Differential Diagnosis and Management of Hip and Knee OA

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Objectives

• Provide the clinician with a review of arthritic progression
• To use current evidence to describe the presentation of pathologies of the hip and knee in order to appropriately differentially diagnose the patient
• To use current evidence to differentially diagnose hip and knee OA using the most appropriate history and testing procedures
• To use current evidence to review treatment of hip and knee OA

Osteoarthritis Overview

• Degeneration of cartilage on the joint surfaces
• Inflammation of the synovium
• Changes to the underlying subchondral bone
• Over time can lead to osteophytes
• In final stages cartilage is worn away and bone rubs against bone

Bijlsma et al, 2011

Primary vs. Secondary OA

• Primary OA
  • Middle to older age
  • Due to failure of cartilage
  • Predisposing factors: genetics/activity level

• Secondary OA
  • Trauma
  • Instability
  • Inflammation
  • Developmental diseases
  • Congenital disease
  • Metabolic dysfunctions

Chinese Orthopaedic Association, 2018

Risk Factors

• Age
• Gender
• Obesity
• Previous joint injury
• Overuse of joint


1 in 2 adults will develop symptoms of knee OA in their lifetime
1 in 4 adults will develop symptoms of hip OA by age 85
2010 global presence of radiographically confirmed knee OA 3.8%, hip OA 0.85%

http://www.arthritis.org/aboutarthritis/types/osteoarthritis/what-is-osteoarthritis.php
Risk Factors

- Weak musculature
  - Knee OA:
    - Hip flexors/extensors/adductors: >50%
    - Knee extensors: 43%
- Tight Musculature
  - Knee OA: Rectus Femoris and ITB
- Genetic predisposition
- Cardiovascular disease
- Lower socioeconomic status

Early Life Risk Factors

- Childhood obesity
  - Increased BMI in young adults (mean age 23) is associated with knee OA at 65, but not hip OA
  - 3x greater incidence at the heaviest BMI vs. the lowest BMI
- Malalignment
  - Increased stresses on articular surface

Clinical Presentation

- Pain with weight bearing activities
- Stiffness in morning or after periods of inactivity
- Crepitus with passive or active movements
- Joint edema

American College of Rheumatology Radiological and Clinical Criteria for Osteoarthritis - Hip

- 1 - Hip pain for most days of previous month
- 2 - Erythrocyte sedimentation rate of less than 20 mm in the first hour
- 3 - Femoral or acetabular osteophytes on radiographs
- 4 - Hip joint space narrowing on radiographs

American College of Rheumatology Radiological and Clinical Criteria for Osteoarthritis - Knee

- 1 - Knee pain for most days of previous month
- 2 - Crepitus on active joint motion
- 3 - Morning stiffness lasting 30 min or less
- 4 - Age 38 years or older
- 5 - Bony enlargement of the knee on examination

American College of Rheumatology Clinical Criteria for Osteoarthritis - Knee

- 1 - Knee pain for most days of previous month
- 2 - Osteophytes at joint margins on radiographs
- 3 - Synovial fluid typical of osteoarthritis (laboratory)
- 4 - Age 40 years or older
- 5 - Crepitus on active joint motion
- 6 - Morning stiffness lasting 30 min or less

Iversen et al, 2016


Bijlsma et al, 2011
Knee Joint Anatomy

- Hinge joint
- Primary function
  - Enables lower leg to swing
- Two joints
  - Tibiofemoral joint
  - Patellofemoral joints

Joint Alignment

- LE joint alignment is key in knee joint load distribution
- Load bearing axis is from mid femoral head to mid ankle
- Study by Sharma, et al demonstrated progression of OA at 18 months
  - 31% of subjects with varus deformity
  - 22% of subjects with valgus deformity

Sharma et al, 2001

Ligamentous Stability

- Anterior Cruciate Ligament (ACL)
- Posterior Cruciate Ligament (PCL)
- Lateral Collateral Ligament (LCL)
- Medial Collateral Ligament (MCL)

Anterior Cruciate Ligament

- Comprised of two areas
  - Anteromedial bundle
  - Posterolateral bundle
- Provides 85% of the resistance of anterior translation of the tibia

