



## Bilateral Ridge Split and Simultaneous Implant Placement Using Bone Expanders In Edentulous Mandibular Posterior Region : A Case Report

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### ABSTRACT

*Osseointegration of dental implants is highly predictable when implants are completely embedded into the bone. Sufficient bone quantity is an essential pre-requisite for implant placement in oral implant therapy. Resorption ridges often pose as a hindrance in oral implant placement. Inadequate width of ridge requires advanced surgical techniques in placing implants. One such technique is ridge splitting technique, which helps expansion of narrow ridge with or without fracture of cortical plates. This technique has the advantage of immediate implant placement, in comparison with other ridge widening techniques. In this case study the ridge split technique was done using saw bur and ridge split chisel and simultaneous implant placement was done with bone expanders. This could be considered as a novel technique for implant placement in narrow ridges.*

**KEYWORDS :** Ridge splitting, narrow ridge, implant placement ,bone expanders.

### INTRODUCTION

Sufficient bone quantity is an essential pre-requisite for implant placement in oral implant therapy<sup>1</sup>. A minimal amount of surrounding bone is necessary for implant placement. In the horizontal dimension, an optimal thickness of vestibular and buccal surrounding bone lamellae is  $\geq 1\text{mm}^2$ . Many etiologies as extraction, trauma, periodontal disease resulting in decreasing the bone quantity result in both vertical and horizontal bone loss. Inadequate bone volume often results in an implant surface exposure and consequent decrease bone-implant interface and potential implant failure.

To enhance the bone volume in implant therapy several techniques are used like guided bone regeneration (GBR), onlay bone grafting or distraction osteogenesis. However, these techniques present several drawbacks like; for bone grafting (1) the surgery to gain the bone material is invasive (2) the grafting material resorbs consistently with time (3) implantation is delayed because integration of the grafting material requires 3-6 months of healing<sup>3</sup>. For GBR procedures (1) membrane collapse can occur & the expected volume augmentation is not obtained<sup>4</sup>, (2) membrane can be exposed & further infected<sup>5</sup>. For distraction osteogenesis (1) the treatment cost is increased<sup>3</sup>. (2) implantation is delayed. To overcome these drawbacks an alternative approach has been developed called ridge split technique also called as widening technique first done by Hilt Tatum and further developed by Summers using osteotomes<sup>6</sup>. This creates room for implant placement with sufficient surrounding bone. Splitting is classically performed with chisel and hammer<sup>7</sup> or rotating / oscillating saws or surgical burs<sup>8</sup>. In this case after ridge splitting conical bone expander screws were used in increasing diameter to widen the space between buccal and lingual cortical plates and to create the implant bed.

This ridge splitting technique has the advantage over ridge augmentation techniques as bone grafting may be done with the simultaneous implant placement which reduces the treatment period<sup>9</sup>.

### CASE REPORT

A female, 53 years old had come to Bharati Vidyapeeth Dental College and Hospital. Pune with the chief complaint of missing teeth in both right and left mandibular posterior region. Patient had a history of dental extractions done 10 years before. Patient had no significant family and medical history. Blood investigations and CBCT were advised. After analyzing CBCT report it was seen that mandibular pos-

terior region on both the sides were atrophic and ridge was narrow for implant placement. However the bone height from alveolar crest to the superior border of inferior alveolar nerve canal was sufficient. Bone width horizontally at the crest in 33 was 3.63 mm, 36 it was 4.37 mm, 46 was 3.8 mm and 47 was 4.2 mm. Implant placement in 33, 36, 46 and 47 was planned but because of narrow edentulous posterior mandibular on both the sides it was considered to do bilateral ridge split and simultaneous implant placement.

