



NOVEL TECHNIQUES IN RIDGE AUGMENTATION: A MINI-REVIEW

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ABSTRACT

Post extraction ridge collapse is a common clinical challenge in contemporary implant dentistry. The amount of horizontal and vertical ridge loss may reach up to 60% within 2 years of tooth extraction, most of which occurs within the first year of tooth loss. Techniques incorporating the principles of guided bone regeneration and other techniques aid in the reconstruction of the osseous tissues of the residual ridge and/or to augment the volume of bone necessary to permit the successful placement of implant fixtures. This review highlights few novel techniques used for ridge augmentation.

KEYWORDS : augmentation, edentulous, ridge, defect, technique

Introduction

Periodontal plastic surgery procedures aimed to reconstruct deformed, partially edentulous residual ridges were introduced to the dental profession between 1971 and 1986 and now holds a major place in the reconstructive dentistry.¹ Previously it was considered impossible to surgically reconstruct deformities in the partially edentulous ridge resulting in the use of long unaesthetic pontic teeth or the use of a flange of simulated gingiva placed over pontic teeth.² This type of prosthesis were acceptable for a functional solution, but they lacked realism and esthetics. Reconstructive plastic surgery procedures enable the dentist to restore the hard and soft tissues of the alveolar ridge to their former dimensions and thus provides the restorative dentist an opportunity to provide patients with fixed prostheses that are truly aesthetic and successfully satisfies the patient needs.

Rationale for ridge augmentation

A sufficient amount of bone is a prerequisite for implant placement for successful osseointegration of the endosseous implant surface. Another prerequisite is placement of implants in positions that are optimal for fabrication of desired prosthetic reconstruction. This requires the placement of implants in the three-dimensional position optimal for achieving the planned treatment result and thus the regeneration of bone is necessary in areas of ridge deficiency to achieve successful osseointegration of the implants.³

Classification of ridge defects

Siebert in 1983 classified ridge defects into 3 classes. Class I ridge defect requires buccolingual ridge augmentation, class II ridge defect requires apicocoronal whereas class III ridge defect requires both buccolingual and apicocoronal ridge augmentation.⁴

Augmentation using Autografts

There are various sources of autografts intraorally like edentulous ridge, ramus, mandibular symphysis, maxillary tuberosity and extraoral sources like iliac crest and tibia. Disadvantages associated with autografts are additional morbidity, limited graft availability and unpredictable graft resorption.⁵ Safety margin for harvesting bone graft is to maintain a 5- mm margin between graft harvest site and vital structures.



Augmentation using Xenografts and Alloplastic materials

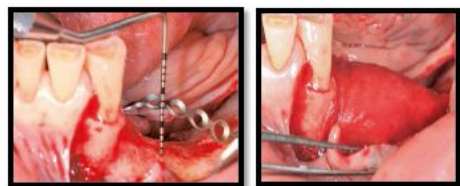
Xenografts are a good alternative but its use is limited due to patient

acceptability. Alloplastic bone substitutes represent a large group of chemically diverse synthetic biomaterials, including calcium phosphate (e.g. tricalcium phosphate, hydroxyapatite and calcium phosphate cements), calcium sulfate, bioactive glass, polymers. Allogenic and xenogenic bone products might be abandoned in the future due to the risk of transmitting diseases. However, these can be mixed with autogenous bone chips and thus the amount of bone graft needed can be reduced.⁶

Guided Bone Regeneration

Based on a series of experimental studies, a biological principle of healing was discovered by Nyman & Karring in the early 1980s which prevented undesired cells from accessing the wound and, at the same time, allowed cells with the capacity to form the desired tissue to access the wound space.^{3,7} This technique was termed as guided tissue regeneration and it led to novel possibilities to regenerate periodontal tissues, including new root cementum, periodontal ligament and alveolar bone.³

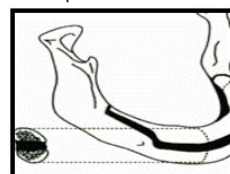
Fence Technique



This technique involves the fixation of the pre-formed osteosynthesis plate with miniscrews following the flap reflection. Cortical perforations are performed before applying the autologous bone and Geistlich Bio-Oss®. The grafted site including the osteosynthesis plate is covered with Geistlich Bio-Gide® and the tensile collagen membrane is pinned down. Thus, the augmented site is accurately sealed and stabilized. Implants were placed in this site following successful augmentation.⁸

Sandwich Osteotomy

This technique involves one horizontal bone cut, two other vertical bone cuts, following which the bone segment is raised upward and then autologous graft material can be sandwiched between the two bone segments. Limitation of this method is the morbidity associated with this technique.⁹



Segmental Ridge Split Procedure

This is a quicker method wherein an atrophic ridge can be predictably expanded and grafted with bone allograft eliminating the need for a second surgical site.¹⁰

Other techniques like distraction osteosynthesis are used infrequently due to the associated morbidity. Sinus augmentation is gaining popularity with increasing demands of implants.

Conclusion

Soft and hard tissue ridge deformities are prevalent in areas of tooth loss and trauma and can significantly compromise aesthetic outcomes. These techniques of ridge augmentation can widen the horizon of treatment options for patient as well as it helps the dentist to provide better esthetic outcomes to the patient.

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