

# Supplement the Base to Complement the Crown: Localized Ridge Augmentation using Connective Tissue Graft

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Interdisciplinary approach should be contemplated as a long term solution for esthetic and functional dental rehabilitation of patients. To obtain longevity of treatment, the therapeutic decisions must be based on a strong periodontal foundation. To prevent unacceptable esthetic deformities due to lost oral tissues, a plethora of treatment modalities are available, to augment the alveolar ridge, and to improve the esthetic outcome of the final prosthesis. Prior to the replacement of missing teeth, esthetic, and physiologic corrections of edentulous areas are critical pre-requisites. This article describes a surgical procedure to enhance a localized buccal ridge defect and create an emergence profile in relation to the maxillary left central incisor region, prior to the construction of a fixed partial denture using a connective tissue graft.

**Keywords:** Connective tissue graft, Localized alveolar ridge defect, Ridge augmentation

## INTRODUCTION

Soft tissue esthetics is a concern not only related to smile design, but also to missing gingival tissues around a tooth or beneath a fixed prosthesis. A complete esthetic is a proper blend of white as well as pink esthetics. Sound prosthetic rehabilitation requires a good, hard, and soft tissue foundation for success. Localized ridge defects pose a major problem in both esthetics and functionality of a prosthesis. Localized alveolar ridge defect refers to the volumetric deficit of the limited extent of the bone and soft tissue within the alveolar process. Restoration of these localized ridge defect is a challenging task for the clinician.

Restoration of deformed collapsed edentulous ridge with a fixed prosthesis results in a number of problems. Esthetic, hygiene, and functional compromises such as "black triangles" interdental, loss of buccal/facial contour, an unesthetic thick pontic made to compensate the horizontal ridge defect, food impaction in the open interdental spaces under the pontic, difficulty in speech, and unesthetic

gingival texture results if localized ridge defect is restored with a long, oversized unesthetic restoration. There is a high incidence of residual ridge deformity following anterior tooth loss either due to traumatic teeth removal, severe periodontal diseases, endodontic failure, implant failure, traumatic accidents, and developmental defects.<sup>1</sup> The ridge deformity is directly related with the volume of the root structure and associated bone that is missing or has been destroyed.<sup>2</sup>

Seibert (1983)<sup>3</sup> classified the various types of ridge loss into three classes:

Class I: Buccolingual loss of tissue with normal ridge height in the apico-coronal dimension.

Class II: Apico-coronal loss of tissue with normal ridge width in a buccolingual dimension.

Class III: Combination buccolingual and apico-coronal loss of tissue, resulting in loss of normal height and width.

A ridge defect can be compensated for with a variety of prosthetic approaches such as modified tooth coloured pontic, pontic with a gingival-shaded cervical portion or removable flexible tooth "mask" made of flexible silicone. However, such prosthetic corrections always compromise esthetics and make oral hygiene more difficult.

Various grafting procedures have been developed for the reconstruction of a deformed ridge that provides a functional, long-term improved esthetics for prosthesis. Soft

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tissue autografts such as pedicle roll flap or subepithelial connective tissue graft in the form of pouch, interpositional or onlay graft, and hard tissue grafts such as guided bone regeneration can be used for localized ridge augmentation.

This case report describes the treatment of a localized ridge defect using autogenous subepithelial connective tissue graft in the anterior maxillary region to achieve optimal esthetics maintaining periodontal health.

### CASE REPORT

A 32 year male patient reported to the Department of Prosthodontics, Nair Hospital Dental College for replacement of his upper front left missing teeth. Patient's dental history revealed that his maxillary left central incisor was extracted before the 1-year following trauma. Intraoral examination revealed missing left central incisor with Seibert's Class I alveolar ridge defect (Figure 1). The bucco-palatal loss of tissue was more pronounced which may cause food impaction in future if it was restored with fixed partial denture. Moreover, esthetics would also have been compromised due to long pontic and lack of emergence profile. To provide a fixed prosthesis without any functional or esthetic compromise, the patient was referred to the Department of Periodontics for localized ridge augmentation.

