



Meniscal Allograft Transplantation
featuring Dovetail Meniscal Allograft

Surgical Technique



Dovetail Meniscal Allograft

Meniscal allografts have been found to be a feasible alternative in the effort to limit sequelae of arthritis that can occur with meniscal excision. The surgical technique for meniscal allograft transplantation of the knee continues to evolve.

Simplified graft preparation and recipient tibia preparation, to allow for the transplant to be positioned anatomically and anchored with reliable fixation, is the ultimate goal of the procedure.

The dovetail technique simplifies graft preparation with a time-saving series of cuts preparing the bone component of the graft to sit securely in the recipient semitrapezoidal slot created in the tibia. A matching semitrapezoidal shaped recipient slot created in the tibia with a series of step drills, rasps and dilators matches the bone block preparation.

Subsequent peripheral graft fixation to the capsular rim with 2-0 FiberWire® achieves the goal of creating a solid meniscal allograft construct. Preferably performed for lateral meniscal incompetence, the dovetail technique anatomically recreates the normal lateral meniscal relationships within the knee.

Healing of the allograft meniscus through the combination of peripheral capsular sutures and graft to host bone lends to the decision of the surgeon to proceed with a functional rehabilitation.

INDICATIONS

Meniscal transplantation is indicated in healthy active young patients (less than 55 years) with a prior history of a meniscectomy.

Failure for such patients to respond favorably to conservative modalities to reduce pain and swelling of the knee and previous arthroscopic debridement procedures gives reason to proceed with allograft meniscal transplantation.

Meniscal transplantation may be combined with necessary ligament reconstruction or realignment procedures.

The articular cartilage surfaces of patients being considered for allograft meniscal transplantation should be normal or minimally arthritic to optimize the outcome. In some situations prior resurfacing (OATS®, Allograft OATS) procedures can be performed.

PREOPERATIVE RADIOGRAPHS

The preoperative x-rays listed below are necessary to evaluate the knee joint and determine appropriate meniscal allograft sizing. Magnification markers are required in order to obtain a properly sized allograft meniscal transplant.

Note: MRI scans may be helpful in evaluating the knee joint and can be used for accurate transplantation matching.

- 45° flexion P/A weight-bearing (with magnification marker)
- Standing A/P
- Nonweight-bearing lateral (with magnification marker)
- Merchant view
- Long-cassette alignment view

SURGICAL TECHNIQUE

Meniscal allograft transplantation technique is best performed by a combined arthroscopic and arthroscopically-assisted mini arthrotomy overlying the lateral peripatellar region. An additional incision along the lateral side of knee is necessary for suture fixation of the transplant to the lateral capsule.

The procedure is begun with a standard diagnostic arthroscopy. Customarily for this technique the medial portal is initially created so as to align the lateral portal with visualization over the anterior horn attachment site. Portals are created with particular attention made to the lateral portal which is made in line with the anterior horn attachment of the lateral meniscus, closely approximating the lateral edge of the patella tendon. The arthrotomy will incorporate this portal in the later stages of the procedure. Debridement of the meniscal remnant is carried out to the peripheral capsule and a tuft of capsular attachment of meniscus is left to provide a reference for anchoring of the transplant, as well as provide secure tissue to sew into peripherally.



Using a motorized burr, the lateral spine is flattened to the point where a slight trough invading the cortex of the tibial plateau and parallel to the articular surface is created. This path falls in line with the posterior and anterior horn attachments and will serve as the area where the trapezoidal bone trough will be created. Both anterior and posterior horn attachment sites should be readily visualized.



The lateral parapatellar incision is carried out by extending the lateral portal incision. Initially, the capsule is left intact to enable continued arthroscopic technique and avoid fluid extravasation. The incision is made just lateral and in line with the patellar tendon. A right angle retractor may be used to retract the patellar tendon, exposing the anterior horn of the meniscus, which is subsequently debrided. The incision will be used to create the trapezoidal bone slot.

TIBIAL PREPARATION OPTIONS

This technique will provide two options for preparing the tibia for the dovetail bone block of the meniscal allograft – an Osteotome Guided Option and a Drill Guide Option.

