

## **MENISCUS INJURY**

Meniscus tear is one of the most common knee injuries. Any activity that causes you to forcefully twist or rotate the knee, especially when putting full weight on it can lead to a torn meniscus. Meniscus tears are common in contact sports like football as well as noncontact sports requiring jumping and cutting such as volleyball and soccer. They can happen when a person changes direction suddenly while running and often occur at the same time as other knee injuries, like an anterior cruciate ligament (ACL) injury. Meniscus tears are a special risk for older athletes since the meniscus weakens with age.

### **MECHANISM OF INJURY:**

The injury occurs when a player standing on a semi-flexed knee twist his body to one side. The twisting movement, an important component of injury is possible only with a flexed knee. During this movement meniscus is sucked in and squeezed as rotation occur between the femoral condyles and tibia. This results in longitudinal tear of the meniscus. Sometimes meniscus injured without any history of injury in case of degeneration.

### **PATHO-ANATOMY:**

- Two bones the femur and the tibia meet to form the knee joint. The patella sits in front of the joint to provide some protection. Two wedge-shaped pieces of fibrocartilage act as shock absorbers between your femur and tibia. These are the menisci. The menisci help to transmit weight from one bone to another and play an important role in knee stability.
- The meniscus is torn often in its posterior horn and extend anteriorly with every subsequent injury. As there is no blood supply to the meniscus it does not heal after injury except the peripheral meniscal tears being in vascular area, often heal.

**SYMPTOMS:** After injury following signs and symptoms occur in the knee:

- Pain, especially when twisting or rotating your knee
- Swelling or stiffness
- A popping sensation
- Difficulty straightening the knee fully
- Feeling as the knee is locked in place when you try to move it
- Feeling of your knee giving way

**TYPES OF MENISCAL TEARS:** These are the types of meniscal tears:

1. **Intrasubstance/Incomplete Tear:** Incomplete and intrasubstance tears of the meniscus are stable injuries and generally do not require any surgical treatment. Often these are a sign of early degenerative changes of the meniscus tissue
2. **Radial Tear:** Radial tears of the meniscus are the most common type. These tears are within the area of the meniscus where there is no blood supply and therefore difficult for the tear to heal. Usually, these tears require some type of surgical treatment and the only option is to shave out the damaged portion of the meniscus.
3. **Horizontal Tear:** A horizontal tear is a tear that most commonly requires a meniscus repair. Rather than removing the damaged portion of the meniscus, a horizontal tear may be able to be sewn together.
4. **Flap Tear:** A flap tear of the meniscus is an unusual pattern of a meniscal tear. In patient where the flap is causing symptoms of catching in the knee, the flap of the meniscus can be removed without removing much tissue at all.
5. **Complex Tear:** A complex tear means there is a combination of tear patterns. A complex tear often involves both radial and horizontal tear patterns. Typically complex tears are not treated with meniscus repair because of the complex nature of the tear.
6. **Bucket-Handle Tear:** A bucket-handle tear is a large type of horizontal tear of the meniscus. These types of tears often cause the knee to become stuck by causing the torn portion of the meniscus to block normal knee motion. Bucket-handle tears often require more surgical interventions in order to allow the knee to start bending again.

## **DIAGNOSIS:**

**Physical examination:** Physical examination should include inspection, palpation, range of motion (ROM) and gait, and tests for integrity of menisci and other structures of the knee joint.

### **Inspection:**

- Height and weight of patient;
- Alignment of the knee joint;
- Effusion, scars
- Muscle atrophy;
- Assessment of the skin and muscle tone

### **Palpation:**

- Pain
- Tenderness

### **ROM and Gait:**

- Active and passive range of motion.
- Difficulties by full extension of the knee.
- Pain by full flexion of the knee.
- Deviations or compensations of the gait pattern (antalgic gait).

**Imaging test:**

**Knee X-ray:** This test won't show a meniscus tear. However it can be helpful to determine if there are any other causes of your knee pain like osteoarthritis.

**MRI:** An MRI uses a magnetic field to take multiple images of your knee. An MRI will be able to take pictures of cartilage and ligaments to determine if there is a meniscus tear. While MRIs can help your doctor make a diagnosis but they are not considered 100 percent reliable. However, using an MRI has helped reduce the need for arthroscopy in some people.

