

SOFT TISSUE MANAGEMENT AROUND IMPLANTS

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Abstract:- *The use of dental implants to replace the missing teeth has become a preferred alternative. Implant therapy has evolved significantly, regardless of the type of edentulism. The periimplant area primarily comprises the crestal bone and the healthy soft tissue around it. They are considered necessary for the long-term success of implant-supported restorations. If these two parameters are respected, implant therapy can be a reliable treatment with an impressive outcome. There are multiple aspects of diagnosis that are essential for the development of an appropriate treatment plan necessary for a successful outcome in aesthetic implant dentistry.*

Key words: - implants, soft tissue, periimplant, crestal bone

INTRODUCTION

With the gained awareness and the improved quality of life, analyses indicates that patients perceive their oral health status as improved by their experience with dental implants. Implant therapy has evolved significantly, from being one of the treatments of choice for edentulous arches to becoming a routine procedure to replace lost dental elements, regardless of the type of edentulism.¹ With this development, the objective of implant therapy has expanded from the functional restoration of the missing dentition to include the re-creation of the lost hard and soft tissues.² Natural teeth are surrounded by gingival soft tissues that provide a biologic seal between the oral cavity and the inside of the body.

This unique structure is composed of epithelium and soft connective tissue that are continually bathed in a transudate called gingival fluid.

Gingival Tissues:

The gingiva is masticatory mucosa that covers the tooth and underlying attachment apparatus. It encircles the necks of erupted teeth and firmly attaches to tooth and alveolar bone. The coronal part of the gingiva rests on tooth and forms a scalloped configuration.⁸ The gingival sulcus is the space between the marginal gingiva and the tooth. It is bordered on one side by the tooth surface and on the other by the epithelium lining the sulcus and covering the gingiva.¹

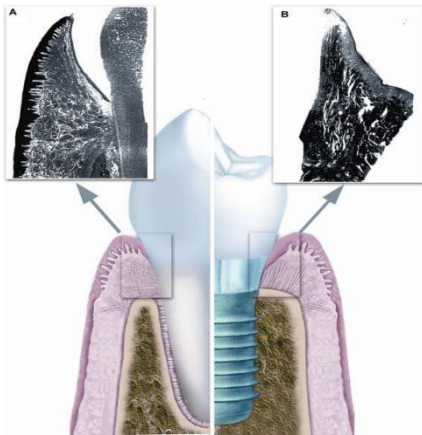


Figure : Normal Peri Implant Anatomy
 Cross-section of the buccal dento-alveolar region (A) and of the buccal and coronal part of the periimplant bone and mucosa (B). Similar anatomical components (i.e. sulcular epithelium, junctional epithelium and connective tissue) are present in both periodontal and peri-implant mucosa.

The periodontal attachment apparatus is responsible for creating and maintaining a seal or barrier around the teeth, which are constantly exposed to the oral microbial flora. Healthy, non-inflamed periodontal tissues are resistant to gentle periodontal probe penetration and tissue retraction away from teeth. When periodontal health is maintained, long-term soft tissue attachment and stability are predictable.

Periodontal Health/Disease

Periodontal health is essential for the achievement and maintenance of soft tissue aesthetics. Gingivitis and periodontitis are bacterial-driven inflammatory diseases that cause swelling and edema of soft tissues adjacent to contaminated tooth surfaces.

