The Socket Shield Technique
A case Report

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ABSTRACT
In the aim of achieving an optimal esthetic result, implant dentistry has become a prosthetically driven procedure. So special care is being taken to focus on the details that would lead to this objective. These details may include imitating the natural teeth, by harmonizing the structures around the placed implant.

The prosthetic and/or surgical parts of the procedure should be performed to reach an optimal outcome. In order 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.

In this paper we will present case report using a new approach in socket ridge preservation, which is the socket shield technique (partial root retention).

The technique was first described in 2010 by Hürzeler et al.

KEYWORDS
Extraction socket preservation, Buccal tooth fragment, Immediate implant.

INTRODUCTION
Many materials and methods have been mentioned in the literature to maintain or preserve the fresh extraction socket especially to support the relatively thin buccal plate of the bone from getting collapsed, these include Immediate implants after extraction protocol,1-2 bone substitutes material has been used,3-7 and/or barrier membranes,8,9 but those procedures have the ability to maintain the ridge dimension to a certain amount.10,5,11 However, a complete preservation and/or entire regeneration of the extraction socket have not been documented yet.12

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 than with the other commonly used socket preservation techniques, which almost always leads to crestal bone resorption and thus reduction of the height of the interdental papillae and width of the edentulous ridge. RST instead maintains the natural attachment apparatus of the tooth in the pontic site, which in turn allows for complete preservation of the alveolar bone frame.13

On the other hand instead of leaving the whole root in RST. The Buccal fragment of the remaining root is being left in socket shield technique after a root sectioning is performed from the mesial to distal side of the remaining root as to separate it into 2 fragments, Buccal and Palatal/Lingual.

So the buccal root fragment is being left while the rest of the tooth is being extracted,12 Leaving 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 40 years old healthy female patient came to the office to replace 2 splinted PFM (Porcelain fused to metal) prosthesis covering upper central incisors, and seeking for a better aesthetic look of the upper 4 incisor teeth. (figs 1-4)

The 2 splinted crowns “kept falling many times” she said, clinical and radiographic examination revealed that the right central abutment was destroyed and a remaining root is left (fig. 4), with a gingival overgrowth covering the root, there was no mobility, nor any periapical lesion on the root.
The 2 splinted crowns were actually a cantilevered bridge on the left central abutment. (fig. 5)

The gingival overgrowth was removed from the right central remaining root, the root was hemisected using a fissure burr in a mesio-distal direction, an atraumatic removal of the lingual fragment of the root was achieved (no pressure was applied on it), then the buccal fragment was reduced using surgical bur leaving a thin layer of the root aspect intact to the buccal plate of the bone. (figs 6-9)
A KOS® Single-piece, straight implant (IHDE Systems) 12 x 3.2 was placed in the socket in a way leaving about 1 mm space away from the remaining fragment, (figs 10,11)

2 Provisional splinted crowns connecting the left central with the implant were placed, care was taken to remove all centric and eccentric functional contacts. A post-op panoramic x-ray was taken. (fig. 12)

A soft diet was recommended for the duration of the implant-healing phase. The patient was advised against functioning or activities to the implant site. (fig. 13)

A 5 months time was waited till healing take place; prep was done to the upper left natural central abutment and the 2 upper laterals. (fig. 14)

Then 4 single zirconium crowns were placed on the 4 upper incisors. (figs 15-17)
DISCUSSION

In order to overcome the negative consequences of tooth extraction—Especially the bone preservation after extracting tooth associated with thin tissue biotype in which ridge resorption takes an apical and lingual direction, whereas a minimal ridge atrophy occur in association with thick biotype. Various treatment approaches such as graft materials and/or barrier membranes have been advocated and described in the literature. However, a complete preservation and/or entire regeneration of the extraction socket have not been documented yet.

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.

Many Studies were performed to evaluate the safety of remaining roots in alveolar bone and concluded that the roots would stay in the socket—unless infected or mobile because it might be felt that the roots may act as a mobile foreign body and become a nidus for infection or migration, further more it could preserve the bone and soft tissue dimensions.

Filippi et al. concluded that Decoronation (removal of crown and pulp, but preservation of the root substance) of ankylosed tooth is a simple and safe surgical procedure for preservation of alveolar bone prior to implant placement. It must be considered as a treatment option for teeth affected by replacement resorption if tooth transplantation is not feasible.

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, and all pulps were vitally retained.

Salama et al. described the Root Submergence Technique (RST) and they concluded that not only it eliminates the risk of caries and periodontitis, but also, the retention of a natural tooth root allows for maximum preservation of the surrounding alveolar bone and soft tissues.

On the other hand a study was conducted in a beagle dog where only the buccal part of the root and its supra-periosteal attachment were preserved and furthermore no primary closure was obtainedin combination with immediate implant.

Placement following application of enamel matrix derivate showed that retaining the buccal aspect of the root during implant placement does not appear to interfere with osseointegration and may be beneficial in preserving the buccal bone plate.

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. (1990) 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 fibres.

Nyman et al. has shown that exclusion of epithelial cells leads to periodontal regeneration due to cells from the periodontal ligament. Within the limits of this experiment, it may be speculated that the blood clot between implant and root may have prevented the epithelium from colonizing the root surface. Amler et al. and Cardaropoli et al. have histologically demonstrated that it takes approximately 4 weeks after tooth extraction to cover the extraction socket with epithelium. 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.

In opposition to the mentioned studies M. Anthony Pogrel, mentioned that Late migration of the root fragment does appear to occur in some cases, but is unpredictable.

Furthermore and in attempt to support the socket shield Techniqueone piece implant system was chosen to do this case.

an experimental study conducted by Hermann et al. showed that significantly increased amounts of crestal bone loss around two-piece vs. one-piece implants, which result in a significant more apical position of the gingival margin, also, the degree of inflammation in peri-implant tissues is less around one-piece implants compared to two-piece implants. These results may have important implications when dealing with esthetic implant-borne restorations, which are based on healthy and vertically constant soft tissue dimensions over time.

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.

But further histological evidence and long-term follow up has to be conducted to recommend the socket-shield technique on a general basis.

REFERENCES


