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# A Simpler Approach to the Connective Tissue Graft

*This article shows an approach to harvesting connective tissue from the palate and using it as a graft for either a tooth or an implant.*

## INTRODUCTION

In the United States and Canada, soft-tissue grafting is something generally seen as within the purview of the periodontist. Great emphasis is placed in American dental education on referring surgeries other than extractions to surgeons. The anatomy of the palate and the techniques necessary to both harvest soft tissue and deal with the recipient site are either not taught at all or poorly emphasized in the conventional dental setting. As a result, general dental students graduate and become general dental clinicians who are often unable to easily incorporate soft-tissue grafting into their repertoires.

Historically, soft-tissue grafting has been associated with periodontal issues and concerns, such as gingival recession and minimal zones of keratinized tissue.<sup>1</sup> However, more recently, as the focus on aesthetics and thin phenotypes around implants has sharpened, general dentists may find themselves at a loss. While general dentists are performing implant surgeries at an increasing rate, they are often impeded by their lack of surgical knowledge and ability when it comes to soft-tissue grafting. In the past, this limitation of general dentists not performing connective tissue (CT) grafting had minimal effect since referral to the periodontist for diagnosis, prognosis, and treatment would occur. It followed nicely that surgical intervention would then be performed by the surgeon. As surgical implant placement has entered the wheelhouse of the general dentist with greater penetration, and as soft-tissue augmentation around implants is often beneficial,<sup>2,3</sup> it would be advantageous for general dentists to more confidently incorporate CT grafting into their skill sets.

This article presents a simpler and less technique-sensitive approach for harvesting CT grafts.

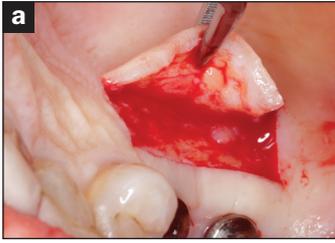
## CONVENTIONAL APPROACH TO HARVESTING CONNECTIVE TISSUE

Colloquially speaking, 2 types of soft-tissue grafts are generally sourced from the palate: the free gingival graft and the CT graft. The literature can be quite confusing on this matter, as terms and definitions are often used with imprecision, and there are numerous versions of each procedure, including many varieties of hybrid procedures.<sup>4-7</sup> We will here summarize each procedure and then describe a simplified approach, which is a hybrid of the two.

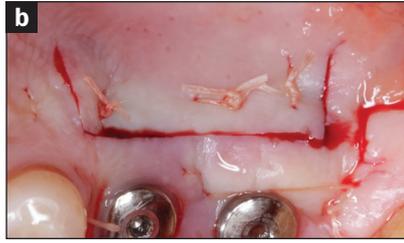
### The Free Gingival Graft

The free gingival graft is a partial-thickness, fully removed piece of tissue taken from the palate. By *partial thickness*, we mean that to remove the graft, you incise from the epithelium into the underlying CT but do not remove all of the soft CT superficial to the submucosa/bone. A free gingival graft is often a rectangular piece of tissue about 1 to 2 mm thick that is taken from the soft tissue palatal to the premolar/molar region.<sup>8</sup> A routine free gingival graft might be 5 to 8 mm wide (measured apicocoronally on the palate) and 10 to 25 mm long (measured mesio-distally on the palate), depending on the needs of the recipient site one intends to graft.

After the outline of the free gingival graft is made with a scalpel, the rectangle of tissue can be lifted slightly at an accessible corner using tissue forceps. Special forceps with teeth at the tip to grip the graft are commercially available, although college pliers can be used as well. With a scalpel,



**Figure 1a.** The incisions for this technique consist of a mesiodistal incision a few millimeters from the gingival margin and vertical incisions on the mesial and distal. A trap door flap was then lifted to provide access to the underlying connective tissue (CT), from which a graft was taken.



**Figure 1b.** After the graft was harvested, the trap door flap was sutured back into place for primary closure with three 4-0 horizontal mattress sutures, which resulted in a much lower risk for postoperative bleeding complications.



