Hi Grandma, why are you limping?

An evidence-based approach to the patient with hip or knee osteoarthritis

Larry Collins, MPAS, PA-C, ATC, DFAAPA
Assistant Professor, Physician Assistant Program
Assistant Professor, Department of Orthopaedics & Sports Medicine
USF Health, Morsani College of Medicine
Disclosures

I have no real or apparent conflicts of interest to report
Osteoarthritis (OA)

- Most common form of arthritis and the most common joint disease
- >14 million Americans suffer from OA of the knee
- Knee OA peaks between 55-64
- Women > men
- ~ 750k knee and 500k hip replacements in 2011


OA Affects All Weight-bearing Components

- Articular cartilage
- Menisci
- Bone

Osteoarthritis (OA)

- Progressive degenerative disorder involving diarthrodial (synovial) joints
- Complex process involving
  - Biomechanical factors
  - Proinflammatory mediators
  - Proteases
- Characterized by breakdown of articular cartilage and proliferative changes of surrounding bones
- → decreased function

Articular Cartilage

- Change in color
- Cartilage fibrillation
- Cartilage erosion to subchondral bone
Characteristics

- Chronic disease of the musculoskeletal system
  - Without systemic involvement
- Primarily a non-inflammatory process
  - Except at the cellular level
- Joint ankylosis not typically observed until late
  - May be seen in erosive OA
Classification

Primary OA
- Genetics?

Secondary OA
- Autoimmune/inflammatory diseases
- Congenital disorders of joints
- Diabetes
- Ehlers-Danlos Syndrome
- Hemochromatosis and Wilson's disease
- Joint infection
- Ligament instability
- Marfan syndrome
- Obesity
- Trauma

Epidemiology

- Most common joint disease
- ~70% >60yo diagnosed with OA of hip or knee
- ~ 90% have radiographic evidence of OA

Risk factors

- Age
- Female >> male
- Obesity
- Lack of osteoporosis
- Occupation
- Sports activities
- Previous injury
- Muscle weakness
- Proprioceptive deficits
- Genetic elements
- Acromegaly
- Calcium crystal deposition disease
Pathophysiology

- Articular cartilage
  - Primarily acts as a smooth, low-friction surface
- Bone
  - Subchondral sclerosis and osteophyte formation
- Synovium
  - Hypertrophy and inflammation
- Soft tissues
  - Ligaments, capsule, meniscus and muscles
Clinical Presentation

• Slowly progressive
• ↓ activity levels (↑ co-morbidities – obesity, diabetes, etc.)
• Antalgic gait
• Pain – deep, achy, exacerbated by use
• ↓ range of motion
• Crepitus
• Morning stiffness <30 minutes and with inactivity
## Patient Characteristics and Symptoms

<table>
<thead>
<tr>
<th>Age of onset</th>
<th>&gt;45 years</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pain</strong></td>
<td>Affects one or a few joints at a time</td>
</tr>
<tr>
<td></td>
<td>Insidious onset – slow progression over years</td>
</tr>
<tr>
<td></td>
<td>Variable intensity</td>
</tr>
<tr>
<td></td>
<td>May be intermittent</td>
</tr>
<tr>
<td></td>
<td>Increased by joint use and relieved by rest</td>
</tr>
<tr>
<td></td>
<td>Night pain in severe osteoarthritis</td>
</tr>
<tr>
<td><strong>Stiffness</strong></td>
<td>Short-lived (&lt;30 minutes) and early morning – or inactivity-related</td>
</tr>
<tr>
<td><strong>Swelling</strong></td>
<td>Some (e.g. nodal osteoarthritis) patients present with swelling and/or deformity</td>
</tr>
<tr>
<td><strong>Constitutional</strong></td>
<td>Absent</td>
</tr>
<tr>
<td>Physical Exam Findings</td>
<td></td>
</tr>
<tr>
<td>------------------------</td>
<td></td>
</tr>
<tr>
<td><strong>Appearance</strong></td>
<td></td>
</tr>
<tr>
<td>- Swelling (bony overgrowth ± fluid/synovial hypertrophy)</td>
<td></td>
</tr>
<tr>
<td>- Deformity</td>
<td></td>
</tr>
<tr>
<td>- Muscle wasting</td>
<td></td>
</tr>
<tr>
<td><strong>Palpation</strong></td>
<td></td>
</tr>
<tr>
<td>- Absence of warmth</td>
<td></td>
</tr>
<tr>
<td>- Swelling (+/- effusion, usually small and cool)</td>
<td></td>
</tr>
<tr>
<td>- Joint line tenderness</td>
<td></td>
</tr>
<tr>
<td>- Periarticular tenderness</td>
<td></td>
</tr>
<tr>
<td><strong>Range of motion</strong></td>
<td></td>
</tr>
<tr>
<td>- Crepitus</td>
<td></td>
</tr>
<tr>
<td>- Reduced range of movement</td>
<td></td>
</tr>
<tr>
<td>- Weak local muscles</td>
<td></td>
</tr>
</tbody>
</table>

