KINAMED INCORPORATED

VIDEO

MD3T™ Technique Overview

Multi-Directional Tibial Tubercle Transfer

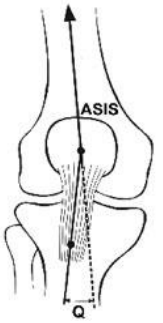
For Medial, AMZ, Anterior, Distal, and Proximal Transfers

Developed by Alan C. Merchant, M.D.
Clinical Professor, Emeritus, Stanford

"The MD3T system allows for precise and reproducible correction of tibial tuberosity position in all three planes. This versatility makes it my 'go-to' for unloading patellofemoral chondrosis and/or correcting aberrant force vectors in the setting of instability. Additional benefits of the MD3T include less invasive soft tissue dissection and maintenance of the lateral tibial cortex creating a smaller cortical defect, which help reduce pain and improve construct stability for earlier weight-bearing and range of motion."

Seth L. Sherman, M.D.
Associate Professor
Orthopedic Surgery
Stanford HealthCare

CAUTION: *This is a brief summary and review of the MD3T system. The surgeon should not proceed without first reviewing the Surgical Technique Guide (document B00237). Other important details are contained in the Brochure (document B00256) and Instructions for Use (document B00236).*



Traditional Tubercle Transfers

Medialization / Flat / Elmslie-Trillat

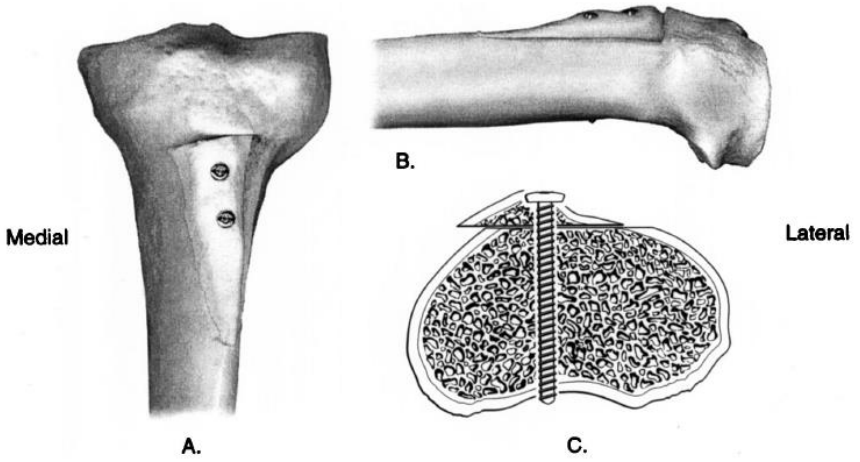


Figure 1. The flat (modified Elmslie-Trillat) osteotomy. A, anterior surface; B, lateral side; C, cross section at the level of the proximal screw. *Cosgarea et al (1999)*

