

# **A Review: Techniques for soft tissue management around the implants**



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## **ABSTRACT**

Dental implants, as a result of their excellent success rates and advantages over fixed or removable methods, have become the optimal treatment for replacing missing teeth. Surgical and restorative techniques that can reduce the loss of hard and soft tissues that often accompany implant placement are desirable. Achieving an esthetic outcome in tooth replacement and implant treatment requires a proper tooth shape and stable surrounding soft tissue profiles. This article introduces the several techniques of manipulating the soft tissue contours management so that optimal emergence profiles and increased restorative flexibility can be achieved in the treatment of patients and discusses the importance of soft tissue's condition surrounding the implant site.

## **Keywords:**

Dental Implants, Soft  
Tissue Injuries, Tooth  
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## Introduction

Dental implants are routinely utilized to replace missing teeth and have excellent success rates and several advantages over fixed or removable alternatives for tooth replacement. Implant restorations, however, do present the clinician with some challenges, since preserving the desired gingival and osseous architecture can be difficult.(1) The framework for the development of healthy aesthetic soft tissue is the osseous tissue, and soft tissue contours are dependent on the supporting hard tissue structures. Inter-dental papilla is the gingival portion, which occupies the space between two adjacent teeth. Hence, it is very important to respect papillary integrity during all dental procedures and to minimize as much as possible its disappearance. Patients have come to expect aesthetically pleasing restorative treatments and have questioned the disappearance of inter-implant papillae (so-called “black triangles disease”).Therefore, many soft tissue management techniques were developed to overcome this problem.

1. The use of Site-preservation Techniques often involves the use of surgical and prosthetic techniques to preserve both the volume and architecture of the hard and soft tissues at an implant site. The term site preservation is most often associated with techniques designed to preserve alveolar ridge anatomy following tooth removal, the author believes that site preservation also plays an important role in all of the surgical and restorative phases involved in implant therapy.(2)
2. The use of immediate implant placement and Immediate Provisionalization Techniques are paramount to the maintenance for aesthetic hard and soft tissue structures.(3)
3. The Surgical Index Technique: This procedure involves attaching a specialized fixture-level impression coping to the implant and registering its three-dimensional position relative to the adjacent dentition. At the time of implant placement, the surgeon must perform a surgical index (fixture-level impression) that is subsequently used to fabricate a working model upon which the abutment and provisional restoration are fabricated in the dental laboratory.(4)

4. Transitional Custom Abutment Technique are as a method of manipulating the supra-implant soft tissue contours so that optimal emergence profiles and increased restorative flexibility can be achieved in the treatment of patients with compromised fixture angulation.(5)

5. Custom Tooth-Form Healing Abutment: Another prosthetic technique used by the surgeon to initiate early guided soft tissue healing involves the use of custom “tooth-form” healing abutments. These anatomically shaped healing abutments closely approximate the cross-sectional anatomy of the lost tooth or the planned replacement at the gingival level . the use of custom tooth-form healing abutments is a practical approach for early initiation of prosthetic-guided soft tissue healing and is to be especially useful when one-piece non-submerged implants are used.(2)

Optimum emergence profiles can be predictably achieved only through the use of techniques that allow maximum manipulation of the available supra-implant soft tissue contours. It would, therefore, be advantageous to utilize intra orally modifiable implant restorative components to fully exploit the potential afforded by the dynamic remodeling ability of the gingival tissues.

### **BODY:**

Preservation or re-creation of natural alveolar ridge anatomy is a prerequisite for success in esthetic implant therapy. Natural hard and soft tissue contours allow both ideal implant placement and the emergence of a restoration that is harmonious with the adjacent dentition and free of prosthetic compensations.

### **Site-preservation techniques:**

The use of site-preservation techniques often reduces or even eliminates the need for subsequent reconstructive procedures. Site preservation often begins at the time of tooth removal. After removing a tooth, the dental implant team faces the formidable challenge of creating a prosthetic restoration that is in harmony with the surrounding natural dentition. To consistent-

