Bone Spreading and Standardized Dilation of Horizontally Resorbed Bone: Technical Considerations

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Abstract

Bone spreading technique (BST) or crest dilatation technique is horizontal augmentation with minimal trauma for simultaneous implant placement. BST is an alternative Summer’s osteotome both clinical use as well as the armamentarium. The foremost advantage of BST is a substantially less invasive method; the buccal wall expands after the medular bone is compressed against the cortical bone. The lateral dilation and compaction of medular bone improved primary stability. The vital difference is that the BST used in this case report avoided discomfort of the patient, thus eliminating the need for malleting.

INTRODUCTION

Alveolar resorption following trauma, extraction or infection of teeth have often resulted in a ridge form with deficient width or height, creating problems of dental implants placement. However, after loss of teeth in the anterior or posterior maxilla, the alveolar ridge decreases by bone atrophy. When patients present with inadequate alveolar ridges, it could jeopardize the application of implant dentistry. If bone volume is inadequate, several surgical techniques may be used to reconstruct the deficient ridge for implant placement. The advanced resorption of alveolar bone in the maxillary region is often a problem for the placement of implants. Bone volume must be available at the position needed to place a fixture. One of the major problems encountered after the tooth extraction is the hard and soft tissue loss. Reduction of the buccal alveolar bone caused by bone resorption in partially edentulous maxilla is a frequent problem. Implants need an adequate volume of bone to stabilize the fixture. In partially edentulous patients often maxilla atrophy requires to be augmented. Numerous augmentation techniques [3-8], have been reported in dental literature to facilitate implant placement in atrophic ridge using blocks grafts, which require several steps before prosthetic restoration. In an effort to shorten the length of treatment, avoid an additional surgical appointment, challenge to the patient a decrease patient morbidity. A technique which would both lessen the trauma to patient and conserve the maximum amount of alveolar bone at precise site of anticipated implant placement would offer clinical benefits. Spreaders of increasing diameters are gently introduced sequentially to expand the implant site.

With each insertion of a larger diameter spreader the bone is pushed laterally. The implant should be slightly larger in diameter than the site created by the largest diameter spreader. BTS is an alternative Summer’s osteotome [9-13], both clinical use as well as the armamentarium.

The limitations of drilling into an atrophic ridge in the maxilla constitute a challenging clinical situation. Zarb & Schmitt [1], indicated that the minimum required dimensions of bone include a ridge width of 5mm, based on clinical experience. In the past few years, much effort has been placed in developing a surgical technique to overcome this problem of bone resorption. To fulfill both the functional and esthetic requirements for implant placement in the residual alveolar bone, a plan may implant the placement of an implant in concert with ridge expansion procedures.

Several techniques have been reported for the placement of dental implants in an effort to shorten the length of treatment, avoid a second surgical appointment, reduce additional surgical sites, reduce the challenge to the patient and decrease patient morbidity. Ridge augmentation procedures available for implant placement include bone grafting and bone guided regeneration. The advantages and disadvantages of local bone grafts from the mandible have been described. A technique which would both lessen the trauma to the patient and conserve the maximum amount of alveolar bone at the site of an anticipated implant placement would offer clinical benefits.

The Bone Spreader Technique (BST) involves horizontal...
augmentation with minimal trauma for simultaneous implant placement and is an alternative to summer’s osteotome [10-13]. BST utilizes a “screw-type” configuration of expansion and condensing burs and screw spreaders in increasing diameters for lateral bone expansion and condensing for placement of an endosseous dental implant. This technique uses a series of six screw spreaders with increasing diameters, which are gently introduced to expand the osteotomy site. With the insertion of a larger screw spreader, the bone is pushed laterally. A control system allows for substance-saving compression of the medular bone to a sufficient horizontal dimension [14,15]. The implant should be slightly larger in diameter than the site created by the last screw spreader. The objective of this technique is to conserve all of the bone in the surgical site and to selectively displace the bone laterally. Trauma and invasiveness are reduced with instrumentation through the ridge crest [16-20]. This paper describes a technique for widening the maxillary cortical bone to improve the placement of implant.