AMZ / Fulkerson / Oblique

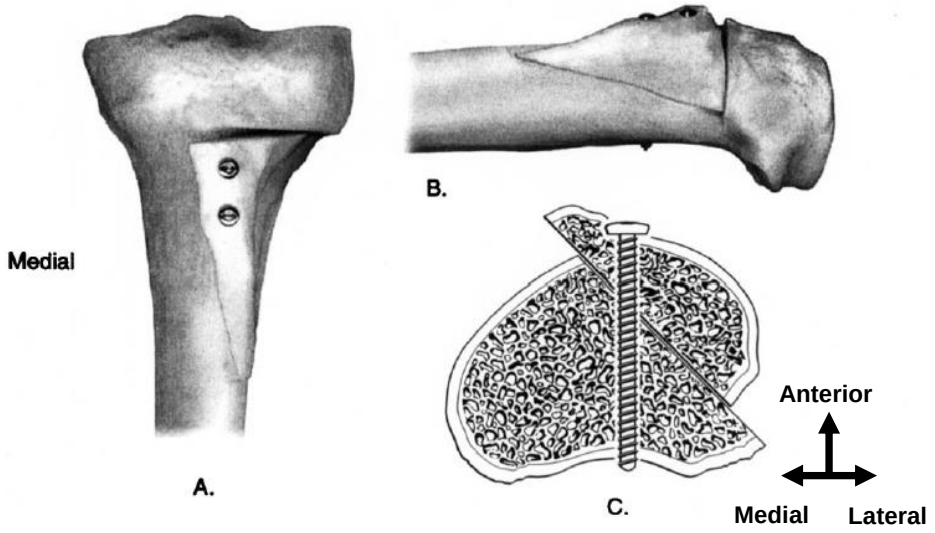
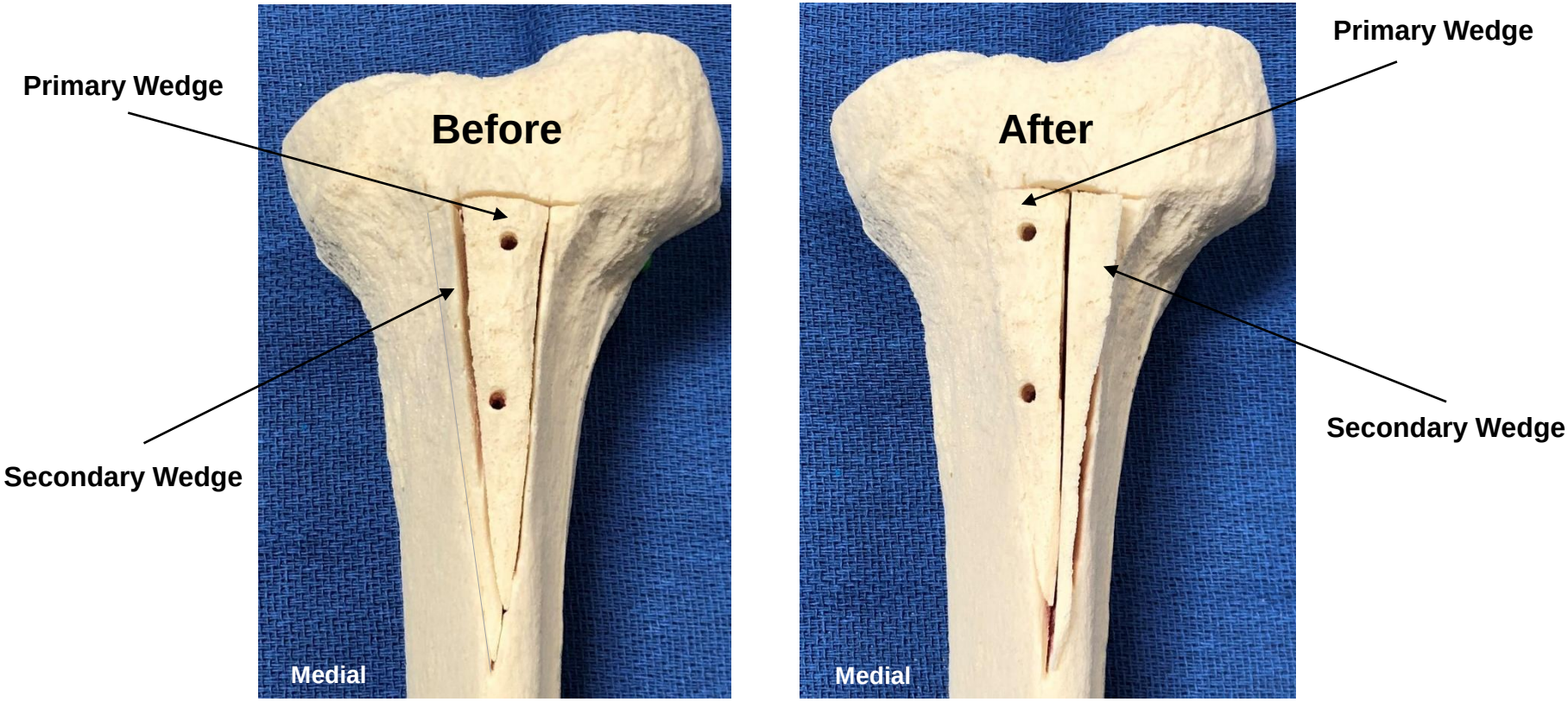


Figure 2. The oblique (modified Fulkerson) osteotomy. A, anterior surface; B, lateral side; C, cross section at the level of the proximal screw. *Cosgarea et al (1999)*

- The Elmslie-Trillat is a straight medialization (without anteriorization) that is performed for correction of patellar instability and lateral patellar compression syndrome with no or minimal chondrosis.
- The Elmslie-Trillat may have a thin bone shingle and small proximal buttress, which can lead to fracture or pull-off.
- The AMZ creates a large cortical defect with a known risk of proximal tibial fracture.
- The slope of the AMZ bone resection controls both anterior and medial transfer distances.

