beyond movement

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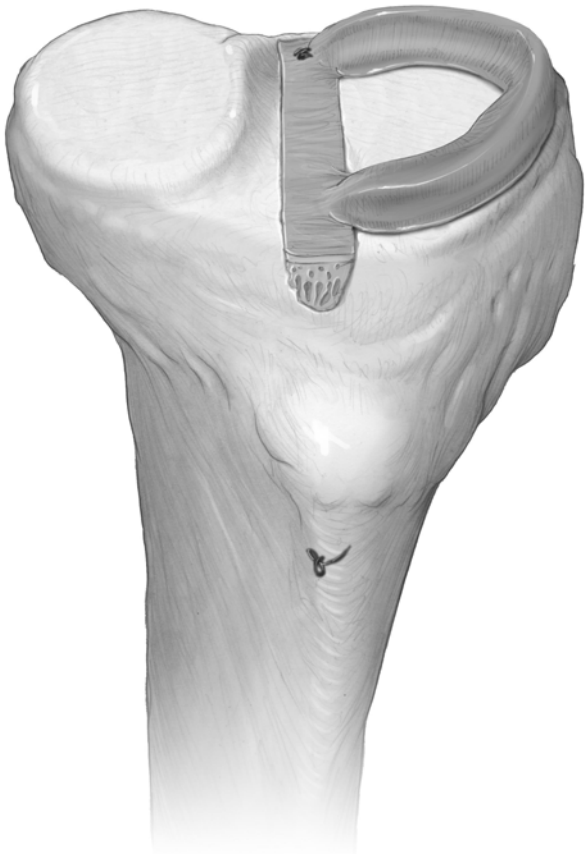
Meniscus Reconstruction:
Trough Surgical Technique



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ABOUT THE TROUGH TECHNIQUE

The **trough technique** for meniscal allograft reconstruction provides a method for implanting a meniscal allograft with rigid fixation at the horn attachments. The procedure can be performed either arthroscopically or through a mini-open technique. It has been demonstrated that bony fixation at the attachment site allows for the maintenance of functional hoop stresses by the meniscal allograft[1].

PLATEAU PREPARATION

It is easier to prepare the trough through arthroscopic visualization and to extend the incision at the end of the procedure to insert the graft. Some surgeons may prefer to create an arthrotomy earlier in the case to prepare the trough.

Step 1: Arthroscopically excise remnants of the native meniscus leaving only a 1-2 mm meniscal capsular rim and the anterior and posterior meniscal attachment stumps. Debride the meniscocapsular tissue until there is a bleeding vascular bed. To save time, the anterior third of the meniscus can be excised either under direct visualization when an arthrotomy is used to prepare the trough, or arthroscopically using an electrothermal device.

Step 2: Identify the anterior and posterior meniscal attachment stumps as visual markers for trough positioning (Fig. 1a).

Fig. 1a

Fig. 1b

PLATEAU PREPARATION

Step 3: Score a guideline on the surface of the tibia using a Bovie or 90° radio-frequency electrothermal wand (Fig. 1b). The guideline must begin from the posterior aspect of the posterior meniscal attachment stump through the anterior meniscal attachment stump and out to the anterior tibia.

Step 4: Using a high-speed burr, shave down the tibial eminence until the posterior attachment of the meniscus is clearly visible. Take care to avoid damage to the ACL and its tibial attachment when reconstructing a medial meniscus.

Step 5: Perform a parapatellar arthrotomy and expose the tibial plateau to approximately 1 cm below the articular cartilage. The length of the arthrotomy should be 3 – 5 cm, or continue using an arthroscopic technique to create the trough through a slightly enlarged portal.

Step 6: Using the provided trough / allograft sizing ruler or a calibrated probe, determine the length from the posterior aspect of the posterior attachment stump to the anterior tibia (Fig. 2a). This measurement will represent the anterior to posterior (AP) trough length. Verify that this length is available on the meniscal allograft bone bridge. NOTE: the allograft comes with excess bone that will need to be trimmed to accommodate the trough length.

Fig. 2a

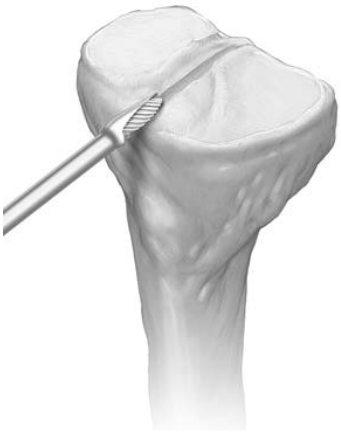


Fig. 2b

Step 7: Utilizing an arthroscopic burr, create an initial trough on the scored guideline, previously marked from anterior to posterior, in direct alignment over the native meniscal attachment stumps. The burr depth should be approximately 4-5 mm. Burr the cortical bone on the anterior tibia to facilitate chisel usage. If the anterior cortex is not burred down, chiseling can cause the tibial plateau to crack (Fig. 2b).

Step 8: Determine the desired trough width, and select the corresponding meniscal allograft starter and finishing chisels (6, 7, 8, or 9 mm). The starter chisel is used to define the trough, while the finishing chisel is used to complete it. The average trough size is 7 – 8 mm.

