



MODIFIED TECHNIQUES IN SOFT TISSUE AUGMENTATION IN ORAL IMPLANTOLOGY

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ABSTRACT

Oral soft tissue thickening or grafting procedures are often necessary to cover tooth recession, re-establish an adequate width of keratinized tissue, correct mucogingival deformities improving esthetics, prepare a site for an implant or prosthetics, for ridge preservation procedures, and soft tissue contouring around dental implants. Gingival recession and root or implant exposure are commonly associated and have led to mucogingival deficiencies that have traditionally been treated with free gingival grafts and autogenous soft tissue grafts. Pouch roll implant soft tissue augmentation provides an easy and less traumatic correction of a mild or moderate buccal ridge deficiency by thickening the soft tissue around the dental implant. This review presents modified tissue augmentation techniques which are proposed to enhance aesthetics in mild or moderate horizontal defects ; however, the choice of therapy depends on the dimensions and position of the defect.

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INTRODUCTION

While innovations in augmentation surgery mainly focused on hard tissue grafting in the past, attention has more and more been directed to the soft tissue as a limiting factor. A variety of techniques is available for augmenting deficient alveolar crestal bone. But reliable and lasting wound closure, an essential factor deciding the success of surgery, is a problem in major grafting cases. The design and tension-free mobilization of flaps for wound coverage as well as the meticulous adaptation of the wound margins and the optimal preservation of the nutritive supply are of prime importance for a predictable outcome of treatment.¹ Multiple classification systems describe alveolar ridge defects. Siebert classified the defects into horizontal, vertical, and a combination of hard and soft tissue deficiencies. This classification provides an excellent description of the defects but it lacks specific treatment recommendations.

To assist in treatment decision making, Wang and Al-Shammari introduced an alternative classification system named the HVC system for horizontal, vertical, and combination defects. The defects are further subclassified based on their size into small (s) 3 mm, medium (m) 4-6 mm, and large (l) 7 mm. With regard to small defects, the roll technique, pouch procedure, and inlay graft are proposed to correct small horizontal deficiency (6). The roll technique was first described by Abrams in 1980.(7) Many modifications of this technique were cited in the literature to improve the treatment outcomes. The majority of these studies described ridge augmentation techniques to improve soft or hard tissue deficiencies for fixed partial denture (FPD) but not for dental implant treatment. Therefore, a modification of the roll technique is described to correct both horizontal and vertical small defects around implants to improve esthetics. The main modifications involve the use of a papilla preservation technique and avoidance of using sutures for the pedicle part of the connective tissue graft (CTG). These two modifications maintain better papillary and soft tissue esthetics around the dental implant restorations.

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METHODS

Modified roll technique: Papillae-sparing vertical incisions are made within the keratinized tissues in the edentulous implant space to maintain papillary height (Figures 1). A partial thickness paracrestal incision is then made extending palatally, reflecting the epithelial layer and maintaining the connective tissue attached to the periosteum (Figures 2). This connective tissue is then reflected, rolled facially, and folded internally as part of the facial flap (Figures 3). Thereafter, an external mattress suture is used to secure the external part of the facial and palatal flaps without engaging the internal rolled CTG (Figures 4).



Figures 1. Occlusal illustration of the papilla sparing incisions



Figures 2. Occlusal and lateral illustrations of the thinning partial thickness palatal incision to obtain the pedicle connective tissue graft



Figures 3. Occlusal and lateral illustrations of the palatal connective tissue folded under the facial flap

Pouch Roll Technique for Implant Soft Tissue Augmentation: A Variation of the Modified Roll Technique
The original pouch roll technique was first described by Abrams in 1980 in reconstructing the gingival margin contour around the residual edentulous ridge for a fixed prosthesis. The Barone modified roll technique, uses only de-epithelialized connective tissue over the implant cover screw Barone et al modified the Abram roll technique during stage-two implant surgery around narrow-platform implants in the lateral incisal position. Because of the limited interdental space, the authors made a sulcular incision along the adjacent teeth to avoid a buccal vertical incision. Deepithelialized tissue was rolled buccally and then secured to the buccal flap using a fixation suture. Two single interrupted sutures were used interproximally to achieve secondary closure. Unlike other pedicle flap techniques, 14,18,23 the modified roll technique did not need a palatal donor site; therefore, healing without risk of sloughing of the superficial split-palatal flap or palatal pain was achieved.