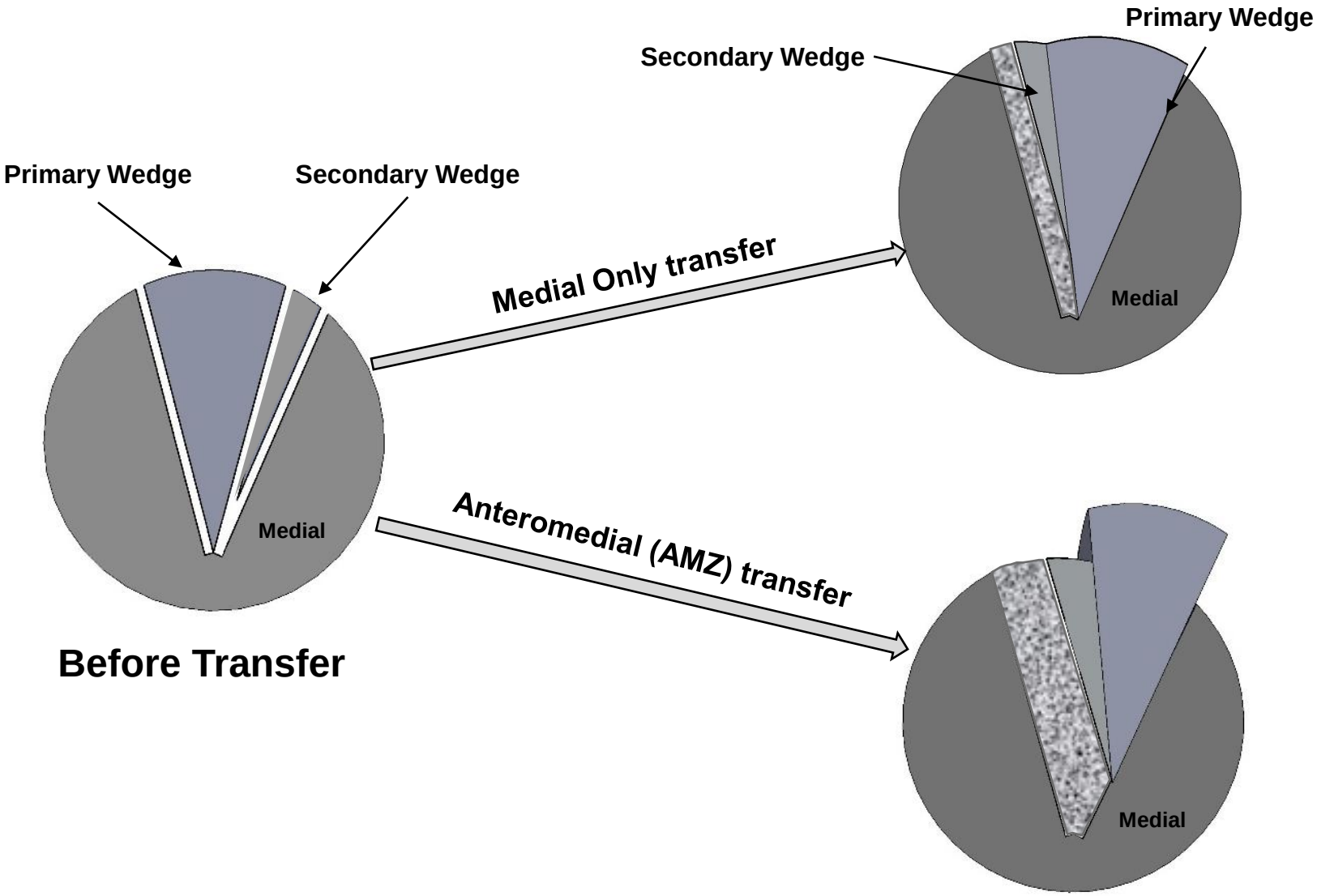
MD3T Basic Concept



All anatomical photos in this Guide represent a Left Tibia

- The MD3T concept is based on the creation of <u>two</u> compound wedges (Primary & Secondary).
- <u>Transposing</u> the two wedges medializes the tibial tubercle (TT).

MD3T Basic Concept



MD3T System Benefits

- **Flexibility:**
  - Medial & Anterior transfer distances are independent (not determined by the slope of the bone cut).
  - Distalization can be performed independently or in combination with medialization or antero-medialization.
  - Though rarely indicated, proximal transfer can also be performed.

- **Precision:** Tubercle is more precisely transferred to the desired position.

- **Safety:** Minimally invasive technique (designed to minimize fracture risk)
  - The lateral tibial cortex is not violated and soft tissue dissection is reduced.
  - The cortical defect is about 1/3 that of the AMZ.

- **Simplicity:** Surgical Cutting Guides are provided to make reproducible and accurate bone cuts.

- **Construct Security:** Wedge shape, proximal buttress, and bicortical screws enhance fixation.

- **Shortened Patient Recovery:** Stable fixation allows for accelerated rehabilitation including immediate braced weight bearing and passive range of motion.

MD3T Technique Overview

1. A compound wedge of bone containing the Tibial Tubercle (TT) and its attached Patellar Tendon is created, the **“Primary Wedge.”**

2. For corrections that include significant medialization, a **“Secondary Wedge”** of bone is created medial to the Primary Wedge.

3. The Primary and Secondary Wedges are **transposed**, transferring the Tibial Tubercle medially. The width of the Secondary Wedge determines the medial transfer distance.

