

A Novel Approach for Soft-tissue Augmentation in the Maxillary Anterior Region - “The WIPAIR Technique”: A Case report and Literature review

Mansi Patel¹, Huzefa S. Talib² and Thomas G. Wiedemann^{3*}

¹Department of Oral and Maxillofacial Surgery, New York University College of Dentistry, New York, United States

²Clinical Associate Professor, Department of Oral and Maxillofacial Surgery, New York University College of Dentistry, New York, United States

³Clinical Associate Professor, Department of Oral and Maxillofacial Surgery, New York University College of Dentistry, New York, United States.

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***Corresponding Author:** Thomas G. Wiedemann, Clinical Associate Professor, Department of Oral and Maxillofacial Surgery, New York University College of Dentistry, New York, United States

Abstract

INTRODUCTION: Achieving ideal dental implant esthetics, particularly in the anterior maxillary region is challenging, particularly with thin peri-implant tissue undermining gingival stability and long-term cosmetic results. Techniques such as Vascularized interpositional periosteal connective tissue graft (VIP-CT graft) and the

Roll-in envelope (RIE) have demonstrated an effective improvement in tissue volume. This study introduces the WIPAIR (Wiedemann-Patel Interpositional Roll) technique, which integrates two well-documented soft tissue augmentation methods, and to evaluate whether this combined approach results in superior clinical and aesthetic outcomes.

METHOD: A 37-year-old male patient presented to the oral surgery clinic after implant placement in the maxillary anterior region at an external clinic. After case discussion, it was determined that neither conventional technique would be adequate. Therefore a review of the literature on soft tissue augmentation procedures was conducted using various platforms with search terms such as “soft tissue augmentation” “VIP-CT graft” and “RIE technique”. A total of 29 articles were included in the study. To the best of our knowledge, no studies have explored the combination of these two techniques.

CONCLUSION: While both VIP-CT graft and RIE technique have their advantages and disadvantages individually, their combination offers supreme benefits. These include easy access to the donor site, improved healing, less morbidity, excellent vascular supply, enhanced keratinized tissue, and increased gingival volume, leading to an exceptionally favorable aesthetic outcome for the patient.

Clinical Significance

The WIPAIR technique predictably enhances connective tissue and buccal volume, improving both peri-implant stability and esthetics in the anterior maxillary region.

Keywords

Soft tissue augmentation, Vascularized interpositional connective tissue graft, Implant esthetics, Connective tissue graft, Roll-in envelope technique, Soft tissue surgery, Esthetic surgery

Introduction

Restoring dental implants in the anterior maxillary region to achieve optimal aesthetic outcomes remains a significant clinical challenge. One of the primary contributing factors is the post-extraction loss of both soft

and hard tissues, which is particularly pronounced in the anterior maxilla. The buccal plate is especially susceptible to resorption, often leading to a substantial palatal displacement of the alveolar ridge (1). Moreover, bone resorption can result in the loss of up to 50% of the original ridge width (2). Such significant horizontal bone loss often results in a coronal displacement of the mucogingival junction (3), reducing the width of keratinized gingiva. Thin peri-implant soft tissue is often associated with compromised long-term implant stability and suboptimal aesthetic outcomes. (4) An adequate volume of peri-implant tissue is essential for developing a proportional emergence profile, which plays a critical role in achieving aesthetic harmony. In cases of gingival and ridge deficiencies, soft and/or hard tissue augmentation becomes necessary to facilitate a restoration that is both functionally stable and aesthetically pleasing (5). Depending on the extent of the defect, various periodontal plastic surgical procedures, ranging from hard to soft tissue augmentation, can be employed. In cases of minor ridge deficiencies, soft tissue augmentation is often the preferred approach. Although free soft-tissue autografts remain the gold standard for soft tissue augmentation (6), their disadvantages include prolonged healing time, soft tissue morbidity at the donor site, and the need for two surgical sites (7). To overcome these limitations, Sclar et al. (8) introduced the pedicled palatal periosteal connective tissue graft in 2003, providing a more predictable and minimally invasive approach for implant site development (8). Another well-documented technique is the roll-in-envelope method, which utilizes the pre-existing peri-implant soft tissue and strategically manipulates it to enhance mucosal thickness. This approach reduces postoperative morbidity while improving tissue bulk and aesthetic outcomes (9).