All restorative and surgical options were thoroughly explained to the patient. After thorough discussion, it was decided to correct the ridge contour using autogenous connective tissue graft harvested from the palate. A provisional restoration was made prior to surgery. The shape of the teeth, an axial inclination, emergence profile, and embrasure form for the provisional restoration was made exact to the prototype of final prosthesis (Figure 2). The provisional prosthesis was used to help in shaping the outline of augmented ridge to desired form during healing. Informed consent of the patient was obtained.

Immediately prior to the surgical procedure the patient was instructed to rinse for 30 s with 0.2% chlorhexidine gluconate solution. The area subjected to surgery was anesthetized by nerve block and infiltration anesthesia using local anesthetic solution 2% xylocaine with 1:100,000 epinephrine. The connective tissue graft was harvested from palate from maxillary right premolar and molar region. The length of the graft was in accordance to the length required at the recipient site measured by a template (Figure 3).

The surgical protocol was adopted from the method of Langer and Calagna<sup>4</sup> who described subepithelial connective tissue graft using "trap door" technique. Two parallel partial thickness horizontal incisions were made

about 3 mm and 6 mm from gingival margin using a no.15 scalpel blade. A wedge of the connective tissue of adequate thickness was harvested by extending partial thickness

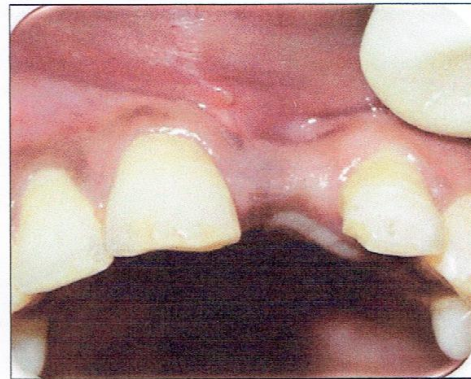


Figure 1: Pre-operative view of missing maxillary left central incisor with Seibert Class I ridge defect



Figure 2: Provisional restoration fabricated as per final prosthesis to be delivered shows the amount of ridge deficiency

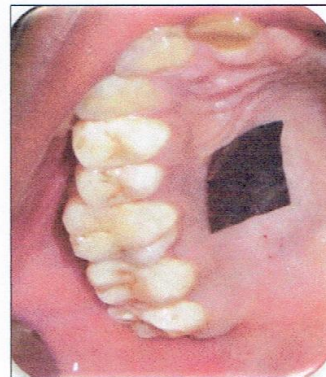


Figure 3: Template used to harvest connective tissue graft from the palate

incisions apically. Two vertical releasing incisions were given at mesial and distal end of the horizontal incision to free the terminal of graft. To completely free the graft, a horizontal incision was made at the most apical border where two horizontal incisions meet. Care was taken to avoid damage to the palatal artery. On removal, connective tissue graft was placed on saline moistened gauze sponge (Figure 4). The split-thickness flap was then replaced over bone, completely covering the bone, and sutured in place to obtain primary closure of donor site except epithelial collar harvested with a connective tissue graft (Figure 5). Periodontal dressing was placed and donor site was secured.

#### Recipient Site Preparation

A subepithelial pouch was created in maxillary left central incisor region using a no.15 scalpel blade. Partial thickness incision was given mid crestally extending deep up to the mucogingival junction to permit coronal repositioning of the flap. Subepithelial connective tissue graft harvested from palate was placed in the pouch thus created after removing the epithelial collar and flap was sutured coronally using vicryl resorbable sutures (Figures 6 and 7).

The provisional acrylic resin bridge, which was fabricated pre-surgically was placed over the abutment teeth, so that post-operatives swelling will cause the tissue to contour to the shape of pontic (Figure 8).

#### Post-surgical Instructions

Systemic antibiotics and analgesics were prescribed for 3 days post-surgically. The patient was also prescribed 0.2%

chlorhexidine gluconate mouth rinse. Patient was recalled after 1 week, 15 days, and 1 month for reevaluation. At 1 month, there was a substantial improvement in the labial contour of the alveolar ridge (Figure 9). Donor site area also healed very well.