OSTEOTOME GUIDE OPTION

Trapezoidal Slot Preparation

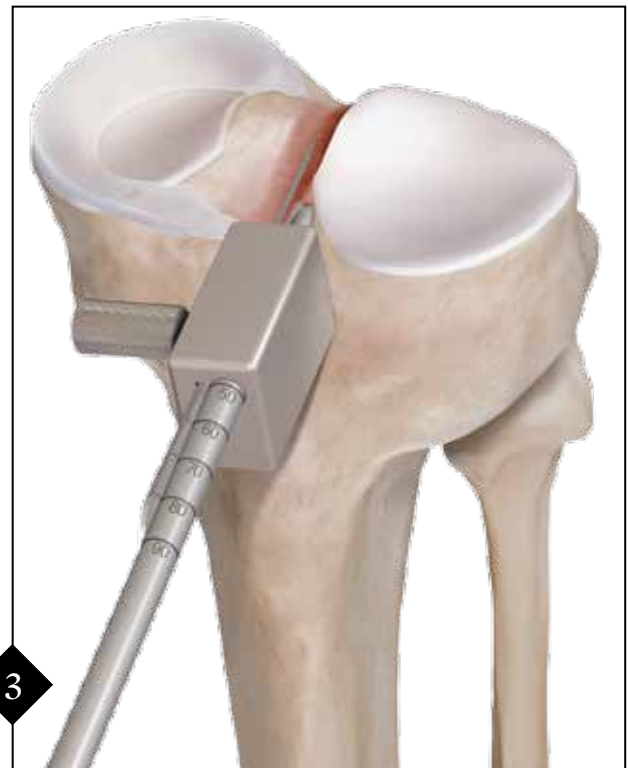


The alignment rod is selected and positioned along the burred area of tibial spine and aligned with the anterior and posterior horn attachments. The osteotome, with depth line and length markings, is oriented vertically just off the patella tendon and is advanced using a mallet into the tibial plateau. *Note: The anterior tibial plateau slopes inferiorly. When referencing the depth line on the osteotome, insure it remains above the anterior tibial plateau slope but flush with the remaining portion of the tibia. The depth line is used to reference positioning of the osteotome in line with the A/P slope of the tibia.*

The osteotome is advanced, while maintaining direct visualization with the arthroscope placed through the anteromedial portal, until it contacts the posterior cortex of the tibia plateau. *Note: "Burring" a path along the cortical plateau will facilitate easier passage of the osteotome.*

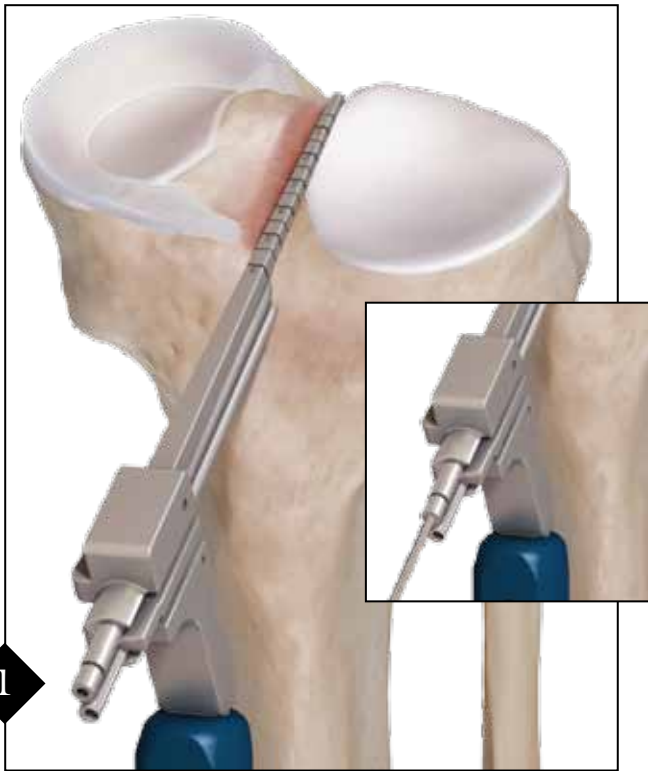


The 6 mm drill is selected and advanced into the tibia under power and direct visualization until it contacts the posterior tibia cortex. The depth markings on the drill may be referenced to the osteotome's depth. With proper advancement the superior surface of the tibia will be removed. *Note: Care is taken to avoid penetration through the posterior cortex or migration superiorly into the lateral femoral condyle.*