PERI-IMPLANT ANATOMY

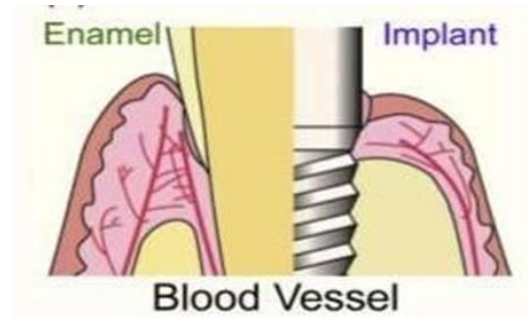


Figure : Blood vessel in natural tooth versus implants

THE BIOLOGIC WIDTH

The term biologic width refers to the entire dimension extending from the connective tissue attachment to the apical extent of the junctional epithelium.¹⁷

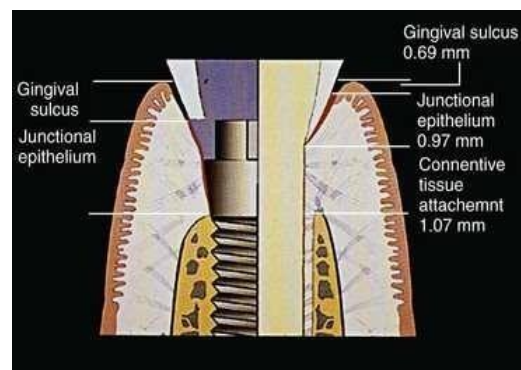


Figure . Biologic Width around Tooth and Implant

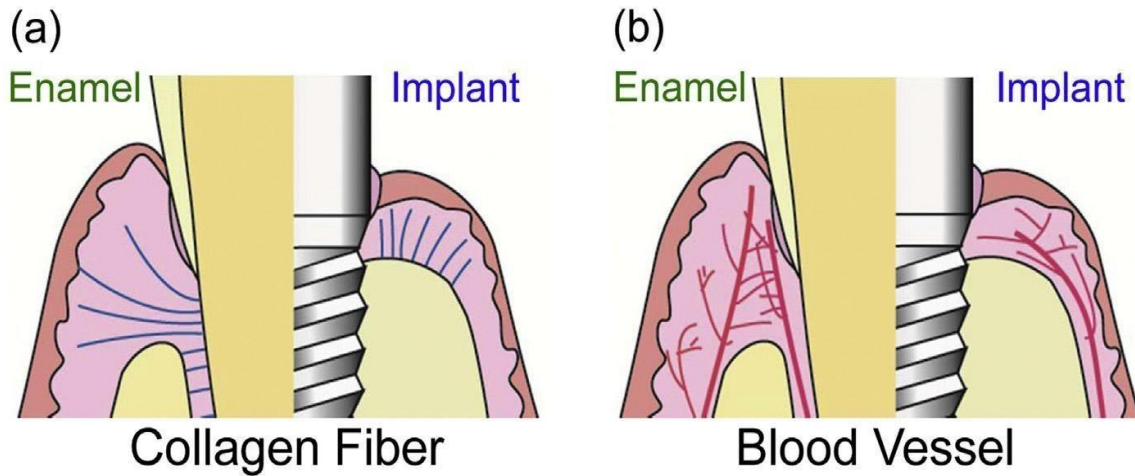


Figure. – Locus of collagen fibers and blood vessels in gingivae.

(a) Natural tooth has collagen fibers perpendicular to the cementum surface, whereas around implants, these fibers extend from the bone and run parallel to the implant surface.

(b) Normal periodontal soft tissue is supplied by blood from vessels running both outside the alveolar bone and through the periodontal ligament; in contrast, the peri-implant tissue has a reduced blood supply as the periodontal ligament source is not present.

TISSUE COMPLICATIONS AROUND IMPLANTS

The presence of peri implant mucosal recessions may significantly affect the esthetic outcomes, patient satisfaction, biological and clinical stability.