This study aims to introduce the WIPAIR technique, which combines two well-established techniques, the Vascular Interpositional Periosteal Connective Tissue Graft and the Roll-in-Envelope method to evaluate whether their combined application results in superior aesthetic outcomes by leveraging the advantages of both approaches

Materials and Methods

A 37-year-old male patient was referred to the Department of Oral and Maxillofacial Surgery at the NYU College of Dentistry. He had undergone dental implant placement in the region of the maxillary right central incisor three months prior at an external clinic. The patient was referred for the second stage of implant placement.

Clinical evaluation revealed a thin gingival biotype and a lack of keratinized tissue that could potentially compromise the long-term stability of the implant (Figure 1.a-b).

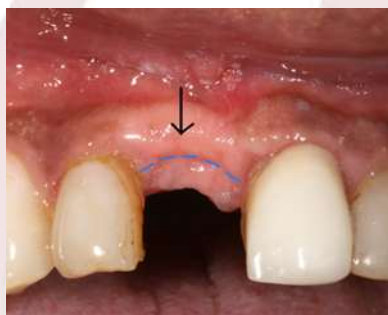


Figure 1.a: Pre-operative deficiency of keratinized tissue

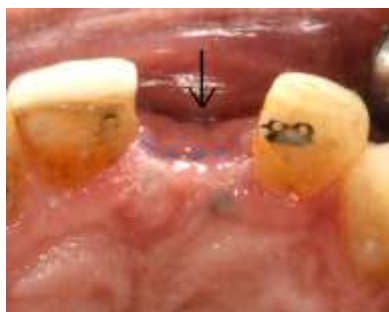


Figure 1.b: Thin gingival biotype and tissue deficiency

A literature review on soft tissue augmentation techniques was conducted across databases such as PubMed and Google Scholar using keywords including “VIP-CT graft,” “RIE technique,” and “soft tissue augmentation procedures.” A sum of 29 articles were included in the study. The inclusion criteria consisted of articles on clinical trials, case series, case reports, or systematic reviews describing VIP-CT grafts, RIE technique, or comparable soft tissue augmentation methods. Only articles publishing human studies and those written in English were considered. Preference was given to those reporting clinical or aesthetic outcomes such as peri-implant tissue stability, keratinized tissue gain, or gingival volume enhancement in the anterior maxillary region. Studies restricted to hard tissue augmentation, animal or in-vitro investigations, and publications limited to free gingival grafts or autogenous grafts without mention of VIP-CT or RIE were excluded. Exclusion criteria also included editorials, conference abstracts, letters, opinion pieces and articles without full text availability. Several studies discussed these techniques individually, no study to date has reported the combined use of both methods.

Results

The patient was informed of a proposed treatment plan involving a two-phase soft tissue augmentation approach: initially using the Vascular interpositional periosteal connective tissue (VIP-CT) graft to increase keratinized tissue (figure 2.a-h), followed by application of the Roll-in Envelope (RIE) technique (figure 3.a-f) to enhance buccal soft tissue volume for improved esthetics. The treatment was carried out in two phases. In the first phase, a VIP-CT graft was performed using a pedicled connective tissue flap harvested from the palate. Two months later, the second phase involved the RIE technique in conjunction with the second-stage implant surgery, during which a healing abutment was placed. An immediate provisional crown was delivered to promote an optimal emergence profile.

Postoperative follow-ups were scheduled at 2 weeks, 1 month, and 6 months, during which satisfactory healing and soft tissue outcomes were observed.

Surgery Phase 1: Vascular Interpositional Periosteal Connective Tissue graft procedure.

Two carpules (1.7 mL each) of 2% lidocaine HCl with 1:100,000 epinephrine were administered to achieve regional anesthesia, effectively blocking the right infraorbital, nasopalatine, and right greater palatine nerves, along with local infiltration for hemostasis. The recipient site was prepared by making a mid-crestal incision in the region of the maxillary right central incisor using a No. 12 blade (Figure 2.a). A partial-thickness suprapariosteal buccal pouch was then created through blunt dissection, extending apically to the mucogingival junction (Figure 2.b).