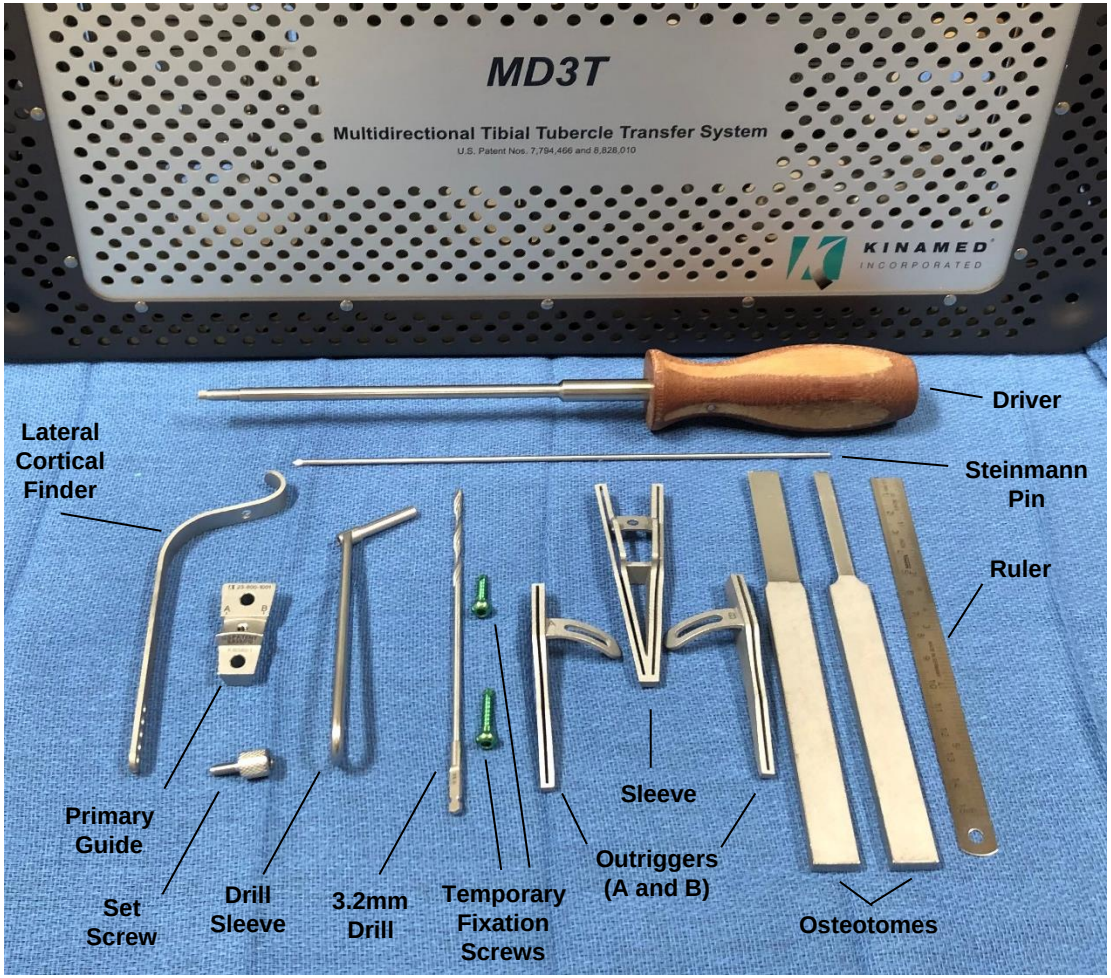
4. For medial transfer, fast-setting bone void filler is used to fill the space lateral to the transposed Wedges prior to fixation.

5. For anteromedial transfer, additional fast-setting bone void filler is placed lateral and posterior to the transposed Wedges prior to fixation.

6. The medial and anterior transfer distances can therefore be planned independently of one another.

7. Unidirectional anterior, distal, and proximal transfers involve repositioning of the Primary Wedge only (a Secondary Wedge is not created).

MD3T Instruments



- The MD3T set does not include the bicortical fixation screw implants.
- The surgeon should use his/her preferred fixation screw implants. Low Profile screw implants are recommended to reduce skin irritation.
- Non-slotted Outriggers are available upon request.

1st Step: Attach the Primary Guide

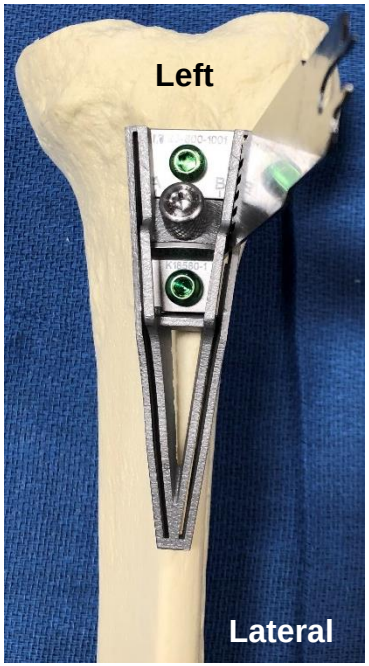
Position the Primary Guide

Drill unicortical pilot holes

Primary Guide secured

- After exposing the TT and the patellar tendon attachment, attach the Lateral Cortical Finder to the Primary Guide and position its tip in contact with the lateral tibial cortex in order to center the Primary Guide on the TT and avoid cutting the lateral tibial cortex. Position the proximal end of the Primary Guide at the top of the TT and align it with the long axis of the tibia.
- Create unicortical pilot holes with the drill sleeve and 3.2 mm drill bit, and secure the Primary Guide to the TT with the supplied unicortical 4.5 mm temporary fixation screws (use the shorter screw distally).