Butler et al, 1980

Posterior Cruciate Ligament

- Comprised of 2 areas
  - Anterolateral bundle
  - Posteromedial bundle
- Primary restraint of posterior translation of the tibia
- Provides 95% of posterior stability from 30 - 90 degrees of flexion

Van Dommelen et al., 1989
Lateral Collateral Ligament

- Limits lateral rotation of the tibia and varus stress
- Knee flexed 5 degrees - contributes to 55% of the resistive load
- Knee flexed 25 degrees - increases to 69%
- Originates on lateral condyle of femur and inserts on the fibular head

Medial Collateral Ligament

- Primary function is to resist valgus stress
- Knee flexed 5 degrees contributes to 57% of the resistive load
- Knee flexed 25 degrees contributes 78% of resistive load
- Superficial and deep portions

Knee Joint Mechanics

- Capsular pattern: Flexion, Extension
- Resting Position: 25 degrees of flexion
- Closed Packed Position: Full extension and external rotation
- Normal ROM:
  - Flexion: 135 degrees
  - Extension: 0 degrees
  - Medial rotation of tibia on femur: 20-30 degrees
  - Lateral rotation of tibia on femur: 30-40 degrees

Patella

- Improves efficiency of extension during last 30 degrees of knee extension
- Decreases friction of quadriceps mechanism
- Controls capsular tension in knee
- Bony shield for cartilage on femoral condyles

Patella Loading with Activity

- Walking: 0.3x body weight
- Ascending stairs: 2.5x body weight
- Descending stairs: 3.5x body weight
- Squatting: 7x body weight

Differential Diagnosis: Knee OA

- Meniscal tears
- Instability
- PFPS
- Tendonitis
  - Patellar
  - ITB
- Hamstring
- Bursitis
  - Pes anserinus
  - Prepatellar
- Referred pain
  - Lumbar
  - Hip
Meniscal Tears

- Sharp, stabbing pain
- Clicking
- Pain is usually posterior medial or posterior lateral
- Pain worsens with squatting and rotary motions
- Joint line tenderness

- Special Tests
  - Thessaly Test
  - McMurray Test
  - Apley grind test

Thessaly Test

- Sensitivity
  - At 5 degrees of flexion: MMT 66%, LMT 81%
  - At 20 degrees of flexion: MMT 89%, LMT 92%

- Specificity
  - At 5 degrees of flexion: MMT 96%, LMT 91%
  - At 20 degrees of flexion: MMT 97%, LMT 96%

- Test Position:
  - Patients stands on test leg with approx 5 degrees of flexion
    rotates 3x’s
  - Repeat with knee flexed 20 degrees

McMurray’s Test

- Sensitivity: 55%
- Specificity: 77%

- Test Position:
  - Patient is supine, examiner grasps distal tibia with one hand and grasps
    knee with opposite hand
  - Start with LE in full flexion, bring knee into extension while externally
    rotating the tibia and providing a valgus stress
  - Bring knee back into flexion and IR tibia while providing a varus stress
    as the knee extends

- Positive test
  - Valgus stress - medial meniscus
  - Varus stress - lateral meniscus

Apley’s Grind Test

- Sensitivity: 16-22%
- Specificity: 88-90%

- Test Position:
  - Patient is prone with knee flexed 90 degrees
  - Examiner places own knee on patients thigh to stabilize
  - IR’ly/ER’ly rotate tibia with distraction and compression

- Positive test = pain with compression

Knee Instability

- Pain with rotation and pivoting
- Buckling during functional activities

- Mechanism of Injury:
  - ACL: deceleration with knee in slight flexion
  - PCL: hyperflexion, dashboard injury
  - MCL: twisting movement while WB’ing, contact sports
  - LCL: twisting movement while WB’ing, contact sports
Special Tests for Knee Instability

- ACL
  - Anterior Drawer Test
  - Lachman’s Test
  - Pivot Shift Test
- PCL
  - Posterior Drawer Test
  - Posterior Sag Sign
  - Quadriceps Active Test
- MCL
  - Valgus Stress Test
- LCL
  - Varus Stress Test

Anterior Drawer Test - ACL

- Specificity: 92%
- Sensitivity: 22.2% - 41%

- Test Position
  - Patient is supine with hip flexed 45 degrees and knee flexed 90 degrees
  - Examiner sits on subject’s foot to stabilize, and provides a posterior to anterior force to the proximal tibia
  - Palpate the h/s tendon with fingers to ensure muscle is relaxed
  - Positive test = torn ACL