After bone remnants from the drilling are removed from the tunnel, Cutting Guide #2 is selected and secured to the osteotome in similar fashion as described previously. A 7 mm drill is passed through the guide and advanced by power. The drill is visualized until it contacts the posterior tibial cortex. *Note: Completion of drilling with the 6 and 7 mm drills begins the process of creating the trapezoidal-shaped recipient site. A curette may be used to further debride the tunnel created prior to proceeding with the trapezoidal rasp and dilator.*

DRILL GUIDE OPTION



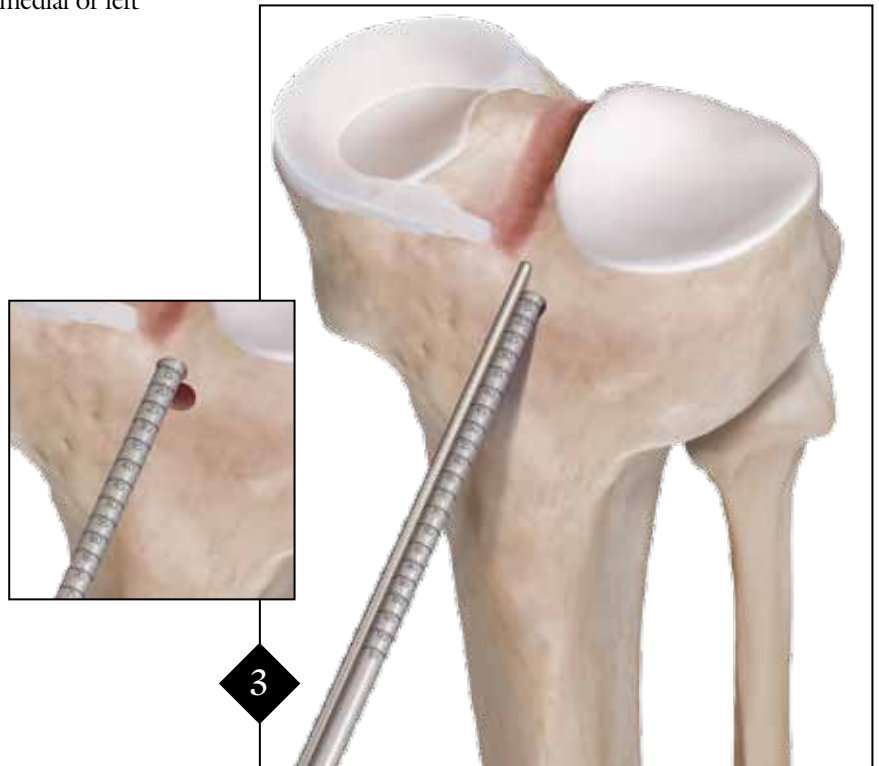
1

A motorized burr may be used to create a trough along the tibial spine aligned from the anterior to posterior horn attachments. Maneuver the end of the marking hook and firmly grasp the posterior tibia, resting the hook in the burred area. Insert the full round Drill Sleeve into the proximal passage of the drill guide and advance to bone. A tibial A/P measurement can be read off the graduations of this Drill Sleeve. Insert and advance the keyed Drill Sleeve into the distal passage of the guide according to laser markings. RL/LM facing up for a right lateral or left medial and RM/LL facing up for a right medial or left lateral.



2

Drill the 2.4 mm guide wires through the Drill Sleeve, taking care not to drill through the posterior cortex. A Depth Stop is provided to help facilitate this drilling. Once the guide wires are placed, the Drill Sleeves can be removed. It is easier to remove the distal keyed Drill Sleeve first and then remove the proximal Drill Sleeve. The guide body can also be removed from the joint space. The result is two guide wires with the distal set at an offset, away from the tibial spine.



3

Ream a 7 mm tunnel over the distal guide wire and remove the guide wire. Ream a 6 mm tunnel over the proximal guide wire. **Note: Caution should be taken to avoid drilling through the posterior cortex.** It helps to use a grasper to hold the distal guide wire out of the way when reaming the 6 mm tunnel. The proximal guide wire can be removed. The result shown is the beginning of the dovetail bone slot that can be finished with the existing bone rasps and dilators.



