

# No Attached Keratinized Gingiva?

## *A Clinical Solution for the Clinician*



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### INTRODUCTION

Implant dentistry is becoming an important method of restoring missing teeth with function and aesthetics. Our patients are requesting and even demanding this type of therapy. Our modern materials and methods have made implant dentistry predictable with long-term positive prognoses. The surgical placement of dental implants involves a comprehensive understanding of both the surgical and prosthetic applications. However, today's implant dentistry is prosthetically- and patient-driven, so there needs to be a clear visualization of the completed restorative case prior to any surgical intervention.

Anatomic considerations need to be understood, including the position of the nerves, sinuses, and undercuts (Figures 1 and 2). The thickness and angulation of bone must be studied, and the integrity of the buccal and palatal or lingual plates clearly understood. Smile design and emergence profile has developed into an art unto itself.

Determining the position of the mucogingival junction prior to dental implant placement is critical to an ideal final result. If there is not a minimum of 3.0 mm of attached gingiva, a flapless technique that has become popular for implant placement should be replaced by the more conventional flap procedure.

This clinical case report will illustrate the use of a flap procedure in the placement of dental implants, with the subsequent creation of attached gingiva where there was only mucosal tissue.

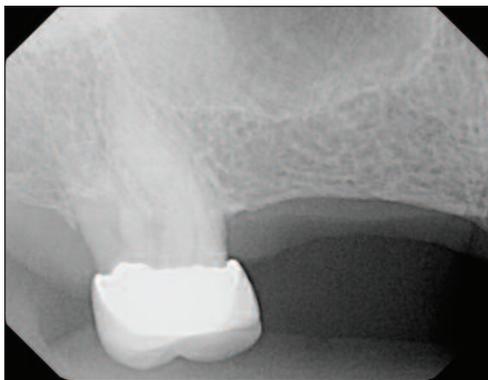
### Keys to Success

Prior to surgical placement of any dental implant, limitations need to be recognized. Implant design and technology, such as digital radiography, has allowed visualization of the underlying anatomy more effectively. However, soft-tissue considerations cannot be forgotten. Periodontal deficiencies, such as a lack of keratinized or attached gingiva, need to be determined and appropriately treated. This may result in the requirement for flap procedures prior to implant placement and creation of attached gingiva.

Success with dental implants is based on the need to achieve primary stabilization and



**Figure 1:** Edentulous maxillary right second bicuspid and first molar area in preparation for 2 dental implants.



**Figure 2.** Radiograph of edentulous space.

secondary integration of the titanium fixtures and also to maintain hard- and soft-tissue contours to create long-term function and aesthetics. Any irregularities, such as a lack of attached gingiva, need to be addressed prior to implant placement. This saves the practitioner a lot of time and effort in doing the case properly from the first step. "Measure twice, cut once," is a statement that can be readily accepted in dentistry today.

### Moving to More Minimally Invasive Procedures

Dental implants have become a popular way to reconstruct edentulous areas of the mouth. The surgical procedures have become less invasive over time, which results in less tissue trauma and discomfort for our patients. Oftentimes, our patients undergo procedures which have little bleeding, do not require sutures, and are relatively painless and easy on the patient. When visualization of the bone is required or if soft-tissue defects need to be corrected,

conventional flap procedures are necessary. Regardless of the techniques used (flap or flapless), local infiltration of the surgical site is followed by creation of the osteotomy sites for placement of the dental implants. A pilot drill, usually 2.0 mm or so, is used to create the proper angles and determines final depth. Digital radiographs are used to determine ideal mesial-distal angulation and vertical positioning. Following the pilot drill, wider diameter drills create the final bone opening to accept the properly predetermined implant size. Longer, wider implants provide more sur-

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face area for osseointegration to proceed and should be used in the edentulous space.

Our case presentation here demonstrates conventional dental implant surgical placement. The uniqueness of the treatment described here is the establishment of attached gingiva where a significant defect exists.

### Periodontal Considerations

Periodontal considerations really need to be understood. Circumstances arise when following tooth loss, the mucogingival junction is right at the crest of the edentulous ridge (Figure 3). This results in a lack of attached gingiva in the place where it is probably most needed. Periodontal procedures should be considered prior to implant placement. Stable gingiva margins are essential to the health of dental implants. The attached gingival tissue provides protection to external injury and is a critical component to proper tissue healing around dental implants. Without this keratinized tissue, food impaction and tissue shrinkage may occur which may affect long term bone stability and aesthetics.<sup>1</sup> Attached gingiva is important when the patient's plaque control is compromised, as plaque may invaginate to the implant surface. When situa-

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**Figure 3.** A periodontal probe was used to determine the position of the mucogingival junction (MGJ). The MGJ is on the facial aspect of the edentulous crest.



