

The bone shielding versus dual-zone concept in treating thin-walled fresh extraction sockets with immediate implant placement: Soft and hard tissue changes. A randomized clinical trial

ABSTRACT

Following a tooth extraction, physiological variable dimensional changes, can jeopardize the esthetic outcomes of an immediate implant placement. Different techniques have been proposed in order to preserve the buccal plate from bone resorption, such as the dual-zone (DZ) technique and the vestibular socket therapy (VST) that involves the use of a flexible cortical bone barrier exploiting the bone shielding concept. As no available randomized clinical trials are comparing the efficacy of the bone shielding concept to the DZ technique, the study aims to compare the bucco-palatal dimensional changes, labial plate of bone thickness changes, and aesthetic outcomes following placement of immediate implants in the aesthetic zone using the two aforementioned techniques. Twenty-six patients with non-restorable maxillary teeth in the aesthetic zone were recruited and randomly divided into two groups to receive immediate implants using either the bone shielding concept or DZ. After tooth extraction and the surgical preparation of the site, in the bone shield group a 1.0 mm thick flexible equine cortical bone barrier (OsteoBiol® Lamina®, Tecnos®, Giverno, Italy), termed as “bone shield,” was tailored and inserted into the labial tunnel. After implant placement, the jumping gap was filled with xenograft bone graft (MinerOss X), and a screw-retained provisional restoration was placed maintaining the graft in position. In the DZ group, the implant placement was performed along with the same bone grafting material packed into the labial gap. The evaluated parameters at baseline and 1 year post-procedure were: pink aesthetic scores (PESs), vertical soft tissue alterations, bucco-palatal ridge dimensional changes, and labial bone thickness. After 1 year, the bone shielding group showed bucco-palatal ridge thickness stability, while DZ showed a significant loss in the bucco-palatal ridge thickness. With reference to ridge shrinkage, after 1 year the difference between the bone shielding group and the DZ group was statistically significant (0.38 mm vs 1.67 mm, $p=0.0002$). Moreover, the average total PES in the bone shielding group was 12.04 versus 10.28 in the DZ group. No significant difference was reported in the mesial papilla length between the two studied groups after 1 year nor in the mean \pm SD mm bone gain at the apical level. However, the bone shielding concept showed a statistically significant more bone gain mm ($p<0.001$) at the (0.56 \pm 0.43) and crestal (0.03 \pm 0.8) levels after 1 year compared to DZ which revealed 0.18 \pm 0.5 and 0.38 \pm 0.29 mm bone loss, respectively.

CONCLUSIONS

Within the limitations of this study, the Authors concluded that “the superior soft and hard tissue readings observed in the bone shielding group, might be explained due to the effect of using the flexible cortical bone shield which was positioned over the thin buccal plate of bone. This might have allowed partial or total postextraction buccal bone remodeling while preserving the regenerative space with no drop of the facial contour until a de novo bone is formed inside the socket underneath (space preservation). The bone shield preserved the ridge dimensions by allowing buccal bone remodeling and thickening of the overlying soft tissue as well. Added to that, the proven overlaying soft tissue attachment to the bone shield helps the stability of the marginal tissues. The nature of the bone shield's slow biodegradation rate and enhanced physical character is considered a contributing factor”.

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