Malanga, et al. 2003

Anterior Drawer Test

Lachman’s Test - ACL

- Specificity: 95%
- Sensitivity: 80% - 90%

- Test Position:
  - Patient is supine, with knee slightly flexed (less than 15 degrees)
  - Use one hand to stabilize the distal femur, with other hand applies a posterior to anterior force on proximal tibia
  - Positive test = torn ACL

Malanga, et al. 2003

Lachman’s Test

Pivot Shift Test - ACL

- Specificity: 98%
- Sensitivity: 35%

- Test Position:
  - Patient is supine, examiner cups heel and flexes hip to 45 degrees
  - Examiner grasps knee with opposite hand
  - A strong IR force is applied at the knee and the ankle
  - Knee is then flexed as a varus force is applied
  - Positive test = sudden reduction of displaced tibia at approximately 25-30 degrees of knee flexion

Malanga, et al. 2003
Posterior Sag Sign - PCL

- Sensitivity: 79%
- Specificity: 100%
- Test Position:
  - Patient is supine with hip flexed 45 degrees and knee flexed 90 degrees
- Positive test = torn PCL

Rubinstein et al., 1994

Posterior Drawer Test - PCL

- Sensitivity:
  - Grade I sprains: 70%
  - Grade II/III sprains: 97%
- Specificity:
  - Grade I sprains: 99%
  - Grade II/III sprains: 100%
- Test Position:
  - Patient is supine with the hip flexed 45° and knee flexed 90°
  - Examiner sits on patient’s foot and places both hands behind the proximal tibia with thumbs on the tibial plateau
  - Examiner applies a posterior force to the proximal tibia
- Positive test = partial or complete tear of PCL

Rubinstein et al., 1994

Posterior Drawer Test

- Sensitivity: 54 - 98%
- Specificity: 97 - 100%
- Test Position:
  - Patient is supine with knee flexed 90 degrees and supported so the limb is in a relaxed position
  - Patient performs an isometric quad contraction
- Positive test = PCL rupture

Malanga, et al. 2003

Quadriceps Active Test - PCL

Valgus Stress Test - MCL

- Sensitivity: 86 - 91%
- Specificity: 49%
- Positive test at 30 degrees and negative at 0 degrees indicates tear is limited to MCL
- Test Position:
  - Patient is supine with hip in slight flexion and abduction
  - Examiner applies a lateral to medial force at the knee
  - Test with knee in full extension and flexed 30 degrees
- Positive test at 0 degrees indicates greater injury

Malanga et al. 2003

Varus Stress Test - LCL

- Sensitivity: ?
- Specificity: ?
- Test Position:
  - Patient is supine with hip in slight flexion and abduction
  - Examiner applies a medial to lateral force at the knee
  - Test with knee in full extension and flexed 30 degrees

Malanga, et al. 2003
Valgus Test at 0 and 30 degrees

Varus Test at 0 and 30 degrees

### Tendonitis
- **Patellar**
  - Anterior knee pain
  - Often associated with jumping
- **ITB**
  - Anterolateral pain
  - Common in runners
- **Hamstring**
  - Posterior knee pain
  - Pain increase with resisted knee flexion or passive stretch

### Patellofemoral Pain Syndrome (PFPS)
- Anterior knee pain
  - Prolonged sitting
  - Squatting
  - Stairs
- More common in young adults
- Special Tests
  - Patellofemoral Grind Test
  - Patella apprehension test

### Patellofemoral Grind Test
- Passive vs. Active Test
- Sensitivity and specificity not studied
- Passive Test Position
  - Patient is supine with knee extended and leg relaxed
  - Place web spaces of hands on superior and inferior borders of the patella and provide a downward force while translating the patella superiorly and inferiorly
- Active test position
  - Patient is supine with LE relaxed, place web space of your hand on the patient’s superior patella
  - Ask patient to contract quads, while you apply a downward and inferior force to the patella

### Patella Apprehension Test
- Sensitivity and specificity not studied
- Need to correlate test findings with subjective
- Test Position
  - The knee is flexed 30 degrees with the quad relaxed on the thigh of the examiner
  - Examiner presses the medial side of the patella with the thumbs of both hands to laterally displace the patella
Bursitis