**Figure 4.** An initial incision was made on the palatal aspect of the edentulous crest.



**Figure 5.** Broad vertical incisions were made to the facial aspect maintaining a healthy blood supply, and a full-thickness flap was elevated, exposing the edentulous ridge bone.



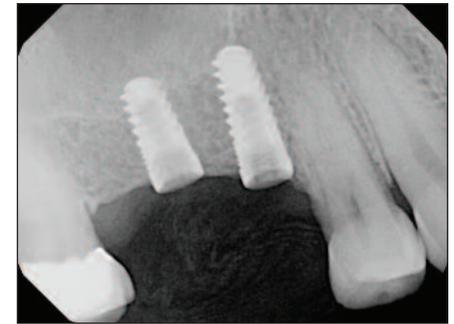
**Figure 6.** A 2.2-mm pilot drill made the initial osteotomy site to the established depth.



**Figure 7.** The osteotomy was widened with subsequent larger diameter drills to the predetermined depth.



**Figures 8 and 9.** The dental implant was threaded into the site to the level of the bone.



**Figure 10.** Digital radiograph of the properly positioned implant.



**Figure 11.** Tall healing abutments were placed into the ideally positioned dental implants. This was now considered to be a one-stage procedure as the healing abutment would penetrate through the gingival tissue.



**Figure 12.** Vicryl sutures were used to reposition the flap; and tied around the tall healing abutment.



**Figure 13.** Following one week of healing, the sutures were removed.



**Figure 14.** Exactly one month following surgical placement of the dental implants, the tissue on the palatal aspect was beginning to regenerate.



**Figure 15.** Five months after implant placement, the tissue appeared pink and firm with excellent keratinized attached gingiva on the facial aspect of the dental implants.



**Figure 16.** Following standard impression techniques, custom abutments were prepared and torqued into position.



**Figures 17 and 18.** Single until implant retained crowns were cemented into place.



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tions arise where the mucosal tissue is near or at the crest of an edentulous ridge, which is common following tooth loss, apically repositioned flaps following dental implant surgical placement may create a zone of attached gingiva. A healthy zone of keratinized mucosa around dental implants facilitates restorative proce-

dures and increases the patient's ability to control plaque and makes professional maintenance routine.

If not careful, keratinized tissue can also be lost during the initial surgical phase of implant placement due to the crestal incision made for flap preparation and also later as the result of second phase uncovering of the buried dental implant. The lack of keratinized tissue may result in the eventual lack of circumferential seal-

ing by the dense connective tissue collar created by the healing abutments during implant healing. This may result in a problematic environment for bacteria penetration and can compromise the long-term health and stability of the dental implants.

### Importance of Keratinized Attached Gingiva

Reconstruction of keratinized mucosa in implant sites is an important facet

of today's dental implant surgical procedures. The establishment of healthy pink tissue around implants results in more predictable maintenance and improved aesthetics.

Keratinized attached gingiva protects the tissue around teeth and implants from trauma. The tight contact of the keratinized attached gingiva which is from the gingival margin to the nonkeratinized free gingival mar-

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gin is essential for implant health and maintenance.<sup>2</sup>

Keratinized attached gingiva provides the periodontium with increased resistance to external injury, contributes to the stabilization of the gingival margin, and aids in dissipating physiological forces exerted by the muscular fibers of the alveolar mucosa on the gingival tissue. Apically positioned flaps, free gingival grafts, and the subepithelial connective tissue graft are the most common surgical procedures used for augmenting the zone of attached gingiva effectively and predictably. The newly obtained keratinized gingiva can be maintained for long periods of time. These periodontal procedures halt the

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progression of gingival recession and could lead to gaining more keratinized gingiva from creeping attachment after surgery.<sup>1</sup>

Without attached gingiva, the freely moveable alveolar mucosa, being more fragile, would suffer injury during eating and cleaning. The width of the attached tissue is critical because the more there is available provides a greater sense of protection.