Three unit porcelain fused metal crown was fabricated using maxillary right central and left lateral incisor as an abutment



Figure 6: Subepithelial pouch created at recipient site and placement of connective tissue graft



Figure 7: Recipient site secured with vicryl 4-0 resorbable sutures

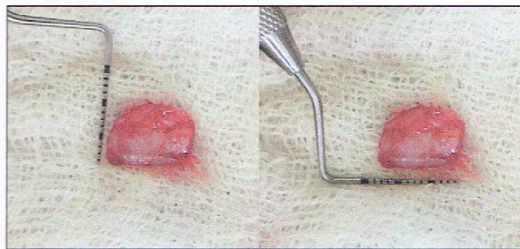


Figure 4: Harvested connective tissue graft placed on a moist gauze

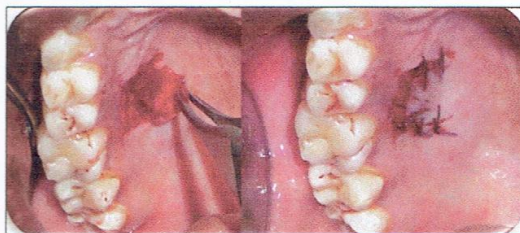


Figure 5: Donor site after harvesting of graft secured with vicryl 4-0 resorbable sutures



Figure 8: Provisional restoration placed post surgically so as post-operative swelling helps the ridge to contour as per shape of pontic

for replacing left central incisor (Figure 10). The esthetic, function, and comfort of the restoration were adequately restored. On subsequent appointments, it was noticed that, there was no relapse of the augmented area (Figure 11).

## DISCUSSION

Recognition of esthetic mucogingival problems and a plan for their correction are the prerequisites for esthetic success in prosthodontics rehabilitation. Prosthetic



Figure 9: Post-operative view at 1 month recall showing substantial increase in buccolingual width of alveolar ridge



Figure 10: Three unit porcelain fused metal crown was fabricated using maxillary right central and left lateral incisor as abutment for replacing left central incisor



Figure 11: Final prosthesis delivered

treatment of a localized alveolar ridge defect is an important mucogingival - esthetic challenge. A plethora of treatment modalities are available for correction of ridge defects depending on volume of tissue required to eliminate the ridge deformity, type of graft procedure to be used, timing of various treatment procedures, design of the provisional restoration, potential problems with tissue discolorations, and matching tissue color.<sup>5</sup>

In the present case, Siebert Class I defect was present with a severe bucco-palatal defect that might lead to the esthetic compromise of fixed partial denture and food impaction in the pontic region. As emergence profile of pontic region was prime purpose subepithelial, connective tissue graft was considered as treatment modality rather than opting for hard tissue augmentation. Connective tissue grafts are preferred surgical option for soft tissue augmentation due to ease of handling, good prospects of success better chance of survival than free grafts such as a bone graft or a non-resorbable membrane over poor or non-vascularized areas.<sup>6</sup> Connective tissue grafts preserve the coloration and characteristics of overlying mucosa resulting in the better esthetic blend in the potentially highly visible area.

A major disadvantage of connective tissue graft is a need for the second surgical site however leaving palatal epithelium with a base of connective tissue will allow the site to heal by primary intention, thereby minimizing post-operative complications. Moreover, alveolar ridges augmented with connective tissue grafts have demonstrated stability for 7-12 years.<sup>7,8</sup>

Other treatment options like pedicle roll flap technique was not considered due to limited availability of connective tissue on the palatal aspect of ridge defect. Onlay graft procedures also have limitations such as insecure prognosis of the gain in volume, compromised vascular supply, and esthetically unsatisfactory shade and texture as they retain their palatal mucosal characteristics.<sup>9</sup>

Provisional restoration was given to the patient that helped in creating anatomy of interdental papillae in accordance to the gingival embrasure. Furthermore, provisional restoration fulfilled the esthetic demand of patient during a healing phase of the surgical site.

Thus, grafting along with the bridge placement, enhanced the esthetic outcome in the patient, and improved the patients required post-therapy care.

## CONCLUSION

Alveolar ridge modification is a pre-requisite for both the implant and/or fixed prosthesis. It improves both

the gingival and the bone architecture for esthetic and functional purposes. In this case, ridge defect being horizontal, connective tissue grafting gave good, and predictable results. A firm, the rounded alveolar ridge was obtained to support the long-term survival of prosthesis.

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