# Evaluation of Hip Girdle Pain in the Athlete

John H Healey MD
River Valley Orthopedics
Oct 2017

# 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)

- **Intra-articular**
- Ligamentum teres tear
- Hip dislocation/subluxation/capsular injury
- Fracture/stress fracture
- Synovitis
- Infection
- Osteonecrosis of femoral head
- Osteochondritis dissecans
- Legg-Calve-Perthes disease
- Slipped capital femoral epiphysis
- Femoroacetabular impingement
- Developmental hip dysplasia
- Acetabular labral tear
- Osteoarthritis

- **Extra-articular**
- Trochanteric Bursitis
- Muscle strain/tendinopathy/tear: gluteus medius/minimus, piriformis, adductors, rectus
- femoris, iliopsoas, rectus abdominis, proximal hamstrings, tensor fascia lata
- Greater trochanteric pain syndrome
- Snapping hip syndrome
- Regional musculoskeletal
- Pubic ramus stress fracture/osteitis pubis
- Sports hernia/pubalgia
- Lumbar spine: facet joint pain, lumbosacral radiculopathy
- Sacroiliac joint dysfunction
- Peripheral nerve entrapment: genitofemoral, iliohypogastric, ilioinguinal, lateral femoral
- cutaneous, obturator, pudendal, superior and inferior gluteal

# 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 Xray 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

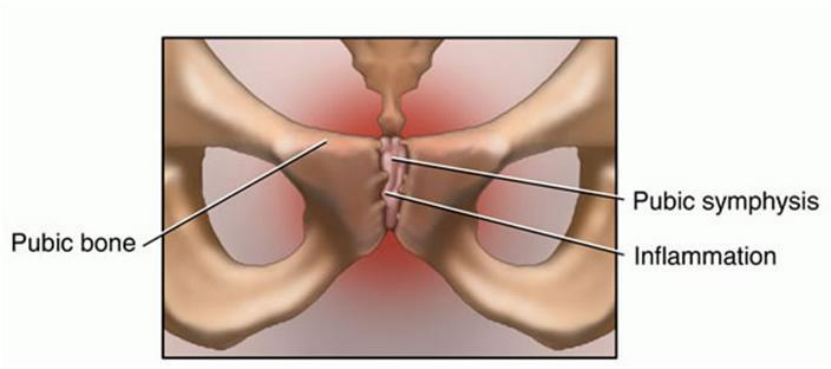
- Degeneration of articular cartilage and subchondral bone
- ~80% caused by: Trauma, hip impingement labrum tears, AVN, Dysplasia, SCFE, Perthes, etc.

# Hip Pain:
# Extra-Articular Hip Sources

- Muscles
- Tendons
- Bursa
- Other soft tissue

# Pubic Symphysis

- Pubic symphysitis progress 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