The etiology of peri implant mucosal recessions may be related to various factors such as the gingival phenotype (e.g., thick or thin), the presence of an insufficient width of attached/keratinized mucosa

Features		Tooth	Implant
Clinical Characteristics	Biologic width	Supracrestal	Subcreastal
	Probing depth	Normal 2-3mm	Increased \geq 4mm
	Bleeding on probing	Reliable Inflammatory sign	Less reliable as bleeding on probing is unrelated to the amount of inflammation in the peri-implant tissue
Tissue quality	CT composition	Low collagen and high Fibroblast	High collagen and low fibroblast
	Vascular supply	Increased (supraperiosteal, vascular plexus of PDL) Resilient connection	Less (supraperiosteal only) Rigid connection
	Hard tissue interface	Bone-periodontal ligament-cementum connection	Osseointegration, periodontal ligament and cementum absent
Soft interface tissue	Connective tissue Fibers	Perpendicular insertion into cementum	Collagen fibers parallel to the tooth surface
	Junctional Epithelium	Originates from the reduced enamel epithelium	Originates from the adjacent oral epithelium

Table 1: Differences Between The Peri-Implant Mucosa And Gingiva

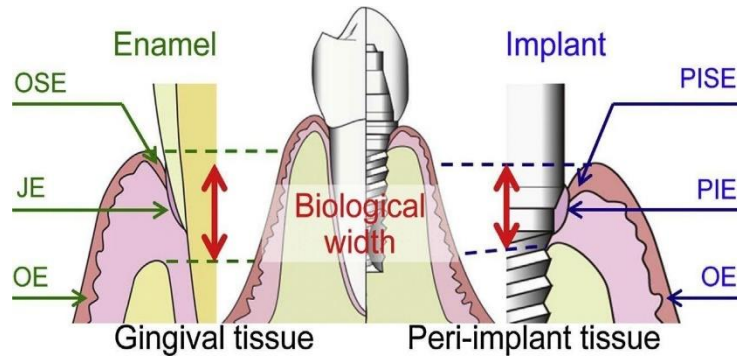


Figure. Landmarks of peri-implant and periodontal tissue. Diagram shows the key landmarks of the soft tissue attachment to natural tooth tissue (left panel) and their functional equivalents in the soft tissue attachment to an implant surface (right panel). (JE: junctional epithelium, OSE: oral sulcular epithelium, OE: oral epithelium, PIE: peri-implant epithelium, PISE: peri-implant sulcular epithelium).



Figure: Implants in position of teeth #12 and #23 presenting soft tissue recessions. These recessions result from improper positioning of implants, and problems in soft tissue handling during implant placement. There are no clinical signs of inflammation, no bleeding on probing, and probing pocket depth of 3-4 mm. These implants do not present any peri-implant disease but pose an esthetic problem and long-term risk to the implant biological stability



Figure: Thin soft tissue on the buccal aspect of implant #13 together with a concavity in the tissues apical to the crown margins leading to a shadow

PERI-IMPLANT PLASTIC

SURGERY

Definition : Peri-implant plastic surgery focuses on harmonizing peri-implant structures by means of hard tissue engineering and soft tissue engineering, and includes: bone structure enhancement; soft tissue enhancement; precision in implant placement; and quality of the prosthetic restoration.¹⁰

PRESERVATION OF SOFT AND HARD TISSUES PRIOR TO IMPLANT PLACEMENT

Post-extraction treatment modalities adopted to minimize the hard and soft tissue resorption are:

- Ridge preservation
- Socket preservation
- Immediate implants
- Orthodontic extrusion before tooth extraction

Principles of soft tissue management around implants at stage 1 and stage 2 surgery aims at:

1. Modified flap designs and suturing techniques
2. Augmentation of keratinized mucosa
 - Increase the width of KT
 - Increase the gingival thickness (biotype)

Techniques for Soft Tissue

Augmentation

Many of the techniques for soft tissue augmentation around dental implants have been adopted from periodontal soft tissue augmentation procedures.

Techniques include free gingival grafts (FGGs), pedicle grafts, subepithelial connective tissue graft (SCTGs), and various non-autogenous materials.

UNCOVERING TECHNIQUES

When a submerged approach is selected, a second surgery is performed for several purposes: it enables the implant to be uncovered and verifies the achievement of clinical osseointegration, it enables the healing abutment or the provisional restoration to be connected to the fixture.

