

Knee Meniscal Injuries

See also Meniscal Injuries

Background

1. Definition

- Injury or tear to C-shaped wedges of fibrocartilage located between femoral condyle and tibial plateau

2. General information

- Medial meniscus
 - Larger
 - Semilunar
 - Fixed to tibia
 - Bears heavier load
 - More freq injured than lateral meniscus
 - Medial and lateral meniscus connected by transverse ligament
 - Fibers of meniscus arranged in circular pattern
 - Expand w/load to provide shock absorption and joint lubrication, "hoop tension"
- Classification of tears
 - Anterior, lateral, posterior, traumatic vs. degenerative, "bucket handle", vertical, radial
- Association w/"Unhappy Triad"
 - ACL tear
 - MCL tear
 - Posterior horn of medial meniscus tear

Pathophysiology

1. Pathology of dz

- Mechanism of injury
 - Twisting action exerted on knee while foot is planted
- Atraumatic injury
 - Degenerative knee w/decr blood supply and fluid content allow meniscus to be vulnerable to injury
- Tear and loss of smooth motion of knee may lead to "locking" sensation, effusion, premature osteoarthritis

2. Incidence/ prevalence

- Meniscal tears: 9% of all knee injuries
- Male to female ratio; 2.5:1

3. Risk factors

- Most common sports
 - Twisting, pivoting, contact sports
 - Football, soccer, rugby, lacrosse, basketball
- Degenerative changes associated w/decr vascularity

4. Morbidity/ mortality

- May be
 - Debilitating
 - Unable to work
 - Time lost for rehab, possible surgical intervention
 - Restriction of ADLs

- Elite athletes
 - Loss of play time
 - Psychological stresses of injury
- May lead to early osteoarthritis

Diagnostics

1. History

- Appropriate mechanism of injury
 - Planting, twisting
- Insidious effusion, clicking, popping, locking/catching, joint line tenderness
- Previous injury

2. Physical examination

- General knee exam
- Joint line tenderness
- Effusion
- Range of motion (ROM)
- McMurray's test
 - The best individual test for ruling in meniscal pathology
 - Technique
 - Pt lies supine
 - Knee flexed to 45°
 - Hip flexed to 45°
 - Examiners thumb and index fingers placed on joint line
 - Passively flex knee
 - Internally rotate tibia at full flexion (to trap lateral meniscus) or externally rotate tibia (to trap medial meniscus)
 - Extend knee
 - Positive test is noted by painful click at joint line
 - McMurray's: 35-68% sensitivity, 87-99% specificity
 - NPV approaches 100%
- Duck walk/squat
 - Pt finds this difficult to perform
- Ottawa Knee Rules
 - Use when there is a possibility of fracture

3. Diagnostic imaging

- Plain x-ray
 - Knee injuries: Indications for radiography
 - Ottawa & Pittsburgh knee rules
- MRI findings
 - MRI sequence varies based on institution, physician preference, and availability
 - No significant difference in evaluating knee structures using different magnet strengths
 - No need for injection of contrast for arthrography
 - Should interpret w/recent radiograph to correlate w/any calcified loose bodies or chondrocalcinosis
 - Sensitivity 89-98%, negative predictive value approaching 100%
 - Strict criteria for dx tear w/MRI

- Normal meniscus appears as homogeneous low signal intensity on all pulse sequences
 - Smooth, clean, dark "triangles"
 - A tear has larger water molecules resulting in incr signal intensity on all T1W, proton density and T2W sequences
 - Bright signal disrupting dark meniscus
 - Bright tear must definitively extend into meniscus
 - "Squint sign": If one must squint to see signal extending into meniscus, not usually a true tear
4. Diagnostic criteria
- Clinical dx, reaffirmed w/MRI, but confirmed only on arthroscopy
 - Comparing to arthroscopy as "gold standard", MRI accuracy is near 90% for predicting a meniscal tear

Differential Diagnosis

1. MCL sprain
2. Foreign body (calcification, loose cartilage)
3. Plica
4. Osteochondritis dissecans
5. Pes anserine bursitis
6. Osteoarthritis

Therapeutics

1. Acute treatment
 - Immediate referral to orthopedics if
 - Severe pain immediately following traumatic injury
 - Severe restriction of motion
 - McMurray positive at minimal flexion
 - Presence of concurrent ACL, MCL tear
 - Initial conservative tx
 - Rest/ restrict
 - No squatting, pivoting, kneeling
 - Ice: 20min q4-6hrs
 - Compression
 - No proven benefit; may use patellar restraining brace if poor quadriceps tone
 - Elevation to reduce effusion
2. Further mgmt (>24 hrs)
 - Surgical decision based on
 - Frequency of symptoms or pain
 - Daily despite 2-4 wks conservative tx
 - Degree of tear
 - Complex
 - Bucket handle
 - Involving articular surface
 - Affects daily functioning
 - Inability to squat
 - Locking
3. Long-term care

- Rehabilitation: post-op repair vs. resection
 - Repair
 - Complete healing 70-80% pts; mainly based on availability of blood supply to area of tear
 - Do not begin vigorous rehab for 6 wks post-op to allow for healing time of repaired meniscus
 - 6 months for completion of remodeling process
 - Tensile strength 50% at 4 wks, 76% at 8 wks
 - ROM (except extremes of flexion and extension) and partial wt bearing important in promoting healing environment
 - No difference in clinical failure rates in restrictive rehabilitation programs w/return to pivoting activity delayed to 6 months vs. accelerated programs w/return at 4-8 wks or when quadriceps strength was 75%
 - Resection
 - No need to restrict sporting activity
 - Regeneration is limited and remaining meniscus is immediately stable
 - These pts experience more pain and swelling leading to
 - Decr ROM
 - Decr strength
 - Overall knee-related quality of life and athletic ability decr
 - No difference between formal physical therapy or home exercise program in most athletes
 - High level elite athlete
 - Lower extremity staged physical therapy for strength, endurance, proprioception

Follow-Up

1. Return to office
 - Time frame for return visit
 - 4-6 wks w/conservative tx
 - Recommendations for earlier follow-up
 - Incr pain
 - Effusion w/activity
2. Refer to specialist
 - Immediate if "Red flags"
 - Traumatic twisting/ pivotal injury
 - Severe pain
 - Restricted ROM
 - Locking
 - Concurrent ACL tear

Prognosis

1. Good w/proper rehabilitation to strengthen, stabilize and prevent re-injury
2. Return to play
 - Full, pain free ROM
 - Able to perform sport specific functional activities

- Athletes may return to sport 2-3 wks after arthroscopic partial meniscectomy or 6-8 wks after meniscal repair

Prevention

1. Preventive bracing for high contact sports
 - Lateral support bracing for football linemen
2. Reinforce proper technique and training
3. Preseason conditioning program
 - Flexibility
 - Agility
 - Proprioception
 - Strength training
 - Emphasize proper sport specific technique

References

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Evidence-Based Inquiries

1. For knee pain, how predictive is physical examination?
2. What is the best way to evaluate an acute traumatic knee injury?
3. Is musculoskeletal ultrasound helpful in diagnosing meniscal tears?
4. Is a structured exercise program as effective as arthroscopic surgery for decreasing the pain of nontraumatic meniscal injuries?

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