Radiologic Findings

- Underestimate the extent and severity
- Quantify end-stage changes
- Cartilage loss → joint space narrowing
- Bony changes → subchondral sclerosis, cysts and osteophytes

# Radiologic Grading

**Kellgren Lawrence Classification**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No radiographic features of OA</td>
</tr>
<tr>
<td>1</td>
<td>Subtle osteophytes, no joint space narrowing</td>
</tr>
<tr>
<td>2</td>
<td>Definite osteophytes, +/- narrowing</td>
</tr>
<tr>
<td>3</td>
<td>Definite joint space narrowing, osteophytes, some sclerosis, +/- bone deformity</td>
</tr>
<tr>
<td>4</td>
<td>Gross loss of joint space, large osteophytes, deformity of bone ends</td>
</tr>
</tbody>
</table>
Radiologic Grade Of OA
Kellgren Lawrence Classification

Radiographic Hip or Knee Osteoarthritis and the Ability to Drive. ORTHOPEDICS. 2017; 40: e82-e89. doi: 10.3928/01477447-20160915-05
Hip OA

- Anterior hip/groin pain – hip joint
- Lateral – trochanteric bursitis, meralgia paresthetica
- Posterior – SI joint, lumbar, Zoster
- Thigh – hip joint, stress Fx, lumbar, tumor, knee
Hip Physical Examination

- **Inspection**
  - Antalgic (possibly Trendelenburg) gait
  - Arising from chair (arm rests)/getting onto exam table
- **Palpation**
  - Trochanteric bursa
  - Pelvic obliquity – ? Leg length discrepancy
  - Trendelenburg – Hip abductor weakness
- **Range of motion** – ? painful
  - ~40-50 degrees IR/ER is normal
  - Log roll – ? painful
- **Strength**
  - Straight leg raise – active
- **Sensation**
- **Patrick (Fabere) test** – localize pain
Hip Physical Examination

Pelvic Obliquity

- Used as screening maneuver for leg length discrepancy
- Hands are placed on top of the iliac crests and the level of the pelvis is estimated
- Asymmetry is seen with leg length discrepancy, pelvic fracture, scoliosis, and paraspinal muscle spasm

Hip Physical Examination

Range of Motion

Log Roll

• ~40-50 degrees IR/ER is normal

Hip Physical Examination

Fabere Test-
Flexion
Abduction
External rotation
Hip Radiographs

Weight bearing AP pelvis

Lateral Hip

Hip Radiographs

Knee OA

- Obese females >50
- Joint stiffness (<30 minutes)
- Mechanical pain
- Crepitus
- Pain with pressure
- Painful ROM
- Functional limitations
- Limited ROM in later stages
Knee OA

- **Pain**
  - Worse with activity – relieved by rest
  - Progressive
  - Predictable, sharp pain brought on by insult →
    - More constant, affects ADLs →
      - Constant dull/aching, with unpredictable episodic flare-ups