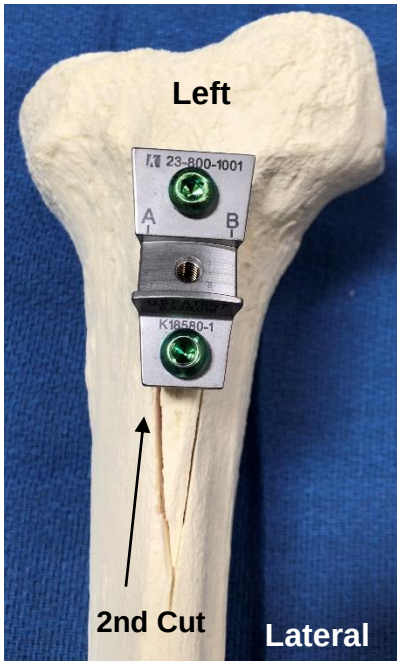
1st (Lateral) Cut to Define the Primary Wedge



1st (Lateral) cut

- The 1st and 2nd cuts define the Primary Wedge.
- Start the 1st cut at the lateral edge of the TT and patellar tendon, and avoid violation of the lateral cortex.
- Cut against the lateral surface of the Primary Guide itself or use the Slotted Sleeve as shown.
- If the lateral edge of the patellar tendon is exposed, lift it up to avoid cutting it with the saw blade.

2nd (Medial) Cut to Define the Primary Wedge



2nd (Medial) cut on a small knee

2nd (Medial) cut on a larger knee

- For small knees, cut against the medial surface of the Primary Guide itself, using the Slotted Sleeve.
- For average or large knees, use the Outrigger medially to avoid cutting the medial side of the patellar tendon.

Plan the Transfer

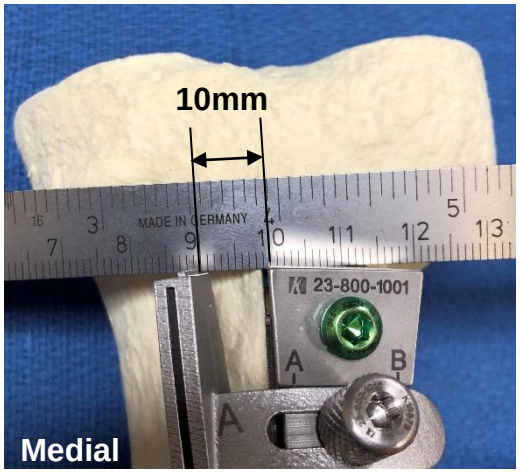
- Unidirectional anterior, distal, or proximal transfers only require a Primary Wedge (a Secondary Wedge is not required).
- A Secondary Wedge is not required for AMZ transfers that involve < 6mm of medialization.
- A Secondary Wedge is only required for AMZ transfers that involve ≥ 6mm of medialization.
  See Chart on next page for details.

For 'Medial Only' Transfers

- Attach an Outrigger to the Primary Guide (the flat surface of the Outrigger should face medially).
- The amount of Medial Transfer is equal to the width of the Secondary Wedge and its two saw kerfs.
- Use a Ruler to adjust the Outrigger so that the width of the Secondary Wedge (including its saw kerfs) will equal the desired medial transfer distance. Measure Secondary Wedge width medially from the edge of the Primary Wedge along the proximal tibial bone surface.

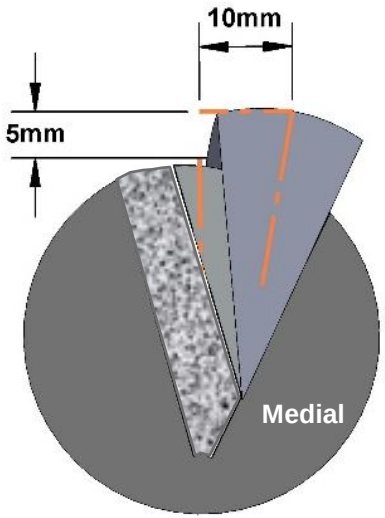
For Antero-Medial (AMZ) Transfers that involve ≥ 6mm of medialization

- When anteriorizing, the cross-sectional shape of the wedges will cause the TT to move farther medial as it is moved anterior. Therefore, the Secondary Wedge for AMZ transfers should be narrower than it would be when only a medial transfer is needed. *See Chart on next page for details.*

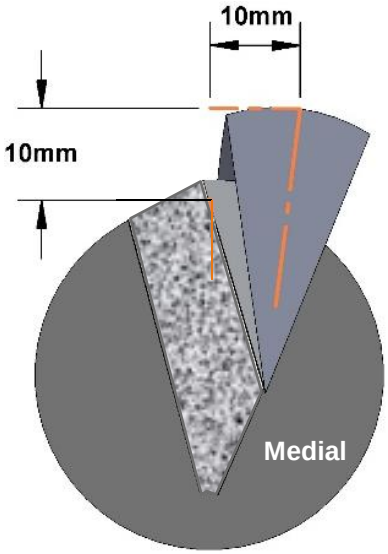


Planning a 10 mm wide Secondary Wedge

Planning an Anteromedial Transfer



For 10mm medial & 5mm anterior, width of Secondary Wedge should be 7mm. See Table.



