Alveolar Ridge Split Technique with Immediate Implant Placement: a Case Report

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Background: The bone split procedure is a technique used to increase the width of narrow ridge for possible simultaneous implant placement. Objective: In this report, we will describe a case of horizontal ridge augmentation using ARST and simultaneous implant placement in left mandibular molar region. Results: In this report, we describe a ridge split technique and immediate implant placement for a 56-year-old posterior left mandible edentulous patient referred to us for implant treatment. Conclusion: A successful prosthetic rehabilitation was obtained following the healing phase. This approach leads to restoration of function with a predictable outcome.

Keywords: alveolar ridge split technique; alveolar bone atrophy; immediate implant placement.

1. INTRODUCTION
Insufficient thickness of an atrophic alveolar bone is a common problem in implant dentistry. Narrow edentulous alveolar ridge of less than 6 mm, requires horizontal augmentation (1). The ridge deficiencies can be horizontal and/or vertical. Several surgical techniques have been proposed in the literature such as the guided bone regeneration, the onlay block bone grafting, the alveolar ridge split technique (ARST) or ridge expansion and distraction osteogenesis (2).

The horizontal bone augmentation using ridge split technique and expansion was first introduced by Tatum (3); it can be obtained by maintaining the periosteal attachment and carefully expanding the buccal cortical plates. The ARST has an added advantage of augmentation and implant placement in a single sitting (4). Proper case selection and diagnosis is important for the success of the ARST (5,6).

Alveolar ridge split technique is useful for managing narrow edentulous ridge (>3.5 mm) for implant placement with high success rates (98-100%) (7-9).

2. OBJECTIVE
In this report, we will describe a case of horizontal ridge augmentation using ARST and simultaneous implant placement in left mandibular molar region.

3. CASE REPORT
A 56-year-old male presented to our specialized private clinic to replace missing second lower left premolar
and molars. Medical and physical examinations revealed a healthy patient. A complete case history with preoperative procedures consisting of a cast for ridge, radiographic examination including a Cone Beam Computer tomography (CBCT) radiograph of the concerning region were done. Oral prophylaxis was achieved. The patient was interested in pursuing a method that would avoid the use of a secondary donor site for augmentation. A ridge split technique procedure was planned in order to achieve adequate ridge width to facilitate implant placement. The complete treatment plan was explained to the patient, and duly written consent was obtained.

The radiographic examination reveals a 4mm of bucco-lingual thickness of bone at the second premolar site and first molar respectively as shown in Figures 1 and 2; this clinical situation is adequate for using this technique.

4. SURGICAL PROCEDURES AND RESULTS

The mandibular left region was anesthetized using 2% lidocaine with epinephrine 1:100,000. A sharp midcrestal incision was given using a 15c blade followed by raising a full thickness flap to expose the ridge crest, which was approximately 4 mm bucco-lingually. A piezosurgery® touch unit (Mectron s.p.a., Genova, Italy) was used for sequential osteotomies. The midcrestal osteotomy (Figure 3) was prepared approximately 10 mm deep, followed by 2 vertical releasing osteotomies. Then, 2mm profile drill was used to localize the placement of implants, followed by using the chisels and the ACE Osteotome Bone Expanders (Brockton, MA, USA) to achieve the cortical plate expansion. The visco-elastic nature of the bone was utilized so as to prevent fracture, thus after every sequential expander was introduced and removed delicately, maintaining the bone resiliency, then a final drill of 10mm length was used which was followed by insertion of 2 implants (4mm diameter x 10mm length) Bone Level Tapered (BLT) Straumann® (Basel, Switzerland) (Figure 4). Two healing abutments were placed immediately (Figure 5). Periosteal releasing incision was performed to extend the flap coronally over the implant so as to achieve tension free interrupted sutures for a close approximation. No bone substitute was used in this case neither collagen membrane. Postoperative instructions were advised to the patient such as the prescription of antibiotics and an-
algesics with chlorhexidine mouth wash 0.2% for 7 days. Sutures were removed after 7 days. Patient was periodically reviewed for 3 months, followed by prosthetic rehabilitation with 2 ceramo-metallic crowns (Figure 6).

Retroalveolar X-ray and a CBCT were taken 1 year after the surgery. The alveolar width noted was 7.7 mm (the initial width was 4mm) and a vertical bone loss of 2 mm (Figures 7-8).

5. DISCUSSION
The gap created by sagittal osteotomy/expansion undergoes spontaneous ossification, following a mechanism similar to that occurring in fractures. The ridge split technique fulfill all requirements for best bone healing/regeneration of bony defects, a minimal extent of bone loss, the presence of bony walls, closed healing environment, space provision and mechanical wound stability (10). Thus, the bone splitting/expansion seem to be a reliable and relatively noninvasive technique to correct narrow edentulous ridges. New bone formation permits a consolidation between the oral and buccal bone plates of the alveolus, and implants placed in expanded ridges seem to withstand the biomechanical demands of loading. By reducing the healing period, the ARST offer an important time and financial economy (11).

Multiple systemic reviews studies confirmed the predictability and effectiveness to gain bone width of the ARST as one-stage alternative to extended two-stage horizontal grafting procedures alveolar ridge augmentation technique, as well as the high survival rates in the short and long term for implants placed in the maxilla or mandible (12-14).

Bone splitting/expansion can be applied only when the buccal and palatal/lingual plates are separated by spongy bone. Therefore, the indications are more limited as compared to onlay grafts and guided bone regeneration techniques; the latter can be also applied in cases presenting with severe horizontal atrophy (11). The guided bone regeneration and the ARST have demonstrated being predictable techniques with a high success rate; split-crest allowing the placement of implants in the same surgical act and maintaining the patient’s bone cortical (15).

A combination of guided bone regeneration and ARST may prevent post-surgical resorption of crestal bone in very narrow ridges. A lack of bone substitute resulted in significant resorption of 3- to 4-mm-wide crests (16).

The delayed lateral ridge expansion technique can be used more safely and predictably in patients with high bone quality and thick cortex and a narrower ridge in the mandible (7).

6. CONCLUSION
This case demonstrates the effectiveness and predictability of split ridge to increase the width of deficient ridge. In contrast to traditional techniques, it allows immediate implant placement following surgery and eradiates the possible morbidity from a second surgical site.

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59-68.