- Pes anserinus
  - Anteromedial tibial metaphysis pain
  - Anteromedial edema
- Prepatellar
  - Anterior prominence
  - Anterior edema

Examination

- Thorough HPI
- Rule out back and hip
- Gait analysis
- Strength/ROM
- Joint line palpation
- Patellar tracking
- Varus/Valgus deformity

Hip Joint Anatomy

- Diarthrodial ball and socket joint with 3 degrees of freedom in sagittal, frontal and transverse planes
- Primary function:
  - Support the weight of the head, arms and trunk statically and dynamically
  - Stability comes from anatomical structure with strong ligamentous and capsular support

Ligamentous stability of the hip

- Illiofemoral
  - Considered to be strongest ligament in the body
  - Prevents excessive extension/IR
- Ischiofemoral
  - Winds tightly on extension
  - Stabilizing in extension/IR
- Pubofemoral
  - Prevents excessive abduction, extension, IR

Hip Joint Mechanics

- Capsular Pattern
- Flexion, abduction, IR
- Closed pack position
  - Extension, IR, abduction
- Normal ROM
  - Flexion: 110-120 degrees
  - Extension: 10-15 degrees
  - Abduction: 30-50 degrees
  - Adduction: 30 degrees
  - IR: 30-40 degrees
  - ER: 40-60 degrees
**Differential Diagnosis**

- Self reported hip pain is common with approximately 14% of the population over 60 being afflicted.
- History and physical exam is crucial for any patient complaint but are typically nonspecific for those with complaints of hip pain. Secondary to the complex anatomy of the hip and pelvis as well as the overlapping organ systems.

**Differential Diagnosis of Hip Pain**

- Hip
  - FAI
  - Labral tear
  - OA
- Lumbar
  - LNP
  - Stenosis
  - Spondylolisthesis
  - Facet Syndrome/Arthropy
- SI
  - Pubic Dysfunction
  - Iliosacral dysfunction
- Other Sources
  - Genitourinary pathology
  - Gastrointestinal pathology
  - Vascular pathology

**Posterior Hip Pain**

- Possible Sources
  - Referral from lumbar spine or SI joint
  - Proximal hamstring tendinopathy
  - Sacral stress fracture
  - Piriformis syndrome
  - Tendinopathy of the obturator internus/gemelli complex
  - Ischiofemoral impingement
  - Femoroacetabular Joint derangement
  - Osteoarthritis
  - Osteonecrosis
  - Labral tear

**Hamstring Tendinopathy**

- Can cause focal posterior hip pain or can produce symptoms mimicking sciatica
- Clinical features
  - Previous injury
  - Pain during activity
  - Pain with prolonged sitting
- Clinical exam
  - Tenderness or pain with palpation
  - Muscular defect over ischial tuberosity against resisted knee flex/hip extension
  - Pain with passive stretching

**Sacral Stress Fracture**

- Can be seen in older population (insufficiency fractures) or athletic population (fatigue-type fracture)
- Information needed to formulate differential diagnosis
  - Training regimens
  - Nutritional habits
  - Menstrual cycles
  - Previous fracture history

**Lateral Hip Pain**

- Possible Sources
  - Tendinosis of gluteus medius and minimus
  - Thickening of the iliotibial band
  - Trochanteric Bursitis
  - Labral Tear

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*Battaglia 2016*
### Gluteal Tendinopathy

- **Pain**
  - May be pain around greater trochanter and may radiate into lateral thigh to the knee

- **Characteristics**
  - Burning or deep dull ache over the posterior or lateral thigh
  - Can become sharp when moving from flexion to extension

- **Aggravating factors**
  - Active abduction of the hip
  - Prolonged sitting
  - Climbing stairs
  - Side-lying position

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### Tests for diagnosis

- Trendelenburg sign
- Resisted hip abduction
- Resisted hip internal rotation
- Resisted hip external rotation test
  - Specificity 97.3%, sensitivity of 88%

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### Anterior Hip Pain

- **Possible Sources**
  - Osteoarthritis
  - Labral tears
  - FAI
  - Iliopsoas Impingement
  - Stress fractures of the femoral neck, pubic rami and acetabulum
  - Osteonecrosis
  - Rectus abdominis/adductor longus tendinopathy

