Differential Dx of Lumbar Spine, Pelvis & Hip

Michael Reiman, PT, DPT, OCS, SCS, ATC, FAAOMPT, CSCS
Assistant Professor - Duke University PT
Duke University Medical Center

Objectives

1. Using an algorithm, evidence based approach, be able to describe a systematic approach to evaluation of the lumbar spine.

2. Using an algorithm, evidence based approach, be able to describe a systematic approach to evaluation of the pelvis.

3. Using an algorithm, evidence based approach, be able to describe a systematic approach to evaluation of the hip joint.

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Differential Diagnosis of Lumbar Spine, Pelvis, and Hip
Michael P. Reiman, PT, DPT, OCS, SCS, ATC, FAAOMPT, CSCS
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### Diagnostic Accuracy

<table>
<thead>
<tr>
<th>Pathology</th>
<th>Present (+)</th>
<th>Absent (-)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test (+)</td>
<td>True positive a</td>
<td>False positive b</td>
</tr>
<tr>
<td></td>
<td>False negative c</td>
<td>True negative d</td>
</tr>
</tbody>
</table>

- **Sensitivity (Sn)** = $\frac{a}{a+c}$  
- **Specificity (Sp)** = $\frac{d}{b+d}$  
- (+) $LR = \frac{Sn}{1-Sp}$  
- (-) $LR = \frac{(1-Sn)}{Sp}$

### Sensitivity

- The proportion of people with the target disorder who have a positive test
- For a test to be useful in **ruling out** a disease, it must have a high sensitivity.

### Specificity

- The proportion of people without the target disorder who have a negative test
- For a test to be useful at **confirming** a disease, it must have a high specificity.
(+) Likelihood Ratio

- sensitivity / (1 - specificity) or a/(a + c) / b/(b + d)
  - The LR of a positive test tells us how well a positive test result does by comparing its performance when the disease is present compared with when it is absent
  - The best test to use for ruling in a disease is the one with the largest likelihood ratio of a positive test.

(-) Likelihood Ratio

- (1 - sensitivity) / specificity or c/(a + c) / d/(b + d)
  - The LR of a negative test tells us how well a negative test result does by comparing its performance when the disease is absent compared with when it is present
  - The better test to use to rule out disease is the one with the smaller likelihood ratio of a negative test.

How much do LRs change disease likelihood?

<table>
<thead>
<tr>
<th>LRs</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 10 or &lt; 0.1</td>
<td>Cause large changes</td>
</tr>
<tr>
<td>5 - 10 or 0.1 - 0.2</td>
<td>Cause moderate changes</td>
</tr>
<tr>
<td>2 - 5 or 0.2 - 0.5</td>
<td>Cause small changes</td>
</tr>
<tr>
<td>&lt; 2 or &gt; 0.5</td>
<td>Cause tiny changes</td>
</tr>
<tr>
<td>= 1.0</td>
<td>Cause no change at all</td>
</tr>
</tbody>
</table>

Likelihood Ratios

<table>
<thead>
<tr>
<th>(+) LR</th>
<th>Explanation</th>
<th>(-) LR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1–2</td>
<td>Alters posttest probability of a diagnosis to a minimal degree</td>
<td>.5–1</td>
</tr>
<tr>
<td>2–5</td>
<td>Alters posttest probability of a diagnosis to a small degree</td>
<td>.2–.5</td>
</tr>
<tr>
<td>5–10</td>
<td>Alters posttest probability of a diagnosis to a moderate degree</td>
<td>.1–.2</td>
</tr>
<tr>
<td>&gt;10</td>
<td>Alters posttest probability of a diagnosis significantly and almost conclusively</td>
<td>&lt;.1</td>
</tr>
</tbody>
</table>

Concordant Sign/Response

• An activity or movement that provokes the patient’s ‘familiar sign’ (the pain or other symptoms identified on a pain drawing and verified by the patient as being the complaint that has prompted one to seek diagnosis and treatment.)

Discordant Pain Response

• A finding that may be painful or abnormal, but not related to the concordant sign as the “discordant pain response”.

Clinical Reasoning

- Each component of the clinical exam is a “test” with its own ability to shift probability
  - History
  - ROM
  - Muscle performance
  - Assessment of function
    - Special tests

Clinical Reasoning in GP’s

- A major cause of misdiagnoses is failure to properly integrate clinical data.