Hemidesmosomal fibers attach the junctional epithelium to the teeth or implants, and is normally about one mm long. The oral sulcular epithelium is connected to the junctional epithelium. Thus, the gingival around dental implants needs to be firm and attached; otherwise the physiologic pattern of health may be broken.<sup>3</sup> Subjacent to the junctional epithelium is a connective tissue layer about one mm long. Around implants, the connective tissue fibers are parallel or oblique and do not insert into the implant surface, unlike teeth, where the fibers are perpendicular to the root surfaces and insert into the cementum. The blood supply around implants is less than around teeth, because there is no periodontal ligament around implants.

It has been determined that areas with less than 2 mm of keratinized gingiva, which means less than one mm of attached gingiva, remained

inflamed when there is plaque buildup. Thus, an adequate width of keratinized gingiva is important for maintaining gingival health.<sup>4</sup>

The absence of keratinized mucosa around dental implants increases the susceptibility of the peri-implant region to plaque-induced destruction.<sup>5</sup> One-stage surgical procedures have become popular and demonstrate the surgical placement of dental implants in an edentulous space and use of a healing abutment which penetrates through the gingival tissue. Because the implant is not buried, there is no need for a secondary surgical uncovering procedure, which is much less invasive to the patient and eliminates the need for local anesthesia and cutting of the tissue. Treatment time is thus reduced since secondary healing time is eliminated.

However, when there is a lack of keratinized tissue at the dental implant site, there may be a need to reconstruct the attached gingiva.

There are several approaches to create keratinized tissue in areas where there is none. Free gingival grafts have been reported in the literature as a method of idealizing soft-tissue concerns in edentulous areas. However, a vascularized flap to develop keratinized mucosa around the nonsubmerged dental implants would save time and discomfort to the patient. The donor site is the actual surgical site itself. The resulting tissue is indeed keratinized.<sup>3</sup>

Peri-implant issues can be reduced at the time of initial dental implant placement when there is a lack of keratinized tissues. A simple procedure can be used at the time of dental implant placement to replace flabby mucosal tissue on the crest of the ridge with keratinized tissue from the palatal aspect of the edentulous space. In the case highlighted here, an initial incision on the palatal aspect of the implant site was made followed by broad vertical incisions on the buccal aspect to maintain a healthy blood supply (Figures 4 and 5). The full-thickness flap was elevated toward the facial. The osteotomies were created and the implants placed using gradually increasing diameter osteotomy burs, which created the surgical site for the dental implants (Figures 6 and 7). Figures 8 and 9 illustrate the 3.7 mm diameter Implant Direct (Implant Direct) dental implants which were torqued into position at 35 Ncm to the crest of the edentulous

ridge. Figure 10 illustrates the digital radiograph taken after implant placement. Note the slight sinus tenting that was done. Tall healing abutments were then engaged into the body of the implants. Next, the buccal flap was repositioned and sutured around the tall healing abutments (Figures 11 and 12). Therefore, the attached gingiva, from the palatal and crestal area of the edentulous space, was repositioned to the facial. The 3-4.0 mm band of exposed bone on the crestal/palatal area is allowed to granulate in over time (Figures 13 and 14).

Following 4 months of integration and tissue healing (Figure 15) the healing abutments were removed and a conventional implant impression was made with impression copings. Custom abutments were fabricated by the dental laboratory team and torqued into position at 25 Ncm (Figure 16). Figure 17 shows the individual crowns cemented to position with proper contours and emergence profile. A healthy keratinized attached gingiva was established and can be seen in Figure 18.

### CLOSING COMMENTS

Dental implants provide the opportunity to fill edentulous spaces without damaging or compromising adjacent tooth structure. Not preparing healthy tooth structure is a huge advantage to the predictable treatment using dental implants. Implant retained crowns, when designed correctly, provide the patient stability and outstanding function. Tooth by tooth replacement and emergence profile allow simple cleaning with floss, which is much simpler and effective than hygiene around and under fixed bridges.

Replacement of missing teeth with dental implants is predictable and has become commonplace. Patients present to our practices with information gathered from many sources, including other medical specialists and even the Internet. They have often educated themselves on the benefits of implant dentistry. However, some cases present themselves that may be more difficult for the practicing dentists than others. Bone contour, tooth position, vital anatomy, and the lack of attached gingival, all need to be carefully evaluated to ensure a high quality functional and aesthetic final result. Dental implants can be a predictable way to improve the patient's smile and function. Over time there may be a significant cost savings since they are safe and highly successful in most candidates.

The quality of life of many of our patients can be dramatically improved through well-done implant dentistry. ♦

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