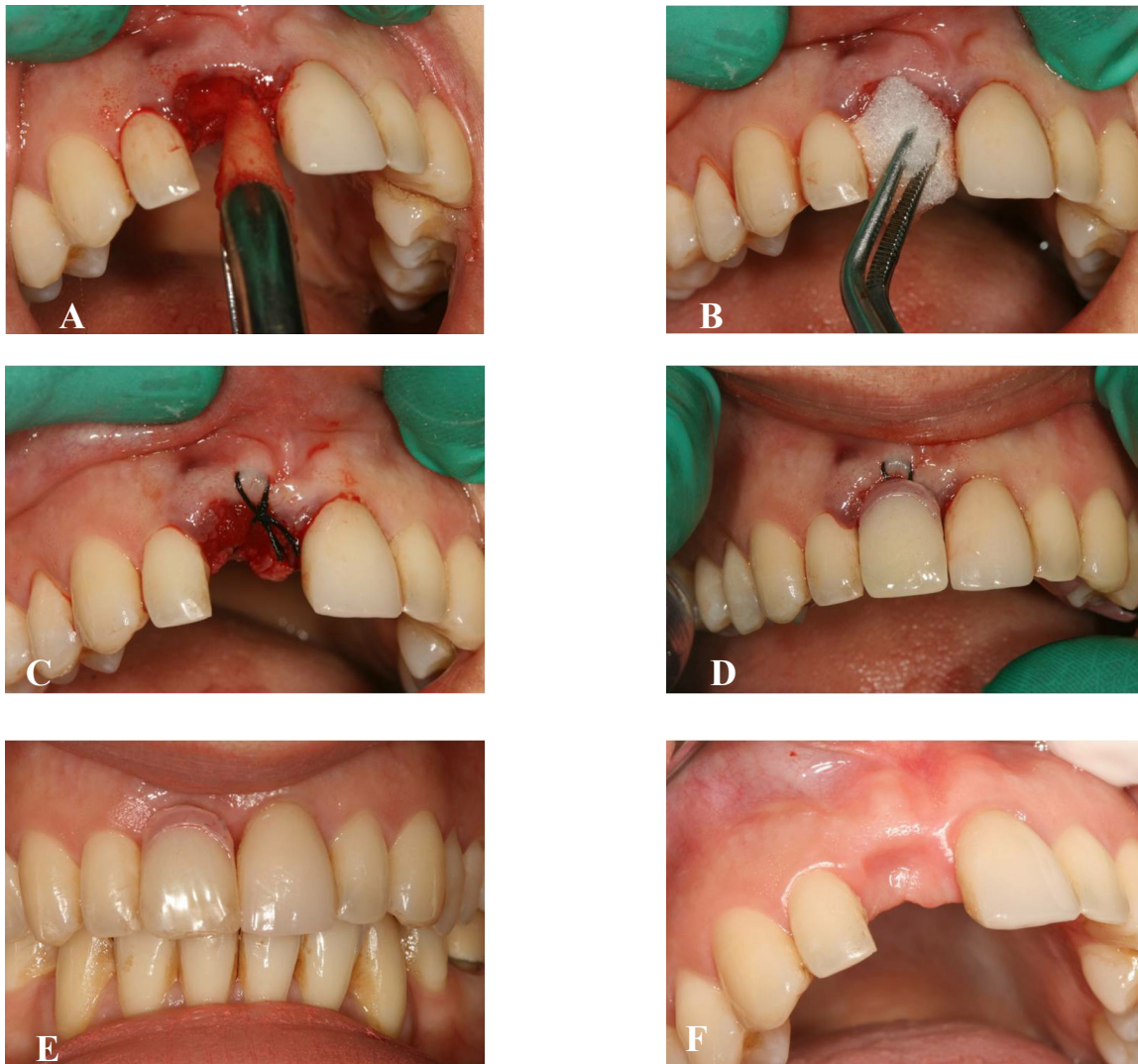
ly meet this challenge, the implant team and the patient must appreciate the importance of site preservation. For example, the flap designs and surgical approaches, which preserve circulation to the soft tissues at an implant site and thereby minimize their shrinkage, can be considered to be surgical site-preservation techniques.(6) Similarly, prosthetic techniques that provide anatomic support to the soft tissues, thereby preventing their collapse throughout the various phases of implant therapy, are considered to be prosthetic site preservation technique.(2, 7) Therefore, careful attention to site preservation at the time of tooth removal often reduces or eliminates the need for subsequent site development procedures (ie. hard and soft tissue grafting) in preparation for an implant restoration. Furthermore, and possibly of greater significance, failure to use site-preservation techniques at the time of tooth removal, even when additional grafting procedures will be unavoidable (eg. in the case of an unfavorable socket wall defect), increases the complexity of subsequent reconstructive efforts because of collapse of the soft tissues into the osseous defect. Subsequent contraction of the reconstructed soft tissue envelope and loss of elasticity of the soft tissue cover often necessitates additional soft tissue grafting procedures to provide adequate soft tissue coverage for the hard tissue reconstruction that will be required to re-create natural alveolar ridge anatomy at the site. Finally, the use of site-preservation techniques is especially important for patients with thin, scalloped periodontal biotype because of their predisposition for soft tissue shrinkage and concurrent alveolar bone resorption, which can jeopardize the long-term esthetic and functional success initially realized with an implant restoration. Bio-Col alveolar ridge preservation technique is one of these techniques to preserve hard and soft tissue alveolar ridge anatomy in preparation for immediate or delayed implant placement in esthetic areas. This proven technique combines both surgical and prosthetic protocols to consistently improve functional and esthetic results.(8) Alveolar ridge resorption is reduced or avoided by minimizing trauma during tooth removal,

