Evaluation of Hip Girdle Pain in the Athlete

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Hip Girdle Pain in the Athlete

- Challenging
- Many conditions can present with overlapping pain complaints
- Intra-articular vs Extra-articular
-REFERRED FROM SPINE, ABDOMEN/PELVIS
- Pain anterior, lateral, posterior, knee, leg
- Surgery hip joint with arthroscopy
  - Non-surgical treatments, who needs surgery
Introduction

• All ages, all activity levels
• Groin pain 10% of visits to Sports Med Centers
• Cutting, & forceful acceleration/deceleration
• Challenges: Location of pain no guarantee of origin of pain
  – Clohisy ’09: Hip Impingement surgery patients
  – 88% groin pain, 67% lateral pain, 35% anterior thigh pain, 29% buttock pain, 27% knee pain, and 23% low back pain

• Overlap in innervations
  – Anterior capsule: Obturator & femoral nerves (L2-L4)
  – Posterior capsule: Sciatic & Sup Gluteal N (L4-S1)
  – These same nerve roots (L2-S1) supply the Lumbar spine, SI joint & lower extremity

• The variety of pain presentations, and pain overlap, need to consider hip as the origin almost any lower body pain condition
Sources of Hip Pain

- intra-articular / Hip joint
- extra-articular structures of hip girdle
- referred sources from lumbopelvic
- referred from visceral structures ab & pelvis.
Differential Diagnosis of Hip Pain: Musculoskeletal Causes (Prather et al ’14)

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Differential diagnosis of Hip Pain:
Non-Musculoskeletal
(Prather et al ’14)

• Gastrointestinal: appendicitis, diverticulitis, lymphadenitis, inflammatory bowel disease,
• inguinal/femoral hernia
• Genitourinary: endometriosis, prostatitis, urinary tract infection, pelvic inflammatory disease, ovarian cysts, nephrolithiasis, ectopic pregnancy
• Pelvic tumor
Hip Pain: Skeletally immature

• Legg Calve Perthes Disease
  – Age 4-10, boys>girls, repetitive microvascular trauma femoral head

• Slipped Capital Femoral Epiphysis (SCFE)
  – Adolescents, boys 2.4 X risk, most common cause hip pain in adolescents, essentially a fracture through growth plate, endocrine disorder, heavy kids
Hip Pain:
Intra-Articular Sources
Femoral Neck Stress Fx

- 10% of all stress fractures
- High rate morbidity, non-union & AVN
- Runners, Military, females, skeletally mature
- sudden increase training intensity or duration
Hip Impingement

- Bony structural deformity: extra bone on femoral head and or socket/acetabulum
- Leads to abnormal bone contact, and injury to labrum and cartilage
- Up to 30% incidence of such bone changes
- Cause: Abnormal skeletal development due to high impact activity
- Types
  - Cam: young males, but females catching up
  - Pincer: Higher X-ray incidence in males, but seen more mid age Females
- Females:
  - more subtle Xrays findings
  - weaker hip stabilizing muscles & joint laxity
  - Places more stress on the joint from Increased ROM and bone contact
Acetabular Dysplasia: Developmental Dysplasia Hip

- Insufficient or shallow socket
- Females > males
- Overloads cartilage and labrum, leads to labrum tears and early Hip arthritis
Acetabular Labrum tears

• A fibrocartilage ring around the edge of the acetabulum
• Acts to stabilize hip, and seal the fluid around the head
• Peripheral third has blood supply, poor healing capability
• Densely innervated anteriorly, so very sensitive
• Tears:
  – Most tears related to bone abnormality (Hip impingement, dysplasia)
  – Trauma, a legitimate, but infrequent cause
  – Dancers frequent extreme motions, increase stress, higher incidence of tears despite normal bone
Hip Avascular Necrosis (AVN)

• End result of loss of blood supply to femoral head
• Legg Calve Perthes, Slip Cap Fem Epiphysis, Femoral Neck Stress Fracture can lead to this
• Often unknown etiology
• Known causes:
  – Corticosteroid use, excessive alcohol use, blood dyscrasias, Deep sea divers/high barometric pressure
Hip Arthritis

• Degeneration of articular cartilage and subchondral bone

• ~80% caused by: Trauma, hip impingement labrum tears, AVN, Dysplasia, SCFE, Perthes, etc.
Hip Pain:
Extra-Articular Hip Sources

• Muscles
• Tendons
• Bursa
• Other soft tissue
Public Symphysis

- Pubic symphysitis progresses to Osteitis pubis
- Pain at symphysis pubis, associated with repetitive overload, direct trauma or instability
- Kick & rotation, adductor & rectus abdominis
- Inflammatory response in joint & muscles
- If untreated, progresses to bone reaction, fracture or arthritis of the joint, then called Osteitis pubis
- Risks increase with history of trauma, infection, pregnancy or rheumatologic diseases
Sport Hernia, Athletic Pubalgia, Core Muscle Injury