PLATEAU PREPARATION

Fig. 2c

Step 9: Use the starter chisel to deepen the trough several millimeters to allow use of the finishing chisel. Proceed directly to the finishing chisel if there is enough room to avoid damage to the femoral articular cartilage. Do not chisel beyond the posterior tibial wall (Fig. 2c).

Step 10: Do not exceed 10 mm depth with the meniscal allograft starter chisel. Finish the trough to its final depth and width using the finishing chisel. Periodically, use the tibial trough sizing guide of the corresponding trough width to check the length and depth of the trough. Several passes will be needed to complete the trough. The completed trough should not exceed 10 mm in depth at the anterior and posterior sections.

Fig. 3

Step 11: To avoid risk of injury to the soft tissue structures posteriorly, a burr may be used to complete the final posterior portion of the trough. Place the tibial trough sizing guide into the completed trough, and confirm the length and depth of the trough. When the trough is complete, the sizing guide should fit flush with the surface of the tibia (Fig. 3).

Step 12: Use the appropriate size tibial trough finishing rasp to make any final modifications. Using the tibial trough sizing guide, measure the trough for preparation of the allograft.

ALLOGRAFT PREPARATION

Step 13: Confirm the three measurements taken from the tibial trough sizing guide: length, width, and depth. To modify the allograft length to fit the trough, trim any excess bone taking care to avoid damage to the meniscal attachment sites.

Step 14: Measure the depth of the allograft bone from the meniscal attachment sites rather than the tibial eminence. The final depth of the allograft bone bridge should be 10mm (Fig. 4a).

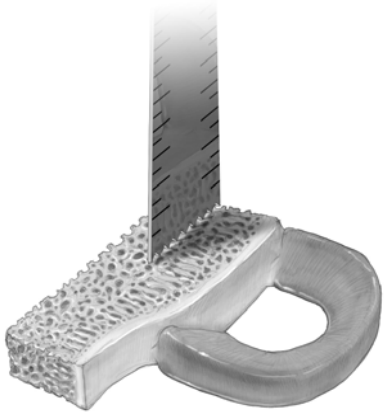


Fig. 4a

Fig. 4b

Step 15: Using a micro-sagittal saw, trim the bone block down to match the width of the tibial trough (Fig. 4b). If necessary, remove a portion of the tibial eminence from the meniscal allograft to avoid excessive prominence and to ease insertion.

Step 16: Using the tibial trough finishing rasp or rongeurs, round off the inferior portion of the allograft bone bridge. Confirm the precise size of the allograft bone bridge with the Meniscal allograft sizing block (Fig. 4c). The finished allograft bone bridge should slide effortlessly in the corresponding sized slot on the meniscal allograft sizing-block. The depth of the finished allograft bone bridge should always be 10mm.

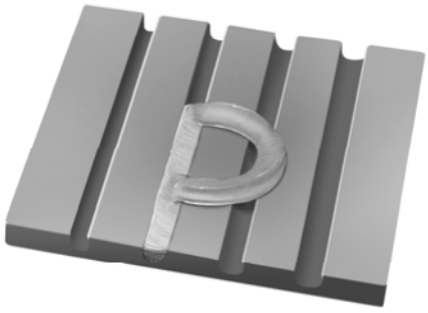


Fig. 4c

ALLOGRAFT INSERTION

Step 17: To facilitate passage of the allograft into the knee, place a passing suture through the meniscus at the junction of the midbody and posterior horn. This suture should be passed through the knee using an inside-out technique.

Step 18: Manually manipulate the allograft bone bridge into the trough while gently pulling on the passing suture to lead the meniscus into the joint. Visually verify that the plug and the meniscus reduce properly (Fig. 5).

Fig. 5

Step 19: Once the bone bridge is seated and the graft reduced, cycle the knee through a range of motion to settle the allograft in place.

Step 20: In most cases, a press fit will be sufficient to secure the bone bridge in the trough. For additional security, a suture may be passed through the bone bridge and sutured to the tibia.

Step 21: With the allograft in place, begin suturing the periphery of the meniscal allograft using standard arthroscopic meniscal repair techniques. Remove the passing suture, as it is unlikely to be in the proper anatomic position to serve as a fixation suture. Place an additional suture between the native intermeniscal ligament and the allograft anterior horn attachment.

[1]Chen MI, et al. Is it important to secure the horns during lateral meniscal transplantation – a cadaveric study. *Arthroscopy* 1996 Apr; 12(2):174-81.

OPTIONAL: ADDITIONAL TIBIAL FIXATION

Optional Step 1: Place permanent sutures through the allograft bone bridge at the anterior and posterior meniscal attachment sites (Fig. 6a). Each suture must purchase some meniscal attachment. This step can be performed outside the knee.

Optional Step 2: Using a standard ACL guide, drill two holes up into the trough at the corresponding Meniscal attachment sites. Pass the sutures through the tibial drill holes and tie over the allograft bone bridge (Fig. 6b).

