Clinical Practice Guidelines
Hip Osteoarthritis

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History of APTA CPG’s

– The Orthopaedic Section CPG’s started after a long talk with my old friend Dr. David Sinacore driving back from APTA National meeting in Chicago

– David convinced me the Ortho Section needs to do something that has an impact on clinical practice, as well as research and that could help with education

– I brought this idea back to the Ortho Section BOD at our last meeting in New Orleans and with the help the BOD, CPG’s were born out of this.
Hip Pain and Mobility Deficits – Hip Osteoarthritis:

Clinical Practice Guidelines Linked to the International Classification of Functioning, Disability, and Health from the Orthopaedic Section of the American Physical Therapy Association

## Levels of Evidence: Grading individual articles

<table>
<thead>
<tr>
<th>Grades</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>I</td>
<td>Evidence obtained from high-quality diagnostic studies, prospective studies, or randomized controlled trials</td>
</tr>
<tr>
<td>II</td>
<td>Evidence obtained from lesser-quality diagnostic studies, prospective studies, or randomized controlled trials (e.g., weaker diagnostic criteria and reference standards, improper randomization, no blinding, less than 80% follow-up)</td>
</tr>
<tr>
<td>III</td>
<td>Case-control studies or retrospective studies</td>
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<tr>
<td>IV</td>
<td>Case series</td>
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<tr>
<td>V</td>
<td>Expert opinion</td>
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## Grades of Evidence: Grading Recommendations

<table>
<thead>
<tr>
<th>Grades of Recommendation Based On</th>
<th>Strength of Evidence</th>
</tr>
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<tbody>
<tr>
<td><strong>A</strong></td>
<td>Strong evidence</td>
</tr>
<tr>
<td><strong>B</strong></td>
<td>Moderate evidence</td>
</tr>
<tr>
<td><strong>C</strong></td>
<td>Weak evidence</td>
</tr>
<tr>
<td><strong>D</strong></td>
<td>Conflicting evidence</td>
</tr>
<tr>
<td><strong>E</strong></td>
<td>Theoretical/foundational evidence</td>
</tr>
<tr>
<td><strong>F</strong></td>
<td>Expert opinion</td>
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Prevalence of Hip OA

• 2016 Summary
  • Osteoarthritis is the most common cause of hip pain in older adults. Prevalence rates for adult hip osteoarthritis range from 0.4% to 27%.
  • The reported prevalence of hip osteoarthritis continues to show great variability, with men showing higher prevalence of radiographic hip osteoarthritis.
Risk Factors: 2016 Summary

- Age (over 65)
- History of hip developmental disorders
- Previous hip joint injury reduced hip range of motion (especially hip internal rotation)
- The presence of osteophytes
- Lower socioeconomic status
- Higher bone mass, and higher body mass
Pathoanatomical Features

- **2016 Summary**
- Early articular changes may help identify individuals who have not been clinically diagnosed with hip osteoarthritis.
- In patients with hip pain, clinicians should look for signs of pelvic obliquity because of its association with acetabular retroversion, which is related to the development of hip osteoarthritis.
Acetabular anteversion (AVA)

- Normal angle of AVA is $+15-20$ degrees
  - Acetabular anteversion
    - Normal anterior direction of orientation
  - Acetabular retroversion
    - A specific variation in morphological features of the hip in which the cranial portion of the acetabulum is posteriorly oriented
Acetabular dysplasia

• Defined: abnormal development of the acetabulum resulting in an abnormal socket:
  1. Depth
  2. Orientation
• Cause: Disruption of the normal force directed through the hip joint.
# Grading of FNA and AVA

(tonnis 1999)

<table>
<thead>
<tr>
<th>Grade</th>
<th>Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-3</td>
<td>&lt;10</td>
<td>severely decrease</td>
</tr>
<tr>
<td>-2</td>
<td>10-14</td>
<td>moderate decrease</td>
</tr>
<tr>
<td>1</td>
<td>15-20</td>
<td>normal range</td>
</tr>
<tr>
<td>+2</td>
<td>21-25</td>
<td>moderate increase</td>
</tr>
<tr>
<td>+3</td>
<td>&gt;25</td>
<td>severely increase</td>
</tr>
</tbody>
</table>
Ischial Spine Sign
ISS = Acetabular Retroversion

- When the ischial tuberosity points into the pelvic inlet = called the ischial spine sign (ISS).
  - Suggestive of acetabular retroversion
- Kalberer: “the presence of ISS indicates that acetabular retroversion is NOT only a periacetabular phenomenon but also could represent a malrotation, ......, of the whole hemipelvis”.
- Kakaty – “retroverted acetabulum is secondary to external or outward rotation of the entire distal hemipelvis”.