• Lower abdominal wall pain, inguinal pain
• Hyperextension of rect abdom insertion pubis
• Injury, weakness, “hernia” posterior inguinal wall
• Gilmore’s groin is a less common subset with external oblique tear and conjoint tendon tear
• Risk Factors:
  – Repetitive rotation upper leg/torso, hockey, soccer, rugby
  – Shear pubic symphysis from repetitive trunk hyperextension & thigh hyperabduction
  – muscle imbalance strong proximal thigh muscles & weaker abdominal muscles
Figure 1: Anatomy of the groin region

Large red arrows indicate the direction of force of the rectus abdominis and adductor longus muscles.

- Rectus abdominis
- External oblique
- Inguinal ligament
- External ring of the inguinal canal
- Conjoint tendon (runs under external oblique)
- Pubic bone of pelvis
- Pubic symphysis joint
- Adductor longus

Omar IM et al. Radiographics 2008;28:1415-1438
Adductor Strain

• Most common cause of groin pain in athletes
• Eccentric contraction, hockey/soccer
• Along with lower ab, adductors stabilize pelvis & low extremity in closed chain
• Risk factors: weakness, decreased ROM, muscle imbalance AB/Add
• Add Longus (1 of 6) usually the one injured
  – poor mechanical advantage, low tendon--muscle ratio at its origin on the pubis, predispose it to injury
Iliopsoas Tendon & Internal Snapping Hip

• IP (iliopsoas), primary hip flexor, functional stability hip/pelvis/spine, disease of IP can be cause or result of compensatory movement patterns
• Ant hip pain, assoc w low back pain, w ecc or concentric contractions, uphill running or lengthening stride
• Mechanisms:
  – guarding for primary spine or intra-articular hip disorder, leads to ↑muscle activation, tendon overload & shortening
  – IP becomes painful when stretched during hip extension.
  – Also, inefficient movement patterns & posture such as excessive anterior pelvic tilt cause IP to activate overlengthened position, reduces effectiveness↑
Iliopsoas & Internal Snapping

• Click/pop with flexion, extension, rotation. Dancers, soccer, weight training, runners
• Also intra-articular snapping and External snapping, not caused by Psoas
• Internal snapping:
  – IP catches over iliopectineal prominence, fem head, lesser trochanter, or paralabral cysts
• Most likely from chronic IP dysfunction
  – Tendon structurally normal, not activating at its optimal length
  – einternal snapping hip and acetabular labral
• Labrum tears & Internal Snapping often found together
  – possibly due to similar movement patterns predispose to both
  – Or compensation for one predisposes the other.
Lateral Hip Pain

• Convention has it that lateral pain is extra-articular in origin
• Intra-articular, Lumbar and SI joint are also known origins to cause Lateral Hip pain
Greater Trochanteric Pain Syndrome (GTPS)

- Formerly Trochanteric bursitis used to label lateral hip pain, now it is clear other pathologies (Tendinopathy, tear etc.) other than bursitis cause/contribute to pain, hence GTPS
- Middle aged athletes, Fem > male, ? Due to Wider pelvis/femur ratio females
- Seen in combination with: pes planus, ITB friction syndrome, obesity, & arthritis Hip/Spine/Knee
- Mechanism:
  - Shear of peritrochanteric soft tissues from abductor weakness or gait disturbance
  - Biomechanical dysfunction → tissue overload, → initial bursitis
  - Without correction of faulty movement patterns & muscle strength/length imbalances, evolves into gluteus medius & minimus tendinopathy, enthesopathy, tendon thinning, and tears
External Snapping Hip

• The most common snapping, usually asymptomatic

• Transient catching of G maximus tendon or ITB on the greater trochanter as move between flexion and extension

• Same biomechanical issues as seen w GTPS
Posterior Pelvic Pain (Not Spine)

- Located post iliac crest to gluteal fold
- Pain not referred from other (Spine, abdomen)
- Pain here is often assoc with trauma, arthritis, biomechanical dysfunction, & pregnancy
- Multiple causes:
  - SI joint, SIJ ligaments, sacral stress fracture, Pelvic floor muscles (piriformis, obturator Int),
  - sciatic nerve compression (piriformis syndrome)
  - hip impingement between the lesser trochanter & ischial tuberosity (ie, ischiofemoral impingement)
  - hamstring injuries (skiers, sprinters, mid-distance runners, contact sport athletes)
Referred pain

