Gingival Grafting Mandibular Anterior Lingual & Minimally Invasive Tissue Harvest

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1. Introduction
This seminar presents an approach to mandibular anterior lingual grafting that is evidence-based, predictable, practical, time-tested, replicable and outcomes-driven. It utilizes a recipient site coronally advanced flap (CAF) for placement of an autogenous tissue graft. Procedures are modified to: 1) Address the unique features of the mandibular anterior lingual zone relative to its local anatomy and the natural mouth/tissue movements that occur during the postoperative healing phase; 2) Enhance the establishment of functional keratinized tissue (KT); 3) Emphasize a minimally invasive treatment approach.

It is recommended that prior to performing mandibular anterior lingual grafting, that clinicians first have considerable experience in successfully performing buccal/facial aspect root coverage procedures for multiple contiguous teeth utilizing CAF and palatal-harvested Subepithelial Connective Tissue Grafts (SCTG).

Autogenous tissue grafting is well known as the gold standard for gingival recession therapy.  

It has the best track record in terms of safety, effectiveness, esthetics, and long-term patient value. For reducing recession, root coverage, gaining clinical attachment and increasing keratinized tissue, the highest-level evidence continues to point to autogenous tissue as the best available graft tissue. This seminar details minimally invasive autogenous tissue harvesting particularly well-suited for mandibular anterior lingual grafting.

2. Evidence, Rationale, Select Literature

Mandibular Anterior Lingual Grafting

Notes:
Donor Tissue Harvesting

- Harvesting Autogenous Connective Tissue with Retained Keratinized Epithelium
- Palatal Harvest
- Tuberosity harvest


Notes:

Retained keratinized epithelium band advantages:

Modified palatal harvest advantages:

Tuberosity harvest advantages:

3. Surgical Techniques
Depending on variables including individual patient presentation, as well as clinicians’ preferences, judgment and experience, there are variations to the fundamental recipient site preparation, tissue harvesting and suturing presented in this seminar. It is beyond the scope of this presentation to present every variation utilized by the Dr. Merijohn or to review surgical techniques reported in the literature by others. Importantly, the surgical techniques, clinical tips and treatment protocols detailed here are presented to serve not as strict rules but rather as guideposts on each clinicians’ path to developing her/his own treatment approach.
General Clinical Tips
Especially in reference to mandibular anterior lingual grafting, a few general clinical tips are provided in the seminar for the clinician’s consideration including the following:

It is recommended that prior to performing mandibular anterior lingual grafting, that clinicians first have considerable experience in successfully performing buccal/facial aspect root coverage procedures for multiple contiguous teeth utilizing CAF and SCTG.

Chambrone and Pini Prato reported important clinical factors for the clinician to consider, including: Minimal tension should be produced by suturing techniques and the tissue should be managed very gently during the surgical procedure; Early suture removal (<10 days postoperatively) can negatively affect root coverage; Flap thickness should be >0.8 mm & and tension should be ≤0.4g; The thicker the recipient site's gingival thickness after treatment, the higher the chance of root coverage achievement; Biotype modification of the recipient site (i.e., increasing KT and increasing CT density/thickness) is associated with better long-term stability and less gingival recession recurrence.*


Properly sharpened and shaped periodontal instruments increase efficiency and minimize the risk of tissue trauma. For the surgery described in this paper, these instruments include: Kirkland knife (K15-16); Orban knife (KO1-2); Universal surgical curette (e.g.: Prichard periodontal surgical curette 1/2); Rhodes back-action periodontal chisel 36/37; and periodontal curettes. (see page 10) It behooves the clinician to be able to proficiently sharpen and shape instruments chairside as needed during the surgery appointment.

Scale and root plane the teeth within the surgical/suturing zone on the day of surgery prior to making initial incisions.

Notes:

Step 1: Recipient Site Horizontal Incision
The recommended incision instruments are: Bard-Parker® #15 stainless steel scalpel blade mounted on a #5 round scalpel handle; Kirkland knife K15-16 and/or Orban knife KO1-2; Prichard periodontal surgical curette 1/2. Make the incision with the Bard-Parker® #15 stainless steel scalpel blade. Use the other instruments as needed, subsequently.

There is considerable variation in manufacturer tip design and shape of #15 scalpel blades. The Bard-Parker® #15 stainless steel scalpel blade is the recommended blade of choice [link to https://www.aspensurgical.com/catalog/blades-scalpels/bard-parker-conventional-blades-scalpels/bard-parker-conventional-blades/stainless-steel-blades/371215]

Bard-Parker® #15 stainless steel scalpel blade is the recommended surgical blade because:__________________________________________

Rationale for operator to utilize the standing position during surgery:_________________________________________________________________________

Horizontal position of incision relative to MGJ:_____________________________________________________________________________________

Why?

