and Markus Hürzeler. "The Socket-Shield Technique: First Histological, Clinical, and Volumetrical Observations after Separation of the Buccal Tooth Segment - A Pilot Study: The Socket-Shield Technique", *Clinical Implant Dentistry and Related Research*, 2013.
5. Salama, M.; Ishikawa, T.; Salama, H.; Funato, A.; Garber, D. Advantages of the root submergence technique for pontic site development in esthetic implant therapy. *Int J. Periodontics Restor. Dent.* 2007, 27, 521–527.
6. Schmildlin, P.R.; Jung R.E.; Schug J. Prevention of alveolar ridge resorption after tooth extraction: A review. *Schweiz. Monatsschr. Zahnmed.* 2004,114, 328-336.
7. Ashman, A. Ridge preservation-the future practice of dentistry. *Dent. Econ.* 1995, *85*, 82–83.
8. Jung, R.E.; Philipp, A.; Annen, B.M.; Signorelli, L.; Thoma, D.S.; Hämmerle, Ch.; Attin, T.; Schmidlin, P. Radiographic evaluation of different techniques for ridge preservation after tooth extraction: A randomized controlled clinical trial. *J. Periodontol.* 2013, *40*, 90–98.
9. Malmgren, B.; Cvek, M.; Lundberg, M.; Frykholm, A. Surgical treatment of ankylosed and infrapositioned reimplanted incisors in adolescents. *Scand. J. Dent. Res.* 1984, *92*, 391–399.
10. Davarpanah, M.; Szmukler-Moncler, S.; Davarapanah, K.; Rajzbaum, P.; de Corbière, S.; Capelle-Quadah, N.; Demurashvili, G. Unconventional transradicular implant placement to avoid invasive surgeries: Toward a potential paradigm shift. *Rev. Stomatol. Chir. Maxillofac.* 2012, *113*, 335–349.
11. Branemark, P.I. Osseointegration and its experimental studies. *J. Prosthet. Dent.* 1983, *50*, 399–410.
12. Hürzeler, M.B.; Zuhr, O.; Schupbach, P.; Rebele, S.F.; Emmanouilidis, N.; Fickl, S. The socket-shield technique: A proof-of-priciple report. *J. Periodontol.* 2010, *37*, 855–862.



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