Figure 2.a: Mid-crestal incision placed in the recipient site



Figure 2.b: Creation of partial thickness supra-periosteal buccal pouch

For the donor site, a hockey stick-shaped incision was made, beginning from the disto-palatal papilla of the first incisor and extending posteriorly to the region of the right maxillary first molar, approximately 2 mm from the palatal cervical margin of the teeth (Figure 2.c). A full-thickness palatal flap was elevated and subsequently divided into two layers (Figure 2.d):

- The inner layer, consisting of the periosteum and the deeper portion of the palatal connective tissue, and
- The outer layer, composed of the superficial connective tissue and overlying epithelium.



Figure 2.c: Hockey stick shaped incision placed in the palate

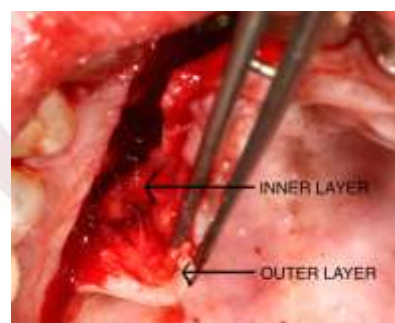


Figure 2.d: Division of the palatal flap in two layers

The inner layer was carefully dissected free from the palate distally, preserving its mesial attachment to the outer layer, thereby creating a pedicled connective tissue

flap (Figure 2.e). This flap was rotated anteriorly and positioned over the implant site, then tucked into the previously created buccal pouch (Figure 2.f). It was secured using 4-0 polypropylene criss-cross sling sutures (Figure 2.g and Figure 2.h). The outer palatal flap was then repositioned and primary closure has been achieved at the donor site.



Figure 2.e: Dissection of the distal part of the inner layer of connective tissue



Figure 2.f: Rotation of the flap anteriorly on the recipient site

The patient was prescribed antibiotics (Amoxicillin 500 mg, TID for 7 days) and analgesics (Ibuprofen 600 mg, as needed for pain control). Postoperative instructions included avoiding brushing in the surgical area and maintaining oral hygiene using 0.12% chlorhexidine mouthwash.



Figure 2.h: Immediate increase in gingival contour can be seen

The patient was recalled after two weeks for a follow-up, during which sutures were removed and a provisional retainer with a replaced tooth was delivered. The patient was then scheduled for the second phase of treatment after two months.

Surgery Phase 2: Roll-In-envelope technique with second stage of implant surgery.

Pre-operatively a gain in keratinized tissue could be noticed (Figure 3.a) After adequate local anesthesia was administered, the crestal tissue over the implant site was de-epithelialized using a 1 mm round diamond bur attached to a surgical handpiece. Any residual epithelial tissue was removed using a curette to ensure thorough de-epithelialization, minimizing the risk of pocket formation postoperatively.



Figure 3.a: Gain in keratinized tissue noticed post first surgery

A papilla-preserving incision was made using a No. 12 blade. A U-shaped flap was designed, consisting of two bucco-palatal incisions connected by a mesio-distal incision on the palatal end, encompassing the full extent of mid-crestal soft tissue over the implant (figure 3.b). A full-thickness flap was then elevated from the crest, followed by the creation of a buccal supra-periosteal pouch via blunt dissection, extending to the mucogingival junction (figure 3.c).



Figure 3.b: Papilla-preserving U shaped incision was made



Figure 3.c: 2.5 mm of keratinized tissue gained on reflection of full thickness flap

The previously prepared “tongue flap” (from the RIE technique) was carefully rolled and positioned into the buccal pouch and secured with 4-0 polypropylene sutures (figure 3.d). The implant cover screw was removed and replaced with an appropriately sized healing abutment. A horizontal mattress suture was placed around the abutment to approximate the buccal portion of the rolled flap with the palatal side, ensuring tension-free adaptation. Two interrupted sutures were placed to secure

the mesial and distal ends of the buccal flap. (figure 3.e and 3.f).



