CASE REPORT

Rehabilitation of atrophic partially edentulous mandible using ridge split technique and implant supported removable prosthesis

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Abstract:
Aims & Objectives- This clinical report describe the use of osteotome assisted bone expansion technique for expansion of atrophic posterior mandibular ridge with immediate implant placement and subsequent rehabilitation with implant supported removable prosthesis.

Material and methods- Patient with adequate bone height and atrophic edentulous posterior mandibular ridge was rehabilitated with implant placement using ridge split technique assisted by osteotomes and removable prosthesis.

Result- After 4-5 months of healing period both the implants were stable and were surrounded by bone. Radiograph and subsequent recall visit at 3, 6, 12, 24 months showed stable implant.

Discussion – Osteotome assisted bone expansion in the treatment plan resulted and correction of atrophic alveolar ridge without significant surgical risk and multiple surgeries. The degree of bone expansion obtained had remodelled the alveolar bone providing adequate bone supported for removable prosthesis.

Conclusion- Ridge split technique is effective for horizontal expansion in atrophic alveolar ridge without the need for more complex treatment. It also decreases the rehabilitation time and improves bone support quality.

Key Words: Atrophic ridge, ridge split, ridge expansion.

Introduction
Treatment of atrophic ridge especially in posterior mandibular presents great problem in achieving successful results with endosseous implants. Although there are different techniques available for reconstruction of atrophic ridge, there are chances of surgical risk, postoperative morbidity and multiple surgeries.¹,²

Ridge splitting technique which causes lateral ridge expansion creates new implant bed by longitudinal osteotomy positioning buccal cortex laterally.³ In this the buccal cortex is positioned laterally to create space between buccal and lingual cortical plates which is filled by endosseous implant with or without any graft material.⁴-⁶ This technique is performed with immediate implant placement which decreases significant amount of treatment time. Although it is more suitable for maxilla, it can be performed in posterior mandibular region if favorable condition exist.⁷

This clinical report describes the use of osteotome assisted bone expansion of atrophic posterior mandibular ridge in a patient with immediate implant placement and subsequent rehabilitation with implant supported removable prosthesis.

Case report
A 26 yr male patient reported to the Department of Prosthodontic, IMS, BHU, Varanasi with chief complaint of missing


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teeth in lower left region of the jaw (Figure 1). His medical history was satisfactory. Dental history revealed missing mandibular left lateral incisor, canine, premolars, and 1st molar. He lost his teeth 4 yr back due to road traffic accident. Various treatment options were discussed with the patient. As the patient was concerned about his appearance he wanted a fixed prosthesis replacing missing teeth.

(Figure 1 - Intraoral pre-operative view)

Intraoral examination revealed atrophic alveolar ridge covered with thin, healthy, and un-inflamed mucosa. Denta scan (Figure 2) was done to evaluate the bone quality and quantity.

(Figure 2 – Dentascan)

It revealed that the bucco-lingual thickness of bone in the edentulous region of missing lateral incisor and canine was less than 2 mm which was not sufficient for ridge splitting technique. In the premolar and molar region width of bone was more than 3.5 mm. Patient was apprehensive for onlay bone grafting. Hence the decision was made to place immediate implant in premolar and molar region by ridge splitting technique and subsequent rehabilitation with implant supported removable prosthesis to improve aesthetics and thereby fulfilling the patient’s demand partly of fixed prosthesis. As fixed prosthesis was not possible to fabricate without taking other treatment measures to improve the bone width or preparing large number of teeth to give long span bridge, hence the patient was convinced for implant supported removable prosthesis.

Clinical Procedure

Prophylactic antibiotic was given to the patient an hour before the procedure. After administration of local anesthesia, one incision was made along the ridge crest slightly towards the lingual side and two vertical incisions were made. A full thickness muco-periosteal flap was elevated on the buccal aspect of mandibular alveolar ridge. To maintain the blood supply to the bone the lingual flap was minimally raised. A crestal horizontal corticotomy was started 1 to 2 mm away from adjacent tooth till the first premolar region. The length of horizontal cut was determined, considering the number of implants and space between implants.

A small chisel was used to expand the bone. The chisel was carefully tapped with a mallet, and the bone was expanded further by osteotomes (Figure 3) in increasing order.

Then the implant site was prepared by using twist drills and implants of 3.75mm
x 13mm, 4.2mm x 13mm were placed in premolar and molar region respectively (Figure 4).

Care was taken to avoid penetration of sublingual plate. Tension free soft tissue closure was performed over implants using 3-0 non-resorbable suture.

After 5 month of healing period the second stage surgery was performed. Then after one week of healing period overdenture attachments were screwed (Figure 5) and impression was made and removable prosthesis was fabricated. Prosthesis was then installed in the patient mouth (Figure 6).

Patient was recalled after 3, 6, 12, 24 month after the prosthesis installation. During the recall visit IOPA and OPG radiographs (Figure 7) were taken and implants were found to be stable and prosthesis functioning.
Discussion

Ridge splitting technique is useful to improve atrophic alveolar ridge for implant placement. As atrophic alveolar ridge makes implant bed preparation difficult due to formation of fenestration and dehiscence on the cortical plates, ridge splitting technique is suitable for improving ridge width.\textsuperscript{8, 9} A minimum of 3 mm of ridge width is preferred for this technique. Although ridge splitting is more applicable to maxilla in some cases narrow posterior mandible may be split and expanded successfully. Favorable conditions for posterior mandible for ridge splitting techniques include long edentulous span, abundant bone height and the presence of cancellous bone between the dense outer cortical plates.\textsuperscript{10-12} Evaluation of the relationship between the residual ridge and opposing dentition is critical before this technique. Intermaxillary space for prosthetic crown height should be determined. As ridge splitting only improves bone width, unfavorable crown to implant ratios cannot be corrected and it does not correct ridge discrepancies.\textsuperscript{13-16}

Advantage of ridge splitting technique over other ridge augmentation technique is that the implant may be placed simultaneously and the treatment time is shortened and the overall cost of implant treatment is also decreased. The disadvantage of this procedure is that if the complication arises and bone loss occurs and the patient is usually left with even larger bone defect than before.\textsuperscript{17, 18} Therefore appropriate case selection and surgical technique is mandatory when considering the application of this technique.

Conclusion

With ridge splitting technique placing implants in atrophic is possible without the need of other more complex treatment. This procedure can be implemented in patient with good bone quality and narrow ridge with thick cortex and some cancellous bone in mandible. In addition it improves the bone quality around the implants and reduces the treatment time.

References


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