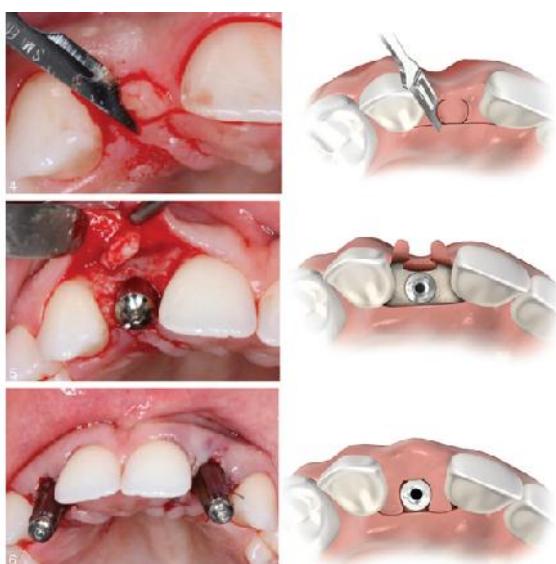
The pouch roll technique presents several novel features. First, there is no need for any sutures. All other soft tissue augmentation procedures use a fixation suture to secure the rolled connective tissue to the buccal flap. Second, the interproximal tissue is completely preserved and heals with primary intention. In contrast, other procedures involve a de-epithelialized interproximal area that heals via secondary intention. Therefore, the pouch roll technique is likely to have minimal or no discomfort and minimal bleeding throughout the entire healing phase. Third, because of routine oral hygiene instituted on the evening of surgery, remarkable plaque control was observed. Furthermore, uneventful healing was observed without use of a postsurgical mouthrinse. Lastly, a 2- to 3-mm increase in the width of keratinized tissue may be expected when the thick tissue is rolled buccally. Biotransformation of the thin peri-implant mucosa to a thick biotype may promote implant stability. A partial gap between the hinge portion of the mini-pedicle flap and the healing abutment was seen to be healed with keratinized tissue at 3 months. The apical portion of the gap, however, remained completely sealed with rolled connective tissue. The pouch roll procedure is an atraumatic, versatile, cost-effective soft tissue augmentation procedure performed during either single-stage implant placement or two-stage implant surgery. This technique is indicated in the correction of a mild to moderate horizontal buccal ridge deficiency or to thicken the marginal gingiva around dental implants during stage-one or stage-two implant surgery

Later, Scharf and Tarnow and Huzel suggested the use of Pouch roll technique to reconstruct the gingival margin contour of a mild or moderate buccal deficiency during the second stage of implant surgery.

Technique: After administration of local anesthesia with 2% lidocaine plus epinephrine 1:100 000, an intrasulcular buccal incision was made, which continued interproximally along the teeth to the palate, followed by a horizontal incision (Figures 1 and 2). Then a semilunar or circular incision was carried out, maintaining a buccal pedicle to preserve the delicate 1 to 2 mm of gingival sulcus adjacent to the teeth, which will become the interproximal papillae (Figures 3). FIGURES 1–3. FIGURES 1. Preoperative occlusal view 6 months after stage 1 implant surgery. FIGURES 2. Intrasulcular buccal incision accomplished and palatal horizontal incision.