- **Tenderness**
  - Joint line suggests intra-articular pathology

- **Range of motion**
  - May be painful
  - Limitations typically in later stages

- **‘Bony swelling’**
  - Remodeling of bone and cartilage with osteophyte formation

- **Deformity**
  - Later stages

- **Instability**
  - Giving way or buckling is common complaint
Knee Physical Examination

• Inspection
  • Gait
    • Normal, limping (antalgic), shuffling, or cannot walk
  • Swelling
    • Effusion versus other soft tissue swelling (e.g., bursitis)
  • Ecchymosis and other signs of injury (e.g., abrasions)
  • Muscle atrophy
  • Alignment
    • Varus (knee bends outward) or valgus (knee bends inward)
    • Windswept – worse prognosis
  • Skin changes
    • Scars (surgical or traumatic), rash, lymphangitis
Knee Physical Examination

• Palpation
  • Lateral joint line
  • Medial joint line
  • Anterior knee
    • Tibial tuberosity
    • Patellar tendon
    • Patella
    • Quadriceps tendon
  • Posterior knee
  • Bursa
  • Effusion
  • Skin temperature – "warm-cold-warm"

Windswept Knee Deformity
Knee Physical Examination

- **Range of motion**
  - Usually later in disease
  - Maintaining extension is important
- **Strength**
  - May be limited 2° pain
- **Stability**
  - Pseudolaxity
- **Neurovascular**

Varus Thrust Gait

https://www.youtube.com/watch?v=FA3u4cCfVds
Knee Physical Examination

1. Medial collateral ligament (broad attachments to femur and tibia)
2. Pes anserine
3. Tibial tuberosity
4. Coronary ligaments (stabilizes meniscus)
5. Patella
6. Lateral collateral ligament
7. Access intra-articular space

Medial view

Lateral view

Knee Physical Examination

Effusion

Bursitis
Knee Physical Examination

Joint Pseudolaxity

Management of OA

• **Education**
  - Etiology, risk factors, prognosis, expectations and treatment options
  - Self-management – complements traditional education
  - Goal-setting – identify problems, set priorities, realistic long and short term goals

• **Monitoring**
  - Periodic and regular

• **Holistic evaluation**
  - Impact on ADLs
  - Restrictions
  - Aspirations
  - Level of distress
  - Falls risk assessment
  - Supports
  - Comorbidities
Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC)

• Assesses pain, stiffness, and physical function in patients with hip and/or knee osteoarthritis
• 24 items divided into 3 subscales
  • Pain (5 items)
    • During walking, using stairs, in bed, sitting or lying, and standing
  • Stiffness (2 items)
    • After first waking and later in the day
  • Physical Function (17 items)
    • Stair use, rising from sitting, standing, bending, walking, getting in/out of a car, shopping, putting on/taking off socks, rising from bed, lying in bed, getting in/out of bath, sitting, getting on/off toilet, heavy household duties, light household duties

http://www.womac.com

Management Goals

• Decrease pain
• Improve function
• Positively affect joint degeneration
  • No approved disease-modifying OA drugs
• Target modifiable risk factors

• Overall quality of OA care suboptimal
• <50% compliance with indicators of appropriate care
  • Inferior to diabetes and osteoporosis

Nonpharmacologic Therapy

- Education
- Weight management
- Exercise
- Braces
- Assistive devices

- Loss of 10% body weight associated with 50% reduction in pain scores

Genu Varus/Valgum – Orthosis
Pharmacologic Therapy

- Oral and topical NSAIDs
- Opioids
- Duloxetine
- Topical capsaicin
- Intraarticular glucocorticoids
- “Structure modifying treatments”
Pharmacologic Therapy

• Topical $\rightarrow$ oral NSAIDs
• Lowest dose required to control symptoms
  $\rightarrow$ Cycle
• COX-2 selective NSAID or a nonselective NSAID associated with a proton-pump inhibitor should be used in patients with comorbidities (DM, HTN, elderly, etc.)
• Use caution in high comorbidity risks (e.g., previous gastrointestinal bleeding or chronic renal failure)
Pharmacologic Therapy