TISSUE-PUNCH UNCOVERING TECHNIQUE

This approach finds its origin in the original description of the second-stage surgery by Dr. P.-I. Brånemark (Garber & Belser 1995). The technique was originally devised for implant-supported restorations of fully edentulous patients and did not consider the final aesthetic outcome of the peri-implant soft tissues.³

SURGICAL APPROACHES FOR SOFT TISSUE MANAGEMENT

Surgical approaches to augment the width of deficient mucosa are usually performed prior to implant placement or when undesired exposure of submerged implants occurs.

1. Apically positioned flaps (APFs) using a midcrestal/ lingual positioned incision.
2. APF/Vestibuloplasty (APF/V) in combination with autogenous tissue [subepithelial connective tissue graft (SCTG)/free gingival graft (FGG)].
3. FGG.
4. Epithelialized palatal graft technique.
5. SCTG technique or a soft tissue substitute [acellular dermal matrix graft. (ADMG)/collagen matrix (CM)].
6. Vascularized interpositional periosteal connective tissue flap vascularized interpositional periosteal connective tissue (VIP-CT flap).⁴

NONSURGICAL APPROACHES FOR SOFT TISSUE MANAGEMENT

1. Lengthening of the contact area.
2. Use of custom tooth form healing abutments.
3. Repeated scaling and curettage of the interdental papilla region every 15 days for 3 months.
4. Use of gingiva colored porcelain.
5. Implant collar surface characteristics
6. Use of zirconia abutments

CONTRAINDICATIONS FOR SOFT TISSUE AUGMENTATION PROCEDURES AROUND IMPLANTS

Certain medical conditions are considered general contraindications to surgical intervention. Collagen disorders such as erosive lichen planus and pemphigoid may pose a risk to the viability of autogenous connective tissue grafts placed on a recipient bed that exhibits a pathologic healing response. However, currently there are no published data to either support or discourage the use of soft tissue grafting techniques in such cases. Smoking is another relative contraindication. It is well established that a key determinant of soft tissue augmentation success is revascularization of the graft. Nicotine in cigarettes causes vasoconstriction to the surgical site, often resulting in necrosis of the graft.