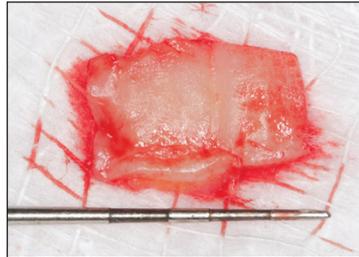
**Figure 2.** This technique consists of a single mesiodistal incision a few millimeters from the gingival margin, but with no vertical incisions. The CT graft is then harvested through the single slit. After the graft is harvested, the single incision can be sutured closed for primary closure, which results in a much lower risk for post-op bleeding complications. (Photo credit: Shmuel Stern, DDS, Miami.)



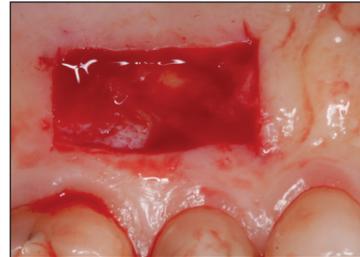
**Figure 3.** The outline for this graft has been drawn as a free gingival graft. Care has been taken to ensure it is far enough away from the teeth (3 mm) to prevent necrosis of the residual marginal tissue. The incision should be made only about 2 mm deep to facilitate graft removal but not cause unnecessary bleeding. (The bevel on the cutting edge of a scalpel is 1 mm wide, which can be used as a guide for this purpose.)



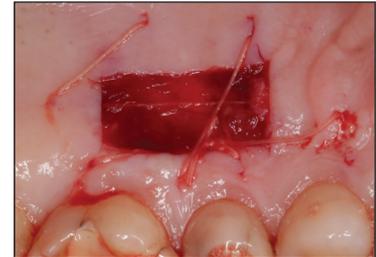
**Figure 4.** Only a portion of the epithelium has been removed to demonstrate the bleeding effect here, and bleeding can be observed from the de-epithelialized regions. After this photograph was taken, the remainder of the epithelium was removed in entirety and the CT graft was removed from the palate.



**Figure 5.** The dimensions of this CT graft were about 8 x 11 mm.



**Figure 6.** The incisions can be seen here to extend at the corners past the rectangular outline of the graft. This is done intentionally to ensure complete detachment of the graft from the donor bed, and these extensions heal along with the rest of the donor bed.



**Figure 7.** Sutures (4-0 Vicryl) were placed into the donor site in a stained glass pattern.



**Figure 8a.** An implant was placed into this lower left second premolar site 14 weeks prior, and it was ready for the second stage. Caries were detected on the DO of the first premolar and referred to restorative for caries removal and restoration.



**Figure 8b.** The plan for this site was to access it with a lingualized midcrestal incision (seen here) so that the occlusal soft tissue could be shifted facially for use on the facial aspect of the healing abutment. However, upon flapping the site and placing the healing abutment, one can observe a thinness of the flap at the coronal aspect that would prevent this technique from being employed successfully. For this reason, a CT graft was proposed to the patient and accepted.



**Figure 8c.** The soft-tissue graft from **Figure 5** was placed into the facial pouch made at this recipient site. If the CT graft was too thick, it would have been difficult to reapproximate the soft-tissue flap against the adjacent premolar and molar, potentially resulting in (further) recession.



**Figure 8d.** Simple interrupted sutures were placed into each interproximal area, as well as into the facial soft tissue to secure the graft to the closed flap.



**Figure 8e.** The site healed well over the 8 weeks from the second stage/grafting to the day of impressions. One can observe both the wide zone of keratinized tissue and the fullness of the facial aspect of the ridge as a result of both the lingualization of the midcrestal incision and the CT graft.<sup>17</sup>



**Figure 8f.** The final result exhibits sufficient keratinized tissue and facial bulk of soft tissue. The gingival margin appears ideal relative to the crown dimensions. There is minimal recession on the first premolar (which the patient did not want to attempt to augment), and the decision was made to leave the recession on the molar as is.