• Opioids
  • Short term use
  • Caution in elderly

• Duloxetine (60-120mg QD)
  • If contraindication to NSAIDs or not responded to NSAIDs

• Topical capsaicin
  • One (or few) joints involved
  • Lack of response or contraindicated other Tx
Pharmacologic Therapy

- Acetaminophen
  - Not considered first-line
  - Negligible effects on pain
  - Toxicity

Pharmacologic Therapy

• “Structure modifying treatments”

• Intraarticular hyaluronic acid (HA)
  • Controversial for knee and hip OA
  • Evidence demonstrates only a small superiority over intraarticular placebo
Biologic Injections

- Platelet-rich Plasma (PRP)
- Mesenchymal stem cells
- Many ?? about effectiveness
  - Long-term clinical trials still needed
  - Preparation techniques make effective evaluation and comparison difficult
  - Bone marrow mesenchymal stem cells currently only stem cell product that appears to be approved by FDA
  - Adipose stem cell use complicated by warning letters from the FDA suggesting orthopaedic use to be improper
Pharmacologic Therapy

• Nutritional supplements
  • Glucosamine, chondroitin, vitamin D, diacerein, avocado soybean unsaponifiables (ASU), fish oil, etc.
  • Golden milk (turmeric spice + coconut milk/oil)

Alternative Therapies

- Acupuncture
- Traditional Chinese medicine
- Transcutaneous nerve stimulation (TENS)
Surgical Treatment

- Arthroscopy
  - No clinically significant benefits over conservative treatment or placebo surgery for knee OA involving partial meniscectomy +/- debridement

Surgical Treatment

- Osteotomy

Step ①  Step ②  Step ③
**Surgical Treatment**

- Arthroplasty (joint replacement) is highly effective in patients with advanced knee and hip OA when conservative therapies have failed to provide adequate pain relief.


Total Knee Replacement

• Indications
  • Symptomatic knee osteoarthritis
  • Failed non-operative treatments
  • Usually only considered in people over the age of 60

• Typically last about 12-15 years in an elderly population

• Not recommended in younger patients
  • Younger patients are more active → more stress on the artificial joint
  • Revision surgery is more difficult with poorer results

Unicompartmental Knee Replacement

- Careful patient selection is critical
  - Single compartment involvement
  - Malalignment is passively correctable
  - Knee is stable
- Similar to total knee replacement
  - Smaller incisionless blood loss
  - Less morbidity
  - Less expensive
  - Quicker recovery and faster rehabilitation
  - Preservation of normal kinematics
Knee Arthroplasty
Hip Arthroplasty

- Cemented
  - Elderly (>65)
  - Low demand
  - Better early fixation
  - ? late loosening

- Porous coated
  - Younger
  - More active
  - Protected weight-bearing first 6 weeks
  - Better long-term fixation
Other Types of Hip Replacement

- **Hemi-arthroplasty**
  - Only the femoral side is replaced
  - When acetabulum is intact
  - May not be efficient in pain relief

- **Hip Resurfacing**
  - In younger patients
  - Complication of a neck fracture
Take Home

• Primary symptoms are joint pain, stiffness, and locomotor restriction
• Age ≥45 years
• ♀ > ♂
• Morning stiffness ≤30 minutes
• Physical exam reveals joint tenderness, crepitus, +/- swelling, weakness, decreased motion late
• Imaging reserved for atypical symptoms or pre-operative planning
Take Home

- Exercise
- Bracing
- Cane
- Pain-coping skills
- NSAIDs
- Duloxetine
- Intraarticular glucocorticoid injections
- Surgery when significant joint-related symptoms persist despite nonsurgical interventions
Questions?

An evidence-based approach to the patient with hip or knee osteoarthritis

Larry Collins, MPAS, PA-C, ATC, DFAAPA
Assistant Professor, Physician Assistant Program
Assistant Professor, Department of Orthopaedics & Sports Medicine
USF Health, Morsani College of Medicine
lcollins@health.usf.edu