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A = Anteverted Acetabulum
B = Retroverted Acetabulum
Rotated Right Pelvis
Notice incongruent “b” & Iliac crest widths
Taking a History
What is important?

Where does the hip refer pain?
How do we measure hip pain and outcomes?
Where does an inflamed hip hurt?

• The most common sites of hip pain
  – Groin or inguinal region
  – Greater trochanter
  – Proximal thigh - knee (when and why?)
    • Radiation of pain distally depends primarily on the amount of irritation present!

• Kellgren 1938:
  • “The deeper a tissue lies, the more pain will be referred”, that is very true of the hip joint!
Diagnosis – Classification
2016 Recommendation

• Clinicians should use the following criteria to classify adults over the age of 50 into the International Statistical Classification of Diseases and Related Health Problems (ICD) category of unilateral coxarthrosis and the associated International Classification of Functioning, Disability, and Health (ICF) impairment-based category of hip pain (b2816 Pain in joints) and mobility deficits (b7100 Mobility of a single joint):

  – Moderate anterior or lateral hip pain during weight bearing activities
  – Morning stiffness less than 1 hour after wakening
  – Hip internal rotation range of motion less than 24° or internal rotation and hip flexion limited by 15° when comparing the painful to the non-painful side
  – Hip pain associated with passive hip internal rotation
The Differential Diagnosis of Hip Pain

- Osteonecrosis of the femoral head
- Paget's disease
- Piriformis syndrome
- Psoriatic arthritis
- Rheumatoid arthritis
- Sacroiliac joint dysfunction
- Septic hip arthritis
- Referred pain as a result of an L2-3 radiculopathy
- Bursitis or tendinitis
- Chondral damage or loose bodies
- Femoral neck or pubic ramus stress fracture
- Labral tear
- Muscle strain
- Neoplasm
Passive Hip Joint ROM

Why is this so important?
Because hip ROM tells us about the health of our hip’s cartilage!
Passive Hip Range Of Motion

**Measurement Properties:** Limited ROM is associated with high levels of disability in patients with hip OA. Pua found both excellent intra and inter-rater reliability for hip passive range of motion when testing 22 patients with clinical and radiographic evidence of hip OA. Measurement properties for passive hip ROM are provided below.

<table>
<thead>
<tr>
<th></th>
<th>Reliability: ICC (95% CI)</th>
<th>SEM</th>
<th>MDC_{90}</th>
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</thead>
<tbody>
<tr>
<td>Flexion</td>
<td>0.97 (0.93 - 0.99)</td>
<td>3.5</td>
<td>8.2°</td>
</tr>
<tr>
<td>Extension: knee flexed</td>
<td>0.86 (0.67 - 0.94)</td>
<td>4.5</td>
<td>10.5°</td>
</tr>
<tr>
<td>Extension: knee unconstrained</td>
<td>0.89 (0.72 - 0.95)</td>
<td>4.7</td>
<td>11.0°</td>
</tr>
<tr>
<td>Abduction</td>
<td>0.94 (0.86 - 0.98)</td>
<td>3.2</td>
<td>7.3°</td>
</tr>
<tr>
<td>Internal Rotation</td>
<td>0.93 (0.83 - 0.97)</td>
<td>3.4</td>
<td>7.8°</td>
</tr>
<tr>
<td>External Rotation</td>
<td>0.96 (0.91 - 0.99)</td>
<td>3.1</td>
<td>7.1°</td>
</tr>
</tbody>
</table>
Assessing Hip Range of Motion

• Normal hip ROM is vital for achieving the full loose pack and close pack position of the hip.
  – Remember we need compression and motion for the health and nutrition of articular cartilage.