4

Insert the appropriate sided Dilating Rasp into the slot created (vertical side towards the midline). *Note: the top of the rasp should remain flush to the articular surface of the tibia.* The rasp is slowly advanced with a combination of malleting and hand rasping until it reaches the posterior tibial cortex. *Note: The rasp should follow the A/P slope of the tibia throughout its course. Its position will reflect the bone graft component of the transplant.*



5

The appropriate sided Dovetail Meniscal Allograft Dilator is selected and inserted into the trapezoidal slot until it contacts the posterior cortex of the tibia. The rasp or curette may be exchanged to fine tune the slot prior to graft placement.



6

Final preparation is made for passing of the graft into the recipient slot. The trapezoidal slot is cleared of remaining bone debris in the posterior portion of the tibia. As the graft is delivered to the field, the graft passing suture is led out the posterior lateral capsule via a standard inside/out meniscal suturing technique.

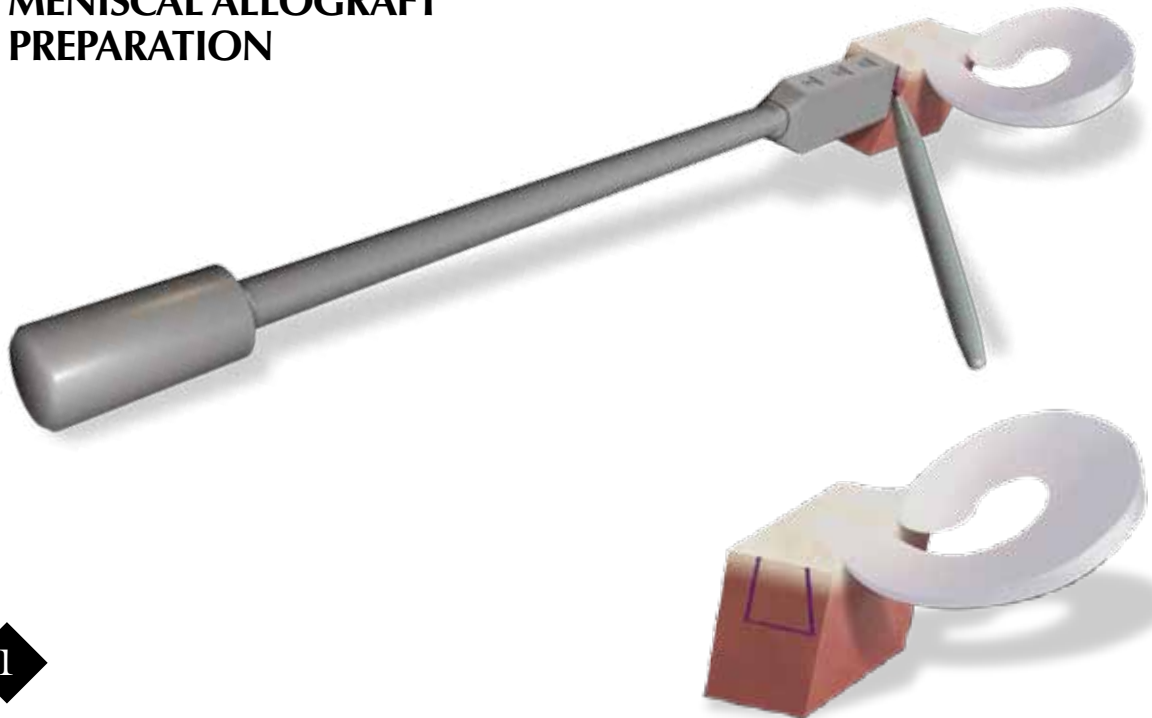


7

A Dovetail Meniscal Allograft Tamp may be used to position the bone block into the slot. The knee is brought into a figure four position, opening the lateral compartment. The passing sutures are pulled from the outside and the graft advanced into position. *Note: The posterior horn must clear the femoral condyle before the bone plug will fully seat against the posterior cortex.*

Once the graft is fully seated into position, the knee is placed through a range of motion assuring final positioning prior to proceeding with suturing of the periphery of the graft to the capsule. The bone block should remain flush with the tibia articular surface from front to back of the tibia. At the conclusion of the procedure, the wound is irrigated and closed in a standard layered fashion. A sterile dressing is applied with a knee range of motion brace and Cryo-therapy device.

