

# Alveolar bone resorption: Socket shield technique

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### ABSTRACT

For the treatment of tooth loss with dental implant-supported restoration in the anterior maxillary aesthetic region, adequate alveolar bone volume and acceptable bone architecture should be present. To prevent alveolar bone resorption and maintain bone dimensions for the best functional and aesthetically pleasing rehabilitation, a number of techniques including atraumatic extraction, socket augmentation,

guided bone regeneration, socket seal technique, and immediate implantation are advised in this area. Although these methods significantly improve alveolar bone preservation, there is yet no method that can completely safeguard the alveolar socket.

**Key Words:** Alveolar bone; Lamellar bone; Periodontal ligament; Buccal crest; Maxillary region

### INTRODUCTION

After tooth loss, alveolar bone resorption has been amply documented in the literature [1]. Following tooth extraction, the periodontium begins to atrophy, causing the cementum, periodontal ligament, and bundle bone to completely lose their attachment. The alveolar crest becomes shorter and narrower as a result of this resorption process [2]. The buccal alveolar crest's dimensions change is bigger than the lingual crest's. The quick loss of the bundle bone, which frequently occurs without the lamellar bone in the coronal section of the buccal crest, has been blamed for the rapid bone resorption that is seen on the buccal crest [1].

Alveolar crest resorption following tooth extraction offers a severe concern, especially for the front maxillary region, especially in light of the significance of aesthetics for dental implant therapy. Socket augmentation, Guided Bone Regeneration (GBR), and socket seal technique have all been advised as alveolar crest preservation methods to maintain alveolar bone dimensions [3]. These methods, however, appear to be insufficient to make up for the dimensional difference following tooth extraction [4]. According to reports, these procedures frequently result in problems (such as edema, face discomfort, and erythema), and some graft materials adversely disrupt the normal healing process [5, 6]. Another surgical approach known as immediate implant placement, which is recommended to avoid the resorptive process, was also reported to cause significant resorption in the buccal and palatal bone walls four months after implant placement [7]. In conclusion, despite the fact that each of the

aforementioned methods significantly outperforms the process of natural socket healing, there isn't currently a method that can totally protect the alveolar socket [8].

It is believed that the resorptive process is aided by the loss of the periodontal ligament and the vascular support it provides [1, 9]. The bundle bone, which is vascularized by vessels coming from the ligament, cannot receive enough nourishment as a result of ligament loss, and as a result, it is resorbed. Therefore, it was claimed that a root fragment left in the socket may safeguard the alveolar bone and the periodontal attachment.

### SOCKET SHIELD TECHNIQUE

A portion of the periodontal ligament is retained using the Socket Shield Technique (SST), according to Hürzeler et al., to prevent the natural bone resorption that occurs after tooth extraction [8]. In this experiment, the distal end of a beagle dog's third and fourth premolar mandibular teeth was separated by hemisection and decoronated. A buccal root fragment was created around 1 mm coronal to the buccal crest after implant osteotomy on the lingual section of the root. Two implants were positioned in direct contact with the buccal fragment and two were positioned without it after adding Enamel Matrix Derivate (EMD) to the buccal fragment's inner surface.

Four months later, the results of a histological study revealed that no inflammatory reaction had been seen in any of the implants, the

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periodontal ligament was intact, and osseointegration had been seen in the lingual portion. When the implants that were implanted without contact were evaluated, fresh cementum had developed on the root surface, thickening toward the apex, and the implant-root interface had healthy connective tissue that extended up to 0.5 mm. On the other hand, when implants were positioned in direct contact with the fragment, cementum was found on the root and implant surface without any soft tissue at the interface.

### CLINICAL STUDIES

Recent studies comparing this procedure to standard instantaneous implant implantation have been published in prospective, randomized controlled trials. The technique's preliminary findings have been reported in these studies. There are also a few retrospective studies in the literature that look at the technique's long-term clinical impact [9]. The marginal bone level was assessed using intraoral radiographs obtained at baseline, post-operative third month, and post-operative third year in randomized controlled research that compared SST with traditional rapid implantation procedure. Additionally, Pink Esthetic Score (PES) was assessed using intraoral pictures snapped at the same follow-up intervals.

Radiological evaluations were performed over a two-year period in another controlled trial to compare the marginal bone loss of 26 implants placed using SST vs the traditional instant implantation approach [10,11]. At the end of the follow-up period, the traditional implantation group had had a 12% bone loss, or 5 mm, whereas the SST group had seen a 2% bone loss, or 0.8 mm. The conventional immediate group was shown to have much more marginal bone loss.

### DISCUSSION

The anterior aesthetic region may be able to preserve both hard and soft tissue with SST. However, the histology of the implant root interface, long-term clinical outcomes, and procedural problems such as shield thickness, shield length, and the requirement for grafting are unclear because it is a novel method. Well-planned prospective studies are required to remove these concerns. Additionally, a single nomenclature is necessary in order to methodically review this methodology because multiple terms have been attached to the same technique.

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