Initial experiences using a new implant based distraction system for alveolar ridge augmentation


Abstract. With this case report we demonstrate a new technique useful in augmenting alveolar ridges after resection procedures or atrophic loss of volume. The augmentation is done by means of a new osteogenic distractor (manufactured by ACE Surgical Supply Co., Inc., Brockton, MA, USA), the distraction procedure is according to Ilizarov’s principles.

The masticatory rehabilitation of patients is dependent on the quality and volume of residual jaw bone. Loss of volume caused by tumor related mandibular ridge resection or age related atrophies can cause considerable functional problems. Reconstructive methods using free iliac bone, external table or sandwich plasties are a few examples of the common surgical treatment modalities. The osteogenic distractor can eliminate the need for bone grafting procedures and can produce significant implant recipient site.

Case report

The patient presented here was treated for a carcinoma of the anterior floor of the mouth. Resection included a part of the cranial rim of the mandible. Soft tissue reconstruction was carried out using an arterialized venous flap. The operative site after horizontal osteotomy with a view of the drill holes for the placement of the distraction apparatus. The mobilized bone segment remained pedicled to the lingual soft tissue, a thin saw was used for the osteotomy.

After insertion of the base plugs and distraction implants, the distraction screws were inserted and turned until they reached contact with the base plugs but without dislocation of the bone segment (Fig. 2). At this point the screw should sit 0.5 mm above the hex of the distraction fixture. Test turns should be performed to ensure that the osteotomized segment is free to move during the distraction process. The distraction screw was removed and replaced by the low profile latency healing screw to maintain and stabilize the osteotomized segment.

After a postoperative latency period of 5 days, the distraction fixtures and smooth, low profile latency healing screw were exposed similar to nonsubmerged implant healing. The latency screw was removed and the initial long body axial distraction screw was placed. The axial distraction screws were turned 1 mm per day using a 0.88 mm hexagon driver to separate the base plug and the distraction fixture until the required planned height of distraction was reached (in this case 7 mm of vertical augmentation). As required, axial distraction screws of different increasing lengths were used, which were replaced sequentially. Each distraction screw in sequence allows a 2 mm elevation of the segment when using the 3 mm distraction fixture and 4 mm when using the 5 mm distraction fixture. With the desired vertical augmentation achieved, a final healing screw is placed over the last axial distraction screw to maintain and stabilize the segment during the callus consolidation phase.

After a 4-week consolidation phase, the definitive implant procedure was carried out. Preparation of the implant socket was performed conventionally using drills with increasing diameters and screw taps. The dental implants stabilize the callus until the bone matures during the distraction healing phase (Fig. 3).

Discussion

The creation of vital bone with increased volume using the alveolar distraction system.
method as described here has many potential advantages compared to other bone regeneration methods. These advantages include: local autologous increase of tissue without donor-site morbidity; stability of the callus and a favorable adaptation of the covering soft tissues, which expands along with the distracted bone including the segmental bone shift for bridging larger bone defects. The method introduced in this study has the added benefit of simplicity of design, the ability to maintain the distracted segment oriented and directed in its proper plane without bone plates or screws, as recommended by Hidding et al. or Chin. With their method, a lateral perforation of the covering soft tissue is possible causing a increased risk of infection of the callus. On the other hand, the ease of

Fig. 1. Baseline finding of patient DH. (A) Condition after ablative tumor surgery with mandibular rim resection and microsurgical reconstruction of soft tissue defect with an arterialized venous flap. (B) Condition after box-like osteotomy with view on the drill holes.

Fig. 2. (A) On both sides, after placement of two distraction anchors and base plates, the distraction screws are twisted until contact with the base plates as can be seen in the schematic drawing (B).

Fig. 3. (A) Radiological control after insertion of 2 dental implants measuring 3.75 × 18 mm (ACE Surgical Supply), the radiologically visible gap is filled with unripe not yet ossified callus; (B) corresponding schematic drawing.
the operation/manipulation is excellent because of the axial access, which is similar to that used in implant treatment. The distraction apparatus is used only in the area where implant placement will be performed. A box-like osteotomy is helpful in the guidance of the mobilized segment.

References


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