How to better distinguish the MGJ during surgery:___________________________________________________________________________________

Blade angle to tissue surface:______________________________________________________________________________________________

Why?

Incision depth:___________________________________________________________________________________________________________

Why?

Instrument selection rationale:______________________________________________________________
Notes:

**Step 2: Recipient Site Vertical/Oblique Incisions**
The recommended incision instruments are as follows: Bard-Parker® #15 stainless steel scalpel blade mounted on a #5 round scalpel handle; Kirkland knife K15-16; Orban knife KO1-2.

Why vertical/oblique incisions? __________________________________________________________

Describe the advantages over envelope flap and/or tunnel techniques:

Blade orientation relative to horizontal: ________________________________________________

Average incision length: ______________________________________________________________

Incision depth: Incisal 60%: ______________; Apical 40%: ________________________________

Flap “corners” importance: ____________________________________________________________

Notes:

**Step 3: Recipient Site Flap Reflection**
Gentle and precise tissue reflection can be accomplished with use of the Bard-Parker® #15 stainless steel scalpel blade on a round scalpel handle (#5), Kirkland knife K15-16, Orban knife KO1-2; Prichard periodontal surgical curette 1/2.

What to do when root dehiscences &/or fenestrations are observed: ____________________________

Full or partial thickness flap for the coronal 5-6mm? ______. Why?

On the right or left of the midline, an ascending branch of the sublingual artery (SLA), submental artery (SMA) or the anastomosed SLA-SMA may be observed approximately ____% of the time. What can be done?

Check flap for low-tension/tension-free flap mobility during coronal/incisal advancement. The flap should be very gently manipulated and carefully advanced without pulling. How far should the flap be advanced?

If further release is needed, first do: __________________________ release (R & L). If further release is needed, then do: __________________________.

Notes:

**Step 4: Donor Site Harvest with Retained Keratinized Tissue Band**

4a) Tuberosity Harvesting Tips: The External Wedge Harvest
The recommended instruments for the External Wedge harvest are: Bard-Parker® #15 stainless steel scalpel blade mounted on a #5 round scalpel handle; Kirkland knife K15-16; Orban knife KO1-2; Rhodes back-action periodontal chisel 36/37.
The External Wedge Harvest is the first consideration for high quality dense CT grafts. Why?

Enhanced access and lighting facilitate tuberosity harvesting.

Diagnostic quality images are indispensable.

The following sequential steps are recommended:

1. Buccal aspect incision. Orientation relative to MGJ: __________________________. Why?

2. Palatal incision: __________________________

   Note: for buccal and palatal incision, monitor the angulation of the scalpel blade, taking special caution to not undermine the External Wedge.

3. Connect the buccal and palatal incisions at the distal aspect: This is best accomplished by use of a sharp Kirkland K15-16 and/or Orban KO1-2.

4. Remove the External Wedge: Avoid using tissue forceps or hemostats on the harvested tissue. Why?

   Question: should the surgeon bevel or blend the borders of the tuberosity bed after External Wedge removal with a goal to make it less of a “flat top” or to render it more naturally convex anatomically?

5. Shape the tuberosity harvest on a sterile tongue blade on the surgical tray.

   Switch to a new blade now?
   Final graft thickness: ___ mm
   Retained KE band width: ___ mm

Notes:

4b) Tuberosity Harvesting Tips: The Internal Slab Harvest

The recommended instruments for the Internal Slab harvest are: Bard-Parker® #15 stainless steel scalpel blade mounted on a #5 round scalpel handle; Kirkland knife K15-16; Orban knife KO1-2; Rhodes back-action periodontal chisel 36/37; Prichard periodontal surgical curette 1/2.

The Internal Slab technique is especially useful for larger tuberosities (e.g.: when 3rd & 2nd molar are missing). Access to the graft tissue is enabled by way of a trap door flap (one main horizontal incision and one vertical release mesial incision) that opens toward the buccal aspect. Keep all incisions within keratinized tissue.

Sequence steps notes:

Suture the trap door flap with a continuous sling suture and/or interrupted sutures.

Atraumatically transfer the Internal Slab graft to a sterile tongue blade on the surgical tray. Redefine the dimensions of the graft with a new #15 blade retaining a 1.5-1.75mm wide KE band. Final graft thickness should be approximately 1.5-1.75mm.

Advantages of the buccal approach harvest technique: __________________________________________
4c) Premaxillary Palate Harvesting Tips
The recommended instruments for the premaxillary palatal harvest are: Bard-Parker® #15 stainless steel scalpel blade mounted on a #5 round scalpel handle; Kirkland knife K15-16 and/or Orban knife KO1-2; Rhodes back-action periodontal chisel 36/37, Pritchard surgical curette 1-2.