• Hip rotation is the most commonly altered hip ROM and thus should be examined carefully.

• Hip flexion should be examined second, then later abduction, adduction and then extension.
My Clinical Guideline’s for Assessing the Hip
Hip Rotation is usually the first motion lost!
The Concept of Total Hip Rotation

1. The total hip ROM when assessing a specific side, the left or right side, should be greater than 90° for a healthy hip.
   - Left hip IR = 45° + left hip ER 45° = 90°

2. Total passive hip rotation should not be less than 70-75°!

3. Less hip ROM means less contact area for compression and motion for cartilage nutrition!
Examining Hip Rotation

IR/ER Unilateral Side Differences

1. Hip ROM when assessing a specific side (e.g. the right side), when comparing hip internal rotation to external rotation differences should be no greater than 10°.
   - Right hip ER = 20° while Right hip IR = 70°
   - Even though the sum is 90° the ROM is skewed toward the motion of ER.

2. Differences between hip IR and ER on a particular side should NEVER >15°.
Guideline’s for Assessing the Hip Left to Right Motion Differences

1. Hip ROM for a specific motion, like hip internal rotation, are normally symmetrical from side to side.
   – Example: Left IR = 45° while Right IR = 70°

2. Differences should NEVER be > than 15° when comparing the left hip to the right hip for a specific motion (e.g. IR/ER/flexion).
   – How did I come up with a 15° difference?
     • If the mean difference between L/R= 4° with a SD of 4°
     • Then: since 2 SD= abnormal; therefore 4° + (4x2) = 12° difference
     • Also figure in SEM for goniometry= 5°
Hip Muscle Strength

**Measurement Properties:** Limited strength is associated with high levels of disability in patients with hip OA. Pua found both excellent intra and inter-rater reliability for hip muscle strength when testing 22 patients with clinical and radiographic evidence of hip OA. Tests of isometric muscle strength should be performed for hip abductor: IR, ER, flexors, adductors, hip extensors muscles. Beiler also measured hip muscle strength in patients with hip OA and found similar results. Measurement properties for hip muscle strength are provided below.

<table>
<thead>
<tr>
<th>Hip Muscle</th>
<th>Reliability: ICC (95% CI)</th>
<th>SEM</th>
<th>MDC&lt;sub&gt;90&lt;/sub&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexors</td>
<td>0.87 (0.69 - 0.95)</td>
<td>10.9</td>
<td>25.3</td>
</tr>
<tr>
<td>Extensors</td>
<td>0.97 (0.92 - 0.99)</td>
<td>13.3</td>
<td>30.8</td>
</tr>
<tr>
<td>Abductors</td>
<td>0.84 (0.55 - 0.94)</td>
<td>12.1</td>
<td>28</td>
</tr>
<tr>
<td>Internal Rotators</td>
<td>0.98 (0.94 - 0.99)</td>
<td>3.7</td>
<td>8.5</td>
</tr>
<tr>
<td>External Rotators</td>
<td>0.98 (0.96 - 0.99)</td>
<td>3.2</td>
<td>7.4</td>
</tr>
</tbody>
</table>
Outcome Measures

• Activity limitation and participation restriction outcome measures may include:
  – Western Ontario and McMaster Universities Arthritis Index (WOMAC): physical function subscale
  – The Hip Disability and Osteoarthritis Outcome Measure (HOOS)
  – Lower Extremity Functional Scale (LEFS)
  – Harris Hip Score

• Hip pain measures may include:
  – Numeric Pain Rating Scale (NPRS)
  – WOMAC (pain scale)
  – Brief Pain Inventory (BPI)
  – Pain Pressure Threshold (PPT)
  – Visual Analogue Scale
Outcome Measures

• Clinicians should use existing guidelines for fall risk management in patients with hip osteoarthritis to assess and manage fall risk.

