Creating Attached Gingiva is Mandatory for Dental Implants

by Timothy Kosinski, DDS, MAGD

Our patient is a 43 year old female who presents with edentulous mandibular left first and second molars. She also desired to have her maxillary dentition esthetically restored with conventional crowns. It was imperative that the mandibular arch be restored to function and several options were provided including a removable partial denture. The patient elected to have the edentulous space restored with dental implants. She does have controlled Crohn's diseas and microadenoma of her pituitary gland. Neither of these conditions contraindicate surgical placement of dental implants.

As implant dentistry has become a prominent means of replacing missing teeth, several items must be addressed to ascertain whether a patient is indeed a candidate for this therapy. First and foremost the patient must be relatively healthy, meaning no uncontrolled medical problems such as uncontrolled diabetes, uncontrolled hypertension or immunosuppressive diseases. Secondarily there must be adequate height and width of bone to accept the dental fixture. If enough bone is not available then more invasive bone grafting procedures would need to be considered. There also must be a thorough understanding of the anatomy in the sites to be considered. The relative position of the mandibular nerve and mental foramen and the maxillary sinus in the maxilla need to be demonstrated. The current use of CBCT analysis helps in the three dimensional visualization of vital anatomy and can help the practitioner idealize each individual case.

Modern, sophisticated implant design has made implant dentistry predictable with a long -term positive prognosis. Prioritizing prosthetic design prior to any surgical intervention can insure a functional and esthetic final result. There needs to be a clear visualization of the case finished prior to any surgical treatment.

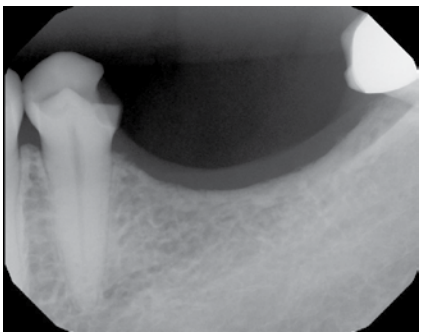

FIGURE 1: Digital periapical radiograph illustrating amount of bone available in the mandibular left first and second molar area.

FIGURE 2: CBCT analaysis demonstrates adequate bone height and width to accept dental implants

In this demonstration, our patient presents with an endentulous area in the mandibular left first and second molars. The mandibular second bicuspid needs a restoration. As is often seen clinically, there is significant vertical bone loss demonstrated in **Figure 1**. As teeth are lost, bone often shrinks vertically, but also horizontally toward the lingual. This bone loss will often result in the mucosal tissue following the bone, resulting in a lack of attached gingiva on the facial aspect of the edentulous site.[1]

The use of the CBCT scan taken using the PaX-i3D Green imaging system (Vatech America, Inc. Fort Lee, NJ) illustrates the amount of vertical and horizontal bone available for implant placement. **(Figure 2**) The mandibular canal is easily navigated and the lingual concavity understood. With this simple tool, I am able to determine that we have a good site for dental implant surgical placement as the nerve position is traced. (**Figure 3**)

Figures 4 and 5 illustrate that there is horizontal width available but that the vertical bone loss is excessive, but not impossible to deal with. The loss of bone height resulted in the mucogingival line, as marked in black here, is very high on the crest of the ridge. (**Figure 6**) Attempting to place dental implants without considering the attached gingiva available would result in mucosal tissue on the facial aspect of the implants which can result in discomfort, maintenance problems and possible bone loss around the implants.

An Orban knife is used to easily incise the attached gingiva around the adjacent teeth and on the lingual surface of the crest of the edentulous ridge. (**Figure 7**). Simply marking out the mucogingival line allows me to create a band of attached gingiva 2-3mm in width on the facial aspect, following implant placement. In **Figure 8** you see that the band of attached gingiva from the lingual portion of the crest was moved facially. The lingual attached tissue is not elevated at all. We can clearly see the amount of available bone.

Another tool used to help me visualize the eventual emergence profile of the final implant retained crowns is called an MD Guide (Golden Dental Solutions, Detroit, MI). The MD Guide is an alternative method to creating a computer generated surgical guide. The current surgical protocol is not altered, rather the MD Guide allows you to drill a pilot hole accurately to create proper mesial distal spacing and parallelism. The kit is comprised of 5 drilling

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FIGURE 3: The software within the Vatech America CBCT allows for virtual drawing in of the vital anatomy including the mandibular canal.

FIGURE 4: Occlusal view of available bone. Note the position of the mucogingival line of the facial aspect of the ridge near the crest.

FIGURE 5: View of the apparent severe vertical bone loss in the surgical site, which is often alarming.

FIGURE 6: The mucogingival line is traced using a marker. The intent is to take a band of attached gingiva from the lingual aspect of the crest and move it to the facial aspect of the final implants.