Figure 3.d: Flap was rolled inside buccal pouch and secured using sutures



Figure 3.e: Healing abutment placed and sutured



Figure 3.f: Immediate gain in buccal gingival volume observed

During the 2 weeks follow up, a labial frenectomy was performed using electrocautery to prevent soft tissue pull and a provisional crown was placed (figure 4). The subsequent follow-up visits were scheduled at 1 month and 6 months postoperatively to monitor healing and soft tissue maturation.



Figure 4: Frenectomy of labial frenum done

The VIP-CT graft resulted in a significant increase in keratinized tissue volume, achieving approximately 2.5 mm of additional tissue (Figure 3.c). This augmented tissue was then fully folded into the buccal pouch during the roll-in-envelope (RIE) procedure, leading to a notable enhancement in gingival volume.



Figure 5.a: Healed superior attachment of labial frenum



Figure 5.b: Gain in buccal contour



Figure 5.c: Gain in keratinized tissue



Figure 5.d: Gain in natural gingival volume

Discussion

Restoring a maxillary anterior implant prosthesis presents a significant clinical challenge due to the high aesthetic demands of this region. Achieving a natural-looking

restoration requires meticulous attention to the replication of both hard and soft tissue contours. However, resorption of the alveolar ridge following extraction or loss of tooth is an inevitable aftermath.(1) Some studies have shown around 91% prevalence of ridge deformity in the maxillary anterior region of patients with partial edentulism.(12) Additionally, since vertical bone loss is more evident on the buccal wall of the socket when compared to the lingual wall (13,14), it becomes essential to augment hard and/or soft tissue for adequate development of the implant site to obtain both aesthetically acceptable and functionally stable results.

The approach to treatment planning in cases of ridge deficiency largely depends on the type and severity of the defect present. According to several studies, ridge defects can be classified based on the extent of hard and soft tissue loss: horizontal, vertical, or combined deficiencies, each requiring a tailored surgical and prosthetic strategy. According to a study (15), the combination of both horizontal and vertical bony defects also classified as Seibert's class 3 possesses one of the highest risks in regards to achieving an unfavorable esthetic outcome. It is well-established that the thickness and quality of peri-implant gingival tissue plays a critical role in determining the long-term prognosis of dental implants, both in terms of biological stability and aesthetic outcomes. Moreover, peri-implant keratinized tissue is generally considered to be better adapted than alveolar mucosa in withstanding mechanical forces generated during mastication, thereby offering greater resistance to soft tissue breakdown and marginal bone loss over time (16), thereby supporting long-term survival of the dental implant. The availability of thicker phenotype along with a stable mucosal margin provides for better results and reduces the probability of peri-implant soft tissue dehiscence or deficiency (17). Therefore, obtaining and maintaining adequate gingival thickness and sufficient width of keratinized tissue during the early phases of implant restoration is critical for ensuring optimal peri-implant tissue health, function, and esthetics. This objective can be effectively achieved through contour augmentation using hard and/or soft tissue grafting techniques at the implant site(5). Before

finalizing the treatment plan, it is essential to evaluate various risk factors, including patient compliance, aesthetic expectations, medical history, and site-specific considerations related to the edentulous area (18). Several studies have demonstrated the successful application of less complex soft tissue augmentation procedures for defects involving up to three adjacent teeth of moderate severity, without the necessity for additional hard tissue augmentation (19). The advantage of exclusively using soft tissue augmentation over simultaneous hard and soft tissue grafting is that the time required for the procedure and obtaining results in the former is less than the latter (20).

In this study, since the patient only had one pontic site with a moderate tissue defect, augmentation using only soft tissue surgery was planned. The options for various soft tissue augmentation procedures for implant site development are free gingival autografts, free subepithelial connective tissue grafts, onlay grafts, interpositional grafts and connective tissue pedicle grafts. While free gingival autografts are considered the gold standard (6), some major disadvantages of this approach include the requirement for two surgical sites and an increased risk of graft necrosis due to limited vascular supply, as the graft relies entirely on the recipient bed for revascularization.

Additionally, since the epithelial characteristics of the graft are preserved at the recipient site, color mismatch may occur, potentially resulting in suboptimal aesthetic outcomes (11), considerable postoperative shrinkage, and unpredictable outcomes (8). Similarly, onlay-grafts are generally considered suboptimal for the management of larger defects, as the requirement for a greater volume of donor tissue may result in increased trauma to the donor site.

