Soft Tissue Ridge Augmentation for Pontic Site Preparation: A Perio-Prostho Synergy

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Citation

Marattha P, Humagain M, Lamichhane S, Rijal AH, Shrestha A, Timilsina S. Soft Tissue Ridge Augmentation for Pontic Site Preparation: A Perio-Prostho Synergy. *Kathmandu Univ Med J.* 2025; 89(1): 106-9.

ABSTRACT

The reconstruction of a lost alveolar housing is important to achieve a harmonious balance between biology, function, and aesthetics for a prosthesis's successful outcome. Soft tissue ridge augmentation is a periodontal surgical procedure designed to correct mild to moderate horizontal alveolar ridge deformities alongside fixed partial prosthesis, mostly preferred for their aesthetic benefits and less invasive nature as compare to hard tissue augmentation. Moreover, the increase in keratinized tissue and the improved soft tissue profile reduces the risk of future complications and is essential for hygiene maintainance. The purpose of this case report was to present the successful periodontics-prosthodontics synergistic approach to treat a seibert class I moderate type ridge defect with additional vestibular depth and keratinized tissue insufficiency issues in an edentulous molar pontic site using a free gingival onlay graft.

KEY WORDS

Alveolar ridge augmentation, Autograft, Esthetics, Pontic site preparation

INTRODUCTION

The alveolar process is a tooth dependent tissue that develops and resorbs in conjunction with the associated tooth. Inadequate ridge contours are a common outcome following the loss of teeth, traumatic teeth removal, severe periodontal disease, endodontic failure, implant failure, traumatic accidents, and developmental defects.[1] Often, challenges like aesthetic mismatches, functional instability, and soft tissue collapse necessitate pontic site preparation. By addressing these issues, it ensures the pontic seamlessly mimics natural teeth, supports functional stability by maintaining proper occlusion, and preserves soft tissue health to prevent complications like plaque accumulation or tissue collapse. It also maintains the underlying bone structure for a stable and lasting dental restoration. Addressing alveolar ridge deficiencies can involve non-surgical methods like tooth-colored pontics and pink materials for prostheses; or surgical techniques such as soft/hard tissue augmentation.[2] Seibert described a full thickness onlay grafting technique for augmenting moderate to severe ridge defects.[3] The onlay full thickness graft procedure is indicated primarily for ridge augmentation in the presence of additional mucogingival problems such as insufficient gingival width, high frenum, gingival scarring, or tattoo.[4] The use of Free Gingival graft has shown remarkable stability over long term study, primarily indicated for increasing the keratinized gingiva and vestibular depth as well as for ridge augmentation.[5,6]

CASE REPORT

A 55-year-old male patient was referred to the Department of Periodontology from Department of Prosthodontics, for consultation regarding Pontic site modification in mandibular right posterior region so that prosthetic rehabilitation can be planned in synergy with surrounding soft tissues, as the patient repeatedly complained of

Figure 8. Pre-surgical Photograph: a overcontoured provisional prosthesis, b-e: Seibert Class I, Allen Moderate (5 mm) type ridge defect with aberrant buccal frenum, absence of keratinized gingiva and inadequate Vestibular depth

frequent accumulation of food debris around temporary crown since 2 weeks of provisional crown placement (Fig 1 a). On further history taking, patient also reported unable to place brush in the affected site and was unable to clean the particular area. There was no any relevant medical or dental history or any habit history. On hard tissue examination, patient presented with over contoured prosthesis on a Seibert Class 1 horizontal defect of Allen's moderate type (5mm), which was the main concern from prosthodontics point of view (Fig. 1 b,c). On soft tissue examination, aberrant buccal freenum, inadequate buccal vestibule and inadequate width of keratinized tissue was found on the site (Fig. 1 d,e), demanding periodontal intervention. Thus, a common prostho-perio-nexus of treatment plan was to be achieved. Taking this into consideration, along with the patient's age and Fixed partial prosthesis design, soft tissue ridge augmentation would alone address all issues without osseous intervention. After thorough evaluation of the history, clinical condition, and radiological investigations, surgical correction of the defect area by Free Gingival Graft, to be harvested from the palate, in combination with Surgical options were discussed and explained to the patient, and written consent was obtained for the same, before the treatment.

