

# A Modified Approach for Split Crest Technique to Augment Narrow Alveolar Ridges for Placement of Endosseous Implants:- A Case Report and Review of Literature

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## ABSTRACT

**Introduction:** Tooth loss leads to alveolar resorption specially in sagittal direction. Shortage of bone can prevent proper positioning of implants unless volume of bone is increased before implantation. This article demonstrates a procedure for widening the atrophic ridge using the lateral ridge expansion technique which is aimed at the creation of a new implant bed by longitudinal osteotomy of the alveolar bone. The buccal cortex is repositioned laterally using a greenstick fracture, and the space between the buccal and lingual cortical plates is left without any graft material.

**Case Report:** Here we have presented an interesting case report of a split crest technique to expand narrow alveolar ridges for the placement of implants in a 35-year-old female patient.

**Conclusion:** The modified approach for split crest technique to augment narrow alveolar ridges for placement of endosseous implants is devoid of foreign material usage and has a low rate cost, therefore, it can be employed more often

**Keywords:** corticotomy, regeneration, osteotomy

## INTRODUCTION

Tooth loss and its replacement in permanent dentition using dental implant procedures is one of the greatest advances in dentistry.<sup>1</sup> Reconstruction of alveolar defects in the posterior edentulous mandible can be a challenging task. In addition to obfuscating anatomic features, like the presence of inferior alveolar nerve, mental foramen, oblique ridge, and lingual undercut of the mylohyoid ridge, edentulous ridges in the posterior mandible have thicker cortices and diminished volumes of vascular trabecular bone than their maxillary counterparts.<sup>2</sup> A major limitation for successful implant placement is the presence of thin ridges.<sup>3</sup> Although multiple techniques exist for reconstruction of atrophic ridge, there are probabilities of surgical risk, postoperative morbidity and requirement of multiple surgeries. Numerous surgical widening techniques have been described, including lateral augmentation with or without guided bone regeneration (GBR), ridge expansion osteotomy, ridge splitting technique with or without interpositional grafting and horizontal distraction osteogenesis.<sup>4,5</sup> Ridge augmentation by bone graft necessitates a second surgery for later implantation hence lengthening the overall treatment time and cost. Bone augmentation can be accomplished by onlay grafting with autogenous block grafts or with guided bone regeneration (GBR) using particulate autografts covered by membranes.<sup>6</sup> Block grafting is accomplished with autogenous grafts, usually obtained from the mandibular symphysis or ramus. This technique entails a second surgical site. Extraoral sites may also be used to harvest autogenous bone.<sup>4</sup> Difficulties with extra-oral sites include prolonged hospitalization, increased expense and

patient morbidity. Block grafting could also be done with bone allografts. Block grafts and GBR require a minimum period of four to six months preceding the implant placement, unless they are done simultaneously with implant placement.

Ridge splitting technique which causes lateral ridge expansion creates new implant bed by longitudinal osteotomy positioning buccal cortex laterally. The buccal cortex is positioned laterally to generate space between buccal and lingual cortical plates, which is occupied by endosseous implant with or without any graft material. This study demonstrates the beneficial usage and outcome of the modified lateral ridge expansion technique. This technique presents with certain advantages as reduced overall cost, no requisite of barrier membranes or bone graft materials and no morbidity related to second donor site.

## CASE REPORT

A 35-year-old female visited the department of Oral and Maxillofacial surgery of College of Dental Sciences. Her chief complaint was missing teeth number 34,35,36,37. She requested fixed prosthesis, preferably an implant-supported. Her expectations were reasonable. Her medical history was noncontributory. Extra oral and intraoral examinations had normal findings (Figure-1) and her dentition was in a good state of repair. Cone beam computed tomography was performed to gauge the bone quality and estimate the amount of available bone. Reporting inadequate bucco-lingual width of bone at the crest for implant placement. The quality of bone was acceptable with an average measurement of 900HU. Adequate amount of cortical and cancellous bone was present to allow ridge expansion. It was decided to give delayed implants, using the split crest technique with controlled expansion to augment the narrow ridge.