preparation, and grafting of the extraction sockets. Isolation of the grafted socket prevents the need for flap elevation and primary closure, thereby preserving surrounding soft tissue volume. Most importantly, the scalloped soft tissue architecture is preserved by the prosthetic protocol, which provides support to the marginal tissues and interdental papillae and thereby preserves natural soft tissue anatomy at the site.(2)

The rationale for the Bio-Col technique's surgical site preservation protocol was based on the author's understanding that post extraction bone resorption could be reduced or eliminated by minimizing trauma to surrounding tissues during tooth removal, preparing and grafting a bleeding socket with an ideal Osseo-conductive material, that is slowly resorbed and replaced by vital bone, and using a technique to isolate the surgical site that avoids the esthetic disfigurement commonly associated with advancement and closure of a large mucoperiosteal flap over a membrane, but yields results similar to those obtained with traditional membrane assisted guided bone regeneration procedures.(9, 10) Similarly, the rationale for the Bio-Col's prosthetic site-preservation protocol was based on the author's understanding that supracrestal gingival tissue morphology is totally dependent upon support from the emerging dentition, and that the soft tissue collapse that occurs following tooth removal could be eliminated by immediately supporting these tissues with anatomically correct provisional restorations that replicate the natural tooth contours.(10) Finally, the rationale for combining the surgical and prosthetic site-preservation protocols was based on the author's understanding of the potential synergistic effects that result when surgical and prosthetic management are closely linked and coordinated. Specifically, the provisional restoration must be delivered immediately after completion of the grafting and isolation of the socket to protect the site from mechanical trauma during initial healing. This would ensure the maintenance and undisturbed healing of the osseous graft within the socket.(7) Ideally, the provisional restoration would be designed

with an ovate pontic that replicates the cervical anatomy of the extracted tooth. The pontic would extend approximately 2.5 mm into the soft tissue socket to provide both support for the surrounding soft tissues and protection for the underlying grafted socket.(11) A provi-

sional prosthesis that was designed and properly adjusted to avoid the transmission of micro-motion to the site, which would otherwise interfere with the integration of the graft complex, would promote maximum bone regeneration.(2)



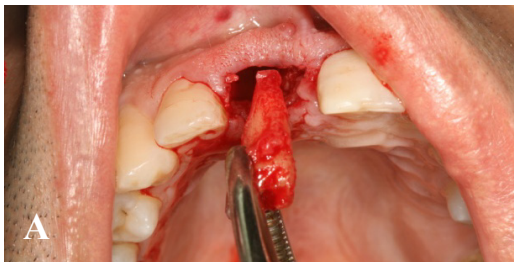
Figs 1. A-F: Showing step by step the usage of collagen after tooth extraction and utilizing acrylic flipper at the time of extraction. Final result after 6 weeks.

***Immediate implant placement and immediate provisionalization technique:***

The use of immediate implant placement and immediate provisionalization techniques are paramount to the maintenance for aesthetic hard and soft tissue structures.(12) the use of customized provisional abutments and immediate provisionalization have shown similar promise for their ability to provide optimal aesthetics and to shape the tissue response during

the healing phase achieving an esthetic outcome in tooth replacement and implant treatment requires a proper tooth shape and stable surrounding soft tissue profiles.(13) Bone augmentation is considered vital to support the esthetic soft tissue profile around definitive restorations.to prevent recession of the pre-implant soft tissue in cases with multiple implants , buccal augmentation of more than 2mm from the implant platform is necessary to overcome

the normal pattern of bone remodeling.(3) Following successful tooth extraction and subsequent bone grafting procedures over a four month period, the alveolar bone is adequately developed for implant placement. One day following implant placement, the patient present for fabrication of an immediate customized provisional abutment and provisional restorations. The use of a custom-fabricated provisional, a customized provisional abutment, and a custom-fabricated final abutment with the appropriate anatomical contours can allow the creation of imperceptible restorations that accurately mimic nature. As the clinician's restorative armamentarium continues to expand based on evolving technological advancements, the ability to deliver functional and aesthetic results with predictable longevity will also expand, allowing optimal results following implant placement.(14)