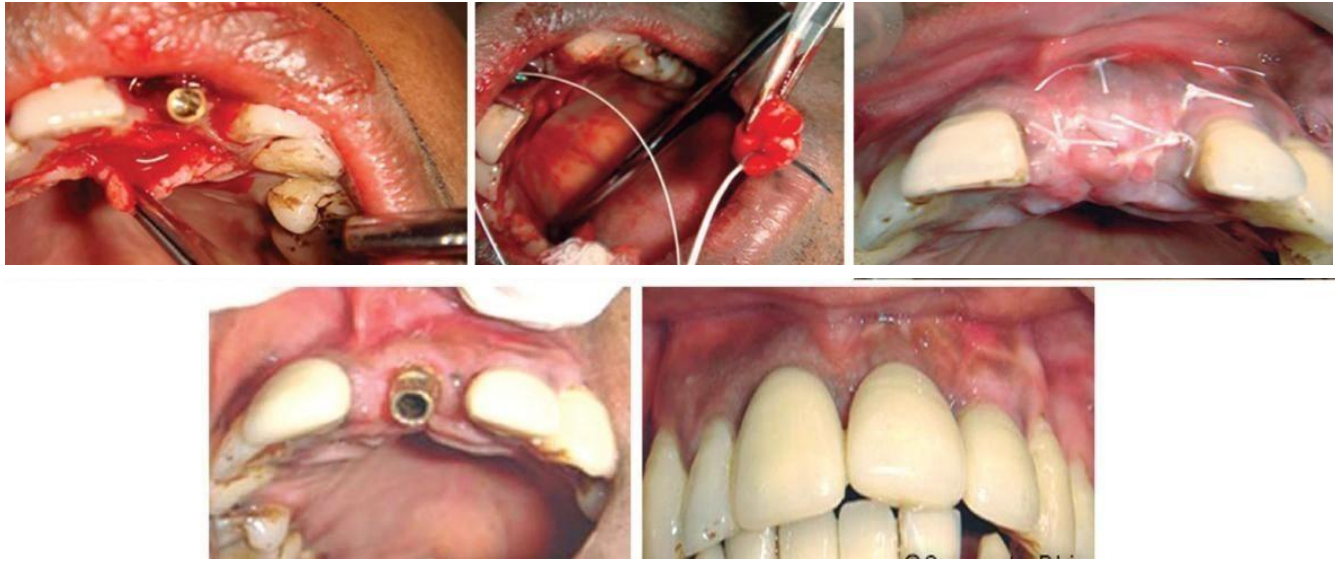


Figure : connective tissue graft for augmentation of buccal keratinized tissue (purse string technique): (a) connective tissue graft donor site (palatal) in relation to 21 (b) CTG graft threaded on the PTFE suture (c) CTG graft sutured (d) 2 months postoperative augmented buccal tissue with prosthetic abutment (e) final prosthesis in place

This nicotine associated vasoconstriction, in combination lack of adherence of the fibroblasts and alteration in immune response, diminishes the likelihood of a successful outcome. Preoperative assessment should attempt to identify such at risk patients, whereby the clinician must inform the patients of the potential adverse effects associated with smoking. Local factors that may also limit patient selection include lack of adequate tissue thickness at the palatal donor site, or restricted surgical access to intra oral donor sites such as the posterior of the hard palate.¹⁴

REFERENCES

1. Sanavi, F., Weisgold, A. S., & Rose, L. F. (1998). Biologic Width and its Relation to Periodontal Biotypes. *Journal of Esthetic and Restorative Dentistry*, 10(3), 157
2. Dhir S. Significance and clinical relevance of biologic width to implant dentistry. *Journal of Interdisciplinary Dentistry* 2012;2:84-91
3. Diego Capri .Soft Tissue Management Around Dental Implants

4. George JP, Dhir S. Soft tissue and esthetic considerations around implants. *J Int Clin Dent Res Organ* 2015;7:119-31.
5. Manicone, P. F., Raffaelli, L., Ghassemian, M., & D'Addona, A. (2012). Soft and Hard Tissue Management in Implant Therapy—Part II: Prosthetic Concepts. *International Journal of Biomaterials*, 2012, 1–6.
6. Rezaei Esfahrood Z, Kadkhodazadeh M, Gholamin P, Amid R, Passanezi E, HoseinZadeh H. Biologic Width around Dental Implants: An Updated Review. *J Dent Mater Tech* 2016; 5(2): 68-81.
7. Vacek JS, Gher ME, Assad DA, Richardson AC, Giambarresi LI. The dimensions of the human dentogingival junction. *Int J Periodontics Restorative Dent* 1994; 14:15
8. Yeung, S. (2008). Biological basis for soft tissue management in implant dentistry. *Australian Dental Journal*, 53(s1), S39–S42.
9. Meenakshi S, Raghunath N, Gujjari AK. Implant hygiene and soft tissue management: Dentist's perspective. *Int J Health Allied Sci* 2013;2:159-67.
10. Klokkevold, P. R. (2018). Soft Tissue Management for Implants in the Aesthetic Zone. *Implants in the Aesthetic Zone*, 95–119.
11. George JP, Dhir S. Soft tissue and esthetic considerations around implants. *J Int Clin Dent Res Organ* 2015;7, Suppl S1: 119-31
12. Araujo MG, Lindhe J. Peri-implant health. *J Periodontol*. 2018;89(Suppl 1): S249–S256
13. Al-Sabbagh, M. (2006). Implants in the Esthetic Zone. *Dental Clinics of North America*, 50(3), 391–407.
14. Chackartchi T, Romanos GE, Sculean A. Soft tissue related complications and management around dental implants. *Periodontol 2000*. 2019;81:12