Figures 3. Buccal minipedicle flap. Afterward, the minipedicle flap was deepithelialized using a 15C scalpel blade held firmly with atraumatic soft-tissue pliers. A fullthickness flap was elevated, creating a pouch the length of the minipedicle flap. It made the division of retent in the direction to proximal apical in the receptor, resulting in a pocket. After obtaining this pocket or framework, the portion wheel is circular or semilunar into the same tissue volume by increasing the buccal region (Figures 4). This provided a dualpurpose soft-tissue stratum on the buccal surface of the implant while preserving the integrity of the papilla during installation of the nonsubmerged implant. The tissue around the abutment or provisional prosthesis healed with an emergent profile suitable for holding the soft tissue inposition. It is helpful to use a horizontal mattress suture to ensure intimate tissue contact of the folded “trapdoor.” The palatal incision was closed with 2 single interrupted sutures (Figures 5 and 6).



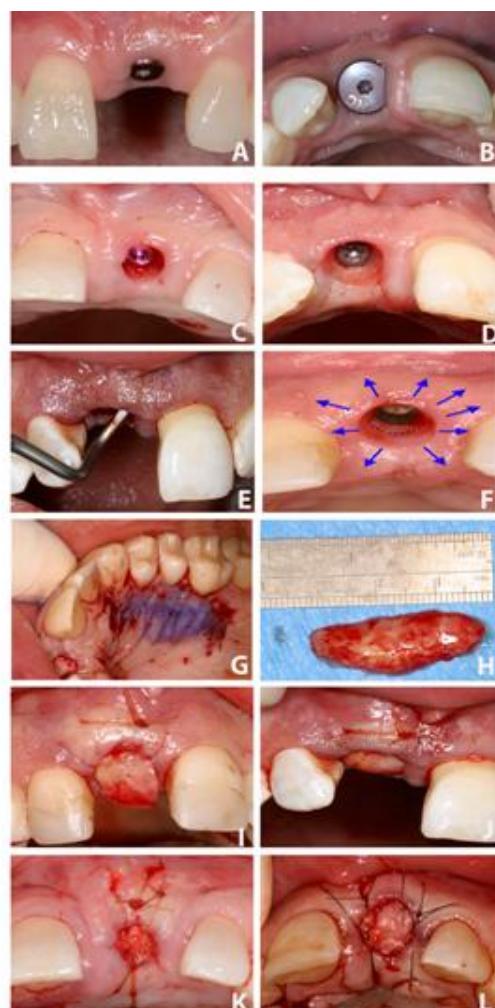
Figures 4–6. Figures 4. Deepithelializing the minipedicle flap using a 15C scalpel blade. FIGURES 5. Minipedicle flap rolled under the buccalpouch. FIGURES 6. Immediate postoperative buccal view. For postsurgical pain control, 600 mg ibuprofen every 4 to 6 hours was prescribed, and 500 mg amoxicillin was prescribed 3 times daily for 7 days to prevent infection. The patient was instructed to avoid brushing and trauma to the surgical site and to rinse every 8 hours with 0.2% chlorhexidine gluconate (Figures 7 and 8).



Figures 7 and 8. Figures 7. (a–d) Buccal and occlusal views at 5-year follow-up, clinical aspect. FIGURES 8. Second case report. (a) Preoperative aspect. (b) Minipedicle flap. (c) Minipedicle flap rolled under the buccal pouch. (d) Immediate postoperative buccal view. (e) Immediate postoperative occlusal view. (f) Five-year follow-up, clinical aspect.

Advantages of the modified pouch roll technique are preservation of the integrity of the papilla, increased soft-tissue thickness, improvement in esthetics by eliminating the buccal soft-tissue concavity, and obtaining healing by primary intention.^{5,10,11,13,16} In cases of minimal bone volume, narrow implants and the modified pouch roll technique can be used as an alternative to bone grafts to minimize postoperative morbidity and risks of infection and to reduce cost and treatment time. However, restoration of more than 2 to 3 mm of soft tissue requires bone-grafting procedures. Accordingly, our case report has demonstrated that this procedure is considered more reproducible, more predictable, and less invasive for small defects

The dome technique: TI created this technique for cases where a tooth-bound single implant or two adjacent implants are placed in the esthetic zone, especially when it becomes apparent that the future crown facial margins and the soft-tissue zenith will be unfavorably more apical to the contralateral tooth and to the ideal and desired position. The name of the technique addresses the placement of the CT, as it is layered over the implant and takes the shape of an inverted dome.