Figs2.A-E: Immediate implant placement and

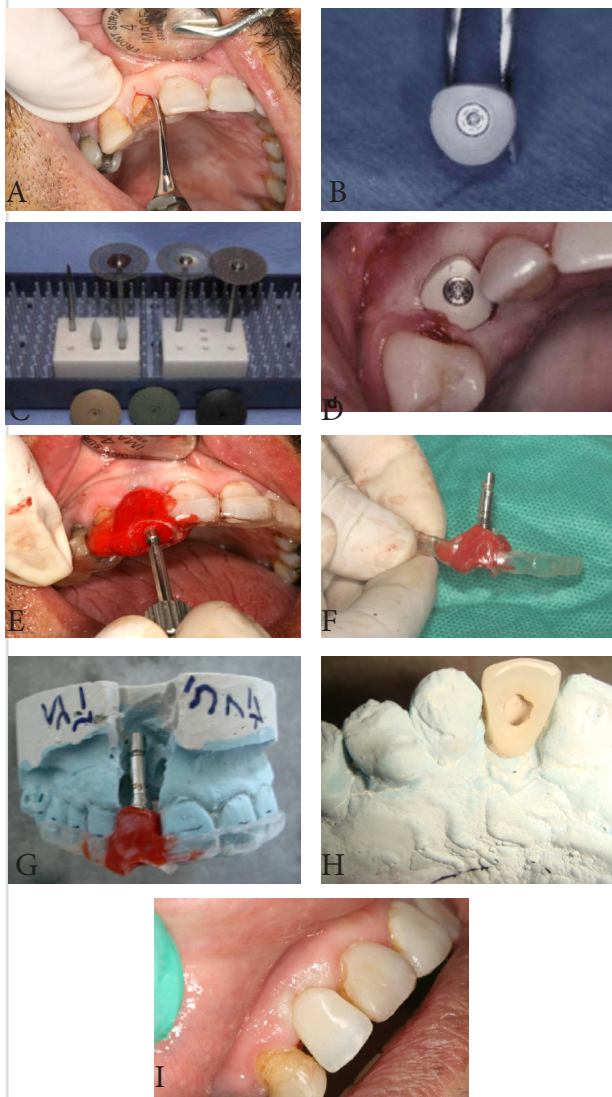
immediate provisionalization technique

### ***The Surgical Index Technique:***

The surgical index procedure involves attaching a specialized fixture-level impression coping to the implant and registering its three-dimensional position relative to the adjacent dentition. (15) Several materials were used to connect impression coping to surgical index such as pattern resin (GC) or Methyl Metacrylat (Duraly ) or fast set polyvinylsiloxane impression material . The material is injected around the index coping and over the incisal and occlusal surfaces of a sufficient number of adjacent teeth to provide an accurate index. The material is not injected into the surgical site. The surgeon dons a second set of sterile gloves to handle the impression gun. Once the index is complete, the second set of gloves is removed and the surgeon removes the index coping and attached impression material. An implant analog is attached to the impression coping complex and the combination is seated on an altered master cast fabricated from a full-arch impression taken prior to surgery.(4)

In order for the index to seat on the master cast, the edentulous site is prepared to receive the implant analog. Subsequent to seating the index, the analog is secured to the cast with quick-set plaster or acrylic resin. The result is a working model that contains a replica of the implant as recorded at the time of surgery. The working model should be fabricated within a few days to prevent any subsequent dimensional changes that might occur during prolonged storage of the index. Subsequently, the restorative dentist can impress the site to capture the soft tissue contours not initially registered by the surgical indexing. Approximately 3 months of healing following the last soft tissue surgical

procedure are recommended prior to obtaining the impression for soft tissue model fabrication. The soft tissue model aids the laboratory technician in the placement of restorative margins at an appropriate depth on the custom abutment. In most instances, the laboratory either casts or mills a custom abutment that incorporates proximal rise to ensure that the restorative margins are located in the superficial aspect of the peri-implant sulcus circumferentially. In addition, the provisional restoration is fabricated with ideal contours to support and guide the healing of the peri-implant soft tissues immediately upon exposure of the submerged implant. Significant occlusal adjustments or modifications to contours are rarely necessary.(2, 4)



