

## The Socket Shield Technique: A Case Report

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**Abstract:** Implant dentistry has become a prosthetically driven procedure. Considering optimal esthetic result, special care is being taken. These details may include imitating the natural teeth, by harmonizing the structures around the placed implant. So, the prosthetic and/or surgical parts of the procedure should be performed to reach an optimal outcome. To minimize the resorption of hard and soft tissue, that exists around the newly extracted tooth - to create a natural emergence profile of implant born prosthesis - socket preservation procedures were introduced. However, in case of ridge deficiencies, hard and soft tissue augmentation procedures are indicated. This case report emphasizes a new approach in socket ridge preservation, which is the socket shield technique (partial root retention).

**Keywords:** Buccal tooth fragment, Extraction socket preservation, immediate implant.

### Introduction

Many materials and methods are implemented to maintain or preserve the fresh extraction socket. Techniques focused to support the relatively thin buccal plate of the bone from getting collapsed, including immediate implants after extraction protocol,<sup>1,2</sup> bone substitutes material,<sup>3-7</sup> and/or barrier membranes,<sup>8,9</sup> but those procedures can maintain the ridge dimension to a certain amount.<sup>5,10,11</sup> However, few inadequacies are noticed.<sup>12</sup>

The (Root Submergence Technique) RST was described by Salama et al. By maintaining the root in the socket a much greater amount of surrounding tissue may be preserved. Other techniques are associated with crestal bone resorption. Such bone resorption leads to the reduction of the height of the interdental papillae and the width of the edentulous ridge. RST maintains the attachment apparatus of the

complete preservation of the alveolar boneframe.<sup>13</sup>

Instead of leaving the whole root in, only the buccal fragment of the root is being left in the socket shield technique. In this technique, a root sectioning is performed from the mesial to the distal side of the root to separate it into two fragments, Buccal and Palatal/Lingual. So, the buccal root fragment is being left while the rest of the tooth is being extracted<sup>12</sup>This provides a space to place the implant behind it. This would give the benefit of preserving the surrounding tissues likewise in RST and place the implant at the same time.

### Case Report

A 35 years old healthy male patient came to the Department of Periodontology and Oral Implantology, with a chief complaint of a fractured tooth. The medical history was noncontributory. On examination, palatal cusp fracture upto cement-enamel junction due to proximal caries with 25 was seen. (Fig. 1) On radiographic examination,

radiolucency was seen with 25 and fracture palatal cusp was seen with 25, and Periodontal ligament(PDL) widening was seen with 25 otherwise normal periodontal tissue. After routine investigation, implant placement with SST was chosen as treatment of choice. Following administration of local anesthesia, the tooth was incised at gingival level, (Fig. 2) a full-thickness flap was raised (Fig. 3) and then divided into buccal and palatal parts using a long root resection bur. (Fig. 4) This was intended to preserve the buccofacial half of the root intact and undamaged. Periotomes were used to sever the PDL, and palatal section of the root was then carefully removed without traumatizing the buccal root section. The remaining root section was then shaped properly and reduced coronally to the level of the alveolar crest. The shaping of the section was done by thinning it both in apicocoronal and mesiodistal direction (using a long-shanked, large, and round diamond bur). The extraction socket was then curetted to remove any granulation tissue, and the buccal root shield was checked for immobility by applying a sharp probe to its surface. Once fully prepared, this root section is known as the socket-shield or root membrane. The implant placement procedure was done as per the drilling sequence suggested by the implant manufacturer. (Fig. 5) The drilling was initiated using a lance drill to engage the palatal aspect of the root so that the buccal aspect would remain intact. Following implant bed preparation, a tapered internal hex implant, 3.8 mm × 15 mm was placed in the correct 3D position. The implant so placed had mesial, distal, and palatal bony walls. On the buccal side, it had the remaining buccal