Clinical Reasoning of Pain

- Results showed a dynamic, multidimensional nature to the therapists’ clinical reasoning, which was found to be grounded in a number of established models of pain
  - (i) biomedical, (ii) psychosocial, (iii) pain mechanisms, (iv) chronicity and (v) irritability/severity


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Pain Generator?

Bogduk et al., 1995
- 39% Discogenic
- 15% Facet
- 13% SIJ
- 33% Undefined

Laslett & April, 2003
- 65% Discogenic
- 15% Facet
- 7% SIJ
- 13% Undefined

Depalma et al. 2011
- 42% Discogenic
- 31% Facet
- 18% SIJ

Sembrano & Polly, Spine 2008
- 65% spine only
- 17.5% Spine and Hip/SIJ
- 8% Hip/SI and no spine at all
- 10% ???
- Overall, 12.5% had hip pathology and 14.5% and SIJ

Ugh!

- There are numerous pain generators of L spine; many are clinically difficult to isolate secondary to convergence


Treatment Based Classification

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TBC

- 25.2% did not meet the criteria for any subgroup
- 49.6% met the criteria for only one subgroup
- 25.2% met the criteria for more than one subgroup
- Most common combination of subgroups was manipulation + specific exercise (68.4%)
- Reliability of the algorithm decision was moderate (kappa=0.52)


Rule OUT Lumbar Spine

Imaging

- Absence of degeneration on MRI was the only test found to reduce the likelihood of the disc as the source of pain: –LR = 0.21

Imaging

- No correlation with pathology on imaging and symptoms
- L – Spine
- Hip

Modic et al. Radiology. 2005

- MR imaging does not appear to have a measurable value in terms of planning conservative care
- Patient knowledge of imaging findings does not alter outcome, may be counterproductive and is associated with a lesser sense of well-being

Patient Hx. Considerations

**Sciatica due to disc herniation**

- Pain below knee (Sn 90%) (Vroomen et al. J Neurol. 1999)

**Stenosis**

- No pain when seated: (Sp 93%) (Katz et al. Arthritis Rheum. 1995)
- Symptoms improved seated: (Sp 83%) (Katz et al. 1995)
- Best posture: sitting (Sn 89%) (Fritz et al. J Spinal Disord. 1997)
- Worst posture: stand or walk (Sn 89%) (Fritz et al. J Spinal Disord. 1997)
Patient Hx. Considerations

**Facet Joint**

- Pain reduced with recumbancy (Sn 89%) (Revel et al. 1992; Revel et al. 1998)
- Rest of Revel’s criterion lack sufficient evidence


**Radiculopathy/Discogenic signs and symptoms**

*Reflexes, Myotomes, Sensation*

- Myotomal Testing (L3-S1): SN 0-28%, SP 100%, QUADAS 7 (Kerr et al. 1988)

**Radiculopathy/Discogenic signs and symptoms**

*Range-of-Motion*

- Centralization/Peripheralization 5-20 reps
- Extension Loss
  - SN 27%, SP 87%, QUADAS 10 (Lasez T, Aprill CN, McDonald B. Centralization as a predictor of provocation discography: a study of clinical predictors of lumbar provocation discography. Eur Spine J. 2006;15:370-380.)

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Radiculopathy/Discogenic signs and symptoms

Special Tests

• Straight leg raise test

• Slump test

• Well-Leg Raise
  — SN 24%, SP 100%, QUADAS 7 (Kosteljanetz M, Bang F, Schmidt-Olsen S. The clinical significance of straight leg raising (Lasegue’s sign) in the diagnosis of prolapsed lumbar disc. Spine. 1998;13:393-395.)

Mobility

• PA’s (useful to identify impaired segment)
  — SN 43%, SP 95%, QUADAS 12 (Fritz JM, Piva S, Childs J. Accuracy of the clinical examination to predict radiographic instability of the lumbar spine. Eur Spine J. 2005;14(8):743-50.)