FIGURE 7: An Orban knife is used to incise the tissue. Note the incision is made on the lingual aspect of the crest to physically move a 2-3mm band of attached gingiva to the facial.

guides of various width, which mimic the approximate mesial distal width of the various teeth in the mouth. (**Figures 9 and 10**).

Once the initial pilot hole is made, I use my conventional osteotomy drills to create my implant site in the bone. Using the Hahn Tapered Implant System (Glidewell, Irvine, CA) The tapered body of the implant features prominent threads, which eases placement into an undersized osteotomy. The implants are engineered to allow precise angulation and positioning during placement. The buttress thread pattern of the implant provides good initial stability and minimizes resorption in all bone types, while its coronal microthreads aid in the preservation of crestal bone. The surface of the implant is treated with resorbable blast media to promote osseointegration.[2,3] The implant's machined collar facilitates soft tissue maintenance, while its conical, internal hex connection provides a secure stable prosthetic seal. A 2.2mm diameter pilot drill is used to create the final depth of the osteotomy. The correct mesial distal spacing was verified by the use of the MD Guide. (**Figure 11**) The digital periapical radiograph shown in **Figure 12** illustrates the length considered to be 8mm. The apices of the adjacent tooth is used as a guide to determine appropriate depth away from the mandibular canal. Since the tissue in the site was simply

FIGURE 8: The incision is made and the band of attached gingiva moved facially. Note that the lingual tissue is retained intact, without elevation.

FIGURE 9: The MD Guide pilot drill is used to help determine mesial distal positioning of the dental implant. It allows me to visualize the approximate emergence profile of the final crown.

FIGURE 10: Radiograph of two MD guides in position, approximating the mesial distal widths of the final implant retained crowns.

FIGURE 11: A 2.2mm diameter pilot drill from the Hahn surgical kit is used to create the initial osteotomy site to proper angulation and depth.

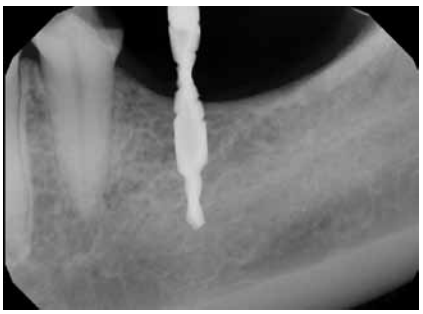

FIGURE 12: A radiograph determines the depth of the implant to be used to be 8mm. The apical position of the adjacent roots are used as a guide in determining depth.

FIGURE 13: The 3.5mm diameter osteotomy bur is used to create the final surgical site.

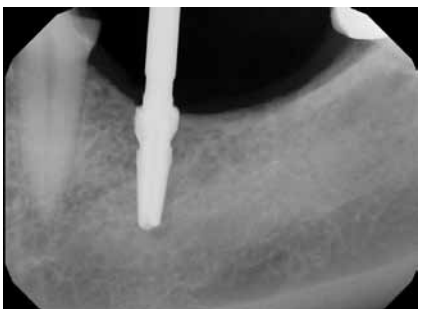

FIGURE 14: A radiograph of the osteotomy bur illustrates ideal position.

FIGURE 15: The Hahn implant is engaged into the seating tool and positioned into the surgical site with a handpiece set at 25Ncm of torque and 25RPM

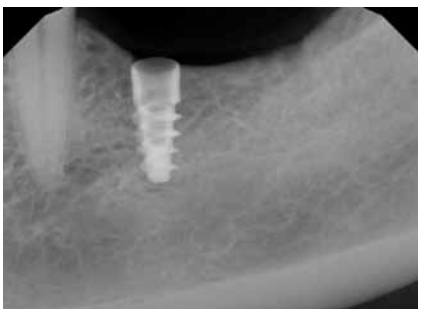

FIGURE 16: A radiograph verifies the implant position at the crest of the ridge.

infiltrated with anesthesia, and no mandibular block done, the patient's sensations can help the practitioner determine how close to the nerve he/she may be. A side cutting 3.5mm diameter osteotomy bur is used next to proper depth, as determined by another radiograph (**Figures 13, 14**). The 3.5mm diameter X 8 mm length Hahn dental implant is placed into the surgical site with the handpiece RPM reduced to 25Ncm and the torque set to 25Ncm. (**Figure 15**). A radiograph is made to insure ideal placement of the implant at the crest of the available bone (**Figure 16**). A 4.3mm X 8mm Hahn implant is placed into the osteotomy site created in the mandibular second molar site. Because both implants were torqued to 35Ncm, 5mm tall healing abutments are threaded into the implants to provide the source for re-attachment of the gingiva. (**Figure 17**).[4]