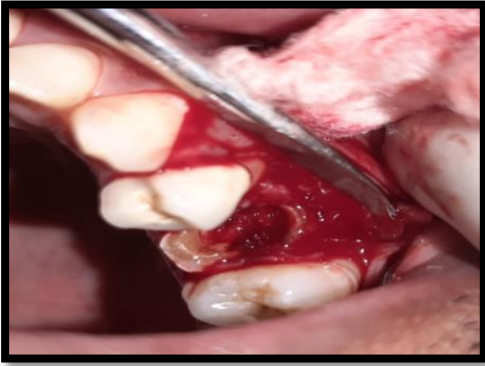
portion of the root which had a thin layer of dentine, followed by cementum, PDL, and bundle bone in socket-facial direction. The socket was closed using absorbable sutures. Postsurgical instructions included antibiotics and analgesic medication and chlorhexidine 0.12% oral rinse. The patient was also instructed to defer from tooth brushing or any mechanical trauma in the area for 2 weeks. At 2 weeks, the patient was asked to return for a postoperative evaluation. Clinical and radiographic evaluation of the site was done after 2 months postoperatively. A gingival former was placed and an impression was made. The routine clinical protocol was employed for the fabrication of the definitive restoration. Complete preservation of hard and soft tissue was noticed at the surgical site. Zirconia abutments were used to fabricate the esthetically pleasing lithium disilicate crowns. (Fig. 7 and Fig. 8) A postoperative photograph and OPG (Fig. 9) were taken for a final judgment. The patient was kept on follow-up 3 months, 6 months, and yearly, thereafter.



**Fig 1. Preoperative Clinical Photograph**



**Fig 2. Incision**



**Fig 3. Full Thickness Flap Elevation**



**Fig 4. Tooth Sectioning with pilot dri**



**Fig 5. Implant placement**



**Fig 6. Impression for prosthesis**



**Fig 7. Abutment placement**



**Fig 8. PFM Crown placement**



**Fig 9. Post operative OPG**

### **Discussion**

Considering the implant prosthesis, there were negative consequences of tooth extraction like bone loss especially buccal cortical plate. It is one of the challenges to preserve the buccal cortical plate for implant placement. Various treatment approaches such as graft materials<sup>3-7</sup> and/or barrier membranes<sup>8,9</sup>

have been advocated and described in the literature, However, complete preservation and/or entire regeneration of the extraction socket have not been documented yet.<sup>12</sup> So it is safe to assume that implants will never surpass the natural tooth's ability to preserve the surrounding bone and soft tissue height.<sup>13</sup>

Many studies were performed to evaluate the safety of remaining roots in the alveolar bone. Such studies had concluded that the roots would stay in the socket could preserve the bone and soft tissue dimensions. However, infected or mobile roots may act as a mobile foreign body and become a nidus for infection or migration.<sup>14-16</sup> Filippi et al. concluded that decoronation (removal of crown and pulp, but the preservation of the root substance) is a simple and safe surgical procedure for the preservation of alveolar bone before implant placement.<sup>17</sup> Plata et al. performed a 12-week histologic evaluation of 12 vital submerged roots that were cut at 2mm below the bone edge. They reported that eight of the roots had complete bone coverage on the cut surfaces.<sup>16</sup> Salama et al. described the Root Submergence Technique and they concluded that the retention of a natural tooth root allows for maximum preservation of the surrounding alveolar bone and soft tissues.<sup>13</sup>

The major findings of the histological analysis in this study were that the internal aspect of the root was covered with new cementum and new periodontal attachment. In addition, in areas where the implant has been placed into the root fragment, cementum could be detected on the implant surface. This can be seen in accordance with the study conducted by Buser

et al. concluding that in areas where the implant has been placed in close relationship to the root fragment, the examination of the undecalcified sections revealed a cementum layer on the implant surface with inserting collagen fibers.<sup>18</sup> Amler et al. and Cardaropoli et al. have histologically demonstrated that approximately 4 weeks after tooth extraction osseointegration is noticed. It may be assumed that the same process occurs between the implant and the retained tooth fragment. As the blood clot prevents the epithelium from growing along the internal root surface, it appears that cells from the remaining periodontal ligament are capable of colonizing the root surface and regenerate new periodontal attachment.<sup>12</sup> Furthermore, in an attempt to support the socket shield technique one-piece implant system was chosen to do this case.

**Conflict of Interest:** None

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