Two parallel vertical incision was given close to teeth avoiding sulcus adjacent to the deficient area and one horizontal incision was given slightly buccal to the mid Crest (Fig. 2a). Vertical incisions extended beyond MGJ to approximately twice planned width of keratinized tissue allowing for 50% contraction of graft when healing is complete(Fig. 2a). Partial thickness flap was reflected, Underlying excessive muscle fibers pull was excised and excess marginal tissue were removed and sutured to base of the sulcus (Fig. 2b). Amount of donor site was determined using tinfoil template (Fig. 2c). The tinfoil template was used to mark the outline at the donor site on the maxillary palate (Fig. 2d).

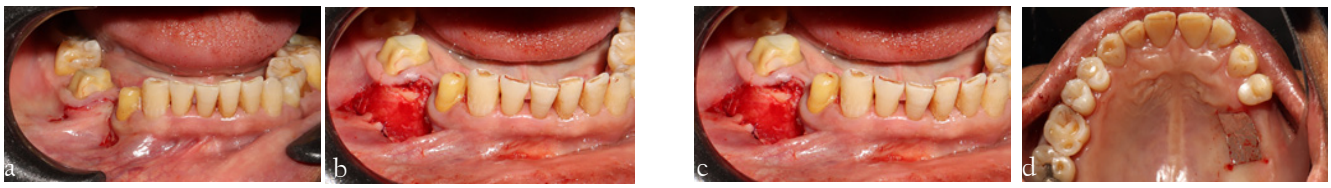

Figure 2. Intra-operative photograph: a: 1 Crestal and 2 vertical incision extending beyond MGJ; b: Split thickness dissected, freenectomy and flap sutured apically; c,d: Graft harvest-template in-situ

The graft of size 12 X 11 X 2 mm was then carefully dissected to achieve partial thickness (Fig. 3 a,b,c). To ensure a smooth surface, any fat or glandular tissue from the underlying layer was removed using a sharp scalpel blade. The graft was positioned at the recipient site and secured with sutures using modified Holbrook and Ochsenbein (1983) Suturing Technique: consisting of Horizontal "graft stretching" suture, circumferential suture and interdental concavity suture modified as per clinical scenario (Fig. 3d). It was followed by application of a periodontal dressing over the surgical areas. Sutures were removed after 10 days (Fig. 4a), and follow-up was done at intervals of 1 months, 6 months, 9 months and 12 months (Fig. 4b,c,d,e,f). On 6th month followup, definitive final prosthesis was given. The graft was stable even after 1 year presenting a well contoured ridge with adequate keratinized gingiva and vestibular depth beneath permanent fixed partial prosthesis.

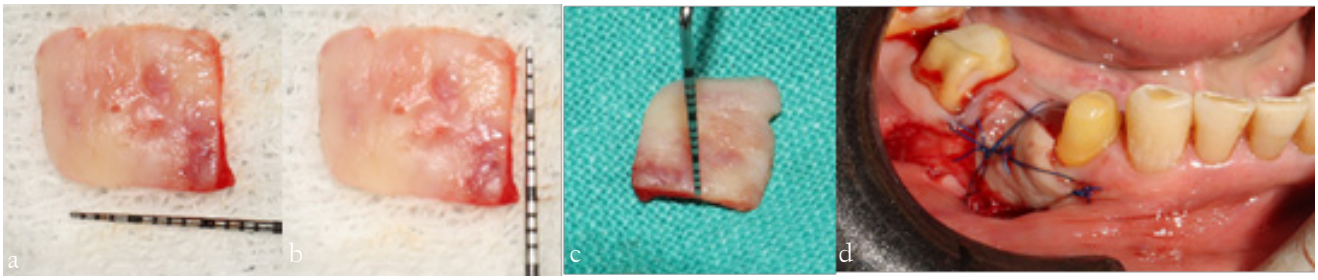

Figure 3. Graft of size12*11*2m harvested and sutured using Holbrook and Ochsenbein (1983) modified

Figure 4a. Follow-up on day of suture removal (after 10 days)