PATIENT SELECTION

Before treatment, all patients were screened for preexisting dental problems, and systemic health. Existing intraoral infections including those of endodontic and periodontal origins were treated before implant placement. An overall treatment plan was formulated in conjunction with the treating restorative dentists. Periapical and panoramic radiographs were taken of all patients. Diagnostic casts, diagnostic wax-ups and surgical templates were also used. The selection criteria were: inadequate bone width or bone type IV.

SURGICAL TECHNIQUES

A 52-years-old man presented for replacement of a missing premolar in the maxilla. The incisive had been extracted 7 years ago. Clinical exam revealed significant buccal bone loss in the premolar maxilla, although adequate ridge height was present for implant placement. The patient requested that we avoid any bone-grafting procedure.

A complete examination of oral hard and soft tissues was carried out for each patient. Preoperative standardized periapical and panoramic radiographs showed a severe atrophy of the maxilla on one or both sides. In selected cases a CT-scan was utilized as pre operative and final investigation. Diagnostic cast, diagnostic wax-up and surgical acrylic template was fabricated. The opposite jaw had to have a sufficient number of remaining teeth to give good occlusion. The CT-scan was produced with this acrylic template in place to analyses the sites for implant placement. A surgical acrylic template was used to indicate the optimal direction of the implant (Figure 1). The patient was given written information regarding the risks of that kind of surgery and their written informed consent was obtained.

The patient was premedicated with 2.0g de amoxicillin 1 hour prior to surgery and 500mg, 4 times a day for 7 days. Prior to surgery, patients were asked to rinse with chlorhexidinegluconate 0.12% for 1 minute. Surgical procedures were performed under local anesthesia. After administering 2% mepivacain, this technique begins with a crestal incision. The criteria were inadequate bone width.

A buccal full-thickness flap was reflected to expose the alveolar ridge (Figure 2). The proposed implant site was cleared marked with an initial bur (1.8 mm in diameter) was used at 18,000 rpm under copious irrigation with sterile saline, removing the cortical plate. The initial bur prevented the pilot bur from slipping. The pilot bur was penetrated to reach the desired height. BST utilizes a “screw-type” configuration of expansion and condensing burs and screw spreaders in increasing diameters for lateral bone expansion and condensing for placement of an endosseous dental implant. Meisinger, USA, LLC. Order of diameter of the instruments must be respected. In maximum diameters of 2.7mm, 2.9mm, 3.1mm, 3.3mm, 3.5mm and 4.0mm at 13mm depth (Figure 3,4). The diameter increases as maximum length is reached. With the help of the appropriate spreader carrier, the spreader is gently screwed in the bone cavity and if necessary...
a ratchet is used, the spreader may be screwed in cautiously. This allows a slow and gradual expansion of the bone. By having wide the implant cavity in this manner it is now possible to place the suitable implant. Furthermore the clearly increased bone rigidity, achieved by bone condensation, results in optimized primary stability irrespective of the subsequent implant brand to be used. A self-tapping implants of 3.75mm diameter and 13mm height (Intraoss, São Paulo, Brazil) was to be placed, it was placed at 35 Ncm at 20 rpm. Titanium cover screw was placed (Figure 5). Finally, the flaps were sutured in their original place. A 12% chlorhexidine di gluconate oral rinse was prescribed for 1 minute twice a day for 2 week as chemical plaque control. Nonsteroidal anti-inflammatory agents were prescribed for post surgical analgesia. There was no occurrence of hematoma. Most patients can return to their normal life the day following surgery.

Patient was not allowed to use any removable prosthesis until after the sutures were removed 10 days postoperatively. The patient maintained excellent oral hygiene. Implants were allowed to heal for a minimum of 6 months before assessing their osseointegration at second-stage surgery and subsequently placing a restoration (Figure 6). Another CT-scan was utilized as pos operative to compare the investigation (Figure 7).

CONCLUSION

BST for ridge horizontal augmentation with immediate implant placement has been shown to be predictable and successful in treating the maxilla with deficient alveolar bone width. BST is superior to drilling technique for application in soft maxillary bone. The BST offers a number of advantages over both the Summer’s osteotome. The BST has proven to be highly advantageous for the comfort of patients, increasing their acceptance and overall satisfaction. This surgery technique is a predictable procedure when patient selection and surgical technique are appropriate.

REFERENCES

6. Misch CM. Comparison of intraoral donor sites for onlay grafting prior...


