

## Socket shield to preserve the buccal cortical plate for an esthetic outcome

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### Abstract

The buccal/labial alveolar bone is primarily vascularised by the periodontal membrane of the tooth. After extraction, the buccal/labial cortical plate starts resorbing at a faster rate than the palatal/lingual plate leading to its partial or total resorption. In order to overcome the negative consequences of tooth extraction various methods have been described in the literature such as hard and soft tissue augmentation following extraction with or without immediate implant placement. Resorption of the buccal/labial bundle bone can be avoided by leaving a buccal/labial root segment in place so that the biological integrity of the buccal/labial periodontium remains untouched. Immediate implant placement is a well-recognized and successful treatment option following tooth removal. Socket shield technique seems to be a good alternative for immediate implant placement in aesthetically challenging cases that aimed first to preserve the buccal/labial plate of bone and prevent post extraction resorption with leaving the buccal/labial aspect of the root intact.

**Keywords:** Extraction socket, Alveolar bone preservation, Immediate implant placement, Socket shield.

### Introduction

The loss of a tooth triggers a remodeling reaction as part of the healing process, involving various degrees of alveolar bone resorption, especially affecting the buccal lamella. The bundle bone is primarily vascularized by the periodontal membrane of the tooth. Therefore, this part of the alveolar bone is compromised by the extraction, to such an extent that the buccal lamella is insufficiently nourished, leading to its total or partial resorption.<sup>1,2</sup> A substantial 0.5% to 1% of the alveolar ridge volume is lost as the result of it.<sup>3</sup>

The socket-shield (SS) technique provides a promising treatment adjunct to better manage these risks and preserve the post-extraction tissues in aesthetically challenging cases. This technique was first described in 2010 which aims at leaving the buccal fragment of root intact and placing implant on the lingual aspect of that fragment so that the tissues which remain in contact with the buccal fragment retain their vitality and prevent the ridge from collapsing thus improving the aesthetics especially during implant in the anterior maxillary region. The tooth root fragment's periodontal attachment apparatus (periodontal ligament, attachment fibers, vascularization, root cementum, bundle bone, alveolar bone) is intended to remain vital and undamaged so as to prevent the expected post-extraction socket remodeling and to support the buccal tissues.

In this case report an immediate implant placement is done using socket shield technique in the maxillary central incisor region and cement retained prosthesis was given after the healing period of six months.

### Case Report

A 30 year old male patient presented for definitive treatment of a restored left maxillary central incisor (Fig. 1). The tooth had been root canal treated and had a crown but after several years the crown fractured along with the coronal tooth structure. Treatment options included root submergence of tooth 21 with a fixed partial denture (FPD)

or removable prosthesis, and implant therapy with a crown restoration. In consultation with the patient considering costs, duration of treatment and prognosis, implant therapy was opted for. To offset the expected post-extraction ridge resorption the SS technique was planned for simultaneous to immediate placement of the implant.

Preoperative orthopantomogram (OPG) indicated sufficient width palatal to the planned facial root section to accommodate a 3.8 x 14 mm implant with the option for cement retention (Fig. 2). The root was then sectioned in a mesiodistal direction along its long axis as far apical as possible using a long tapered fissure diamond bur coupled to a hydrated high-speed handpiece (Fig. 3). The root is divided into two halves, facial and palatal with the intention of leaving the facial half intact (Fig. 4). The palatal half was conservatively removed with the help of luxators and forceps (Fig. 5). The tooth socket's palatal wall and apex were then curetted to remove any tissue or infective remnants and the root section was checked for immobility with a sharp probe. Intact buccal contour can be appreciated (Fig. 6). An osteotomy was done and a 3.8 x 14 mm CSM implant was then placed palatal to the socket shield (Fig. 7). Implant was placed 2mm below the facial crest and the gap was grafted with hydroxyapatite bone graft (Sybograf) (Fig. 8). Then sutures were placed and soft tissue conditioner relined removable denture prosthesis was given to the patient.

After six months of healing period, the patient came for definitive prosthesis. The intraoral periapical radiograph showed well Osseo integrated implant in the maxillary central incisor region (Fig. 9). The cover screw was removed and healing abutment was placed (Fig. 10). Open tray impression was made with heavy body addition silicon impression material and CSM impression analog was placed over it (Fig. 11). The cast was poured in die stone. A 1mm, end line Alpha Bio-Care abutment was placed and wax pattern was fabricated. Shade selection was done and metal-

ceramic cement retained crown was fabricated. Definitive restoration was given to the patient (Fig. 12). The patient was satisfied with the aesthetic and functional outcomes achieved.



Fig. 1: Pre-operative view



Fig. 2: Pre-operative OPG



Fig. 3, 4: The root is sliced vertically-mesiodistally to split the root into two pieces



Fig. 5: Palatal portion of the root removed



Fig. 6: Buccal shield is left to maintain the buccal contour



Fig. 7: Osteotomy prepared in the palatal aspect of the socket and implant is placed



Fig. 8: Implant placement along with bonegraft



Fig. 9: IOPA showing well osseointegrated implant



**Fig. 10: Healing abutment placed**



**Fig. 11: Final impression with impression analog**



**Fig. 12: Definite prosthesis**

### Discussion

True to the motto “when we take something out, we should put something back in<sup>4</sup>”, studies have been carried out where fresh extraction sockets were filled and covered with various bone substitutes and membranes.<sup>5</sup> Socket shield technique seems to be a good alternative for immediate implant placement. It was first described in 2010, aiming to preserve the buccal plate of bone and prevent post extraction resorption with leaving the buccal aspect of the root intact. Recently, there have been publications regarding socket preservation suggesting they have the ability to maintain the ridge dimension to a certain amount.<sup>6</sup> Other studies reported that for de-crowned root fragments not only adequate bone volume preservation but also vertical bone growth in a coronal direction.<sup>7</sup> Clinical studies have suggested that leaving remaining roots of hopeless teeth in

their sockets may prevent or decrease tissue alterations and bone resorption after tooth extraction; this was documented by numerous publications.<sup>8,9</sup> Some authors suggested that it may even be possible to do a modified socket shield technique without any of material requirements (collagen cone/membrane).<sup>10</sup> Histological studies conducted have shown new bone formation in the small gap between implant in contact with the tooth fragment and the tooth fragment.<sup>6</sup> Similarly, this case report describes that by preserving the facial fragment of the root, the buccal contour can be maintained. It is indisputable that the buccal shield protects the integrity of the buccal bundle bone and serves as a guiding structure when placing the implant in the optimum position with a slight palatal shift during the re-entry procedure.

### Conclusion

The SS technique offers a promising solution to the difficulties encountered when managing the post-extraction tissues. Ideally, a method for the prevention of alveolar ridge resorption should be cost-effective and minimally invasive. Various methods of guided bone regeneration (GBR) have been described to retain the original dimension of the bone after extraction. All these procedures are cost-intensive and technique-sensitive. In contrast, the presented cost-effective but still technique-sensitive socket shield technique avoids the resorption of the bundle bone by leaving a buccal root segment (socket shield) in place.

**Conflicts of Interest:** None.

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