Knee Pain

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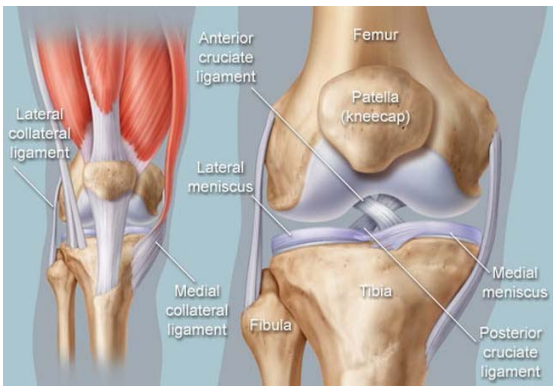
Knee Anatomy

- Complex hinge joint
  - Distal Femur, Tibia, Patella, Fibula
  - ACL, PCL, MCL, LCL, lateral and medial meniscus
- Three compartments
  - Medial
  - Tibiofemoral
  - Patellofemoral
- Bursae
  - Suprapatellar
  - Prepatellar
  - Infrapatellar
  - Pes anserine



Epidemiology

- Children <18 years
  - Prevalence approaching 25-30%
  - Females > Males
- Adults >18 years
  - Affects 25% of people

History and Physical

- Duration of pain
  - 6 weeks – Acute vs. Chronic
- Trauma
  - Type of force causing injury
- Location of pain
  - Anterior, lateral, medial, posterior
- Effusion
- Constitutional symptoms
- Activity level

Etiologies of Knee Pain

Acute/Traumatic

- Soft tissues
  - Cruciate ligaments
  - Collateral ligaments
  - Menisci
- Fractures
  - Patellar
  - Tibial Plateau
  - Distal Femur
  - Proximal Fibula
- Bursitis

Chronic/Overuse

- Osgood Schlatter
- Quadriceps and patellar tendonopathy
- Bursitis
- Plica
- Chondromalacia Patella
- Iliotibial band pain
- Osteoarthritis

Etiologies of Knee Pain

Infectious

- Septic arthritis

Inflammatory

- Gout
- Pseudogout
- Autoimmune

Patellofemoral Pain

- Defined as anterior knee pain with no intraarticular or peripatellar pathology
- Most common cause of knee pain in primary care setting
  - Approximately 25% of all knee injuries
  - Female to male ratio of 2:1
- Etiologies
  - Overload
  - Malalignment
    - Static vs. Dynamic
  - Trauma

Patellofemoral Pain

- Physical examination:
  - Observation
  - Palpation
  - Strength
- Special tests
  - 80% patients with PFP have pain with squatting
  - Trendelenburg
- Imaging
  - Not indicated unless treatment failure
  - Chondromalacia patella
    - MRI shows articular cartilage damage on underside of patella

Patellofemoral Pain

- Treatment
  - Activity modification with offloading exercise
    - Elliptical, recumbent bikes, swimming, water running
  - Pain control
    - +/- NSAIDs for 1-2 weeks
    - Ice
    - Studies insufficient for ultrasound, electronic stimulation, inotophoresis
  - Correction of Biomechanics
    - Physical therapy biweekly for 6 weeks focusing of hip strengthening
    - Daily stretching
  - Other therapies
    - Minimalist shoes show mild decrease in PFP
    - Steroid injections are not recommended

Osgood-Schlatter Disease

- Epidemiology
  - Occurs in children 9-15 years of age usually following growth spurt
  - More common in active children
    - 20% compared to 5% non active
    - Can be bilateral but more commonly unilateral
- Pathophysiology
  - Overuse injury causing avulsion of the apophysis of the tibial tubercle
  - Causes secondary ossification (callous formation)
- Presentation
  - Gradual worsening of anterior knee pain
  - Worse with activity and relieved by rest

Osgood-Schlatter Disease

- Physical Examination
  - Pain with palpation along the distal patellar tendon/tibial tubercle
  - Absence of effusion/swelling/warmth/erythema
- Imaging
  - Lateral Plain film of affected knee
    - Elevation of the tibial tubercle
    - Irregular, fragmentation of the tibial tubercle
    - Calcification of patellar tendon

Osgood-Schlatter Disease

- Treatment
  - NSAIDs – short term
  - Prolotherapy
    - 12.5% dextrose injection
  - Continuation of activity
  - Physical therapy
    - Quadriceps strengthening
  - Bracing