Furthermore, the limited vascularization associated with larger grafts increases the risk of graft necrosis, thereby contributing to a higher postoperative morbidity (21).

Some techniques of soft tissue augmentation, especially Vascularized interpositional periosteal connective tissue (VIP-CT) grafts (8,22) and Roll-in-envelope (RIE) (9,20) technique, have been well demonstrated individually to overcome these limitations and achieve desired results. This study introduces the WIPAIR technique, a novel approach that combines the advantages of both the VIP-CT graft and the RIE technique to produce additive clinical benefits. By integrating these two methods, the WIPAIR technique aims to overcome the individual limitations associated with each, thereby enhancing soft tissue outcomes while minimizing procedural drawbacks.

The results of the Phase 1 surgery, involving the use of a VIP-CT graft, were notably superior to those typically achieved with conventional free connective tissue grafts. Unlike free grafts, the pedicled connective tissue used in the VIP-CT technique retains its native vascular supply when rotated onto the recipient site. This preserved blood supply significantly reduces the risk of graft necrosis and postoperative shrinkage. Additionally, as healing occurs through the proliferation of epithelium over the grafted connective tissue, the color and texture of the overlying mucosa are maintained. This results in a more natural appearance and improved aesthetic integration with the surrounding tissues. These findings are consistent with those reported in previous studies, which have also demonstrated favorable outcomes (23).

One modification employed in the WIPAIR technique, similar to that described in the study (10), involves using a mid-crestal incision rather than the curvilinear incision traditionally used in conventional techniques. Additionally, a suprapariosteal pouch is created to receive the graft. This approach helped decrease surgical time, minimize tissue trauma, and enhance vascularization at the recipient site, thereby promoting faster healing and reducing postoperative morbidity.

When planning a pedicled graft from the palate, several anatomical considerations must be taken into account.

One critical factor is the thickness of the palatal tissue, which should be at least 4 mm to ensure graft viability and avoid complications (23). Additionally, an adequate palatal vault depth is essential to prevent adverse outcomes such as palatal perforations (10). This is particularly important because the palatal flap is split into two layers during the procedure. In patients with a shallow palatal vault, the proximity of neurovascular bundles to the cemento-enamel junction significantly reduces the margin of surgical safety (24).

Splitting the palatal flap into two layers has demonstrated several clinical advantages. The superficial layer, which consists of epithelium and a portion of the underlying connective tissue, helps preserve vascular supply to the overlying tissue, thereby reducing the risk of necrosis. Additionally, because this superficial portion is sutured back into its original position, healing occurs by primary intention, which promotes faster recovery at the donor site and results in reduced morbidity. These findings are consistent with those reported in a previous study (25), where this technique was associated with an improved risk-to-benefit ratio and a reduction in postoperative bleeding. The inclusion of the periosteum in the deeper portion of the flap, which remains pedicled to the recipient site, plays a crucial role in promoting bone regeneration and supporting the formation of keratinized tissue over the connective tissue graft. As a result, the VIP-CT technique yields a greater amount of keratinized tissue gain with more predictable healing and stable soft tissue coverage (26). In the WIPAIR technique, the connective tissue gained during Phase 1 using the VIP-CT graft was later utilized in Phase 2 during the Roll-In-Envelope (RIE) procedure to achieve the desired buccal gingival volume. A critical element for the success of RIE technique is the evaluation of whether sufficient thickness of keratinized tissue is available to be rotated and repositioned to establish an optimal gingival contour.

Using the WIPAIR approach, the desired gingival thickness was successfully achieved through the VIP-CT graft in Phase 1. In Phase 2, a curvilinear, papilla-preserving incision was employed to maintain the integrity of the interdental papillae and preserve the

aesthetic contours of the soft tissue. Additionally, the incision was strategically extended and positioned more palatally to maximize the amount of keratinized tissue available for rotation into the buccal pouch, thereby enhancing buccal tissue volume and overall soft tissue architecture.