Once local anesthesia was administered, crestal incision was placed extending from distal of lower left mandibular canine till the retro molar area. The incision was extended mesially following the crevicular pattern around mandibular left canine and lateral incisor so as to gain better exposure. A full thickness

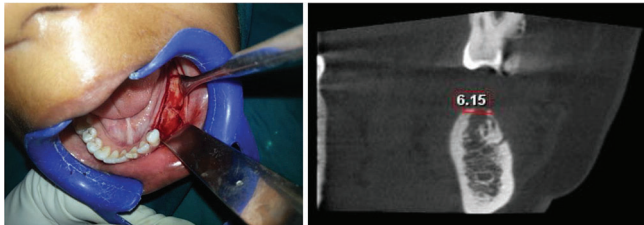
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**Figure-1:** Intraoral photograph showing edentulous ridge; **Figure-2:** Crestal incision and full thickness flap raised



**Figure-3:** Crestal corticotomy using vertical osteotome diamond disc; **Figure-4:** Post operative CBCT showing crestal expansion

muco-periosteal flap was raised exposing buccal aspect of the mandibular alveolar ridge (Figure-2).

Minimal periosteal reflection was done towards the lingual side to maintain the blood supply of the bone. Crestal osteotomy was done using a diamond disc (Figure 3), the horizontal osteotomy was started 2 mm away from the adjacent tooth. The length of the horizontal cut was determined, considering the number of implants and the space between the implants. Thereafter vertical osteotomies were performed using #701 straight fissure bur at the mesial and distal ends of horizontal osteotomy, the length of the vertical osteotomy was approximately half the length of the proposed implants height and the depth of both the osteotomies to reach the lingual plate in depth, following which lateral expansion was tried with the help of straight and curved chisels but the expected amount of expansion could not be achieved due to lack of the flexibility of the buccal segment (because of the long span of the edentulous atrophic ridge) hence we decided to perform another horizontal corticotomy at base of the vertical osteotomies meeting both the mesial and distal ends. During the above mentioned cut care was taken not to enter the cancellous bone therefore provoking a greenstick fracture of the buccal cortical segment.

Approximately 4mm of expansion was achieved which was measured intra-operatively using surgical caliper which was also later confirmed using post operative cone beam tomography (Figure 4). There was no interpositional graft used during this procedure. Tension free soft tissue closure was achieved using 4-0 non resorbable sutures.

4 weeks of healing period was allowed following which enough bone formation was noted at the level of the crest and implants were placed.

## DISCUSSION

Advantageous conditions of posterior mandible for ridge splitting technique include long edentulous span, abundant bone height and existence of cancellous bone sandwiched between the dense outer cortical plates.<sup>7-9</sup>

The lateral ridge expansion technique is useful for managing the narrow edentulous ridge for implant placement as the posterior

mandible is the most difficult region for reconstruction and early implantation.

Ridge split technique in implant dentistry was introduced for the first time by *Simion et al.* in 1992.

In our technique here the added cortical cut of the rectangular buccal segment at the base of the vertical cuts along with staged ridge splitting technique are two ways to overcome the problem of malfracture which proves to be one of the common complications associated with split crest technique to augment narrow alveolar ridges.

Our modification in this technique can prove to be a viable option when dealing with long span atrophic mandibular ridges having thick cortical and cancellous bone. This can be explained by the increased flexibility of the buccal bone segment obtained while expanding the ridge.

With this technique, the position of the osteotomy was pre surgically determined and corticotomy was performed all around the buccal cortical bone including the spongy bone, thus, decreasing the chances of irrepressible green stick fracture. Depending upon the fact that fresh extraction sockets in these regions are always broader than 5 mm and they heal by secondary intension without the necessity for bone grafting or using guided regeneration techniques.<sup>6</sup>

This approach is devoid of foreign material usage and has a low rate cost, therefore, should be employed more often. The only limitation there is to this modification is that it is technique sensitive and the modified horizontal corticotomy cut has to be placed with great precision and care.<sup>10</sup>

## CONCLUSION

The modified approach for split crest technique to augment narrow alveolar ridges for placement of endosseous implants is devoid of foreign material usage and has a low rate cost, therefore, it can be employed more often. The only limitation there observed in this modification is that it is technique sensitive.

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