Iliotibial Band Syndrome

- Epidemiology
  - 2nd most common knee complaint in primary care
  - Occurs exclusively in active populations
- Pathophysiology
  - Distal ITB courses over lateral femoral epicondyle causing pain around lateral joint line
  - Overuse injury
  - ITB under most tension at 30 degrees of flexion
- Etiologies
  - Intrinsic
    - Valgus vs Varus knees
  - Extrinsic
    - Uneven running surfaces, sudden increase in mileage

Iliotibial Band Syndrome

- Physical Examination
  - Tenderness to palpation just medial to lateral joint line
    - Joint line is NON tender
  - Noble compression test and Ober testing
- Imaging
  - Usually not indicated
  - Ultrasound/MRI
    - IT band thickening
    - Fluid around LFE

Iliotibial Band Syndrome

- Treatment
  - Acute phase (within one week of symptom onset)
    - Rest
    - Ice massage
    - NSAIDs
  - Subacute (within months of symptoms onset)
    - Physical Therapy
    - Mobility exercises
    - Leg length discrepency
  - Chronic (years)
    - Glucocorticoids
    - Dry Needling
    - Autologous blood injections
    - Topical nitroglycerin
    - Surgical release

Inflammatory Knee Pain

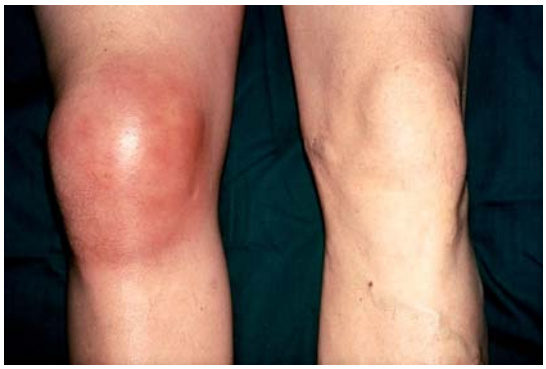
- Autoimmune
  - Rheumatoid arthritis, SLE, Sjogren's, Polymyositis, Dermatomyositis
  - Constitutional Symptoms
    - Fever, weight loss, fatigue
  - Symmetric polyarthralgia
    - Swelling
    - Migrating
  - Laboratory findings
    - ANA, RA, anti-CCP, etc.
  - Imaging
    - Joint destruction
  - Treatment
    - Early Rheumatologic consultation
    - DMARDs, Biologics, Corticosteroids

Gout

- Epidemiology
  - Most common in men in 4th or 5th decade of life
  - Children
    - Purine metabolism defect
- Pathophysiology
  - Hyperuricemia exceeds the solubility of urate in extracellular fluid
  - Monosodium urate crystals
    - Red, hot, swollen joints
  - Tophi
    - Granulomatous envelopment

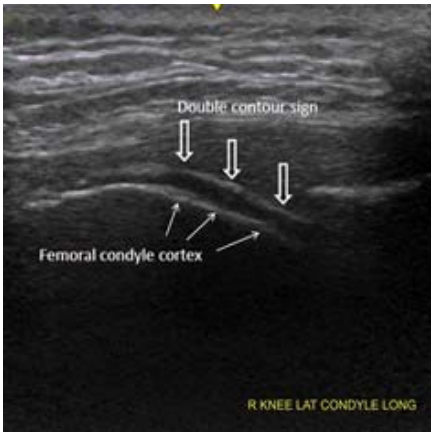
Gout

- Clinical Manifestations
  - Monoarticular arthritis
    - Intensely painful and inflamed
  - Effusion
- Diagnosis
  - Joint Aspiration
    - Compensated Polarized microscopy
      - Birefringent needle shaped crystals
  - Laboratory findings
    - ESR, CRP, leukocytosis
    - +/- hyperurecemia



Gout

- Imaging
  - Plain film/MRI
    - Tophaceous erosions
  - Ultrasound
    - Double contour Sign – 44% sensitive and 99% specific
    - Hyperechoic cloudy area – 79% sensitive and 95% specific
- Treatment
  - Glucocorticoids
    - PO/IV/IM/IA
    - Intraarticular only if history of gout and low chance of infection
  - NSAIDs
  - Colchicine



Pseudogout (CPPD)

- Epidemiology
  - 50% of acute attacks affect the knee
  - Older population
    - Mean age of 72 years
- Clinical Manifestations
  - Largely asymptomatic
  - Much like gout
- Risk factors
  - Synvisc injections
  - Pamidronate, GM-CSF
  - Parathyroidectomy

Pseudogout (CPPD)