**Ultrasound:** An ultrasound uses sound waves to take images inside the body. This will determine if you have any loose cartilage that may be getting caught in your knee.

**Arthroscopy:** If your doctor is unable to determine the cause of your knee pain from these techniques they may suggest arthroscopy to study your knee. If you require surgery your doctor will also most likely use an arthroscope. With arthroscopy a small incision or cut is made near the knee. The arthroscope is a thin and flexible fiber-optic device that can be inserted through the incision. It has a small light and camera. Surgical instruments can be moved through the arthroscope or through additional incisions in your knee.

**Special test:****MacMurray test:**

- The patient lies supine while the examiner provides varus and valgus stress in addition to internal and external rotation to the patients knee during passive extension.
- The examiner holds the knee and palpates the joint line with one hand, thumb on one side and fingers on the other
- The other hand holds the sole of the patients foot and acts to support the limb and provide the required movement through range
- From maximal flexion, the knee is passively extended with internal rotation of the tibia and varus stress
- The knee is returned to maximal flexion and then passively extended again, this time with external rotation of the tibia and valgus stress

Internal rotation + varus stress = lateral meniscus

External rotation + valgus stress = medial meniscus

The test is positive if there is reproduction of pain, locking or clicking which may indicate a compromised meniscus.

**Appley grind test:**

**Procedure:** Patient lie prone with knee flexed to 90°, place one hand on foot other on tibia, compress knee into table, then internally or externally rotate the tibia.

**Findings:** Medial aspect joint line pain = medial meniscus tear, lateral aspect joint line pain = lateral meniscus tear.

**Thessaly Test:**

The Thessaly test is performed with the patient standing with all weight on one extremity. The foot is planted and knee is flexed at 5° at first and then at 20°. The patient is then asked to

internally and externally rotate the body, while holding the examiner's hand for support. This test combines axial load and rotational forces. The test is considered positive by pain.

### **TREATMENT:**

**Non-surgical treatment:** Many meniscus tears will not need immediate surgery. If your symptoms do not persist and you have no locking or swelling of the knee, your doctor may recommend nonsurgical treatment.

**RICE:** The RICE protocol is effective for most sports-related injuries. RICE stands for Rest, Ice, Compression, and Elevation.

**Rest:** Take a break from the activity that caused the injury. The doctor may recommend to use crutches to avoid putting weight on your leg.

**Ice:** Use cold packs for 20 minutes at a time, several times a day. Do not apply ice directly to the skin.

**Compression:** To prevent additional swelling and blood loss, wear an elastic compression bandage.

**Elevation:** To reduce swelling put your leg up higher than your heart.

**Nonsteroidal anti-inflammatory drugs (NSAIDs):** Anti-inflammatory drugs such as aspirin, ibuprofen, and naproxen help reduce pain and swelling.

**Steroid injection:** The doctor may inject a corticosteroid medication into your knee joint to help eliminate pain and swelling.

**Surgical treatment:** If your symptoms persist with nonsurgical treatment, your doctor may suggest arthroscopic surgery.

### **Arthroscopy:**

**Procedure:** Knee arthroscopy is one of the most commonly performed surgical procedures. In this procedure, the surgeon inserts a miniature camera through a small incision (portal) in the knee. This provides a clear view of the inside of the knee. The surgeon then inserts surgical instruments through two or three other small incisions to trim or repair the tear.

**Partial meniscectomy:** In this procedure the damaged meniscus tissue is trimmed away. This procedure allows for immediate weight bearing and full range of motion soon after surgery.

**Meniscus repair:** Some meniscus tears can be repaired by suturing (stitching) the torn pieces together. Whether a tear can be successfully repaired depends upon the type of tear as well as the overall condition of the injured meniscus. Because the meniscus must heal back together, recovery time for a repair is longer than for a meniscectomy.