Note here that Vicryl sutures (Ethicon, Somerville, NJ) are used to reposition the band of attached gingiva taken from the lingual aspect of the crest of the ridge. This band of attached gingiva is sutured around the tall healing abutments and not onto the lingual tissue at all. (**Figure 18**). The 2-3mm open wound on the lingual aspect of the surgical site is not covered and is allowed to regenerate on its own. **Figure 19** illustrates the CBCT of the post operative ideal positioning of the dental implant. After one week (7 days) the sutures are removed. **Figure 20** shows how the initial healing progressed and the newly formed band of attached gingiva on the facial aspect of both implants. The mucogingival line has been moved down the vestibule significantly. After three months of integration, the band of attached ginigiva is apparent in **Figure 21**. The healing abutments are removed prior to final impression and illustrates the nice, healthy tissue cuff created by the abutments. **(Figure 22**) Conventional impression techniques are done using medium and heavy body Panasil

FIGURE 17: Because both implants were torqued to 35Ncm, 5mm tall healing abutments are placed and used to position the reflected attached gingiva from the lingual aspect of the crest to the facial aspect of the implants.

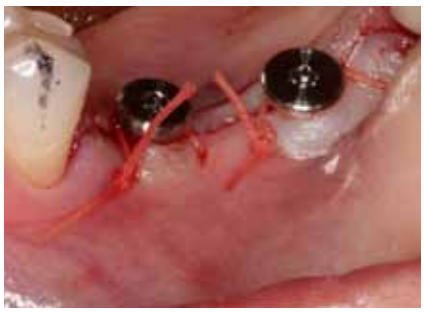

FIGURE 18: The 3mm band of attached gingiva is sutured to the healing abutments, leaving the lingual tissue intact. The open site on the crest will regenerate with attached gingiva is a short time.


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FIGURE 19: A final CBCT illustrates ideal position of the dental implant.

FIGURE 20: After 7 days, the sutures are removed. You can see the band of attached gingiva on the facial aspect of the healing abutments.

FIGURE 21: After 3 months of integration the attached gingiva is intact. The mucogingival line is significantly vertically repositioned.

FIGURE 22: The healing abutments are removed illustrating a healthy tissue cuff and a clear band of attached gingiva on the facial aspect.

vinyl polysiloxane material (Kettenbach, Huntington Beach, CA). (**Figure 23**). The implant transfer assemblies are threaded into the lab analogues and inserted into the final impression. **(Figure 24**)

The final impressions were sent to Glidewell dental laboratory (Irvine, CA)and custom titanium abutments were created using innovative CAD/CAM design. Note the margins of the abutments are at the gingival contour, thus preventing subgingival margins and potential for periodontal problems resulting for excess cement being pushed subgingiva.(**Figures 25**) The abutments are torqued to 35Ncm and the Bruxzir zirconia crowns cemented with Improv Provisional cement (Alvelogro, Inc. Pomona, CA). (**Figure 26**) I prefer a "soft" cement when seating my implant retained crowns and have done so for the past 30 years. This insures that if any issues arise with the implant retained crown or the implant itself, I can remove the crown and get back to the body of the implant. The final radiograph of the two implants illustrate a nice restorative result of an edentulous ridge.

Stable gingival margins are critical to the health of dental implants. The attached gingiva gives protection to external injury and is important to proper tissue healing around dental implants. Bacteria penetration can compromise the long term health of our dental implants. Without the keratinized attached gingiva, food impaction may occur as well as tissue shrinkage which may affect the long term prognosis and esthetics. Keritinized tissue is critical in area of the mouth where plaque control may be compromised. Hemidesmosomal fibers attach the junctional epithelium to the teeth or implants, and is normally about 1mm long. The oral sulcular epithelium is connected to the junctional epithelium.[5] Thus, the gingiva around dental implants needs to be firm and attached, otherwise the physiologic pattern of health may be broken. 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.[6] Often following tooth loss, mucosal tissue may migrate at or near the crest of the edentulous ridge. Learning to control the positioning of attached gingiva is a significant treatment modality which facilitates restorative procedures, emergence profile out of the gingiva, function and hygiene.

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FIGURE 23: Transfer impression coping are inserted into the implants and vinyl polysiloxane material is used to make the final accurate impression.

FIGURE 24. The impression copings are removed from the implants and threaded into laboratory analogues which are placed into the final impression.

FIGURE 26: The final Bruxzir crowns are cemented to place.

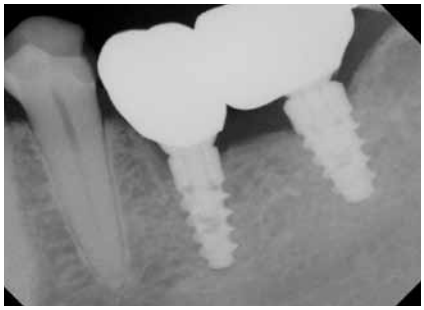

FIGURE 27: The final periapical radiograph illustrates a nice final implant retained restoration of an edentulous ridge.

FIGURE 25. Custom titanium abutments are torqued to 35Ncm into the implants. Note the position of the prepared margin at the gingiva contour.