Langer and Langer (1985) described a harvesting technique for SCTG. Modifications used by Dr. Merijohn include:

- Harvest zone: ___________________________________________________________
- The scalpel blade is oriented perpendicular to the palatal mucosal surface
- The most coronal horizontal incision is positioned approximately 4mm apically from the free gingival margin of the adjacent teeth. Why?
- The distal vertical release incision does not extend beyond that needed to connect the two horizontal parallel incisions.
- A vertical/oblique incision is made at the mesial aspect of the horizontal incisions to create a trap door flap access. Why?
- Suturing: A modified (interlocking) continuous suture is used to close the horizontal incision and one or two interrupted sutures are placed to close the mesial vertical/oblique incision.

Similar to the Langer and Langer approach, the two horizontal incisions are 1.75-2mm apart in order to create the desired KE band width and to start to establish the thickness of the SCTG harvest.

Atraumatically transfer the graft to a sterile tongue blade on the surgical tray. Redefine the dimensions of the graft with a new #15 blade retaining a 1.5-1.75mm wide KE band. Final graft thickness should be approximately 1.5-1.75mm.

Notes:

Step 5: Donor Graft Suturing to the Recipient Site
Recommended instruments include: Castro-Viejo curved tip (5.5-inch length) needle holder with carbide inserts; Adson Tissue Pliers-plain tip (4.75-inch length) with carbide inserts.


How does this suture resorb?
Name some of its advantages over gut suture: __________________________________________

Clinical tips:
Compared to tissue grafting on the buccal/facial aspects, the mandibular anterior lingual area is subject to potentially disruptive tissue mobility during the critical postoperative healing period. Why is this important to recognize?

Careful execution and attention to fine details especially with gentle tissue manipulation and precise suturing will improve the probability of favorable outcomes.

Suture knot recommendation: ________

Needle enters tissue perpendicularly. Why?

Interrupted sutures are recommended.

NEVER suture through the gingival sulcus. Why?

Variations for securing graft to anchoring tissue include: ________________________________

Needle bending to increase/decrease the radius: _____________ When might this be helpful?
Suturing sequence: start at the midline and then suture ______________________. Why?

Take deep bites. Why?

How tightly should you suture the graft to theanchoring tissue?

After suturing to the anchoring tissue is complete, in order to achieve precision graft positioning and facilitate its preliminary stabilization, apply gentle compression for 1-2 minutes with finger pressure on saline dampened and flattened 2”x2” sterile gauze.

Notes:

6: Recipient flap suturing over the graft
Recommended instruments include: Castro-Viejo curved tip (5.5-inch length) needle holder with carbide inserts; Adson Tissue Pliers-plain tip (4.75-inch length) with carbide inserts.

Recommended suture material: GORE-TEX® CV-5 suture (catalog # P5K23A) https://www.goremedical.com/products/suture
   Material: Expanded polytetraflouroethelyne (e-PTFE)
   Suture needle: RT-18 (3/8c)
   Suture length: 24 inches (61cm)

GORE-TEX® e-PTFE suture offers major advantages over PTFE sutures including:

Clinical Tips
The mandibular anterior lingual is a highly movement-prone area of the mouth. During the healing phase, the flap is under tension mostly because of mobilization from normal mouth and tongue movements.

When suturing the recipient site flap, enter from its mucosal surface and take deep bites (needle insertion 4-5mm apical to the leading coronal edge of the flap). Entering the tissue perpendicularly with the suture needle. Why?

When securing the suture, knot with 3 alternating single twist throws. This contributes to slight knot “give” or slippage which can also contribute to less suture tissue tear through.

It recommended to not tighten the sutures too securely/snugly to the tissues.

When do you do final trim of suture “tails” from 5-6mm to ~3mm?

Start suturing at midline. First identify the __________________ ducts and avoid them.

Continue suturing by alternating placement (e.g.: right side then left side, right side then left side, etc).

NEVER suture through the gingival sulcus.

The recipient site flap (CAF) is advanced superiorly and labially to cover the graft. Ensure that the flap is under no tension or under only slight tension. The leading edge of the flap may also cover the free gingival margin of the lingual aspect of the treated teeth.
Techniques for suturing the flap to the anchoring tissue are dependent upon the available anchoring tissue anatomy.
Describe three routine options: ____________________________________________________________

In conventional CAF + SCTG technique, the interproximal papillae surfaces approximating the sutured CAF are
deepithelialized to facilitate CAF adhesion to them in the more coronally advanced position.**

** Chambrone L, Chambrone LA, Valdivia Frias EG, Serna Gonzalez MA, Mancini E, Mendoza G, Maeda Reino D, Bueno Rossy LA, Garcia
Valenzuela FS. Evidence-Based Periodontal and Peri-Implant Plastic Surgery. Rationale for the surgical treatment of single and multiple
recession-type defects. Chapter Three: A clinical roadmap from function to aesthetics. P45-145. Chambrone, L. Editor. Springer
International Publishing 2015.

