

# SOFT TISSUE MANAGEMENT IN IMPLANT DENTISTRY: A REVIEW

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## Abstract

Implant therapy has evolved significantly since last few decades and has become a reliable treatment of choice for the replacement of missing teeth. Soft tissue management in implant dentistry has come forth as an important matter of concern in recent years. The knowledge and concepts about periodontal and peri-implant anatomy and biology are important for successful management of soft tissues during implant therapy. Appropriate selection and timing of soft tissue management procedures help to ensure a healthy peri-implant soft tissue environment and successful reconstruction of natural looking soft tissues with esthetic implant restoration. This paper presents an insight into various procedures and techniques of soft tissue management in implant dentistry.

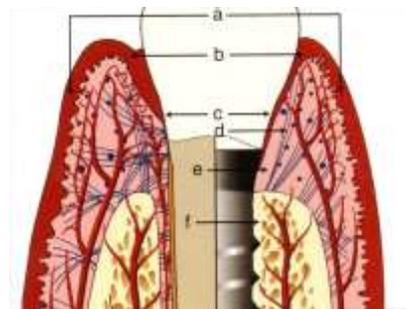
**Key Words:** Peri-implant soft tissue, Soft tissue management, Surgical techniques, Non-surgical techniques.

## INTRODUCTION

Implant therapy has evolved significantly over the last few decades and so has the expectations from it in terms of esthetics and function. Soft tissue management in implant dentistry has taken precedence in recent years<sup>[1]</sup>. The maintenance and augmentation of the soft tissue has come forth as an area of concern and focus<sup>[2]</sup>.

The success of implant therapy is dependent upon various factors including soft tissue management which is of paramount importance<sup>[1]</sup>. The knowledge and concepts about periodontal and peri-implant anatomy and biology are important for soft tissue management in implant dentistry.

Appropriate selection and timing of soft tissue management procedures help in establishing a healthy peri-implant soft tissue environment and successful reconstruction of natural-looking soft tissues with esthetic implant restoration<sup>[3]</sup>. This paper presents an insight into various procedures and techniques of management of soft tissues in implant dentistry.



**Fig. 1<sup>[26]</sup> – Comparative anatomy of periodontal and peri-implant soft tissues**

Where, a- Oral epithelium  
b- Sulcular epithelium  
c- Junctional epithelium  
d- lack of connective tissue attachment  
e- hypovascular- hypocellular connective tissue zone adjacent to the implant  
f- absence of periodontal ligament blood supply

## DISCUSSION

### Peri-Implant Soft Tissue Anatomy

Peri-implant mucosa comprises of highly keratinized oral epithelium, sulcular epithelium and junctional epithelium along with connective tissue. Hemi-desmosomes and basal lamina are present amidst the implant surface and epithelial cells<sup>[4]</sup>. The oral, sulcular and junctional epithelium in peri-implant soft tissues are quite identical to their periodontal counterparts in form and function. The connective tissue around teeth is cellular, rich in fibroblasts and highly vascularized whereas the connective tissue around implants has paucity of cells, is composed mainly of dense collagen fibres and has poor vascular supply. The alignment of fibres of connective tissue is in parallelism with the surface of the implant<sup>[5]</sup>.

### Biological Width around Dental Implants

The biological width around dental implants provides a defensive barrier to prevent invasion and ingress of food debris into the implant/soft tissue interface.

The total extent of contact of the epithelial and connective tissue components with the implant denotes the “biologic width”<sup>[6]</sup>. There is a biologic width of 3-4mm around the implant, slightly longer in comparison to that around natural tooth. Berglundh and Lindhe (1996) proposed that the establishment of biologic width was nature’s phenomenon in order to protect the osseointegration zone against bacterial and mechanical issues of the oral cavity<sup>[7]</sup>.

Healing of peri-implant soft tissue along with establishment of biologic width around the implant is necessary for prolonged survival of the implant. An optimal dimension of the biologic width is needed to attain a physiologic soft tissue seal. Inadequate dimension may lead to crestal bone resorption in order to attain space to establish the biologic width<sup>[8]</sup>.

### Surgical Techniques for Soft Tissue Management

Several techniques have been proposed for the management of soft tissues around dental implants.

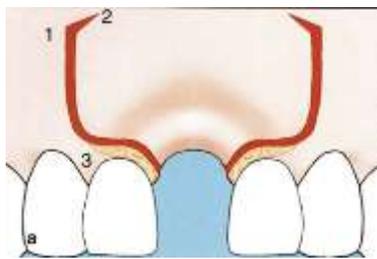
#### The Bio Col Technique:

This technique is exclusively used for site preservation in cases of defects involving both soft and hard tissues. An osteoconductive material such as Bio-Oss is utilized for regeneration of bone to preserve the site immediately after the extraction. Also, collaplug which is an absorbable collagen dressing, is condensed into the socket. Lastly, a provisional restoration is given to prevent tissue collapse<sup>[9]</sup>.

#### Flap Techniques:

##### Exaggerated Curvilinear Flap

This flap is indicated when exposure of the alveolar ridge on the facial aspect is necessary to allow visualization of the buccal anatomy or when hard or soft tissue augmentation is indicated as part of site development. The incisions are carefully beveled and directed through or parallel to existing anatomic landmarks such as the mucogingival junction and interdental grooves in order to provide aesthetic camouflaging<sup>[10]</sup>.