Abbreviation: CTG, connective-tissue graft. A prerequisite of the technique is to have adequate resilient soft tissue around the implant. This is achieved by using a healing abutment at the time of implant placement to shape the peri-implant tissues and create a space for the future dome CTG (Figures 9A and B). After the successful integration of the implant, but not less than 6 weeks, the healing abutment is removed and replaced by

a flat cover screw or closure cap (Figures 9C and D). A primary circumferential incision is performed at the level of the implant head using a microsurgical blade or a 15C blade to produce a partial thickness circumferential flap or “dome” over the implant.

The partial-thickness dissection is carried all around the implant on the buccal, palatal, and interdental areas with a thin and curved periosteal elevator, which is used as a tunnelling instrument (Figures 9E). Careful use of an Orban knife as an alternative is possible, but perforation of the buccal flap (which is frequently thin and fragile) must be avoided. Via the usual steps of a tunneling technique, the interproximal papillae are detached from the roots and “lifted” to allow the harvested CTG to spread under the papillae, as well as buccally and palatally (Figures 9F). It is imperative to refrain from root planing the interproximal root surfaces to avoid removal of the fiber attachments and risking additional postoperative recession. The second step in the technique involves the harvesting of an autogenous subepithelial CTG from the contralateral side of the palate (Figures 9G). A long, wide graft is needed to fully cover the implant site and be placed under the papillae (Figures 1H). The donor site is sutured with 4-0 Vicryl continuous sutures with or without the application of cyanoacrylate tissue adhesive. The final step in the procedure is to position and secure the newly acquired autogenous tissue in the created dome pouch. The CTG is inserted carefully in the buccopalatal direction covering the implant (Figures 9I). The graft is stabilized first along the buccal aspect by a blind suture that penetrates the overlying buccal tissue and the underlying CTG using 6-0 or 5-0 chromic gut or nylon sutures (Figures 9J). The rest of the CT is inserted into the palatal aspect and then spread laterally underneath the interdental papilla, thus creating a dome-shaped tissue. Further suturing takes place to secure the graft in place, which includes a crossover suture (Figures 9K and L). Having more than two-thirds of the graft covered underneath the flap is critical to ensure survival of the part covering the implant head, which remains exposed. The graft is allowed to heal for 6–8 weeks. It is important to adjust the temporary prosthesis during this time to avoid any pressure on the graft during healing.^{15,16,17}

CONCLUSION

Conventional sub epithelial connective tissue graft may improve the buccal aspect of compromised sites, coronal gains remain unpredictable. The depth and thickness of the palate will affect the possibility to obtain ample amount of the connective tissue without fat and glandular tissue, postoperative sequelae as bleeding and palatal necrosis (19). The free gingival graft and distal edge techniques may improve harvesting the connective tissue graft in quality and quantity which may permit successful development of vertical soft tissue augmentation with aesthetic appearance and functional peri-implant soft tissue structure.²⁰ Although scientific evidence in most part is lacking, soft tissue vertical augmentation at implant sites may need to be considered in some clinical situations. Surgical manipulation of peri-implant soft tissue by using techniques to harvest sub epithelial connective tissue graft, may be beneficial to increase gingival keratinized tissue and also to improve aesthetic outcomes of implant therapy. Free gingival grafts are an appropriate clinical approach to treat lack of keratinized tissue surrounding implants²¹. The use of this techniques prevents from clinical

conditions directly associated with an unhealthy periodontal tissue such as inflammation and recession. the current modified rolled technique can be a beneficial adjunctive and conservative procedure to help the practitioner in managing peri-implant soft tissue with mild ridge deficiencies. The modified roll technique may initially be technique-sensitive; however, a clinician can overcome this issue with adequate training and experience

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