- Diagnosis
  - Joint aspiration
    - Compensated polarized light microscopy
      - Positively birefringent crystals
  - Laboratory Findings
    - +/- ESR, CRP, leukocytosis
  - Imaging
    - Plain films
      - Chrondocalcinosis
      - Patellofemoral joint degeneration
  - Treatment
    - Gout tx
    - Plaquenil or Methotrexate

Septic Arthritis

- Epidemiology
  - Prevalence of about 10% adults
  - More common in older individuals
- Risk factors
  - Diabetes Mellitus
  - Rheumatoid arthritis
  - Prosthetic joint/recent joint surgery
  - IV drug user/recent intraarticular injection

Septic Arthritis

- Pathophysiology
  - 72% acquired hematogenously
    - Commonly secondary infection
  - Bite, trauma, osteomyelitis
  - Bacteria proliferate quickly causing acute onset symptoms
  - Bone and cartilage damage from inflammatory cells
  - S. Aureus including MRSA is most common
- Clinical Manifestations
  - Acute onset monoarticular arthritis
  - Febrile
  - Underlying primary infection

Septic Arthritis

- Diagnosis
  - Joint Aspiration w/ synovial fluid analysis
    - Gram stain and culture, leukocyte count and differential, crystals
  - ESR, CRP, Blood cultures
  - Imaging
    - Not required
    - MRI/CT could show osteomyelitis
  - Treatment
    - IV antibiotics total 14 days then 14 days oral antibiotics
      - Gram +
        - MRSA/MSSA
      - Gram –
        - 3rd generation cephalosporin
    - Joint Drainage

ACL Injury

- Epidemiology
  - Annual incidence rate of 1 in 3500 in general population
  - Majority occur during noncontact
  - Females are at greater risk
- Clinical Manifestations
  - Injury with “popping” sound
    - Contact vs. Noncontact
  - Large effusion with instability
  - +/- pain

ACL Injury

- Diagnosis
  - Largely Clinical
    - History
    - Lachman’s, anterior drawer, Pivot shift
  - Imaging
    - MRI
      - Shows extent of injury along with surrounding structures
    - Arthroscopy
- Treatment
  - Acutely
    - Ice, Elevation OTC pain relievers
  - Definitive
    - Surgical candidate vs non-operative

PCL Injury

- Epidemiology
  - Relatively rare
    - 5% trauma related knee injuries
  - Most commonly MVC
    - Least likely structure in knee to be injured during sports
- Clinical Manifestations
  - High energy vs. low energy
    - Multiple other ligamentous injuries
  - Isolated PCL injury
    - Low energy
    - Popliteal pain, loss of terminal flexion, mild effusion

PCL Injury

- Diagnosis
  - Clinical
    - History
  - Physical Examination
    - Posterior Drawer
    - Posterior Sag
  - Imaging
    - MRI
    - Arthroscopy
- Treatment
  - Orthopedic Referral
  - Surgical vs nonsurgical

Meniscal Injury

- Overview
  - Medial more common that lateral
    - Medial firmly tethered to MCL
  - Most commonly caused from rotational forces
  - Various types
    - Partial/Complex
    - Traumatic/Degenerative
    - Anterior/posterior
    - Lateral/medial
- Clinical Manifestation
  - Pain
  - +/- effusion
  - Catching/popping
  - Often weeks after inciting event

Meniscal Injury

- Diagnosis
  - History
  - Physical Examination
    - Joint line tenderness
    - McMurray's
    - Thessaly's test
      - Most sensitive and specific
  - Imaging
    - MRI
    - Ultrasound
- Treatment
  - Orthopedic referral
    - Arthroscopy
  - Physical therapy

Osteoarthritis

- Epidemiology
  - Estimated that 1 in 5 Americans are affected
    - Knee OA is most common form
    - Commonly beginning in the 5th and 6th decades of life
  - Significant comorbidities
    - Long term NSAID/Acetaminophen use
      - Renal and Liver disease
    - Difficulty ambulating/Obesity
  - Increased mortality
    - 50% increase in females of same age without OA
    - 20% increase in males
  - Disability
    - 3rd leading cause of disability among Americans

Osteoarthritis

- Pathophysiology
  - Multifactorial
    - Age, trauma, obesity, genetics, anatomy, sex
    - Inflammatory
- Clinical Manifestation
  - Pain/bilateral
  - Swelling
  - Deformity
  - Limited ROM

Osteoarthritis

- Diagnosis
  - Clinical
  - Imaging
    - Tibiofemoral and patellofemoral most common
- Treatment
  - NSAIDs
  - Steroid injection
  - Hylauronic acid
  - Partial knee replacement
  - Total knee replacement
    - Patient selection
      - Increased complication rate in smokers and obese

Resources

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