Fig. 6a

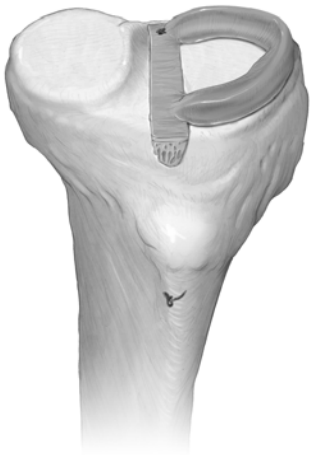


Fig. 6b

HELPFUL HINTS

1. If the prepared allograft bone bridge breaks, suture it together using permanent suture.

2. If the length of the allograft bone bridge is too short, center it within the trough. Though filler is not required, morselized bone from the remnant allograft bone block can be used to fill the trough.

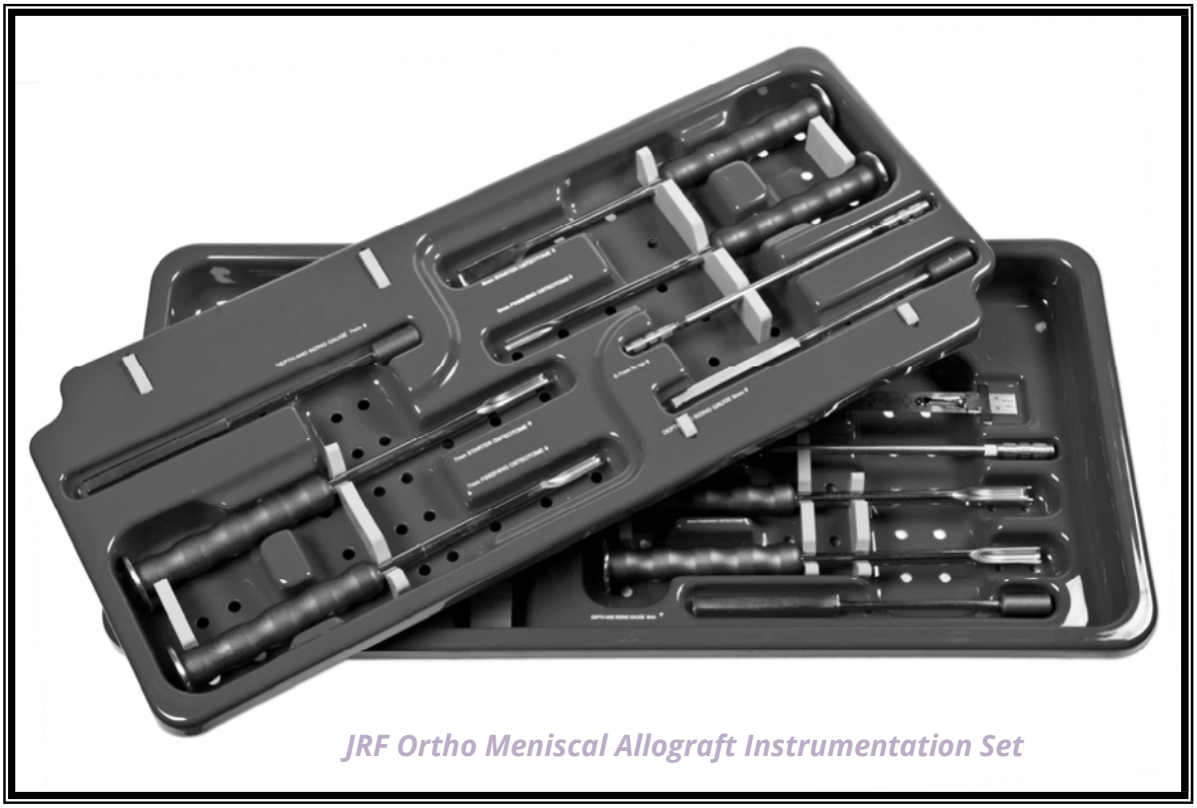
3. If the trough is too large, use morselized bone from the remnant allograft bone block to fill the space. Alternatively, the allograft bone bridge can be affixed with a screw or sutures.

4. If meniscal arrows or staples are to be used for peripheral fixation of the meniscal allograft, leave slightly more of a cartilaginous rim of the native meniscus to more securely anchor the allograft into the capsule.

INSTRUMENT LIST

JRF Ortho *Meniscal Allograft Instrumentation Set* is comprised of the following:

1. Meniscal Allograft Sterilization Tray: customized for Instrument Set
2. Meniscal Allograft Starter Chisel: variable sizes from 6 mm - 9 mm.
3. Meniscal Allograft Finishing Chisel: variable sizes from 6 mm - 9 mm.
4. Tibial Trough Sizing Guide: variable sizes from 6 mm - 9 mm.
5. Tibial Trough Finishing Rasp: variable sizes from 6 mm - 9 mm.
6. Meniscal Allograft Sizing Block: variable sizes from 6 mm - 9 mm.
7. Trough/Allograft Sizing Ruler



JRF Ortho Meniscal Allograft Instrumentation Set

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JRF Ortho specializes in providing orthopedic surgeons with the highest viability, most widely available fresh osteochondral allograft joint repair solutions helping patients regain movement and improve their quality of life.

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