Rule OUT Pelvic Girdle
Pelvic Girdle Diagnosis

• Signs and symptoms

• Special Testing
  – Static anatomical position testing
  – Motion palpation testing
  – Pain provocation testing

Static Anatomical Position Testing

• Palpation of Sacral Sulcus, Pubic symphysis, ASIS, and iliac crests to detect differences from side to side
• Multiple studies have concluded caution should be used if performing these tests during assessment

Motion Palpation Testing

• “Motion of the SIJ is limited to minute amounts of rotation and of translation suggesting that clinical methods utilizing palpation for diagnosing SIJ pathology may have limited clinical utility.”
• Multiple studies have concluded caution should be used if performing these tests during assessment

Anatomic Landmark and Motion Testing

- Gillet’s (+LR 1.2)
- Long sit test (+LR 1.13)
- Standing Flexion Test (+ LR 0.81)
- Standing ASIS Asymmetry > 3mm (+LR 0.94)
- Standing PSIS Asymmetry > 3mm (+LR 1.11)
- Seated PSIS Asymmetry > 3mm (+LR 0.88)

Accessory Motion

Medial to PSIS


Laslett, et al. assessed the diagnostic utility of the McKenzie method of mechanical assessment combined with the following sacroiliac tests:
Distraction, thigh thrust, Gaenslen, sacral thrust, and compression
McKenzie assessment consisted of flexion in standing, extension in standing, right and left sidegliding, flexion in lying, and extension in lying.
The movements were repeated in sets of 10, and centralization and peripheralization were recorded.
If it was determined that repeated movements resulted in centralization, the patient was considered to present with pain of discogenic origin.
If discogenic origin of pain was ruled out the cluster of tests exhibited:

Sensitivity .91, Specificity .78, +LR 4.16, -LR .12

SI Joint – Thigh Thrust Test
SN 88; LR- 0.17
• The patient is supine and the hip and knee are flexed to 90°. The examiner provides compression along the long axis of the femur using a hand under the patient’s sacrum as a wedge to create shearing force at the SIJ.


Gaenslen’s Test
• Overpressure into hip flexion and hip extension
• 3-5 torsions
Distraction

• 30 seconds
• Bounce force at end


Compression

• 30 seconds
• Bounce force at end

**For Ankylosing Spondylitis**


Sacral Thrust

• 3-5 hard thrusts at S3

**For Ankylosing Spondylitis**

Pelvic Girdle Pain/Pelvic Instability

Active Straight Leg Raise

- The patient is supine with legs 20 cm apart and asked to raise one leg while rating the difficulty of the lift. The process is repeated on the opposite leg. A belt is placed securely around the pelvis and each leg lift is repeated and the patient is asked whether the lift was more difficult, as difficult, or easier than the lifts without the belt.


SN 87; SP 94; LR+ 14.5

Stork Test – Movement Test

- **Pattern of intrapelvic load during transfer**
- Patient lifts one leg and maintains single leg stance
  - (+) = PSIS moves cephalic with respect to S2 during load transfer
  - (-) = PSIS stays neutral or moves caudal
- Hypomobility?

Stork Test and ASLR

- Together, these tests measure the presence of a pelvic ring instability AND poor neuromuscular control during loading

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SI Provocative Tests
(European Guidelines – Dx. & Tx. PGP)

• **Recommendation**
  – The following tests are recommended for clinical examination of PGP:

• **SIJ Pain**
  – Posterior pelvic pain provocation test (P4/thigh thrust)
  – Patrick’s/FABER test
  – Palpation of the long dorsal SIJ ligament
  – Gaenslen’s test

SI Provocation Tests
(European Guidelines – Dx. & Tx. PGP)

• **Symphysis**
  – Palpation of the symphysis and the modified Trendelenburg function test of the pelvic girdle

• **Functional pelvic test**
  – Active straight leg raise test (ASLR)

Modified Trendelenburg Test

- Pubic Symphysis Movement
- Rotates 3 degrees and translates 2 mm
  
  One legged Stance:
  - 2.6 mm vertically
  - 1.3 mm sagittally
  
  Walking:
  - Pubic symphysis pistons
  - 2.2 mm vertically
  - 1.3 mm sagittally


(Presswood et al. Strength Cond J. 2008)

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Passive Physiological Movement

Top leg flexed and knee in clinician anterior hip

- Top leg extended and supported
  - What is innominate motion?
  - What is sacral motion?
  - Look for concordant pain

Palpation

- Useful for Extraarticular disorders

- Useful to implicate the long dorsal ligament

Rule OUT Hip
Fracture

Patellar Pubic Percussion (PPP) Test

* R/O femoral neck fracture
* A stethoscope is placed on the pubic bone while the examiner either taps or places a tuning fork on the patella