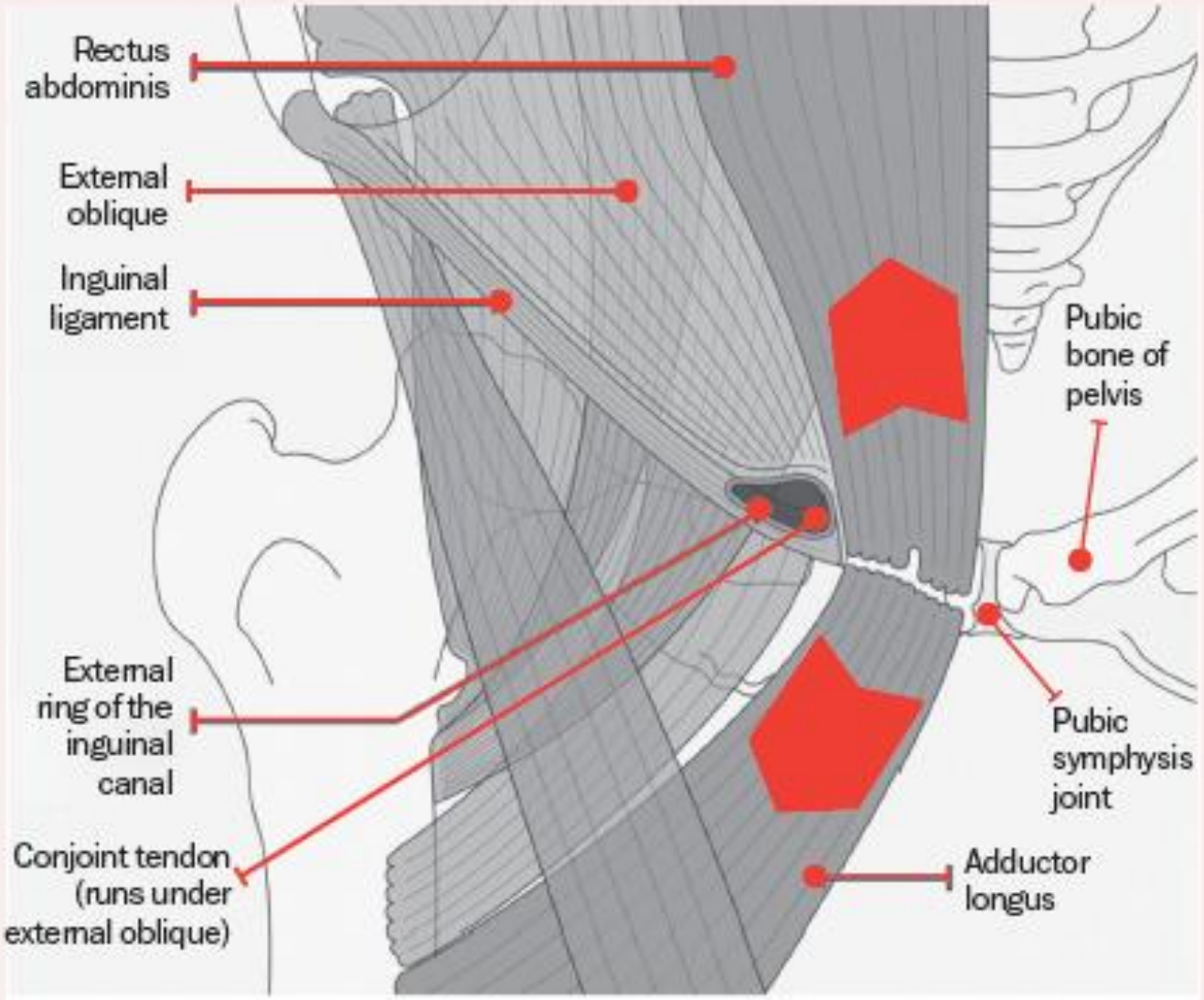



# Sport Hernia, Athletic Pubalgia, Core Muscle Injury

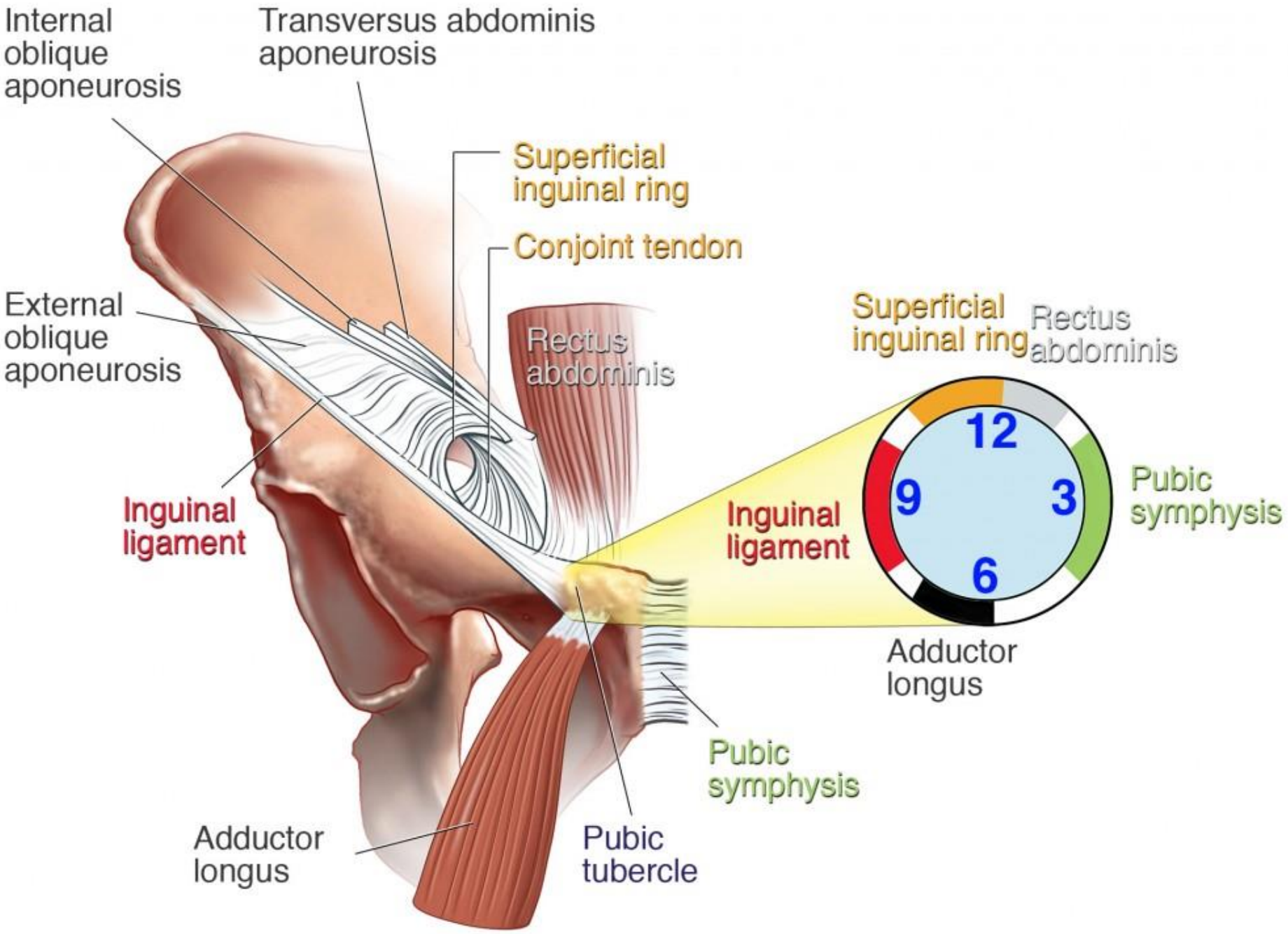
- Lower abdominal wall pain, inguinal pain
- Hyperextension of rect abdom insertion pubis
- Injury, weakness, “hernia” posterior inguinal wall
- Gilmore’s groin is a less common subset with external oblique tear and conjoint tendon tear
- Risk Factors:
  - Repetitive rotation upper leg/torso, hockey, 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