A key distinguishing feature of the mandibular anterior lingual grafting technique described herein is that CAF adhesion to the
approximating interproximal papillae surfaces is not encouraged or facilitated.

How is this done?

Why is this done?

After suturing the horizontal incisal edge of the recipient site flap to the anchoring tissue with GORE-TEX® e-PTFE, use the
Vicryl Rapide® VR490 and place interrupted sutures to close the vertical/oblique incisions with 1 to 2 sutures per side.

Apply gentle compression for 3-5 minutes with sterile saline dampened gauze to help express clots/pooled blood and
facilitate fibrin clot formation.

Notes:

4. Clinical Tips for the Postoperative Healing Phase
The mandibular anterior lingual graft surgery healing process is similar to that for facial/buccal aspect CAF + SCTG. In
addition, because of the movement/mobility in this zone, slight flap retraction to the lingual aspect is not uncommon
especially during the first postoperative week. It is most often observed near the midline of the recipient site flap.

It is recommended to schedule the first postoperative visit at 10-11 days post-surgery.

Although GORE-TEX® e-PTFE suture tends to be resilient enough to resist suture tear through, each suture should be checked
to ensure it is anchored to both the recipient site flap and the anchoring tissue. If not, remove the unanchored e-PTFE suture
and check to see if another suture is indicated. Vicryl Rapide® suture need not be removed but it is acceptable to removal at
the first postoperative appointment. Otherwise, all sutures can be removed at the 2nd week postop visit.

With appropriately developed keratinized tissue in well-maintained patients, lingual recession decrease will often be
observed over time. ***

***Agudio G, Chambrone L, Pini Prato G. Biologic remodeling of periodontal dimensions of areas treated with gingival augmentation: a 25-year follow-

It cannot be overstated that successful clinical results can be ascribed in part to long-term patient motivation and compliance
with clinician’s instruction relative to oral self-care and ongoing maintenance therapy.****

****Agudio G, Chambrone L, Pini Prato G. Biologic remodeling of periodontal dimensions of areas treated with gingival augmentation: a 25-year

****Pini-Prato, G., Franceschi, D., Rotundo, R., Cairo, F., Cortellini, P. & Nieri, M. Long-term 8-year outcomes of coronally advanced flap for root

It behooves clinicians to recognize that it is common for patients to lose motivation over time and this should be planned for
accordingly with effective communications and regularly scheduled preventive maintenance appointments.
## 5. Appendix: George K. Merijohn Mucogingival Surgical Kit List

<table>
<thead>
<tr>
<th>Surgical Kit Instruments: Mucogingival Surgery</th>
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<tbody>
<tr>
<td>Bard-Parker® #15 stainless steel scalpel blade</td>
</tr>
<tr>
<td>Cheek/Tissue Retractor Univ. Minnesota CRM</td>
</tr>
<tr>
<td>Aspirator: Frazier 8 (2mm) ASPFR8</td>
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<tr>
<td>Scalpel Handles (2): Round #5</td>
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<tr>
<td>Kirkland Knife: K 15-18</td>
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<tr>
<td>Orban Knife: KO 1-2</td>
</tr>
<tr>
<td>Prichard Elevator: PR-3</td>
</tr>
<tr>
<td>Tissue Pliers: Adson plain 4.75&quot; (carbide inserts)</td>
</tr>
<tr>
<td>Needle Holder: Castroviejo curved 5.5&quot; (carbide inserts)</td>
</tr>
<tr>
<td>Hemostat: Halsted-Mosquito Curved 4.75&quot; H3</td>
</tr>
<tr>
<td>Suture Scissors: S 13</td>
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</tbody>
</table>

**Cook-Waite Aspirating Syringe**

- Rhodes back-action periodontal chisel 36/37
- Periodontal surgical curette: Prichard 1/2
- Periodontal curette: Universal anterior and posterior
- Mirrors: M5, M5D (double-sided)
- Explorer: fine pigtail
- Periodontal probe: Marquis #2 (Std. Hex) [www.perio-aid.net](http://www.perio-aid.net)
- Sharpening Stone: Norton #FB24 Flat Fine India Stone or Hu-Freidy Diamond Sharpening Cards (Med & Fine)

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