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### Hip Labral Tear

- **The labrum is a fibrocartilaginous rim that encompasses the circumference of the acetabulum which causes a deepening of the socket**

- **The prevalence of labral tears in patients with hip or groin pain ranges from 22-55%**

- **Patients on average visit 3.3 healthcare providers before being correctly diagnosed with a hip labral tear over a period of 21 months**

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### Hip Labral Tear Diagnostic Imaging

- **Conventional MRI**
  - Sensitivity 30%, accuracy of 36%

- **MR Arthrography**
  - Sensitivity of 90%, accuracy of 91%

- **Arthroscopy**
  - 90% sensitivity, 100% specificity

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### Subjective complaints

- Dull or sharp groin pain
  - 50% of patients have radiating pain to the lateral hip, anterior thigh and buttock

- Usually insidious onset
  - Occasionally begins after an acute traumatic event

- Mechanical symptoms
  - 50% of patients report catching or painful clicking with activity
Hip Labral Tear

- Objective Findings
  - Minimal to no hip ROM deficits
  - Impingement Test/FADIR
  - FABER
  - Other labral tests
  - Trendelenburg gait

Impingement/FADDIR Test

- Subject supine, hip brought to 90 degrees of flexion brought into end range adduction and IR
- (+) = reproduction of groin pain
- 75% sensitivity, 43% specificity
- More indicative of anterior superior tears

Impingement/FADDIR

- Subject supine, hip brought to 90 degrees of flexion brought into end range adduction and IR
- (+) = reproduction of groin pain
- 75% sensitivity, 43% specificity
- More indicative of anterior superior tears

Labral Provocative Tests

- Flexion of the hip with ER and full abduction followed by extension, abduction and IR
  - Anterior tear
- Extension, abduction and ER brought into flexion, adduction and IR
  - Posterior tear
- Passive hyperextension, abduction and ER
  - Posterior tear
- (+) = pain in the groin or clicking/catching

Femoroacetabular Impingement (FAI)

- Definition:
  - Abnormal femoral acetabular contact that occurs within normal ROM caused by alterations of the acetabulum and/or the femoral head or neck
- Types
  - Cam FAI
  - Pincer FAI
- Approximately 42% of affected patients present with some combination of both conditions
- FAI causes abnormal forces within the hip joint that lead to clinical symptoms and may drive the progression of primary hip OA

FAI Types

- Cam FAI
  - Generally caused by morphological factors on the proximal femur
  - Typically found in young males with abnormally shaped femoral head
  - Involves an aspherical femoral head with a flat or convex head-neck junction
  - Impingement with flexion and IR of the hip

- Pincer FAI
  - Due to either localized or generalized acetabular over coverage
  - Typically found in middle aged females with functionally excessive acetabulum that is either too deep or maloriented
  - Often leads to labral injury resulting in labral cyst formation, fissuring and tearing
FAI

Subjective complaints
- Patients are often younger and physically active
- Insidious onset of pain in the groin with occasional radiation to the lateral hip or anterior thigh
- Pain is worse with sitting, rising from a chair, getting into or out of a car and leaning forward
- Loss of terminal hip ROM

Objective Findings
- ROM deficits: greatest with flexion and IR in flexed position
- IR in maximal hip flexion
- Impingement test

Hip Osteoarthritis
- Prevalence ranges from 7-25% of people ages 55 and older
- Incidence is 88 per 100,000
- Diagnosis criteria of the American College of Rheumatology
  - Hip pain for most days of the previous month
  - ESR of less than 20mm
  - Radiographic findings of hip joint space narrowing and femoral/acetabular osteophytes

OA Risk Factors
- Epidemiological studies of primary hip OA reported risk factors including:
  - Race
  - Female sex
  - Old age
  - History of external hip trauma
  - Manual labor
  - Social factors including:
    - Marital status
    - Residence
    - Education
    - Income including receiving a pension

Men vs. Women
- Little difference in the incidence between genders but there seems to be different patterns for each gender
  - Women have a more superiomedial femoral migration
  - Men have a more superolateral migration
  - Superolateral migration is an important prognostic factor in the progression of hip OA
Diagnosis