A critical step in this procedure is the thorough de-epithelialization of the donor site tissue to ensure that only connective tissue is packed into the buccal pouch, thereby preventing the formation of a sulcular pocket. The advantages of the Roll-In-Envelope (RIE) technique include reduced technique sensitivity, shorter healing time, and the ability to achieve an adequate gingival contour that enhances esthetics. Additionally, this method is associated with less donor site morbidity and improved patient comfort, findings that are consistent with those reported in previous studies (27,28).

Some complications associated with the WIPAIR technique are similar to those reported in other studies (26,29), including the risk of flap necrosis, palatal sloughing, donor site morbidity, and the inherent technique sensitivity of the procedure.

A limitation of this study is its restricted clinical application and small sample size, which preclude robust evidence-based statistical analysis. These factors should be acknowledged when interpreting the findings and considering broader clinical implementation.

Conclusions

This novel soft tissue augmentation approach, termed the WIPAIR procedure, effectively combines the advantages of two well-established techniques to achieve superior aesthetic outcomes. By first utilizing the VIP-CT graft to increase connective tissue, followed by complete rolling of this tissue using the RIE technique, the method facilitates additive buccal volume, excellent gingival

contour, minimized patient morbidity and favourable healing conditions. Consequently, the WIPAIR procedure offers supreme esthetics and high patient satisfaction.

References

1. Jaime Pietrokovski, Maury Massler, Alveolar ridge resorption following tooth extraction, *The Journal of Prosthetic Dentistry*, Volume 17, Issue 1, 1967, Pages 21-27, ISSN 0022-3913
2. Lekovic, V., et al. "A Bone Regenerative Approach to Alveolar Ridge Maintenance Following Tooth Extraction. Report of 10 Cases." *Journal of Periodontology*, vol. 68, no. 6, 1997, pp. 563-70
3. Landsberg CJ. Socket seal surgery combined with immediate implant placement: a novel approach for single-tooth replacement. *International Journal of Periodontics & Restorative Dentistry*. 1997 Apr 1;17(2).
4. Ferreira CF, de Magalhães Barreto E Junior, Zini B. Optimizing Anterior Implant Esthetics With a Vascularized Interpositional Periosteal Connective Tissue Graft for Ridge Augmentation: A Case Report. *J Oral Implantol*. 2018 Aug;44(4):267-276.
5. Payne SH. Contouring and positioning. *Esthetics*. 1973.
6. Langer B, Calagna LJ. The subepithelial connective tissue graft. A new approach to the enhancement of anterior cosmetics. *International Journal of Periodontics & Restorative Dentistry*. 1982 Apr 1;2(2).
7. Luo RM, Chvartszaid D, Kim SW, Portnof JE. Soft-tissue grafting solutions. *Dental Clinics*. 2020 Apr 1;64(2):435-51.
8. Sclar A. Vascularized interpositional periosteal-connective tissue (VIP-CT) flap. *Soft Tissue and Esthetic Considerations in Implant Dentistry*.