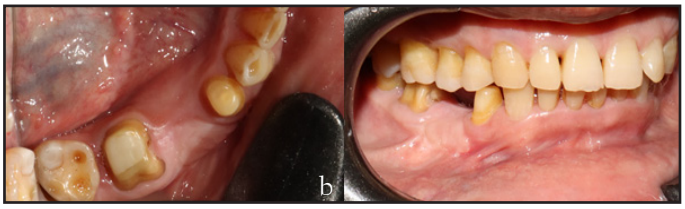

Figure 4b. Followup after 1 month

Figure 4c. Followup after 3months: Re-provisionalization done

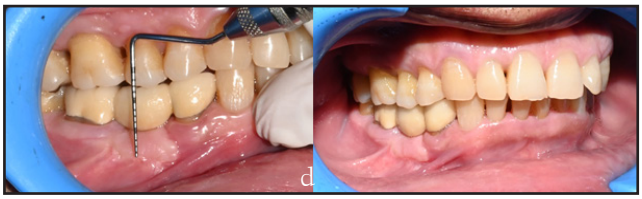

Figure 4d. Follow-up after 6 month: Definitive Prosthesis given

Figure 4e. Follow up after 9 month

Figure 4f. Follow up after 12 months

DISCUSSION

Ridge defect is defined as the volumetric deficit of limited extent in bone and soft tissue within alveolar process.[7] Schropp et al. performed a prospective study to evaluate the alveolar ridge resorption following extractions in a one-year interval and he found that 50 % of the ridge was reduced from its original volume.[8] Nevins et al. reported that at least 20% of the buccal process of alveolar bone undergoes resorption within the first 12-weeks of tooth loss.[9]

Seibert classified these residual ridge deformities into mainly three classes: Class I - buccolingual loss of tissue with normal ridge height in apicocoronal dimension, Class II - apicocoronal loss of tissue with normal ridge width in buccolingual dimension and Class III - combination of I and II resulting in loss of both the normal height and width. Allen et al. modified Seibert's original classification, with additional quantitative description by assessing the depth of defect relative to adjacent ridge as either Mild (<3 mm), Moderate (3 to 6 mm) or Severe(> 6 mm).[3]

Ridge augmentation are the procedure designed to enlarge or increase the size, extent or quality of a deformed ridge.[10] Depending upon the severity, prosthetic and periodontal demand, Alveolar ridge deficiencies can be managed through non-surgical approaches, such as using tooth-colored pontics and pink prosthetic materials, or through

surgical interventions, including soft and hard tissue augmentation. Soft tissue augmentation is a must in the presence of additional mucogingival problems.

The soft tissue ridge augmentation as defined by Siebert and Salama, 1996 is periodontal plastic surgery designed to reconstruct deformed, partially edentulous residual ridges.[2] The original concept of Soft tissue ridge augementation can be attributed to Dr. Jeffrey A Meltzer in 1979, where he published the first case report on soft tissue ridge augmentation in Aesthetic Zone using FGG, as before this, FGG was solely described only to augment keratinized tissue.[11] Thus, Soft tissue ridge augmentation is designed to correct mild to moderate horizontal alveolar ridge deformities alongside fixed partial prosthesis, mostly preferred for their aesthetic benefits and less invasive nature as compare to hard tissue augmentation. Moreover, the increase in keratinized tissue and the improved soft tissue profile reduces the risk of future complications. Goldman and Cohen's "tissue barrier" concept, introduced in 1979, posits that a dense band of connective tissue, or keratinized tissue, acts as a barrier against the spread of inflammation better than loose alveolar mucosa, advocating for increasing the zone of attached gingiva to enhance this barrier. The advantages with soft tissue ridge augmentation using FGG are: technically less demanding, can be harvested in good quantity, found to be stable in a scientifically documented 25 years long follow-up study and is less time-consuming procedure when compared with its counterpart hard tissue augmentation. However, patient compliance, colour mismatch, and open raw wound at donor site are the major drawbacks of FGG.[12] Therefore, reconstruction of a normal alveolar housing, in height and width, is imperative to achieve a harmonious balance between biology, function, and aesthetics to receive pontics or dental implants and the management of any of such risk defects required an interdisciplinary approach from prosthodontist, periodontist and any other involved specialists.

When planning FPD as definitive prosthesis, soft tissue ridge augmentation using techniques like full-thickness onlay grafts offers comprehensive benefits, improving both the functional and aesthetic aspects of the gingiva, thereby enhancing the success and longevity of dental prostheses. Augmentation with FGG is reliable procedure to not only increase width of keratinized tissue but also to modify the pontic site

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