<table>
<thead>
<tr>
<th>Test, authors</th>
<th>SN/SP</th>
<th>LR+/LR-</th>
<th>QUADAS</th>
<th>Criterion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adams &amp; Yarnold</td>
<td>94/95</td>
<td>20.4/0.06</td>
<td>8</td>
<td>Radiography</td>
</tr>
<tr>
<td>Bache &amp; Cross</td>
<td>91/82</td>
<td>5.1/0.11</td>
<td>8</td>
<td>Radiography</td>
</tr>
<tr>
<td>Tiru et al</td>
<td>96/86</td>
<td>6.7/0.75</td>
<td>10</td>
<td>Radiography, bone scintigraphy, MRI or CT</td>
</tr>
</tbody>
</table>

Meta-analysis revealed a pooled sensitivity of 95% and a specificity of 86%

Stress Fx. (Fulcrum) Test

**R/O femoral stress fracture**

Clinician places one forearm under patient’s thigh to be tested. Clinician’s other hand a downward pressure is applied to the proximal knee.

**Assessment:** Test is considered (+) if the patient reports pain with the maneuver.

**Special Note:** Confirmation of a stress fracture requires a bone scan, therefore a positive finding warrants physician referral.

### Stress Fx. (Fulcrum) Test

<table>
<thead>
<tr>
<th>Test, authors</th>
<th>Sample size</th>
<th>SN/SP</th>
<th>LR+ or LR-</th>
<th>QUADAS</th>
<th>Criterion standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Johnson et al. (1994)</td>
<td>7 college-aged athletes with proximal 1/3 femoral shaft stress fracture</td>
<td>58/73</td>
<td>1.70/0.09</td>
<td>3</td>
<td>Repeat weight-bearing Radiography</td>
</tr>
<tr>
<td>Kang et al. (2005)</td>
<td>6 female Lacrosse players with femoral shaft stress fracture; age range of 19-23 years</td>
<td>88/13</td>
<td>1.03/0.92</td>
<td>7</td>
<td>Repeat weight-bearing Radiography, bone scan and/or MRI</td>
</tr>
</tbody>
</table>


### Posterior Pelvic Palpation

<table>
<thead>
<tr>
<th>Test, authors</th>
<th>SN/SP</th>
<th>LR+ or LR-</th>
<th>QUADAS</th>
<th>Criterion</th>
</tr>
</thead>
<tbody>
<tr>
<td>McCormick et al (2003)</td>
<td>98/94</td>
<td>16.3/0.02</td>
<td>7</td>
<td>CT scan</td>
</tr>
</tbody>
</table>


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Intra-Articular Pathology

Scour Test – R/O:R/I?

• Traditionally considered test of hip intra-articular pathology
• 2 arcs without, then 2 with longitudinal compression loading
• No diagnostic values
  – Variations of testing, naming, etc.

FABER’s Test (Patrick’s Test; Figure-Four Test)

Hip joint is passively externally rotated and abducted by placing pressure over the ipsilateral knee, while stabilizing the contralateral innominate.

Assessment: is of quantity and quality of motion, as well as for pain. ROM measurement can be taken in reference to the horizontal plane of the table.
Maslowski et al (2010) 50 subjects with signs/symptoms suggestive of hip pathology; mean age: 60.2 years, 30 females

\[ \frac{8}{25} \] \text{SN/SP} \quad \frac{1.00}{0.72} \text{LR+/LR-} \quad 7 \text{ QUADEAS} \quad \geq 80\% \text{ improvement on visual analog scale after intra-articular hip injection}

Martin et al (2008) 105 subjects with hip pain; mean age: 42±15 years, 24 females

\[ \frac{60}{18} \] \text{SN/SP} \quad \frac{0.73}{2.2} \text{LR+/LR-} \quad 9 \text{ QUADEAS} \quad \text{MRA; anesthetic intra-articular injection}

Troelsen et al (2009) 18 subjects with previous periacetabular osteotomy (17 had labral tear); median age 43 years (32-56 years), 16 females

\[ \frac{42}{75} \] \text{SN/SP} \quad \frac{1.58}{0.77} \text{LR+/LR-} \quad 9 \text{ QUADEAS} \quad \text{MRA}