- Chicago: Quintessence Publishing. 2003:163-87.
9. Shakibaie B, Sabri H, Blatz MB, Barootchi S. Comparison of the minimally - invasive roll - in envelope flap technique to the holding suture technique in implant surgery: A prospective case series. *Journal of Esthetic and Restorative Dentistry*. 2023 Jun;35(4):625-31.
 10. Farooqui AA, Kumar AT, Triveni MG, Shah R. Pontic site development by modified vascularized interpositional periosteal-connective tissue graft: A case series. *Journal of Dental Implants*. 2022 Jan 1;12(1):69-75.
 11. Bjorn H. Free transplantation of gingival propria. *Odontol Revy*. 1963;14:323.
 12. Abrams H, Kopczyk RA, Kaplan AL. Incidence of anterior ridge deformities in partially edentulous patients. *The Journal of prosthetic dentistry*. 1987 Feb 1;57(2):191-4.
 13. Araújo MG, Lindhe J. Dimensional ridge alterations following tooth extraction. An experimental study in the dog. *Journal of clinical periodontology*. 2005 Feb;32(2):212-8.
 14. Scharf DR, Tarnow DP. Modified Roll Technique for Localized Alveolar Ridge Augmentation. *International Journal of Periodontics & Restorative Dentistry*. 1992 Oct 1;12(5)
 15. Dawson A, Chen S, Buser D, Cordaro L, et al. The determinants of the SAC classification. *The SAC Classification in Implant Dentistry*. Berlin: Quintessence Publishing Co Ltd. 2009:6-9.
 16. Buyukozdemir Askin S, Berker E, Akincibay H, Uysal S , et al. Necessity of keratinized tissues for dental implants: a clinical, immunological, and radiographic study. *Clinical implant dentistry and related research*. 2015 Feb;17(1):1-2.
 17. Zucchelli G, Tavelli L, Stefanini M, Barootchi S , et al. Classification of facial peri - implant soft tissue dehiscence/deficiencies at single implant sites in the esthetic zone. *Journal of periodontology*. 2019 Oct;90(10):1116-24.
 18. Teehanke MT, Olcay V, Wiedemann TG. Vascularized Interpositional Connective Tissue Graft: An Alternative in Esthetically Demanding Regions. A Case Report and Literature Review. *Dent Oral Sci*. 2024;6(1):1-8.
 19. Naef R, Schärer P. Adjustment of localized alveolar ridge defects by soft tissue transplantation to improve mucogingival esthetics: a proposal for clinical classification and an evaluation of procedures. *Quintessence International*. 1997 Dec 1;28(12).
 20. Tarnow DP, Cho SC, Chu SJ, Froum SJ. Esthetic complications with adjacent implant restorations. *Dental Implant Complications: Etiology, Prevention, and Treatment*. 2015 Nov 16;316-31.
 21. Cortellini P, Tonetti MS, Lang NP, Lindhe J. Regenerative periodontal therapy. *Clinical Periodontology and Implant Dentistry*. 5th ed. Oxford: Blackwell Munksgaard. 2008:926.
 22. Nemcovsky CE, Artzi Z, Moses O. Rotated split palatal flap for soft tissue primary coverage over extraction sites with immediate implant placement. Description of the surgical procedure and clinical results. *J Periodontol*. 1999 Aug;70(8):926-34. doi: 10.1902/jop.1999.70.8.926. PMID: 10476903.
 23. Agarwal C, Deora S, Abraham D, Gaba R, Kumar BT, Kudva P. Vascularized interpositional periosteal connective tissue flap: A modern approach to augment soft tissue. *J Indian Soc Periodontol*. 2015 Jan-Feb;19(1):72-7. doi: 10.4103/0972-124X.145793. PMID: 25810597; PMCID: PMC4365162.
 24. Reiser GM, Bruno JF, Mahan PE, Larkin LH. The subepithelial connective tissue graft palatal donor site: anatomic considerations for surgeons. *Int J Periodontics Restorative Dent*. 1996 Apr;16(2):130-7. PMID: 9084301.
 25. Adriaenssens P, Hermans M, Ingber A, Prestipino V, Daelemans P, Malevez C. Palatal sliding strip flap: soft tissue management to restore maxillary

- anterior esthetics at stage 2 surgery: a clinical report. *Int J Oral Maxillofac Implants*. 1999 Jan-Feb;14(1):30-6. PMID: 10074749.
26. Rahpeyma A, Khajeh Ahmadi S, Reza Hosseini V, Azimi H. A bilateral pediculated palatal periosteal connective tissue flap for coverage of large bone grafts in the anterior maxillary region. *Iran J Otorhinolaryngol*. 2012 Summer;24(68):143-6. PMID: 24303400; PMCID: PMC3846218.
 27. Chowdhury S, Karar CK, Singh DK, Dutta D, Singh G, et al. Roll Flap Technique to Enhance Buccal Gingival Thickness and Implant Emergence Profile: A Case File. *J Oral Med and Dent Res*. 4(2):1-8.
 28. Barakat, Khaled & Ali, A. & Meguid, A. & Moniem, M.. (2013). Modified roll flap a handy technique to augment the peri-implant soft tissue in the esthetic zone: A randomized controlled clinical trial. *Tanta Dental Journal*. 10. 123–128. 10.1016/j.tdj.2013.11.004.
 29. Harris RJ. A comparison of two techniques for obtaining a connective tissue graft from the palate. *Int J Periodontics Restorative Dent*. 1997 Jun;17(3):260-71. PMID: 9497718.



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