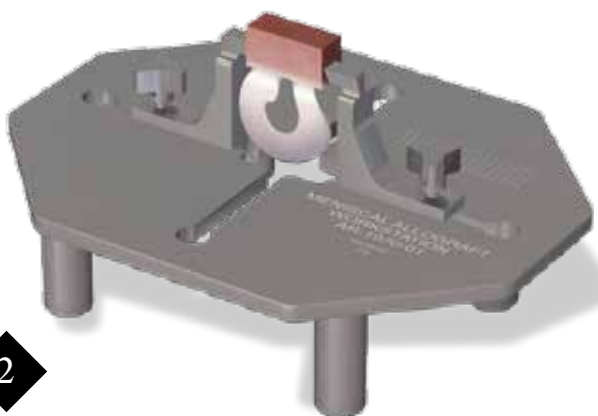
MENISCAL ALLOGRAFT PREPARATION



1

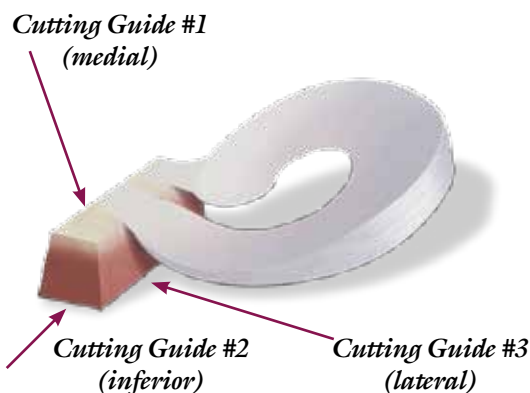
The allograft meniscus is initially evaluated to ensure it matches the recipient. The bone block is trimmed of excess bone and soft tissue to better identify the meniscal origin and insertion sites. This also allows for a better fit into the Dovetail Meniscal Allograft Workstation. Based on the A/P length of the trapezoidal slot created in the tibia, the graft is marked and cut to similar length.

Vertical and parallel saw cuts are made on each end of the bone plug to establish the desired length. Using the trapezoidal rasp for tibia slot preparation, an outline of the dovetail bone block is drawn on the end of the bone plug. The vertical (midline) sketch line is made at the midline aspect of the soft tissue attachments. Note the angled cut is on the lateral side of the bone plug. The vertical (midline) sketch line is made at the midline aspect of the soft tissue attachments.

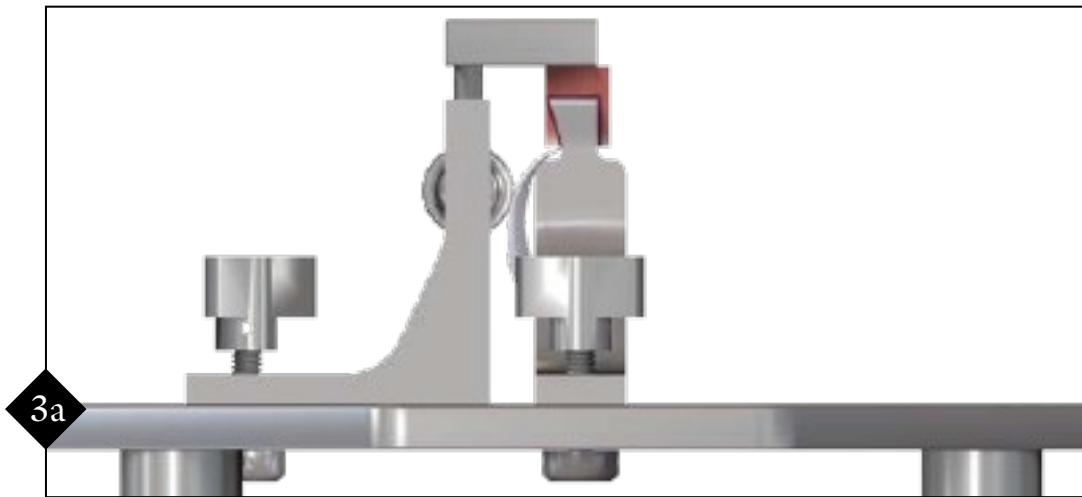


2

The allograft is positioned upside down, allowing the meniscus to hang free away from the bone block. Align the medial edge of the dovetail sketch line with the vertical face of the holding posts. Align the level of each soft tissue attachment to the lower face of the holding posts. The ends are secured into the workstation graft holding posts as shown.