• Most commonly neurogenic from lumbar spine or nerve root compression
• Pelvic floor muscles contribute to hip stability, their dysfunction and pain can be assoc with bowel, bladder and sexual changes
Determining the cause

• History
  – Age, sport/repetitive motion
  – Progression, severity, exacerbating & alleviating factors
    □ Acute onset, muscle stretch/contract with pop, likely musculotendinous
    □ Acute onset with collision, possibly fracture
    □ Burning, neurologic
• dull, achy, insidious-onset pain, worsens with activity think intra-articular origin
History

- Pain with prolonged sitting, standing, sharp pain with pivoting/kicking think labrum tear or hip impingement
- Dull pain, worsens with activity, after recent increased training, think stress fracture
- Severe pain that prevents weight bearing, think unstable fracture SCFE, AVN, FNSF.
Location pain

• Anterior pain:
  – most commonly intra-articular
  – extraarticular such as pubic ramus stress fractures, pubic symphysis, adductor or abdominal wall injury, radiculopathy from high lumbar nerve roots

• Lateral Pain: (can be intra-articular)
  – More commonly GTPS, ITB dysfunction, and lumbar L4-L5 nerve
  – GTPS lateral hip pain sleeping on side, climbing stairs, crossing leg
  – “C” sign over ant-lat hip for Impingement & Lab tear
Location: Posterior

• Again, can be intra-articular
  – 29% of FAI, 17% with DDH, 38% with isolated acetabular labral tears posterior pelvic pain

• SI Joint, lumbar
Physical Exam: Non-Specific

- Antalgic gait
- Trendelenburg gait
- Lateral lurch gait
- Decreased or asymmetric stride length
- Foot internal or external rotation during stance and/or gait
- Asymmetry iliac crest & trochanteric heights when standing and/or supine
Exam: Intra-Articular

• Asymmetric or reduced passive ROM

• Provocative tests
  – Hip log roll test
  – Anterior hip impingement test
  – Dynamic Ext Rotation Impinge Test
  – Hip scour test
  – FABER (Flex Abd Ex Rot ) Patrick test
  – Stinchfield resisted hip flexion test
  – Posterior hip impingement test
  – Traction Relocation test
Exam: Extra-Articular Problems

• Tenderness /Palpation:
  – Iliopsoas
  – Rectus Abdominis insertion
  – Conjoint tendon
  – Inguinal ring/posterior inguinal canal
  – Pubic tubercle
  – Adductor origin
  – Greater trochanteric region
  – Hamstring origin

• Muscle Tightness
  – Thomas test- hip flexors
  – Ober Test- fascia lata
Exam: Not Hip or Mixed

- Pain with ROM lumbar spine
- Motor/Sensory/ Reflex exam findings
- Positive neural tension signs
  - Slump-sit test
  - Straight leg raise test
- Femoral nerve stretch test
- Obturator nerve stretch test
Hip Examination

• Exam:
  – “20” point exam
  – 5 positions
    • Stand, sit, supine, lateral & prone
  – Special tests

*Figure 4.1.* Trendelenburg sign is a test of the contralateral leg abductors. The patient lifts the leg and the pelvis is assessed for at least 2 cm of sag. (From Berry D, Steinman S. *Orthopaedic Surgery Essentials: Adult Reconstruction.* Philadelphia, PA: Lippincott Williams & Wilkins; 2007, with permission.)
Physical Exam

**Standing**

**4 Ls, plus Trendelenburg**

**Limp:** Gait (Pelvic “Wink”), Posture, Standing Ab, Flex & squat

**Length:**

**Laxity:** Ligament Assessment

**Beighton’s Criteria**

- Thumb, 5th >90°, Elbow>10°, Knee >10° and Palm to floor.
- 3 of 5 = hypermobility

**Lumbar** Alignment AP/Lat, Scolio, Lordosis

**Trendelenburg:**

single leg wt on Left note Right Hip drops>2cm.
Physical Exam: Sitting

Neuro:
- L2 – S1 Motor, sens & reflex

Vascular

Special
- Pace (Sitting test Piriformis)
  - Resist Abd & ExRot → buttock pain

\[\text{BD Stevenson, Orthopedic Essentials Adult Reconstruction 197}\\\]
Exam: Supine

Palpation: Hip Flexor, groin/Conjoint tendon/superficial inguinal ring/rectus abdominis, adductor tendon

ROM:

Tests:

*Log roll* worry

*Stinchfield* 30-40°Straight leg

*Ant Impingement* FADDIR

*Post Impingement* ExtAbExR

*FABER* distance knee to table

Thigh Squeeze Test

*Apprehension test*

*LABRUM* Tests:

*Psoas Tests:*

*Snap* (Internal Snapping):