• Balance Test
  – Berg Balance Scale
  – Four-Square Step test
  – Timed Single Leg Stance test
Activity Limitation and Participation Restriction Measures

- 6-minute walk
- Thirty-second chair stand
- Stair measure
- Timed up-and-go test
- Forty meter fast paced walk test
- Timed single leg stance
- Four square step test
- Self-paced walk
- Step test
Clinicians should use the following measures at least at baseline and one follow-up for all patients with hip osteoarthritis to support standardization for quality improvement in clinical care and research:

Body Structures and Functions:

- Pain
  - Numeric Pain Rating Scale (NPRS)
- Hip ROM and strength for the following:
  - Internal rotation
  - External rotation
  - Flexion
  - Extension
  - Abduction
  - Adduction
- Balance
  - Timed Single Leg Stance

Activity and Participation: performance-based:

- 6-Minute Walk Test

Activity and Participation: self-report:

- Western Ontario and McMaster Universities Arthritis Index (WOMAC) physical function subscale
Clinical Tests for Hip OA

• Clinical tests are non-discriminating of tissue and are only provocation tests suggesting that the hip joint is likely “inflamed”!

• No Spin’s or Snout’s on these test.
Hip Pain

• Tests recommended in Hip OA GL
  • Faber test
  • Scour test (only if minor pain – little inflammation)

— Other hip OA tests (not included)
  • Log roll (if very inflamed/irritated)
  • FAIR or also called FADIR test
  • Stitchfield (resisted SLR)

— Tests for Pelvic Obliquity
  • Supine long sitting
  • PSIS (sitting and standing)
Patrick’s or Faber’s Test

- Flex the hip,
- Externally rotate the hip and place heel above the opposite patella.
- Apply increasing pressure over both the contralateral ASIS and medial knee.
- Ask does this reproduce the same or similar pain and where?
Scour test

- Supine. Flex the knee fully, hold on to knee cap while applying pressure downward and “scour” the hip by moving in a “circle” feeling for pain and “smoothness” of range.
- Again check for same or similar hip pain.
- An aggressive maneuver, use carefully and gently.
Diagnostic Imaging

Looking for signs of Dysplasia:

- Signs of Retroversion of the acetabulum
- Center edge of Wiberg

Looking for signs of hip OA:

- Joint Space Narrowing
- Osteophytes
- Subchondral Sclerosis/Cysts
Imaging Studies: Summary

• Plain film radiography is commonly used to assess for hip OA and for assessing the progression of hip OA.

• Standard radiographs are used to look for joint space narrowing, the presence of osteophytes, and subchondral sclerosis or cysts.\textsuperscript{67}

• Clinicians must be careful when only using radiography in diagnosis because symptoms of hip OA do not always correlate with radiographic findings.\textsuperscript{17}

• The search for imaging methods that can identify pre-arthritic changes, MRI and ultrasound are still underway.\textsuperscript{52, 67, 69}

• Current evidence has suggested that hip dysplasia or FAI may predispose hips to hip OA\textsuperscript{45}, however more research is needed.
Gold Standard of Diagnosis
Radiograph Diagnosis of Hip OA

1. Joint space narrowing (JSN)
   1. 3-5 mm normal joint space
   2. <2.5 early OA
   3. <1.5 late OA
• JSN is the most commonly used diagnosis of radiographic hip OA

2. Osteophytes or spurs
3. Subchondral sclerosis
Tonnis Grading of Hip OA using AP Pelvic Radiographs

0 = No sclerosis, no narrowing, no spurs
1 = Sclerosis of the femoral head and acetabulum, with only mild decrease in joint space.
2 = Small cysts in the head or acetabulum, moderate decrease in joint space.
3 = Formation of large cyst in femoral head or acetabulum with moderate to complete loss of joint space and possible collapse of head.
<table>
<thead>
<tr>
<th>Grade</th>
<th>Radiographic Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No evidence of joint space narrowing, osteophyte formation, or sclerosis (normal radiograph)</td>
</tr>
<tr>
<td>1</td>
<td>Possible narrowing of the joint space medially and possible osteophytes around the femoral head</td>
</tr>
<tr>
<td>2</td>
<td>Definite narrowing of the joint space, definite osteophytes, and slight sclerosis</td>
</tr>
<tr>
<td>3</td>
<td>Marked narrowing of the joint space, slight osteophytes, some sclerosis, and cyst formation, and deformity of the femoral head and acetabulum</td>
</tr>
<tr>
<td>4</td>
<td>Gross loss of joint space with sclerosis and cysts, marked deformity of femoral head and acetabulum, large osteophytes</td>
</tr>
</tbody>
</table>
Nomenclature: Hip Osteophytes’

