

Soft Tissue Seal Around Dental Implants and its Maintenance

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Received: June 03, 2022

Published: July 05, 2022

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Introduction

Management of peri-implant soft tissues is emerging as a major concern over the past decade. Soft tissue stability is of importance not only for desirable aesthetic results but also in preventing peri-implant diseases. Soft tissue seal if not maintained properly allows microbial penetration which may predispose the implant towards implant complications or peri-implant diseases. This thereby affects the prognosis of implant therapy and its longevity. Soft tissue evaluation, its maintenance and augmentation when required is imperative for success in clinical implantology.

Important things to consider in soft tissue evaluation

The width of keratinized tissue

The external characteristic of the soft tissue between the mucosal margin and the muco-gingival junction is termed "keratinized tissue"; in its absence only mucosa surrounds the implants. For peri-implant health maintenance and facilitating proper oral hygiene procedures, a minimum of 2 mm of KT is considered necessary.

Thickness of the peri-implant soft tissue

Peri-implant soft tissue thickness is the horizontal dimension of the soft tissue between the outer surface of the mucosa and the implant surface. Thin phenotype is identified as a risk factor for gingival or mucosal recession. The minimum soft tissue thickness to prevent mucosal recession should be greater than the area occupied by the inflammatory infiltration (1-2 mm) induced by subgingival bacteria or toothbrush trauma. Therefore a soft tissue thickness greater than 2 mm is necessary to prevent dehiscence.

Structure of the soft tissue (epithelium and connective tissue) and implant interface

The orientation of fibers in connective tissue and vascularity of peri-implant soft tissues are the two main niches where implants

are disadvantaged as compared to natural teeth. The fibers run parallel to the implant or the abutment surface; resulting in poorly sealing connective tissue that may accelerate recession in implants. Adding to it is the vascular supply to the peri-implant mucosa, which is only from the alveolar suprapariosteal blood vessels. The connective tissue adjacent to the implant is similar to scar tissue, i.e. collagen-rich, relatively acellular and avascular. These differences emphasize the need for high maintenance of peri-implant soft tissues. The distance between the bone crest to the mucosal margin i.e., the height of peri-implant supracrestal soft tissue is longer in implants (3-4 mm) as compared to the supracrestal attachment of a natural tooth (2 mm).

Clinical relevance - The difference in these structures clinically translates to the differences in the pattern of spread of biofilm induced inflammation leaving it with greater susceptibility towards accelerated progression of inflammation.

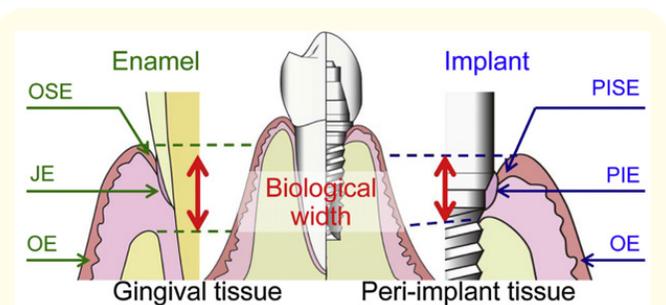


Figure 1: Landmarks of peri-implant and periodontal tissue.

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.

Maintenance of soft tissue around dental implants

The evaluation of clinical appearance of peri-implant tissues must be done during routine maintenance visits. Peri-implant mucosa should be evaluated for alterations of color, contour, and consistency, erythema, oedema, and swelling.

Probing depth measurement around implants is more sensitive to force variation, as compared to natural teeth. Probing force of 0.2-0.3 N is recommended. Even with this force, the probe is said to breach the junctional epithelium, but not the connective tissue. Epithelial attachment healing was noticed after 5 days of clinical probing. Clinical probing around osseointegrated implants does not have detrimental effects on the soft tissue seal or jeopardize the longevity of oral implants.

It is recommended to have a fixed reference point on the implant abutment or prosthesis for measurement of attachment levels. Probing depth of less than 5 mm is considered to be under peri-implant health. During the first 3 months after abutment connection, it is best to avoid peri-implant probing, as it may disturb healing and thereby the soft tissue seal.

Controversy exists if bleeding on probing represents clinical inflammation or is the cause of mechanical trauma. Hence, gentle probing and correct interpretation of visual and objective signs needs to be carried out. Peri-implant mucositis is a reversible phenomenon and with early diagnosis and treatment, its progression to peri-implantitis can be prevented.

Deplaning or scaling of implant surfaces or superstructures should be carried out at maintenance visits with plastic instruments so as to avoid any undesirable surface alterations. At-home care should be demonstrated to the patients and the need for accessory aids like interdental aids, waterpik or irrigation devices, antimicrobial or essential oil mouthrinses should be evaluated.

The following factors must be evaluated at each maintenance visit for soft tissue considerations :

- Presence of plaque and calculus
- Clinical appearance of peri-implant tissue
- Probing depths and presence of exudates or bleeding on probing
- Patient comfort and function

In addition to the evaluation, the maintenance appointment also should include

- Review of oral hygiene reinforcement and modifications
- Biofilm/calculus removal from implant/prosthesis surfaces
- Re-evaluation of the present maintenance interval, with modification as dictated by the clinical presentation.

Strategies to improve soft tissue seal

Several studies have been carried out to promote epithelial cell adhesion and prevent its downgrowth, enhance fibroblasts attachment and connective tissue adhesion. Such strategies include engineering approaches like changes in surface topography, biomolecular coating approaches or surgical approaches. These strategies could promote the adherence of the implants with the host soft tissues, prevent or reduce bacterial adherence and colonization or a combination of both.

Conclusion

With growth in the number of implants placed every year, it is imperative to enhance the success of implants. It is possible by taking into consideration the factors which affect the prognosis of implants. Peri-implant soft tissue is one such factor which has a major influence on the esthetics and function of implants. It is therefore important to evaluate it prior to implant placement and during maintenance visits.