For 10mm medial & 10mm anterior, width of Secondary Wedge should be 5mm. See Table.

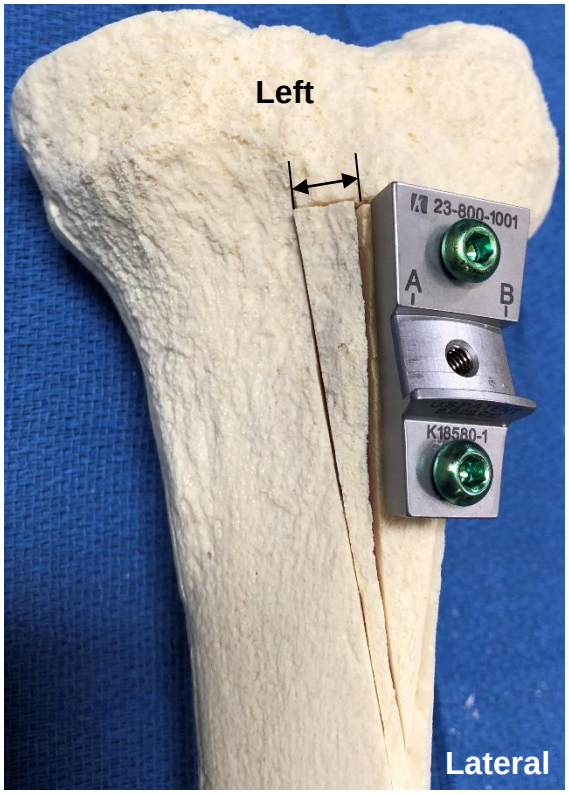
Planned Medial Transfer (mm)

Planned Anterior Transfer (mm)	Width of Secondary Wedge (mm)	2	4	6	8	10
	5	*	*	*4*	*5*	*7*
	10	*	*	*	*4*	*5*
	15	*	*	*	*3*	*4*

To achieve the planned AMZ transfer, create a Secondary Wedge (including saw kerfs) having the proximal width shown in red italics.
Note: For smaller medial transfers, a Secondary Wedge is not needed, as shown by the asterisks (*).

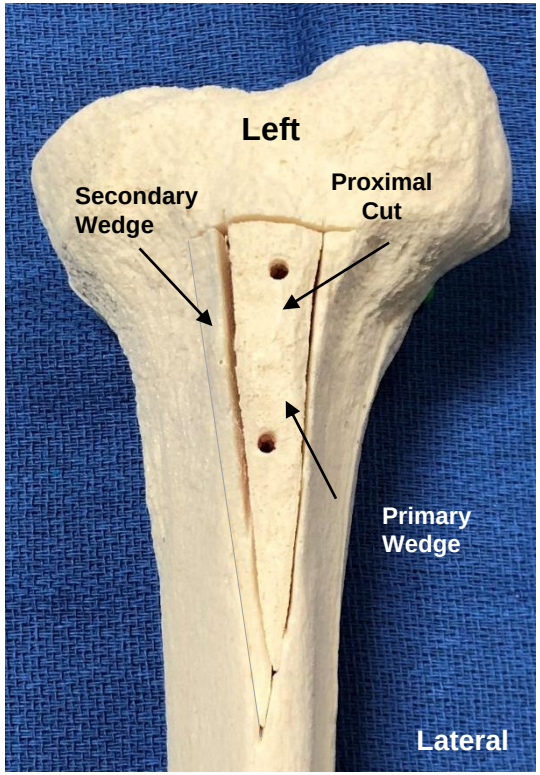
- For **Anteromedial Transfers**, the shape of the Primary Wedge causes the tubercle to move medially as it moves anteriorly.
- Therefore, desired anterior & medial distances can be achieved by creating a Secondary Wedge having a maximal proximal width shown in red in the Table and Examples above.
- For Medial Transfers only, the amount of medial transfer will be equal to the width of the Secondary Wedge including its two saw kerfs. The Secondary Wedge width should be measured medially from the edge of the Primary Wedge along the proximal tibial bone surface.

Make the 3rd Cut to Define the Secondary Wedge (if necessary)



- Confirm the width of the Secondary Wedge and perform the 3rd Cut, working from proximal to distal. All three cuts should meet distally at the apex.