**Fig.II<sup>[26]</sup> – Curvilinear beveled incisions**

##### U-shaped Peninsula Flap

The palatal or lingual based U-shaped peninsula flap was advocated by Miller to achieve accessibility to the site of

implant placed in an esthetic zone, when exposure of the alveolar ridge on the facial aspect is not required for tissue augmentation. Avoiding buccal incisions reduce gingival scarring and recession of soft tissues<sup>[11]</sup>.



**Fig. III<sup>[26]</sup> – Peninsula flap design**

#### Tissue Punch:

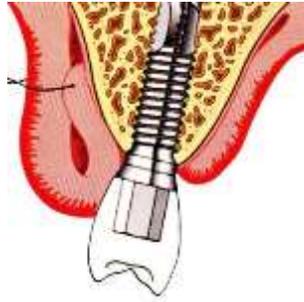
In implant dentistry, tissue punch is basically recommended for exposing a submerged implant with ideal bulk and contour of peri-implant soft tissues in the region crucial for prosthetic emergence. Various diameters of tissue punch are provided by manufacturers according to implant sizes<sup>[12]</sup>.

#### Soft Tissue Grafting Around Implants:

**Sub-epithelial connective tissue graft:** This method for reconstruction of interdental papilla was suggested by Langer and Calagna. It involves elevation of a facial envelope type of split thickness flap. An appropriate connective tissue graft is obtained from the region of maxillary tuberosity and placed in the deficit interdental papilla area beneath the flap<sup>[13]</sup>.

**Free Gingival Graft (FGG) or Epithelialized palatal mucosal graft:** The epithelialized palatal graft technique was advocated by Atkins and Sullivan for increasing the width of attached tissues in the region where implant is placed. A thick split thickness palatal mucosal graft is taken to precisely match the recipient bed. The graft is sutured and immobilized followed by placement of absorbable collagen dressing over it<sup>[14]</sup>.

**Modified Palatal Roll Technique:** This technique was proposed by Scharf and Tarnow in which palatal connective tissue pedicle is rotated or rolled into a prepared labial pouch. This procedure is indicated for correcting minor smaller size soft tissue defects around implants in maxillary anterior region and is recommended for both labial and vertical soft tissue augmentation<sup>[15]</sup>.



**Fig. IV<sup>[26]</sup> – The connective tissue pedicle is rolled and secured in the labial pouch via a horizontal suture initiated and tied apically in the vestibule.**

**Papilla Regeneration:** This technique was proposed by Jemt T to be performed at the time of second stage implant surgery. This technique advocates a T-shaped incision and the flaps on either side are made to slide laterally in order to occupy the space between the abutment/gingival former and adjacent teeth<sup>[16]</sup>.

#### **Guided Tissue Regeneration:**

Melcher in 1976 proposed the use of GTR membranes to accomplish soft tissue augmentation. The procedure involves the placement of an expanded polytetrafluoroethylene barrier membrane around the implant, covering the margins of alveolar bone. Then the flaps are repositioned with adaptation around the neck of implant and suturing is done. The GTR membrane acts as a barrier and separates the gingival epithelium and connective tissue from the wound space, permitting regeneration of bone and periodontal tissues. Examples of GTR membranes are polytetrafluoroethylene, polyglactin, polylactic acid, calcium sulfate and collagen<sup>[17]</sup>.

#### **Non-Surgical Techniques For Soft Tissue Management**

**Lengthening the Contact Area:** A classification system was advocated by Norland and Tarnow<sup>[18]</sup> for loss of papillary height which was related to interdental contact point as well as Cementoenamel Junction for classification of papillary loss. It was proposed that increasing the length of the contact area can decrease the black triangles and cover up the interdental papilla deficit<sup>[19]</sup>.

**Gingiva coloured porcelain:** It was proposed by Kamalakis<sup>[20]</sup> and many other authors that gingival coloured porcelain can be used on the cervical region of abutments or restorations to achieve esthetically pleasing results when surgical reconstruction is unfeasible.

**Custom tooth form healing abutments or Temporary restorations:** It has been recommended by several authors<sup>[21]</sup> that using custom tooth form healing abutments or temporary restorations at the early stage of implant placement or exposure helps in guiding soft tissue healing resulting in appreciable contours of soft tissue at the implant site.

**Surface characteristics of implant collar:** It has been documented that rough coated implant collar design bring about less crestal bone loss in comparison to smooth implant collar design, resulting in long-term maintenance of healthy soft tissues<sup>[22]</sup>.

**Platform switching:** Platform switching concept involves connecting an abutment that is smaller in diameter to a larger-diameter implant neck. This leads to inward shifting of perimeter of the implant abutment junction (IAJ) towards the axis through the centre which is the mid of implant. As proposed by Lazzara and Porter<sup>[23]</sup>, the inward shifting of the IAJ leads to inward shifting of inflammatory cell infiltrate away from the surrounding crestal bone which restrains the bone changes around the coronal part.

**Maintenance of oral hygiene:** Maintenance of proper oral hygiene and regular professional care are important for healthy peri-implant tissues. The patients' appointments should be scheduled as per required and maintenance program should be designed based on individual's needs.<sup>[24]</sup> The clinician should be mindful of the level of effectiveness of patient's home care, systemic status, and condition of the peri-implant tissues when scheduling the recall visits<sup>[25]</sup>.

#### **CONCLUSION**

Besides osseointegration, the success of dental implant treatment also depends furthermore on the soft tissue conditions around the implants. Soft tissue management has become an important part of the implant therapy. The concepts regarding soft tissue management in implant dentistry have evolved over the years. With new surgical techniques and improved materials, much better results can be achieved for the benefit of patients, with pleasing esthetic outcomes and functional success.

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