• Patients were classified as having hip OA by the American College of Rheumatology if they reported experiencing hip pain and presented with one of the following clusters of clinical findings:
  • Hip IR less than 15 degrees along with
  • Hip flexion less than or equal to 115 degrees
  • Age greater than 50
  • Or:
  • Hip IR greater than or equal to 15 degrees along with
  • Pain with IR
  • Duration of morning stiffness of the hip less than or equal to 60 min
  • Age greater than 50

Altman 2009

• When patients were classified using these clinical criteria compared to radiographic reference standard of joint space narrowing and osteophytes diagnostic accuracy statistics were:
  • Sensitivity 86%
  • Specificity 75%

Altman 2009

Hip Osteoarthritis

• Subjective complaints
  • Stiffness in the AM or with prolonged immobility
  • Generally subsides within 30 min
  • Intermittent pain which increases with weight bearing activities
  • Pain described as “deep ache”
  • Crepitus
  • Difficulty performing WB activities of daily living including stairs, walking etc

Bijlsma 2011

• Objective Findings
  • ROM deficits
    • Flexion and internal rotation are the most common limitations
    • Flexion <115 and IR <15 was 86% sensitive and 75% specific for hip OA
  • Intra-articular provocation tests
    • Hip Scour
    • FABER
    • Stinchfield
    • Hip IR over pressure
    • Trendelenburg gait
    • “C” Sign

Bijlsma 2011

Hip Scour

• The patient is in supine with the tested hip in maximal flexion, adduction and IR

• The therapist applies a compressive force to the joint and moves the femur in a circular arc to abduction and ER while maintaining the flexion angle

• (+)= reproduction of hip pain

• Sensitivity 0.50
• Specificity 0.29

Hip Scour

FABER

• Patient lies in supine with the foot of the tested leg on the knee of the opposite leg such that the tested leg is flexed, abducted and externally rotated

• The therapist applies a stabilizing force at the opposite ASIS and applies gentle overpressure to the tested knee

• (+)= reproduction of the hip pain
FABER
• Sensitivity 0.82
• Specificity 0.25

Stinchfield Test
• The patient lies in supine while performing an active SLR
• The therapist provides resistance to hip flexion
• (+)= reproduction of the hip pain

Stinchfield
• Sensitivity 0.59
• Specificity 0.32

Internal Rotation with Over Pressure (IROP)
• The patient is lying in supine with hip and knee flexed to 90 degrees
• The hip is internally rotated while the pelvis is stabilized with pressure over the opposite ASIS
• (+)= reproduction of hip pain

IROP
• Sensitivity 0.91
• Specificity 0.18

Combined Tests
• FABER + Stinchfield
  • Sensitivity .96 specificity .11
• FABER + Stinchfield + Scour
  • Sensitivity 1.0 specificity 0.1
• FABER + Stinchfield + Scour + IROP
  • Sensitivity 1.0 specificity 0
Functional Limitations with Hip OA

- Factors negatively affecting stair climbing
  - Old age
  - Short height (<151.0 cm)
  - High BMI
  - Parity
  - OA stage
- Functional limitations had an inverse association with
  - Many years of education
  - Participation in sports at school
  - Current alcohol consumptions

Radiology

- The specificity of radiographic hip OA for anterior hip pain is ~94% however sensitivity is only 16.5%
- Only 9-16% of hips in patients with frequent pain showed radiographic evidence of OA
- Only 21-24% of hips with radiographic hip OA were painful

Osteonecrosis of the Femoral Head

- Affects 10,000-20,000 people in the US each year
- Risk factors
  - Prior trauma
  - Long-term corticosteroid use
  - Chronic alcohol consumption
  - Connective tissue diseases (especially lupus)
- Differential Diagnosis Needed
  - Progressive deep groin pain
  - Aggravated by axial loading of femur
  - Intra-articular tests are positive

Treatment

- Conservative
  - Medication
  - Patient Education/Lifestyle advice
  - Intra-articular injections
  - Physical therapy
- Surgical
  - Joint Arthroplasty

Medications

- Anti-inflammatory
  - Acetaminophen
  - NSAIDs can be effective for the temporary relief of symptoms and improvement of function in patients with OA
- Complementary medication
  - Glucosamines have shown mixed results and use is not recommended at this time

Injections

- The use of corticosteroid injection in patients with hip OA provide short term relief
  - Benefits lasting up to 3 months in recent study vs. placebo
- Hyaluronic acid
  - Evidence to supports the short term use of into the hip joint
  - Works best in mild to moderate hip OA especially when conservative therapy has failed
  - Varying effectiveness in treatment of knee OA
Patient Education