### Hip Osteoarthritis

- Restriction in any single hip motion (flexion, ER, or IR):
  - Sensitivity = 86%
  - Specificity = 54%
- (+) LR = 1.9 for mild to moderate radiographic arthritis.
- Limited IR ROM was found to be most predictive finding of mild to moderate OA, with (+) LR = 3.6


“Gold Standard”
- Individuals with hip pain and hip IR ROM ≤ 15° who experienced pain with IR, had morning stiffness ≤ 60 minutes, and were 50 y.o. or older could be identified as having hip OA
  - Sensitivity = 86%; specificity = 75%
- If hip IR ROM was < 15° and hip flexion ≤ 115°
  - Sensitivity = 86%; specificity = 75%


### Hip ROM

- "Gold Standard"
  - Individuals with hip pain and hip IR ROM ≤ 15° who experienced pain with IR, had morning stiffness ≤ 60 minutes, and were 50 y.o. or older could be identified as having hip OA
  - Sensitivity = 86%; specificity = 75%
- If hip IR ROM was < 15° and hip flexion ≤ 115°
  - Sensitivity = 86%; specificity = 75%


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Hip Impingement/Labral Tear

Subjective history

• 96% (Keeney et al. Clin Orthop Relat Res. 2004) and 100% (McCarthy and Busconi, 1998) of individuals with arthroscopically identified labral tear reported groin pain

“C” – Sign

<table>
<thead>
<tr>
<th>Authors</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keeney et al. 2004</td>
<td>Groin pain most common location (96%), anterior hip (35%), lateral hip (38%), buttock (17%). Presence of locking or catching may not be sensitive (58% reported hip locking or catching)</td>
</tr>
<tr>
<td>McCarthy &amp; Busconi, 1995</td>
<td>Groin pain may indicate not only labral tear, but presence of intra-articular pathologies in general (100% with labral tear reported it, 98% with intra-articular pathology reported it)</td>
</tr>
<tr>
<td>Narvani et al. 2003</td>
<td>Presence or absence of clicking in hip may provide useful diagnostic information.</td>
</tr>
</tbody>
</table>

### Flexion Adduction Internal Rotation Test (FADDIR)

- The patient is supine. The examiner moves the patient’s leg into the combined motions of flexion, adduction, and internal rotation


### FADDIR Test

- Multiple studies
  - Most are case cohorts
  - High SN, poor SP
  - Highest LR+ = 2.4
  - Lowest LR- = 0.2


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Flexion-Internal Rotation Test

Movement: Combined motions of flexion to $90^\circ$ and IR are performed as shown.

Assessment: As with impingement test, pain in groin is indicative of labral degeneration, fraying, or tearing.

---

Flexion-IR Test

<table>
<thead>
<tr>
<th>Number of studies/sample size</th>
<th>SN</th>
<th>SP</th>
<th>LR+</th>
<th>LR-</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 studies/42 total subjects</td>
<td>96</td>
<td>17</td>
<td>1.12</td>
<td>0.27</td>
</tr>
</tbody>
</table>


---

Internal Rotation-Flexion-Axial Compression Test

Movement: Combined motions of flexion, IR, and axial compression are performed as shown.

Assessment: Reproduction of concordant pain, locking, clicking, catching

---

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Internal Rotation-Flexion-Axial Compression Test


<table>
<thead>
<tr>
<th>Test, authors</th>
<th>Subjects</th>
<th>Sensitivity/ specificity</th>
<th>Likelihood ratio</th>
<th>QUADAS score</th>
<th>Criterion standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Narvani et al (2003)</td>
<td>18 athletic subjects with complaints of groin pain; mean age of 30 ± 8.5 years, 5 females</td>
<td>75/43</td>
<td>1.30/5.8</td>
<td>8</td>
<td>MRA</td>
</tr>
</tbody>
</table>

Thomas Test

Patient holds leg not being tested in a flexed position.

**Assessment:**
- If less than 0 degrees of hip extension is achieved - indicates a tight iliopsoas. Simultaneous extension of the knee during this maneuver indicates tightness of the rectus femoris.
- Knee flexion: If less than 80 degrees is available, the rectus femoris is tight. (Kendall et al. 2005)

**Special note:** Examiner can use proximal hand to monitor lumbar spine position. Lumbar spine should maintain contact with table.