## **REHABILITATION GUIDELINES FOR MENISCAL REPAIR**

### **Phase I- Protective Phase (1–4 Weeks )**

#### **GOALS:**

- Decrease inflammation and swelling
- Restore ROM
- Reestablish Quad muscle activity-SLR without Quad lag
- Full scar mobility
- Full patellar mobility

#### **PRECAUTIONS:**

- WB (weight bearing) status: WBAT (weight bearing as tolerated) with crutches and brace locked at 0°
- ROM Restrictions: Passive ROM 0°-90°
- Recommended Restrictions: avoid pivoting and varus/valgus stress, no flexion beyond 90°

#### **TREATMENT:**

- Ice, compression, elevation
- Electrical muscle stimulation
- WBAT with crutches and brace locked at 0°
- Motion is limited for the first 7-21 days depending on the development of scar tissue around the repair site. Gradual increase in flexion ROM is based on assessment of pain and site of repair (0°-90°)
- Patellar mobilization
- Scar tissue mobilization
- Proprioception training with brace locked at 0°
- **Exercises:** Quad isometrics, HS isometrics (if posterior horn repair, no HS exercises until 6 weeks), ankle pumps, Quad sets, heel slides, Hip ABD, Hip ADD

### **Phase II – Intermediate Phase (Weeks 4 – 6)**

#### **GOALS:**

- Diminish inflammation and swelling
- Restore Full AROM
- Reestablish Quad muscle activity
- Criteria to progress to next phase: ROM 0°-90°, no change in pain or effusion, Quad control (MMT 4/5)

#### **PRECAUTIONS:**

- WB status: WBAT with crutches and brace locked at 0°
- ROM Restrictions: Passive ROM 0°-90°
- Recommended Restrictions: Avoid pivoting and varus/valgus stress, no flex beyond 90°

#### **TREATMENT:**

- Progress PRE's for hip, knee, ankle
- Progress WB flex 45°-90°

- Continue proprioceptive training
- **Exercises:** heel raises, mini-squats (less than 90° knee flexion), stationary bike (no resistance)

### **Phase III (Week 6-12)**

#### **GOALS**

- Restore full AROM
- Regain full muscle strength
- Prepare patients for advanced exercises
- Criteria to progress to next phase: full, pain free ROM, no pain or tenderness, SLR without lag, gait without device, brace unlocked

#### **PRECAUTIONS**

- **WB status: FWB crutches and brace**
- ROM restrictions: WB flex 0°-90°
- Recommended Restrictions: Avoid patellofemoral overload, avoid squatting, avoid pivoting or twisting on knee

#### **TREATMENT:**

- Begin loaded flex beyond 90° at 8 weeks
- Exercises: Progress PRE's, stationary bike, Quad set, heel slides, SLR, SAQ, heel raises, side lying hip ABD, standing HS curl, wall slides with knee flex <90°, squat to chair, seated leg press, step up/down, flexibility exercise (HS, Quad, Gastroc stretching)

### **Phase IV (Weeks 12-16)**

#### **GOALS**

- Regain full muscle strength
- Increase power and endurance
- Prepare for return to unrestricted activities
- Work on cardiovascular conditioning
- Sport-specific training

#### **PRECAUTIONS:**

- WB status: FWB (full weight bearing)
- ROM Restrictions: No restrictions
- Recommended Restrictions: Avoid patellofemoral overload, avoid squatting, avoid pivoting or twisting on knee

#### **TREATMENT:**

- Continue all exercises
- Increase plyometrics and pool program (if available)
- Initiate running program
- Sport specific drills
- Emphasize plyometrics, jumping, cutting

## **Phase V (Weeks 16 – onward)**

### **GOALS:**

- Safely recondition the injured area for the demands of sports activity

### **Criteria for discharge from skilled therapy:**

- Non-antalgic gait pattern
- Pain free full ROM
- No palpable edema
- Strength at least 4/5
- Independent HEP (home exercise programme)
- Age appropriate balance and proprioception abilities

### **PRECAUTIONS:**

- WB status: FWB
- ROM Restrictions: No restrictions
- Recommended Restrictions: Avoid patellofemoral overload, avoid squatting, avoid pivoting or twisting on knee

### **TREATMENT:**

#### **RETURN TO RUNNING PROGRESSION:**

- Light running on soft, level surface
- Need full ROM, good strength and no swelling to run safely
- Start with running 10 minutes, 3 times per week for first 2 weeks...if pain free with running, can increase running time by 1 minute per session for max 30 minutes

#### **SPEED AND AGILITY RUNNING PROGRAM FOR RETURN TO SPORT:**

- Straight ahead running phase
- Direction change running phase
- Unrestricted direction change