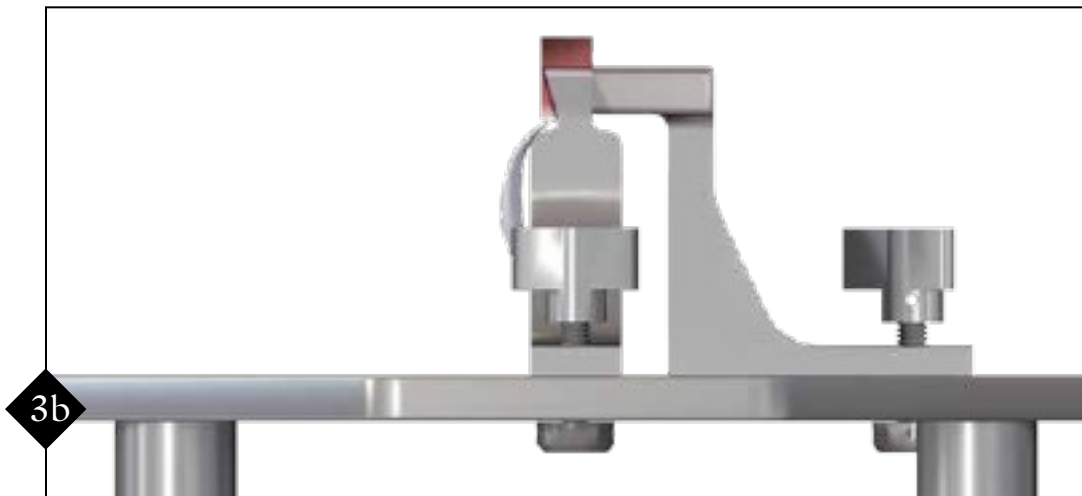


The three modular Cutting Guides will be used to create the final shape of the dovetail bone block as shown above.



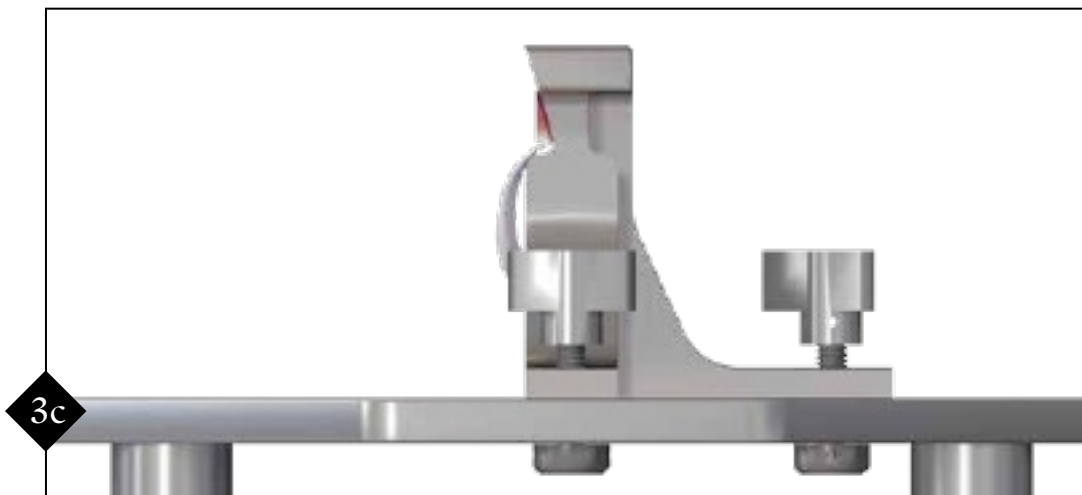
3a

Cutting Guide #1 is secured into the workstation and aligned so the vertical cutting face is aligned with the vertical face of the holding post. A sagittal saw is used to complete the cut.



