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Piezotome and osteotome assisted ridge augmentation using ridge split technique with immediate implant placement- A case report

[1]Dr. R. Anil Kumar, Pg Student, Department of Periodontics, Panineeya Mahavidhyalaya Institute of Dental Sciences & Research Centre, Dilsukhnagar, Hyderabad-60.

[2]Dr. K. Rekha Rani, Professor & HOD, Department of Periodontics, Panineeya Mahavidhyalaya Institute of Dental Sciences & Research Centre, Dilsukhnagar, Hyderabad-60.

[3]Dr. G. Pranavi, Pg Student, Department of Periodontics, Panineeya Mahavidhyalaya Institute of Dental Sciences & Research Centre, Dilsukhnagar, Hyderabad-60.

[4]Dr. M. Harish Kumar, Pg Student, Department of Prosthodontics, Panineeya Mahavidhyalaya Institute of Dental Sciences & Research Centre, Dilsukhnagar, Hyderabad-60.

Corresponding Author: Dr. K. Rekha Rani, Professor & HOD, Department of Periodontics, Panineeya Mahavidhyalaya Institute of Dental Sciences & Research Centre, Dilsukhnagar, Hyderabad-60.

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Abstract

Ideal implant placement is often impeded by an insufficient alveolar ridge width. Guided bone regeneration, bone grafting, alveolar ridge splitting, and combinations of these techniques are used to augment the ridge horizontally. Ridge splitting, is ideal in cases of horizontal ridge aberrations and is observed to facilitate immediate implant placement due to the lower postoperative sequelae. The conventional approach employs osteotomes and mallet to split the alveolar ridge, however, the ridge split approach has been observed to preserve more buccal cortical bone thus increasing the implant success rate as well as providing more consistent and reliable outcomes. This article highlights the versatility of ridge split approach with immediate implant placement in the left lower first and second molar region of a 33year old male patient.

Keywords: Mandibular ridge augmentation, Piezo surgery, Dental Implants.

Key Messages: Deficient ridges can be augmented with ridge split/expansion techniques facilitating immediate implant placement.

Introduction

Ridge discrepancies are always an impediment to successful implant placement, making it a prerequisite that sufficient ridge width and height is available to

uphold the ideal goals of implant dentistry.

Resorption of the labial cortical plate occurs immediately after extraction or trauma. with a volume decrease of about 25% in the first year and a width decline of 40–60% in the next three years that causes the labial cortex of bone to move further medially than it did initially.[1] A very narrow alveolar ridge due to atrophy, periodontal disease, or trauma makes implant placement a dilemma. Ridge augmentation procedures using guided bone regeneration (GBR) principle have been advocated in these situations. The main drawback of these procedures is their longer healing times and risk for membrane exposure, which may potentiate implant failure due to bone loss. Although autogenous bone grafting is a reliable technique, it has drawbacks such as slow healing times, morbidity at the donor site, and graft resorption. Tatum introduced the ridge split technique as an alternative treatment option for horizontal ridge augmentation with instruments like D-shaped osteotomes and tapered channel formers to increase the width of the resorbed residual ridge.[2] A minimum bone width of 3mm and presence of 1mm of cancellous bone between the two cortical plates is mandatory for ridge splitting, resulting in a controlled green stick fracture between the cortical plates. Similar to the way an extraction socket heals, this area is gradually filled with new bone. Piezo surgery, Osseo densification burs, micro saw, are the other methods of performing ridge split. Osteotomes, screw spreaders or horizontal spreaders and chisels are used for lateral positioning of the buccal cortical plate.[3-4] The space between the separated buccal and lingual/palatal bone plates is filled with bone grafts alone or in combination with barrier membranes.[5] Split method was made simpler, safer, and far less hazardous in the treatment of severely atrophic crests owing to piezo surgery.[6] The present case is a combination of ridge split with piezo and expansion using osteotomes with simultaneous implant placement along with graft and membrane.

Case History

A 33-year-old male patient reported to the outpatient ward with a chief complaint of missing teeth in the lower left first and second molar region. The medical and family history was not relevant and a written informed consent was taken from the patient. The edentulous space was observed to have a Siebert's Class I ridge deficiency during clinical examination. (Fig1).