- Clinicians should consider education that focuses on:
  - Activity modification
  - Exercise
  - Weight reduction when overweight
  - Methods of unloading the joint
    - Cane in contralateral hand
    - Carrying loads in ipsilateral hand

PT Management

- Activity modification
- Bracing/Orthotics
- Strength training
- Low impact cardiovascular exercise
- Balance
- Functional gait
- Manual therapy
- Flexibility
- Strengthening
- Aquatic exercises

Strength Importance

- A significant correlation between hip and thigh muscle strength and walking distance has been demonstrated in patients with mild to moderate pain
- Knee extensor and hip abductor strength has been shown to be associated with functional ability in patients awaiting THA
- Only knee extensor strength predicted functional ability
- Reduced knee extensor strength is a significant predictor of falls in patients with lower limb OA
- Reduced muscle strength has been identified as a risk factor for functional decline in patients with hip OA

Strength

- Muscle strengthening exercise is an essential component in the international treatment guidelines of hip and knee OA

Low Impact Cardiovascular Exercise

- Improve circulation to the joint
- Promote weight loss
- Increase muscle strength and endurance
- Reduce pain
- Enhance proprioception

Those with hip OA are at a higher risk for death compared to the general population
- This risk increases with severity of walking disability
- Early treatment of OA should focus on reduction of pain and maintenance or improvement of functional capacities

Bieler 2016

Fernandes 2013
**Surgical Indications**

- Surgery is considered indicated when the following domains are met
  - Pain
  - Function
  - Radiographic changes

- A prerequisite is that pain cannot be managed with conservative therapy

  Gademan et al, 2016

**THA Appropriateness**

- Algorithms developed to determine if patients are appropriate for THA secondary to OA

- Variables taken into account:
  - Age
  - Surgical risk
  - Previous nonsurgical treatment
  - Pain
  - Functional limitations

  Quintana et al, 2009

**THA Appropriateness**

- Patients rated as appropriate candidates had better outcomes at 3 months on the WOMAC stiffness and functional limitation domains compared to inappropriate candidates

- It was found that higher surgical risk often results in worse outcomes
  - Conservative treatment should “always be performed” before considering THA

  Gademan et al, 2016

**Total Knee Arthroplasty (TKA)**

- Annual rate of TKA has increased 9x between 1979 and 2006 for people over 65 y.o.

- In 2010 close to 50% of TKA’s were performed in patient less than 65 y.o.

- Volume TKA’s/year has increased 161.5% from 1991 to 2010

  Riddle et al, 2014; Kim, 2008

**TKA Appropriateness**

- Algorithm developed by Escobar et al in Spain in 2003
  - Pain
  - Functional status
  - Extent of radiographically evident arthritis
  - Age
  - Knee joint impairment

- Studies done in US to determine possible overutilization
  - Riddle et al 2014: 175 subjects over 5 years
    - Appropriate: 44.0%
    - Inconclusive: 21.7%
    - Inappropriate: 34.3%

  Riddle et al, 2014

**QUESTIONS?**
References

Thomas Jefferson University

Sidney Kimmel Medical College (formerly Jefferson Medical College)
- Ranked among the nation's best medical schools by U.S. News & World Report
- 100% Medical School Graduates are placed at亂

Sidney Kimmel Cancer Center (NCI-designated)
- Oldest and largest NCI-designated cancer center in the country
- Sidney Kimmel Cancer Center Network with 12 members

Jefferson Colleges of:
- Combined Medicine - D.O. Medical School and B.S. Science Pre-Professional Program graduate accepted by medical school
- Health Professions - More than 30 programs; occupational therapy ranked among nation's top 10 by U.S. News & World Report
- Nursing - Ranked among the top 100 Best Graduate Nursing Schools by U.S. News & World Report and named Center for Excellence in Nursing Education by National League for Nursing
- Pharmacy - Innovative Doctor of Pharmacy program set among the nation's top graduate schools for pharmacy
- Population Health - For people interested in people in the nation and dedicated to exploring policies and forces that define population health and well being

Jefferson Institute for Emerging Health Professions
- Programs for community health and research in public health and advance technologies