**Figure 9.** The cyanoacrylate glue was placed flush with the surface of the soft tissue, and locked in nicely around the suture lines.

the tissue intended as the graft can be separated from the underlying bed of CT. As palatal soft tissue can be anywhere from 3 to 7 mm thick, the way to manage depth is to maintain an even thickness of the graft rather than relate it to the graft bed. In order to avoid mishaps during graft harvest, a suture can be placed into the intended graft and either held by the assistant or “flossed” through tooth contacts just prior to the harvest.

After removal of the graft, the resulting donor site is a rectangular void that is highly vascular. Without a flap to gain primary closure, bleeding complications tend to be one of the most likely potential problems encountered.<sup>9</sup> We will discuss a method for gaining both hemostasis and closure later on in this article.

### The CT Graft

The first question surgeons generally encounter from general dentists when the discussion turns to CT grafting is “Why would one use a CT graft instead of a free gingival graft?” The answer lies in the anatomical differences between the two.

The free gingival graft consists of both epithelium and CT, while the CT graft is composed of CT *alone*. The CT graft, more formally referred to as the subepithelial connective tissue graft, is similarly sourced from the palate, but with a number of key differences.

As we stated above, the free gingival graft is taken from the palate with overlying epithelium, and the entire graft should be about 1 to 2 mm thick<sup>10</sup> (approximately 0.5 mm of epithelium along with approximately 1 mm of CT) and is taken from the surface, so to speak, of the palate. Note that in a 2010 study of a Korean population,<sup>11</sup> mean thickness of pal-

atal epithelium was 0.43 mm, with a range of 0.12 to 0.82 mm.

Traditionally, a CT graft is taken from the area deep to the epithelium via surgical access. Some techniques use a trap door (Figure 1), while others utilize a long mesial-distal slit, double parallel slit, or a single slit with a single vertical incision, through which the graft is cut from the surrounding tissue and removed<sup>11-13</sup> (Figure 2). Collecting the CT graft in these ways tends to be more difficult than the process for a free gingival graft because of technique sensitivity. If the trap door flap is made too thin, it is more liable to necrose.<sup>14,15</sup> If one uses a closed technique, where the graft is removed through a slit, an appropriate entry angle of the scalpel relative to both the epithelial surface and the underlying bone is critical, and the blind nature of the process may complicate matters for the novice.

### THE SIMPLIFIED HYBRID APPROACH TO CT GRAFTING

To maximize ease of harvesting the CT graft, we would like to review a method that entails neither a trap door nor a complicated single slit for blind harvest.

1. After anesthetizing the palate and determining the appropriate size, outlining incisions are made as though for a free gingival graft (Figure 3).

2. Prior to grasping and lifting a corner with tissue forceps, however, the surface epithelium of the delineated area should be removed with either a round or a football diamond bur. (I used samples of custom-made burs from Microcopy.) The depth of the epithelium can be best determined by the point at which bleeding from the surface becomes uniform. As there are no blood vessels within epithelium, uniform surface bleeding indicates that the superficial aspect of the underlying CT has been reached (Figure 4).

3. The delineated CT can now be harvested as though it were a free gingival graft. However, because it had been de-epithelialized, it is a CT graft.

4. Following removal of the CT graft, most surgeons place it between thoroughly moistened gauze to remain hydrated while the donor site is managed<sup>16</sup> (Figure 5). The donor site will appear as a large rectangular

void as it would following harvest of a free gingival graft (Figure 6).

5. Durable absorbable (often referred to as resorbable) sutures, such as Vicryl or PGA, should be used in a continuous fashion to form numerous passes across the large rectangular void of the donor site. This is called the *stained glass method* because the large void is now divided up into numerous smaller sections (between the suture lines). These smaller openings improve the site's ability to form clots and anchor the subsequent use of surgical glue (Peri-Acryl [Glustitch]) (Figure 7).

6. After the continuous suture is completed, apply pressure with gauze while you tend to the graft recipient site (we briefly cover this case's recipient site in Figure 8). So as not to leave the graft without vascularity for too long, it is recommended to have the recipient site prepared prior to harvesting the graft from the palate.