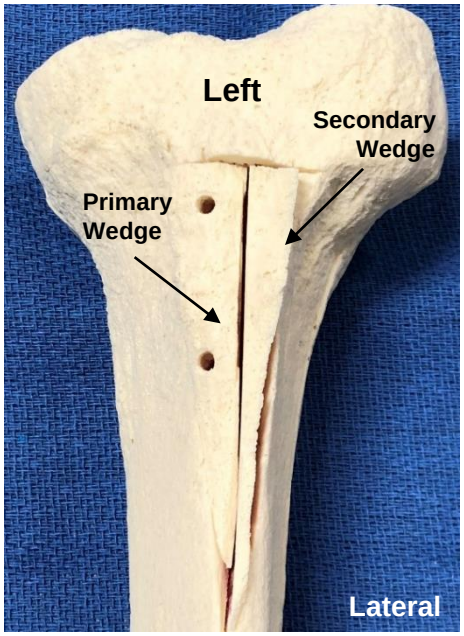
Make the Proximal Cut and Free the Wedge(s)



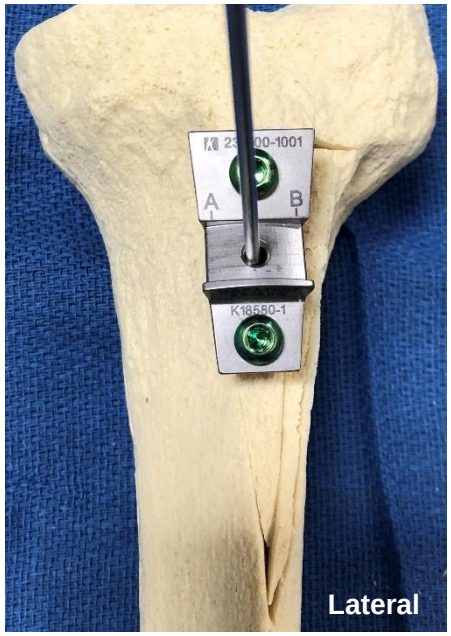
Wedges freed

- Free the wedge(s) by using the osteotomes to make the 4th cut transversely under the distal end of the patellar tendon.

Transpose the Two Wedges



Wedges transposed



Primary Wedge temporarily pinned in new position before final fixation

Demonstration (Left knee, full extension) of how to measure the intra-operative clinical Q angle with a newly positioned tibial tubercle before final fixation to avoid under- or over-correction. Stretch a Bovie cord from the ASIS to the center of the patella and use a sterile goniometer to measure and confirm the corrected Q angle.

- After carefully completing all cuts with the osteotomes and saw, transpose the two Wedges by swapping their positions.
- Because an MRI cannot be obtained in surgery, a planned and completed medial transfer can be double checked intraoperatively by measuring the clinical Q angle. Avoid under-correction by assuring the Q angle is <10° and avoid over-correction by assuring the Q angle is >0°.
- Once the TT has been transferred to its new desired location, drill a Steinmann Pin through the middle hole of the Primary Guide to temporarily fix the TT in position.
- Confirm the proper correction by repeat measurement and patellar tracking.

Prepare and Apply Bone Void Filler

Key features of Fast Setting Bone Void Filler

1) Easy to handle in its putty-like form
2) Sets fast and hard, so it can be drilled
3) Cures stronger than cancellous bone in 24 hours
4) Osteoconductive and remodelable
5) 10cc size appropriate for use with MD3T

Step	Duration	Instruction
1		Pour all powder into bowl
2		Pour liquid into bowl
3	1 min	Mix quickly and completely
4	2 mins	Collect Paste and prepare to implant
5	1 min	Implant the Paste
6	5 mins	Setting (Do Not Disturb)
7	2 mins	Hard Set & Ready to Drill (8 mins > start of implantation)

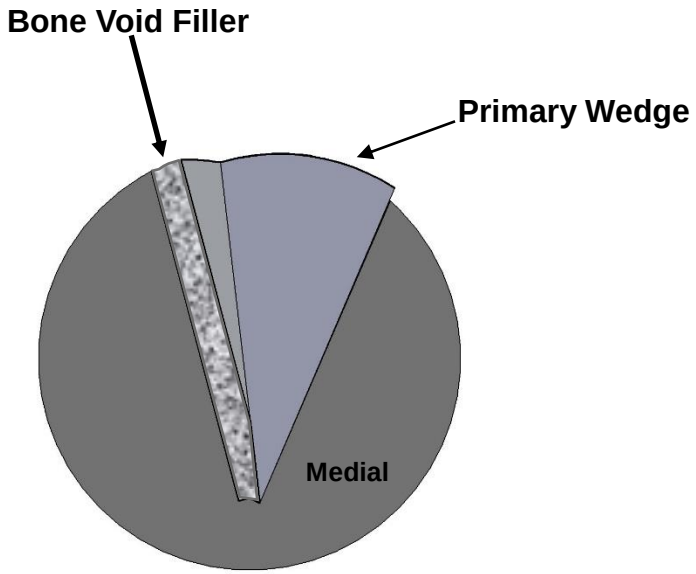
Mixing instructions for OsteoRepair™ Paste Bone Void Filler. Prior to use, OsteoRepair Paste must be at or below 77ºF to work properly. Once the product touches the patient, it needs a warm body temperature (above 90ºF) and a wet environment to set properly.