### SURGICAL TECHNIQUE:

Crevicular incision was given on the distal most tooth right side followed by crestal incision extending beyond the 47 region. Full thickness flap was raised and the flap design was envelop flap with no vertical releasing incision for minimal reflection. Initial osteotomy was done with surgical saw bur on the crest of the ridge extending from distal of 45 to 3 to 4 mm beyond the 47 region. Depth of the crestal osteotomy was around 3-4 mm. After the precise crestal osteotomy ridge split chisel was used with mallet to increase the depth and widen the distance from buccal and lingual cortical plates. Ridge split chisel has special markings on it for 3, 5, 7, 9 and 12 mm to get the exact height of separation. Chisel and mallet were used to further enlarge the osteotomy to a point 3 mm shorter than the final length of the implants to be placed. Pilot drill was used up to the final length of the implants at both the implant placement sites in 46 and 47 region according to standard implant placement protocol. Then conical bone expanders were used in increasing diameters with ratchet in distal implant osteotomy site first then mesial site. In each implant site last bone expander was used as of the same width and up to the same height as decided implant diameter. Approximately 2-3 mm of expansion was achieved without performing vertical incisions in the bone. Bone width after expansion in 46 region was 6.2 and in 47 it was 7.1 mm giving sufficient horizontal diameter for implant placement. Thus in 46 region 3.8 × 11 and in 47 region 4.2 × 9.5 diameter implants were placed giving at least 1 mm<sup>2</sup> of surrounding bone for optimal implant integration<sup>2</sup>. Primary stability of 45 N was observed at the time of implant placement. DFDBA and FDBA combination bone graft was added in the expanded area to fill the gap between buccal and lingual cortical plates.

Same procedure was performed on the left side and bone width of 5.9 mm in 33 region and 6.8 mm in 36 region was achieved allowing implant placement of 3.8 × 11 and 4.5 × 9.5 in the subsequent

regions. Primary stability of 45 N was observed at the time of implant placement. DFDBA and FDBA combination bone graft was added in between the buccal and cortical plates. Flap was closed and sutures were given . Postoperative instructions and medications were given and patient was recalled after 7 days.

After waiting period of 4 months second surgical phase over the implant site was done. After exposing the implant's heads gingival formers were placed for 15 days. Abutments were placed at 20 N torque wrench over the implants after removing gingival former. Implant level impression was taken for prosthetic appliance. Crowns were placed on 46 and 47 and 4 unit FPD was given on 33 to 36.

## DISCUSSION

Results from the study demonstrated that horizontally deficient edentulous ridges may be successfully corrected with ridge split and bone expansion technique. This technique allows single procedure implant placement in a narrow crestal ridge. The surgical success in implant survival rate are high with advantage of shorter treatment period<sup>10</sup> . This technique may be considered a reliable alternative to other techniques such as onlay bone graft,GBR and distraction osteogenesis. Sethi and Kaus in 2000 presented case reports with split – crest procedure in combination with immediate implant placement.Base et al in 2004 presented studies of similar technique with the survival rate of 97-100 % range. However Coatoam & Mariotti in 2003 observed an early saucerization of the crestal bone around implants that are placed flush with the crest of the ridge.To avoid the above mentioned crestal bone loss , the treated ridges were covered with bone graft material.However , efficiency of this procedure to achieve this goal still remains to be determined because measurements of the crestal bone level on radiographs at implant placement and at second stage surgery were not performed.

Limitations of this procedure are the possibility to treat only horizontal defects and the necessity of cancellous bone within the edentulous ridge.The following are the benefits of this ridge splitting technique in comparison to other techniques<sup>11</sup> : (1) It allows less invasive manner implant placement & avoids donor –site morbidity caused by bone grafting & (2) It allows simultaneous implant placement and short treatment time.

## CONCLUSION

This article gives a brief view on implant placement in narrow ridge crests using the ridge-splitting technique.This procedure is technique sensitive although incidence of intra – operative and post-operative complications was limited. The correct indication associated with careful clinical maneuvers of the ridge –splitting technique allows predictable placement of implants even in narrow alveolar ridges.

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