3b

Cutting Guide #2 is secured in the workstation and positioned flush to the bone block (vertical cut) and used to complete a horizontal (inferior side) cut of the bone block with a sagittal saw.



3c

Cutting Guide #3 is secured to the workstation in contact with the medial bone surface and aligned to guide the angled cut of the bone block. The bone cut is completed using a sagittal saw.

ORDERING INFORMATION

Dovetail Meniscal Allograft Set (AR-1970S) includes:

Dovetail Meniscal Allograft Workstation (AR-1970):	
Dovetail Meniscal Allograft Workstation Base	AR-1970-01
Dovetail Meniscal Allograft Workstation Holding Post	AR-1970-2A
Dovetail Meniscal Allograft Workstation Holding Post	AR-1970-2B
Cutting Guide #1	AR-1970-03
Cutting Guide #2	AR-1970-04
Cutting Guide #3	AR-1970-05
Dovetail Meniscal Allograft Osteotome Blades, qty. 2	AR-2960
Dovetail Meniscal Allograft Osteotome Handle	AR-2961
Dovetail Meniscal Allograft Alignment Rod	AR-2961A
Dovetail Meniscal Allograft Drill Guides, qty. 2	AR-2962
Dovetail Meniscal Allograft Dilating Rasp, left	AR-2963L
Dovetail Meniscal Allograft Dilating Rasp, right	AR-2963R
Dilating Rasp, Slot, Meniscal Allograft	AR-2963BR
Dovetail Meniscal Allograft Dilator, left	AR-2964PL
Dovetail Meniscal Allograft Dilator, right	AR-2964PR
Slap Hammer	AR-2964SH
Dovetail Meniscal Allograft Tamp	AR-2964T
Dovetail Meniscal Allograft Graft Sizing Block	AR-2965
Kirk Mallet	AR-2966
Dovetail Tibial Drill Guide	AR-1965G
Drill Sleeve, 2.4 mm	AR-1965G-01
Offset Drill Sleeve, 2.4 mm	AR-1965G-02
Depth Stop	AR-1965G-03
2.4 mm Guide Pin, qty. 2	AR-1250L
Acorn Reamer, 6 mm	AR-1406
Acorn Reamer, 7 mm	AR-1407
Dovetail Meniscal Allograft Instrumentation Case	AR-1970C
Dovetail Meniscal Allograft Case Insert	AR-1970C-1

Accessory Instrumentation:

Protector Meniscus Suturing Set (AR-4060S), sterile, includes:

Malleable Curved Cannula w/Handle, qty. 1	
Nitinol Suture Needle w/Wire Loop End, qty. 1	
Adjustable Needle Holder, qty. 1	
2-0 FiberWire Meniscus Repair Needles	AR-7223
2-0 FiberWire Meniscus Repair Needles, small diameter	AR-7223SM

References:

1. Carter, Thomas, *Meniscal Allograft: Keyhole Technique*, Operative Techniques in Sports Medicine, Vol. 10, No 3 (July) 2002: pp 144-149.
2. Carter, Thomas, *Meniscal Allograft Transplantation*, Sports Medicine and Arthroscopy Review, Vol. 7 No 1, 1991 pp 51-62.
3. Henning CE, Lynch MA, *Current Concepts in Meniscal Function and Pathology*, Clinical Sports Medicine, 4:259-265, 1985.
4. Rodeo SA, *Current Concepts: Meniscal Allografts-Where do we stand?* American Journal of Sports Medicine, 29: 246-261, 2001.
5. Cole, Brian J., Carter, Thomas R., Rodeo, Scott A, *Allograft Meniscal Transplantation*, The Journal of Bone & Joint Surgery, Vol. 84-A, No. 7, July 2002, pp. 1236-1250.

This description of technique is provided as an educational tool and clinical aid to assist properly licensed medical professionals in the usage of specific Arthrex products. As part of this professional usage, the medical professional must use their professional judgment in making any final determinations in product usage and technique. In doing so, the medical professional should rely on their own training and experience and should conduct a thorough review of pertinent medical literature and the product's Directions For Use.



U.S. PATENT NOS. 6,716,234 and 7,164,762

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