The radiographic examination done using Cone Beam Computed Tomography (CBCT) (Kavo Kerr Group France Dental imaging software Invivo™ 6) showed that the available width of bone at the ridge crest was 5.12mm and the available ridge height was 12.56mm with mesiodistal width of the space being 20.99mm. The scan revealed condition of bone to be optimal to employ the ridge split technique. oral prophylaxis and routine blood investigations were done preoperatively. Since, the patient opted for an implant supported prosthesis a ridge split technique with GBR and simultaneous implant placement was planned.

Surgical technique

Prior to the surgical procedure, pre-operative prophylactic antibiotics and analgesic were prescribed and the patient was prepared in a sterile environment. The patient was advised to rinse his mouth for a minute with a solution of 0.2 % chlorhexidine (Clohex Ads, Dr Reddy's Laboratories Ltd). 2 % lignocaine containing 1,000,000 epinephrine was administered to anesthetize the region.

The surgical blade no. 15 was employed to make incisions in the mid crestal and crevicular regions first. After that, the flap was reflected, exposing the underlying bone. A piezo surgical unit with bone insert

was utilized to perform the ridge-split. The many advantages of piezo surgery include micro precision, selective cutting action on hard tissues, maximum intraoperative visualization, excellent tissue healing, as well as an aseptic environment.[7] The BS1 piezo insert tip was initially used to split the ridge and subsequently osteotome and mallet was used to expand the ridge further.(Fig 2) Sequential drilling was done under copious saline irrigation for implant bed preparation and an implant of dimensions 4.2 X 10mm was placed simultaneously at 35Ncm (Implant Genesis - Aktive implant) and immediate RVG was taken. (Fig3a,3b).

The residual space between the two cortical plates was filled with Freeze-dried irradiated bone allograft material and covered with a resorbable freeze-dried irradiated chorion membrane (Tata Memorial Hospital & Tissue Bank, Mumbai) after placing the cover screws. (Fig 4a,4b). The periosteum was released by incising it to allow for tension free closure of the flap coronally. Periodontal pack and postoperative instructions were advised to the patient Antibiotics and analgesics were prescribed with chlorhexidine mouth wash 0.2% for 5 days.

Pack and sutures were removed after 7 days. Patient was recalled after 3 months and RVG was taken. After 6 months, implant stability was rechecked and further, prosthetic phase of treatment started with placement of gingival former and suturing was done After 2weeks, impression coping fit was evaluated by RVG. Splinting of impression copings was done with floss and resin. An open tray implant level impression was taken. Metal trial, bisque trial was done and prosthesis was cemented. The patient was recalled after 1 month for clinical and radiological evaluation. (Figure 5a,5b)

Discussion

Ridge split technique with simultaneous implant placement is in vogue as a treatment modality for the past twenty years. When compared to block bone grafting, the main advantage of this technique is the low morbidity and speedy recovery times.[8] In ridge split, the process of creating new bone is comparable to healing a bone fracture. Between the two bone plates, a blood clot forms, which later organizes and is replaced by woven bone. The implant interface transforms this woven bone into load-bearing lamellar bone.

Some researchers who employed the ridge split technique to augment the width of the ridge in both the jaws of twenty five patients who received eighty two implant fixtures, have observed that that the average ridge width increased from 3.2 ± 0.34 mm to 5.57 ± 0.49 mm. Mean gain in crest ridge after ridge splitting was 2 ± 0.3 mm and all the placed implants were functional at six month follow up.[9] Another study assessed the success of immediate implant placement after ridge split in the right maxillary anterior region using a piezo surgical unit.

The ridge width increased from 3.69 mm to 6.69mm A ten month follow up period showed that the implant was functional.[10]

Conclusion

Ridge split technique using presurgical inserts and osteotomes with immediate implant placement has shown successful treatment outcome in this case. At 6 month follow up it was observed that the patient was using the restored implants without any discomfort and was very satisfied with the results. For horizontal ridge augmentation ridge split using piezo surgical inserts is a very safe and precise procedure with predictable results.

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Legend Figures

Fig 1: Preoperative Clinical Photograph

Fig 2: Piezotome assisted ridge splitting

Fig 3a: Immediate implant placement in 36,37region

Fig 3b: Postoperative RVG showing implants

Fig 3a Fig 3b

Fig 4a: Clinical Picture depicting graft placement around implants

Fig 4b: Clinical picture depicting chorion membrane placement over implants


Fig 4a Fig 4b

Fig 5a: Prosthesis fixed in relation to 36, 37.

Fig 5b: RVG showing implant with prosthesis.


Fig 5a Fig 5b