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### Avascular Necrosis

<table>
<thead>
<tr>
<th>Test, authors</th>
<th>Subjects</th>
<th>Sensitivity/ specificity</th>
<th>LR+</th>
<th>LR-</th>
<th>QUADAS score</th>
<th>Criterion standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joe et al (2002) (extension &lt; 15 degrees)</td>
<td>176 HIV infected subjects; no demographic information reported</td>
<td>19/92</td>
<td>2.38/0.88</td>
<td>10</td>
<td>MRI</td>
<td></td>
</tr>
<tr>
<td>Joe et al (external rotation &lt; 60 degrees)</td>
<td>38/73</td>
<td>0.48/0.85</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Joe et al (pain with internal rotation)</td>
<td>13/66</td>
<td>0.93/1.01</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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### Gluteal Tendinopathy

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Trendelenburg’s Sign

• The patient stands in front of the examiner.
• The examiner instructs the patient to stand on one leg.
• The examiner evaluates the degree of drop of the contralateral pelvis once the leg is lifted.

• Confirmation of abnormal pelvic drop is required during gait.
• A positive test is identified by an asymmetric drop of one hip compared to the other during single stance.

<table>
<thead>
<tr>
<th>Test, authors</th>
<th>Subjects</th>
<th>Sensitivity/specificity</th>
<th>LR+/LR-</th>
<th>QUADAS score</th>
<th>Criterion standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bird et al. (2008)</td>
<td>24 subjects with clinical features consistent with greater trochanteric pain syndrome, median age 58 years, range 36-75 years, all subjects were female</td>
<td>73/77</td>
<td>3.13/0.39</td>
<td>10</td>
<td>MRI</td>
</tr>
<tr>
<td>Woodley et al. (2008)</td>
<td>40 patients with unilateral lateral hip pain, mean age: 54.4±9.5 years, 37 females and 3 males</td>
<td>23/94</td>
<td>3.65/0.82</td>
<td>12</td>
<td>MRI</td>
</tr>
<tr>
<td>Lequesne et al. (2008)</td>
<td>17 patients with refractory greater trochanteric pain syndrome, mean age: 66.1±10.4 years, 16 females and 1 male</td>
<td>87/96</td>
<td>24.3±0.03</td>
<td>10</td>
<td>MRI/Surgery</td>
</tr>
</tbody>
</table>

Modified Trendelenburg Test

1. The patient starts in the standing position, while gently holding onto examiner.
2. The patient lifts the non-tested lower extremity off the ground and stands on the tested lower extremity for 30 seconds.
3. No lateral deviation of trunk to ipsilateral side is allowed.
4. The patient is asked whether any concordant pain occurred.
5. Pain similar to spontaneous pain is recorded as immediate, early, or late if it occurred after 0–5 seconds, 6–15 seconds, or 16–30 seconds, respectively.
### Trendelenburg

<table>
<thead>
<tr>
<th>Number of studies/sample size</th>
<th>SN</th>
<th>SP</th>
<th>LR +</th>
<th>LR -</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 studies/78 total subjects</td>
<td>61</td>
<td>92</td>
<td>6.83</td>
<td>0.25</td>
</tr>
</tbody>
</table>


### Resisted Hip Abduction

- The patient is placed in a sidelying position.
- The examiner instructs the patient to abduct the leg to 45 degrees.
- The examiner applies force, resisting hip abduction against the leg.
- A positive test is replication of symptoms during the testing.

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Sensitivity/ specificity</th>
<th>95% CI</th>
<th>QUADAS score</th>
<th>Criterion standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bird et al. (2001)</td>
<td>73/46</td>
<td>1.35/0.59</td>
<td>10</td>
<td>MRI</td>
</tr>
<tr>
<td>24 subjects with clinical features consistent with greater trochanteric pain syndrome; median age 58 years, range 36-75 years, all female</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lequesne et al. (2008)</td>
<td>71/97</td>
<td>23.7/0.30</td>
<td>10</td>
<td>MRI/Surgery</td>
</tr>
<tr>
<td>17 patients with refractory greater trochanteric pain syndrome; mean age: 68.1±10.8 years, 16 females</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>