Handling Tips

- Refrigerate the box prior to surgery in order to extend the working time.
- Once placed, apply a warm saline compress in order to accelerate setting time.

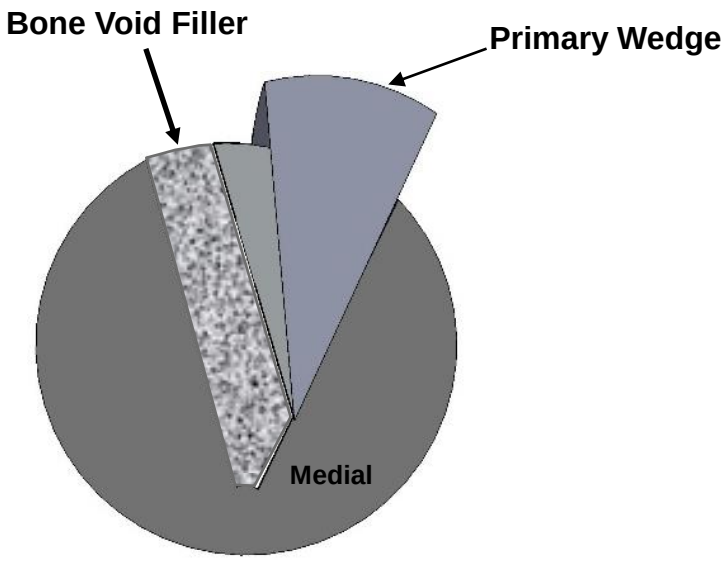
Medial Transfer

Colored bone void filler is shown for demonstration purposes



- For Medial Transfer, place enough Bone Void Filler lateral to the two bone wedges to compensate for the resected bone.
- This maintains the tubercle at the same level, preventing it from sinking posteriorly.

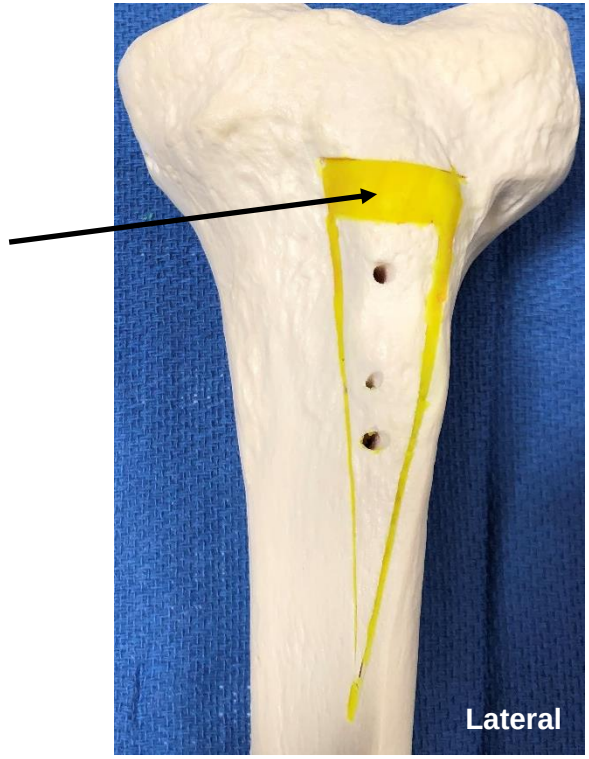
AMZ Type of Transfer



- For Anteromedial Transfer, place the Bone Void Filler lateral and posterior to the bone Wedge(s) to fill the space from the resected bone and the anterior transfer.

Distal Transfer

Use fast setting Bone Void Filler proximal to the Primary Wedge to resist the pull of the patellar tendon. Alternatively, a corticocancellous bone block may be used to fill the proximal void.



Colored bone void filler is shown for demonstration purposes

- For Distal Transfer, pushing the two wedges distally closes the saw kerfs and moves the tubercle approximately 5 mm distally.
- Running the saw blade along the closed medial kerf moves it another 5 mm distally.
- Repeating this maneuver on the lateral side provides another 5 mm of distal transfer.
- The distal 1-2mm of the Primary Wedge may be resected in order to facilitate the transfer.

Secure the Tubercle

- Finally, use a lag-screw technique to secure the tubercle in its new position using two or three 4.5 mm diameter (or greater) bicortical bone screws (these screws are not included in the MD3T set).

Contact Kinamed for more information

https://www.kinamed.com/products/orthopedic-products/md3t

www.Kinamed.com

contact@kinamed.com

800-827-5775