

## Meniscal Repair

### Surgical Indications and Considerations

*Anatomical Considerations:* The meniscus is a half moon shaped piece of cartilage that acts as force transmitter between the femur and the tibia. The meniscus has nutritive as well as lubricating properties in the knee joint as well. In a normal knee, there are two menisci, which sit on the tibia itself; the lateral and medial menisci. The meniscus itself is largely avascular, and therefore, cannot repair itself if the tear is in an avascular portion of the meniscus. The only time a meniscus will repair itself is if the injury is located in the periphery of the meniscus, where it has a vascular supply. A short (<1cm) stable tear that is limited to the outer 20% of the meniscus could heal itself with a period of immobilization. Descriptively, the anterior third of the meniscus is known as the anterior horn, the posterior third as the posterior horn, and the middle as the body. The complete removal of the meniscus can result in progressive knee arthritis.

*Pathogenesis:* Traumatic tears are the result of a sudden load being applied to the meniscal tissue that is severe enough to cause the cartilage to fail. This trauma is usually the result of a twisting injury on a semi-flexed knee or a blow to the side of the knee that causes the meniscus to be compressed or levered against. Common examples of this injury are a fall backwards onto the heel with rotation of the lower leg or a football clipping injury. Degenerative tears are a result of the failure of the meniscus over time. There is a natural “drying out” of the center of the meniscus which progresses with age. Therefore, often the mechanism of injury is nothing out of the ordinary for the patient. An example of a possible mechanism would be a squat to pick an item up off of the floor. However, other times, there are no memorable injury that caused the tear.

*Epidemiology:* A meniscus tear can be located in any location, and in any conceivable pattern. However, tears that are confined to the anterior horn are unusual. Tears typically begin in the posterior horn and progress anteriorly. Patients with sports injuries have a mean age of 33 years, and account for approximately 32% of cases. Patients with non-sporting injuries have a mean age of 41 years, and account for approximately 39% of cases. Patients with an indefinable injury have a mean age of 43 years, and account for about 29% of cases. There is a 4:1 male to female ratio in these tears, and approximately 2/3 of all cases occur in the medial meniscus. It should also be noted that associated ACL tears were found in 47% of the patients in sports injuries and in 13% of the non-sporting injuries. In the no-injury group, there were no ACL tears.

### *Diagnosis*

- Pain on the side of the knee at the level of the joint line between femur and tibia
- May observe swelling, but generally low grade, associated with stiffness and limping
- Patient may report a “locking” of the knee in a bent position, associated with pain
- Twisting, squatting or impacting activities cause pain
- Positive McMurray’s, Apley’s grinding test and/or Bounce home test
- Radiographs rule out bony injury
- MRI is helpful in determining the presence, size, location and severity of the tear

*Nonoperative Versus Operative Management:* Surgical repair is typically recommended for patients who are experiencing pain and/or locking of the joint. Arthroscopic surgery is the method of choice to treat a tear, as there are currently no medications, braces or physical therapy treatments that have been shown to promote healing in avascular tears. Arthroscopic surgery is performed on an outpatient basis, with the surgeon evaluating the tear. Upon this evaluation, the decision is made to either remove or repair the tear based on the location and size of the tear. If there is a vertical tear at the rim near the meniscal blood supply, it is desirable to repair the meniscus by approximating the torn edges of the meniscus to allow for healing and preventing these edges getting caught in the joint. Note that if the tear is located in an avascular portion of the joint, a meniscectomy will most likely need to be performed. The main surgical risk is wound infection and breakdown.

*Surgical Procedure:* One arthroscopic technique is known as the inside-out method. It uses cannulas to direct a pair of long needles into the meniscus and out through a small incision in the back of the knee. The suture ends are then tied together on the outside of the knee capsule to firmly approximate the tear. This procedure does require a 1 ½” incision to access the area where the sutures are tied together. Other arthroscopic methods can avoid incisions completely. Some of these include bioabsorbable arrows and dissolving meniscal staples. T-Fix sutures are another option that provide a good repair. These sutures have an anchor that acts like a wall anchor and is deployed after placing the suture through the meniscus, the tear, and the peripheral rim. The sutures are then tied together from the inside using a knot pusher instrument that secures the meniscus to the rim.

## POSTOPERATIVE REHABILITATION

### **Phase I:** Weeks 1-4

Goals: Decrease swelling and pain  
 Protect Repair  
 Increase range of motion and strength

Intervention:

- Physical Agents
  - Electrical Muscle Stimulation
  - Cryotherapy
- Therapeutic Exercises
  - Isometric quadriceps, straight leg raises, active knee extension
  - Non-weight bearing gait training (weeks 1-2)
  - Toe touch weight bearing – ¼ body weight gait training (weeks 3-4)
  - Progressive Strengthening Exercises (hamstrings, quadriceps, gastroc-soleus, ilio-tibial band)
  - Closed Chain activities (gait, toe raises, wall squats, mini squats) in weeks 3 and 4
  - UBE for conditioning (weeks 1-2)

- Stationary bike < 15 minutes (weeks 3-4)
- External Devices
  - Post-operative bracing (immobilizer)
  - Axillary Crutches
- Passive Range of Motion/Manual Therapy
  - Goal of achieving 0-90 degrees in weeks 1-2; 0-120 degrees in weeks 3-4
  - Patellar mobilizations

**Phase II:** Weeks 5-8

Goals: Restore normal, pain free full range of motion

Ability to walk with full weight bearing by weeks 7 and 8, while wearing immobilizing brace

Intervention:

- Physical Agents
  - Electrical Muscle Stimulation (stops after week 6)
  - Cryotherapy
- Passive Range of Motion/Manual Therapy
  - Goal of achieving 0-135 degrees
  - Patellar and peri-patellar soft tissue and joint mobilizations
- Therapeutic Exercises
  - Knee flexion (hamstring curls to 90°)
  - Knee extension (quad sets 0-30°)
  - 4 way hip exercises
  - Leg press (70-10°)
  - Step-Downs
  - Proprioceptive/balance training (weight shifting, mini trampoline, BAPS board, KAT board, plyometrics)
  - Conditioning with stationary bike
  - Weeks 7/8 and on – stationary bike, aquatic therapy, swimming, walking, stair climber, elliptical machine, straight running
- External Devices
  - Axillary Crutches and immobilizing brace as indicated

**Phase III:** Weeks 9-12

Goal: Allow patient to return to most normal activities including community ambulation, unlevel surfaces and stairs without pain - and without brace

Intervention:

- Approaches / strategies listed above
- Functional training: Introduce running without brace, multi-plane single leg activities, cutting and full sport activities

Intervention for High Performance / High Demand Functioning in Workers and Athletes

Goal: Return to unrestricted sport or work activity

- Therapeutic exercises  
Review desired activity and progress to ballistic activity specific exercises
- Patient education/ergonomics instruction  
Educate patient to recognize knee injuries  
Instruct in home/gym exercise and stretching program to prevent recurrence.

Selected References

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