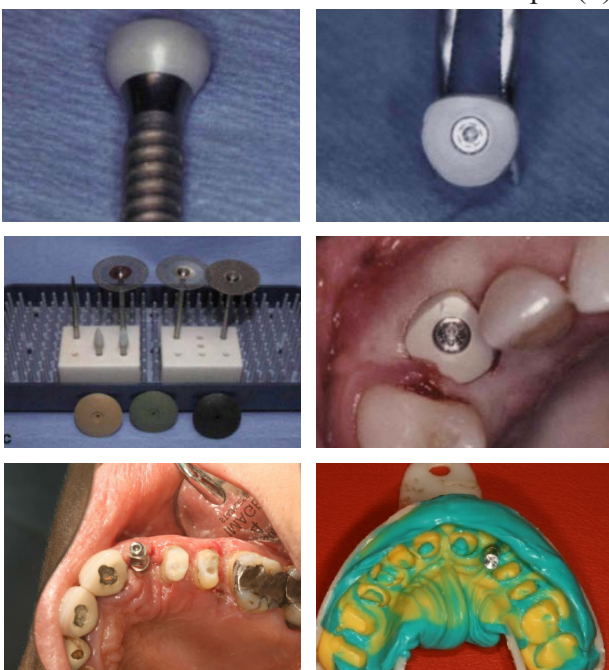
Figs3. A-I: The surgical index is used to create a working cast for fabrication of custom abutments or tooth-form healing abutments.

First, a pre surgical cast is altered by creating a receptor for an implant analog attached to the surgical index. Next, the index is seated on the cast and the analog is secured with quick-set plaster, rendering a working implant analog cast. A soft tissue mask can subsequently be added by taking a second impression after maturation of the soft tissues at the site.

#### ***Transitional custom abutment technique:***

Transitional custom abutment technique are as a method of manipulating the supra implant soft tissue contours so that optimal emergence profiles and increased restorative flexibility can be achieved in the treatment of patients with compromised fixture angulation. The use of transitional custom abutments may provide enhanced restorative flexibility and optimal emergence profiles in situations where mesiodistal positioning, buccolingual angulation, or fixture diameter selection have been compromised. This technique allows simple and controlled modification of the abutment profile to optimally manipulate the supra implant tissue contours. The tissue resistance generated by gingival expansion during seating of the abutment is effectively overcome by the screw-retained transitional custom abutment. In addition, excessively subgingival restorative margins are avoided and can instead be placed according to aesthetic and the dynamic nature of the process through which the abutments are initially customized and sequentially modified, and the manner in which the desired emergence profiles are progressively achieved.(3, 16) This technique utilizes a temporary cylinder abutment that is prepared according to implant angulation and interocclusal space. Lightcured composite resin is subsequently added to develop the customized abutment form. Once installed, the transitional custom abutment is gradually modified until the desired suprainplant tissue contours are achieved. This technique is not limited to the development of an adequate emergence profile, but may also include aesthetic enhancements to the tissue-restorative interface, eg, control of gingival margin position, creation of interdental papillae, and camouflage of com-

promised mesiodistal as well as buccolingual implant placement .(17)The term transitional custom abutment accurately describes the progressive contour modifications and consequent dynamic gingival remodeling process through which the desired emergence profile and pseudo alveolar gingival ridge forms are ultimately attained. Adequate position and proper fixture selection are essential in achieving predictable implant-supported restorations. The utilization of transitional custom abutments further enhances restorative flexibility while allowing the optimization of emergence profiles in situations that involve compromised fixture position, angulation, and selection. The technique’s versatility allows its application in simple as well as extensive restorations. Transitional custom abutments increase restorative flexibility since they can be progressively modified to address specific site requisites. With the use of this technique, tissue sculpting is prosthetically induced rather than surgically created. This requires revision of the technique and sequence of implant-related surgical procedures for maximum preservation of the attached gingiva. Once the desired emergence profiles are achieved, the recommended transfer impression protocol ensures an accurate replication of the gingival contours and, therefore, constitutes an integral component of the transitional custom abutment technique.(5)



Figs 4: Transitional custom abutment technique.