  *FABER* to Extension neutral rot

*Ludloff*

  Flex Hip @90° & knee @0°
Supine: **Labrum Tests**

**McCarthy**  Flex both, Ex Rotate one + **Pop**

**Labrum Stress:**  Flex to Ext & rotate

**DEXRIT**  Dynamic Ex Rotate

**DIRI**  Dynamic Int Rotate

**Scour’s**  Flexion axial load

**Butterfly**  Ab Flex IR

**FlexABExRot/Patrick**

**Traction Relocation Test**
**Point Palpation:**
Troch, G Max, Piriformis, etc.

**Abductor Strength:**
- Hip Flex / Knee @ 0° G.Max
- Hip Neut/Knee @ 90° G Medius
- Hip Ext / Knee @ 0° T. Fasc Lata

**Ober’s Test: Flexibility**
- Adduct thigh touch Knee to table
- Knee 0° TFL & G.Max, 90° G.Med

**Stability Tests:**
- Ab ExRot “Crank test”
- Ext Ex Rot “Apprehension”

**Provocative tests:**
- Dynamic Piriformis test
- Post Impingement test
- Bicycle ITB Pop test
Exam: Prone

“Ely” Test  Rectus tightness
“Craig” test  femoral anteverision
Femoral Nerve Stretch test
Palpation:
  SI Joint
  Ischium/Hamstring
  Piriformis
Diagnostic Testing

- Xrays
- MRI
- Ultrasound
- Cat Scan
- Diagnostic injections
Xrays

- AP Pelvis, 45° Dunn Lateral, False Profile View
- Least amount of radiation while still able to assess arthritis, fracture, impingement & dysplasia
MRI

• **Plain MRI**: Good to assess extra-articular
  – Sensitivity 68% Rectus tears, 86% adductor tears
  – Excellent for stress fx, fractures, AVN, infections, inflammatory conditions and neoplasm.
  – Labrum tears less than 60% sensitivity, 20% for cartilage

• **MRI Arthrogram**: Better for intra-articular
  – Far from perfect, still only 71% sensitivity for labrum tears and 44% for cartilage.
Ultrasound

• Good for superficial structures and evaluation of popping pathologies with dynamic test
• Limited value for deep structure evaluation and in heavy patients
• Very operator dependent
• Use increasing, primarily for diagnostic and therapeutic injections
Injections: Diagnostic and Therapeutic

- Valuable in sorting out origin of pain
- Looking for 50% reduction in pain
- Intra vs extra-articular
  - Keep hip joint volume low to avoid painful tensioning of joint capsule (5 cc)
- Psoas bursa
- Trochanter
- Piriformis
Non-Surgical Treatment

• General:
  – pain reduction
  – patient education
  – activity modification
  – movement retraining
  – return to play with a maintenance

• More specific treatment tailored to diagnosis

• Intra-articular vs Extra-Articular
Treatment: Intra-Articular

• Pre-arthritic Hip joint conditions
  – Hip impingement, Labrum tear, Dysplasia
  – No pain no gain, increased risk
  – Sport/movement increases pain and damage

• Limited circumstances, w labrum tear, can rehab and return to sport

• patient ed, activity mod, Standardized PT protocol, & injection as indicated for pain
Physical Therapy

• neuromuscular retraining
• avoidance of damaging motions
• precision of hip motions, decrease ant glide of the femur in on the acetabulum
• Optimize muscle strength/length of hip flexors, extensors, lateral rotators, & abdominals;
• Avoid hip hyperextension, rotation of acetabulum on femur under load
• Avoid painful hip ROM
Treatment: Hip Arthritis

- Similar to pre-arthritis conditions, more restrictive
- Rest/avoidance of pivot, Int rotation, & end range Flex
- Address impairments, muscle inhibition, shortened muscles, & strength deficits in pain-free range
- Medications, injections, ? supplements
Treatment: Extra-Articular

• Greater Troch Pain Syndrome:
  – Stretch tensor fascia lata, ITBand & Hip Flexors
  – Strengthening abductor, external rotator, and extensor musculature
  – Activity modification, NSAIDS, modalities (ice/heat/US/Estim) and injections
Conclusion

• Hip/pelvic girdle injuries are common
• Diagnosis challenging.
• intra-articular, extra-articular, referred sources, & coexisting conditions
• comprehensive history & exam
• all hip disorders warrant a trial of
  – conservative management
  – education, therapeutic exercise, sports-specific activity modification.
• without proper treatment, many hip disorders result in chronic disorders & tissue degeneration
• Pre-arthritis intra-articular hip problems common in athletes
  – Surgical options available
  – appropriate conservative treatment important to offer the best treatment options tailored to each athlete’s goals, anatomy and severity