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### Resisted Hip Abduction

<table>
<thead>
<tr>
<th>Number of studies/sample size</th>
<th>SN</th>
<th>SP</th>
<th>LR⁺</th>
<th>LR⁻</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 studies/58 total subjects</td>
<td>71</td>
<td>84</td>
<td>6.83</td>
<td>0.25</td>
</tr>
</tbody>
</table>


### Resisted External Derotation Test

- The patient lies supine, with hip and knee flexed at 90 degrees, hip in external rotation.
- The examiner slightly diminishes the external rotation just enough to relieve the pain (if any was present).
- The patient then actively returns the lower extremity to neutral rotation (place the lower extremity along the axis of the bed) against resistance.
- The test was considered positive if spontaneous pain was reproduced.
- If the result was negative, the test was repeated with the patient lying prone, hip extended and knee flexed at 90 degrees.

Lequesne et al. Arthritis & Rheumatism 2008

<table>
<thead>
<tr>
<th>Test, author</th>
<th>Subjects</th>
<th>Sensitivity/ Specificity</th>
<th>LR⁺/LR⁻</th>
<th>QUADAS score</th>
<th>Criterion standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lequesne et al (2008)</td>
<td>17 patients with refractory greater trochanteric pain syndrome; mean age: 68.1±10.8 years, 16 females</td>
<td>88/97.3</td>
<td>32.60/12</td>
<td>10</td>
<td>MRI</td>
</tr>
</tbody>
</table>


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Sports Related Chronic Groin Pain

Single Adductor Test

- The patient is supine, hip flexed to 30 degrees, and the other leg at 0 degrees on the table.
- Patient resists the clinician’s attempt to abduct the leg to be tested, effectively contracting their adductor muscle on that side.
- Assessment was made for the presence or absence of pain in the pubic bone/adductor region.
- The other side was then tested.

Squeeze Test

- The clenched fist of the examiner is placed between the patient’s legs at the level of the knees with approximately 45 degrees of bilateral hip flexion and 90 degrees of knee flexion (heels flat on bed surface, in supine hooklying position).
- The patient is then asked to contract maximally both adductor muscles simultaneously to “squeeze the fist” effectively.
Bilateral Adductor Test

- The patient is supine with bilateral legs raised off the table (approximately 30 degrees of hip flexion) with slight hip abduction and leg internal rotation.
- The examiner then attempts to perform bilateral hip abduction, requiring resisting this movement, thereby effectively contracting both adductor muscles simultaneously.

<table>
<thead>
<tr>
<th>Test, authors</th>
<th>Sample size</th>
<th>Sensitivity/specificity</th>
<th>LR+LR-</th>
<th>QUADAS score</th>
<th>Criterion standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Adductor Test</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Verrall et al (2005)</td>
<td>89 Australian Rules football players; 47 with chronic groin pain; all were male</td>
<td>30/94</td>
<td>3.3/0.66</td>
<td>7</td>
<td>MRI (bone marrow edema)</td>
</tr>
<tr>
<td>Squeeze Test</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Verrall et al (2005)</td>
<td></td>
<td>43/91</td>
<td>4.8/0.63</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bilateral Adductor Test</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Verrall et al (2005)</td>
<td>54/95</td>
<td>7.7/0.49</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


Test of General Ligament Laxity
Dial Test

Movement: With the hip in a neutral flexion/extension and abduction/adduction position, the clinician grasps the patient’s LE at the femur and tibia and is passively rolled into full IR.

The LE is released and allowed to ER.

Assessment: Evaluate side-to-side ROM differences and clicking. A negative Dial test constitutes external rotation of the lower limb less than 45°, as measured vertically, with a firm endpoint. Patients with passive ER greater than 45° are considered to have a positive Dial test.

Log Roll Test

With the hip in a neutral flexion/extension and abduction/adduction position, the patient’s LE is passively rolled into full IR and ER.

Assessment: Evaluate side-to-side ROM differences and clicking. A click reproduced during the test is suggestive of labral tear, while increased ER ROM may indicate iliofemoral ligament laxity.

Function
Conclusion

- Lumbar spine – Pelvis – Hip
- Entire exam
  - Subjective, observation, triage, myotomes/dermatomes
- R/O vs R/I
- Function Assessment
  - Why is the patient seeing you?
- Assess – Re-assess

Thank You!

reiman.michael@gmail.com