7. After completing work at the recipient site, return to the donor site to apply surgical cyanoacrylate glue (Peri-Acryl) (Figure 9). It often comes in clear and violet, and we recommend the latter for ease of visualization. The donor site will usually, by this time, have formed a clot, and a thin coat of glue to seal the site should be applied. The multiple suture lines running in somewhat haphazard directions help keep the clot and the patch of glue in place during healing providing adequate hemostasis and preventing pain during the healing process. A large hole of exposed CT on the palate would otherwise elicit pain every time food or the tongue touches it for a number of weeks.

There are a number of methods for obtaining CT grafts from the palate,<sup>17-21</sup> and the recommendations made in this article are not intended as a broad substitute for these other methods. With the appropriate training and experience, they can be very efficient and result in much smaller postoperative wounds at the donor site. However, due to the greater technical complexity of these methods, dentists new to harvesting CT might find the method outlined above easier to perform. ♦

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To submit Continuing Education (CE) answers, use the answer sheet below. Or, use our easy online option at dentalcetoday.com. This article is available for 2 hours of CE credit. The following 10 questions were derived from "A Simpler Approach to the Connective Tissue Graft," by Dale R. Rosenbach, DMD, MS, and Shira Theil, DDS, on pages 68 to 70.

**Learning Objectives:** After reading this article, the individual will be able to (1) know the difference between various types of soft-tissue grafting procedures, including some of the alternative surgical methods; (2) identify some of the indications for the various soft-tissue grafts; and (3) discuss with both patients and other clinicians how best to incorporate soft-tissue grafting into the comprehensive treatment plan. **Subject Code:** 492.

1. After harvest, many surgeons recommend \_\_\_\_\_ until it is ready to be sutured into the recipient site.

- a. keeping the graft hydrated between moistened gauze
- b. injecting the graft with anesthesia
- c. soaking the graft in chlorhexidine
- d. both a and c

2. A palatal epithelium mean thickness of 0.43 mm was reported in which population?

- a. Austrian.
- b. Korean.
- c. Brazilian.
- d. Canadian.

3. In order to avoid mishaps, which of the following was/were suggested?

- a. Placing a suture into the graft and "flossing" it through tooth contacts.
- b. Suturing the graft into place before it's fully removed from the donor site.
- c. Avoiding the use of suction during soft-tissue grafting.
- d. All of the above.

4. Which is not an alternative method for harvesting CT grafts?

- a. Single-slit incisions.
- b. Double-slit incisions.
- c. The Greenstein method.
- d. Trap door techniques.

5. Epithelium has no \_\_\_\_\_.

- a. basement membrane
- b. soft-tissue integrity
- c. cell-to-cell adhesions
- d. direct blood supply

6. While cyanoacrylate comes in both clear and violet, clear is not recommended because its bond strength is less than ideal.

- a. True.
- b. False.
- c. It depends on the pH of the saliva.
- d. It depends on the amount of inflammation at the surgical wound.

7. Because de-epithelialization can be such a painful procedure, a greater palatine nerve block is usually recommended. Following removal of a free gingival graft, the donor site will hardly bleed because most of the local vasculature has been removed with the graft.

- a. Both statements are true.
- b. The first statement is true; the second is false.
- c. The first statement is false; the second is true.
- d. Both statements are false.

8. Free gingival grafts are ideally about \_\_\_\_\_ thick.

- a. 0.25 to 0.5 mm
- b. 0.5 to 1 mm
- c. 1 to 2 mm
- d. 3 to 5 mm

9. The bevel on a scalpel blade is \_\_\_\_\_ wide and can be used to aid in gauging incision depths.

- a. 1 mm
- b. 2 mm
- c. 3 mm
- d. 4 mm

10. All of the following are good reasons to use glue except:

- a. It establishes good hemostasis.
- b. It exhibits antibacterial properties.
- c. It protects the open wound from contact with the tongue, which can elicit pain.
- d. Its ease of application.

**ANSWER SHEET Test 258, beginning on page 68**

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