1. Roof
2. Superior cervical
3. Capital drop
4. Tent
5.a Inferior cervical
5.b Elephants trunk
6. Floor
Prognosis: 2009 and 2016 Summary

- Currently, there is no consensus on the appropriate time to recommend surgery (THA) as a clinical end point.
- The Group for the Respect of Ethics and Excellence in Science suggests that conservative intervention has failed when a patient does not experience a reduction in symptoms
  - At least a 20% to 25% improvement on the WOMAC pain subscale
  - And has a progressive loss of hip joint space, measured on AP pelvic radiograph, of between 0.3 and 0.7 mm/year.
- Prognosis should ideally be determined actively via measuring response to an optimal conservative management treatment approach.
2016 Hip OA Guideline
Interventions
ANTHI-INFLAMMATORY AGENTS

• 2009 and 2016 Summary
• Use of NSAIDs, Cox-2 inhibitors, and steroid injections are an effective treatment for relief of symptoms in patients with hip osteoarthritis.
• Some evidence suggests that NSAIDs may increase the progression of hip osteoarthritis by decreasing glycosaminoglycan synthesis; however, further studies are needed.
Alternative Medication: 2016 Summary

• There is insufficient evidence to support the use of supplements such as glucosamine, chondroitin or similar substances for the treatment of hip osteoarthritis.
Patient Education: 2016 Recommendation

• Clinicians should provide patient education combined with exercise and/or manual therapy to teach activity modification, exercise, support weight reduction when overweight, and methods of unloading the arthritic joints.
Intervention: Manual Therapy

• Clinicians should use manual therapy for patients with mild to moderate hip osteoarthritis and impairment of joint mobility, flexibility, and/or pain.
• Doses and duration for effects should range from 1-3 times per week over 6-12 weeks in patients with mild to moderate hip osteoarthritis.
• Clinicians should determine any changes in hip range of motion and end feel after manual therapy assessment.
• Manual therapy should not be the only treatment modality within the episode of care.
• As hip motion improves; exercises, including stretching and strengthening, should be added to progress patient’s range of motion, flexibility, and strength.
Intervention: Flexibility, Strengthening, and Endurance Exercise

• Clinicians should use individualized flexibility, strengthening, and endurance exercises to address impairments in hip range of motion, specific muscle weaknesses, and limited thigh (hip) muscle flexibility.

• Doses and duration for effect should range from 1-5 times per week over 6-12 weeks in patients with mild to moderate hip osteoarthritis.

• Exercise is more likely to improve patients with mild hip osteoarthritis, but not as likely to improve patients with moderate to severe hip osteoarthritis especially when patients display a bony end feel on passive hip range of motion, have a long duration of symptoms (greater than 30 months), or radiographic evidence of severe hip osteoarthritis (joint space narrowing or KL score above 3).

• Clinicians should use individualized one-on-one exercise prescription when possible; however, if group-based exercise is the only method available then effort should be made to tailor exercises.
Intervention: Modalities

• One RCT: Koybasi
  – Clinicians may use ultrasound (1 Mhz; 1 Wcm² for 5 minutes each to the anterior, lateral, and posterior hip for a total of 10 treatments over a 2 week period) in addition to exercise intervention in the management of pain and activity limitation in individuals with hip osteoarthritis.
  – Need more Rx. RCT’s for modalities
Intervention: Bracing

• Clinicians should not use bracing as a first line of treatment for hip OA.
• A brace may be used after exercise or manual therapies are unsuccessful in improving participation in activities for patients with mild-moderate hip osteoarthritis.
Intervention: Weight Loss

• Clinicians may use structured exercise interventions to target weight loss in overweight and obese individuals with hip osteoarthritis.

• Clinicians should collaborate with physician, nutritionist, or dietician to support weight reduction in overweight and obese individuals with hip osteoarthritis.