#### **Custom Tooth-Form Healing Abutment:**

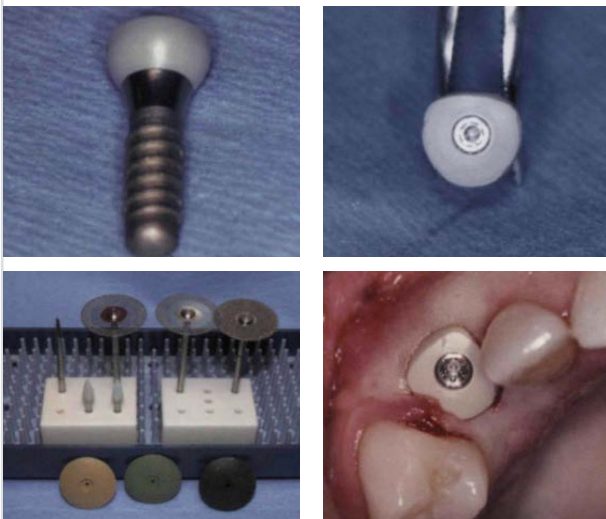
Another prosthetic technique used by the surgeon to initiate early guided soft tissue healing involves the use of custom “tooth-form” healing abutments. These anatomically shaped healing abutments closely approximate the cross-sectional anatomy of the lost tooth or the planned replacement at the gingival level. Custom tooth-form healing abutments can be fabricated in the laboratory from a surgical index, as described above, and subsequently delivered at implant exposure, or they can be fabricated on a working cast in preparation for nonsubmerged implant placement. This process involves laboratory modification of a prefabricated prosthetic component to approximate the cross-sectional anatomy of the proposed final restoration.

To start, a diagnostic wax up of the final restoration is performed and a surgical guide is fabricated.(18) The laboratory technician alters the study cast, assumes ideal implant placement by the surgeon, and secures an implant analog in the altered cast according to the surgical guide. A modifiable stock prosthetic component is then secured to the analog, and a tooth-form healing abutment is customized for that site.(7) The technician can use the contralateral tooth,

when present, as a guide for accurate reproduction of contours. The surgeon then delivers the custom healing abutment immediately upon placement of the non-submerged implant.

Minor chair-side modifications are sometimes necessary. Alternatively, the surgeon can modify a stock prosthetic component to create a custom tooth-form healing abutment for immediate use at the time of submerged implant exposure or non-submerged implant placement. When fabricated chair-side, a prefabricated component is modified either by adding acrylic resin or by reducing, shaping, and polishing an oversized cylindrical stock component.<sup>(19)</sup> A practical approach used by the author is to modify a stock component to match the mesiodistal width of the proposed replacement tooth and under contour the facial aspect of the custom healing abutment. This provides support and guidance for the adjacent papillae while allowing excess soft tissues to collapse

over the facial aspect, thereby preventing recession. The mesiodistal dimension of the contralateral tooth, if present, is measured with a Castro-Viejo caliper, and the dimensions are transferred to the modified healing abutment.<sup>(2)</sup>



Figs 5.A-D : Custom Tooth-Form Healing Abutment

## Conclusion

Although aesthetics represents an essential part of the dental treatment, the value of the results, the predictability of the different therapeutic modalities, and the long-term progno-

sis involve a scientific approach in all clinical procedures. In order to establish an optimal aesthetic implant restoration, and to achieve a successful outcome, the essential prerequisites should always remain a precise, comprehensive, biological, and prosthetic diagnosis as well as the choice of the most conservative, appropriate, and least traumatic treatment for the patient; these prerequisites are established to prevent any injury to the periodontal and dental structure with an adequate tridimensional position/orientation. The final objective is to achieve an optimal aesthetic restoration implant surrounded by its natural gingival environment in harmony with the adjacent teeth, using delicate osseous and/or mucogingival aesthetic surgery.

An understanding of both periodontal and peri-implant anatomy and biology is necessary for successfully managing the soft tissues during implant therapy. Similarities between the periodontal and peri-implant soft tissues provide the anatomic and biologic bases for applying basic periodontal flap techniques and reconstructive periodontal surgery in implant therapy, while differences reveal the limitations that can be expected when various periodontal surgical techniques are used during implant therapy. Understanding these similarities and important differences, the surgeon can modify standard periodontal techniques to make the more suitable for use in implant therapy. Armed with this knowledge, the surgeon can formulate a soft tissue treatment plan that includes the appropriate selection and timing of soft tissue management procedures to ensure a healthy peri-implant soft tissue environment and the successful reconstruction of natural-looking soft tissues from which an

esthetic implant restoration can emerge  
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