Omar I M et al. Radiographics 2008;28:1415-1438


Internal oblique aponeurosis
Transversus abdominis aponeurosis
Superficial inguinal ring
Conjoint tendon
External oblique aponeurosis
Rectus abdominis
Inguinal ligament
Superficial inguinal ring
Rectus abdominis
12
9
3
6
Pubic symphysis
Inguinal ligament
Adductor longus
Pubic symphysis
Adductor longus
Pubic tubercle

# 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 musculotendinious
  - Acute onset with collision, possibly fracture
  - Burning, neurologic
- dull, achy, insidious-onset pain, worsens with activity think intra-articular origin

# History

- Pain w prolonged sitting, standing, sharp pain with pivoting/kicking think labrum tear  or hip impingement
- Dull pain, worsens w 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

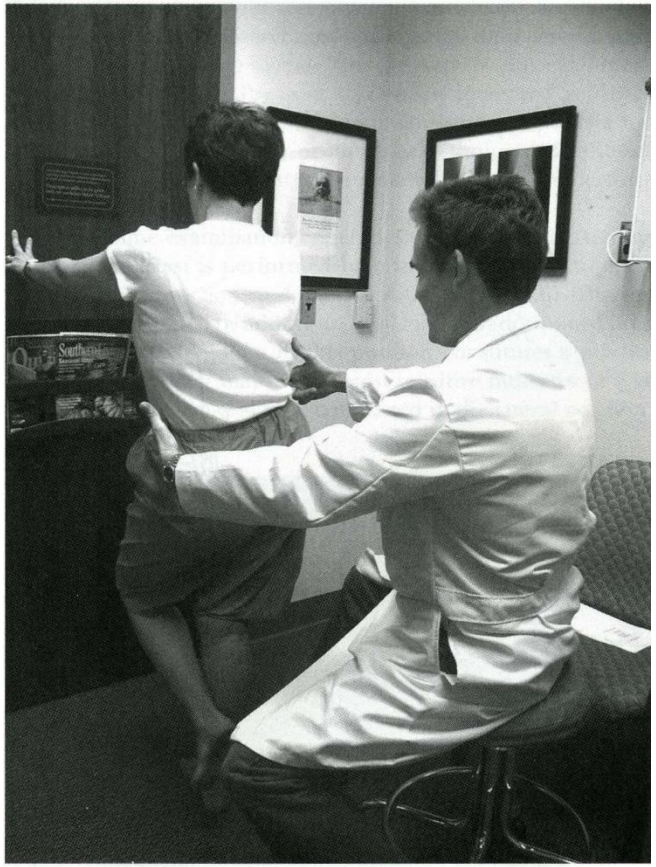


**Figure 4.1.** Trendelenburg sign is a test of the contralateral leg abductors. The patient lifts the leg and the pelvis is assessed for at least 2 cm of sag. (From Berry D, Steinman S. *Orthopaedic Surgery Essentials: Adult Reconstruction.* Philadelphia, PA: Lippincott Williams & Wilkins; 2007, with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

# Physical Exam

## Standing

4 **L**s, 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**.

**Beighton**

# Physical Exam: Sitting

**Neuro**:

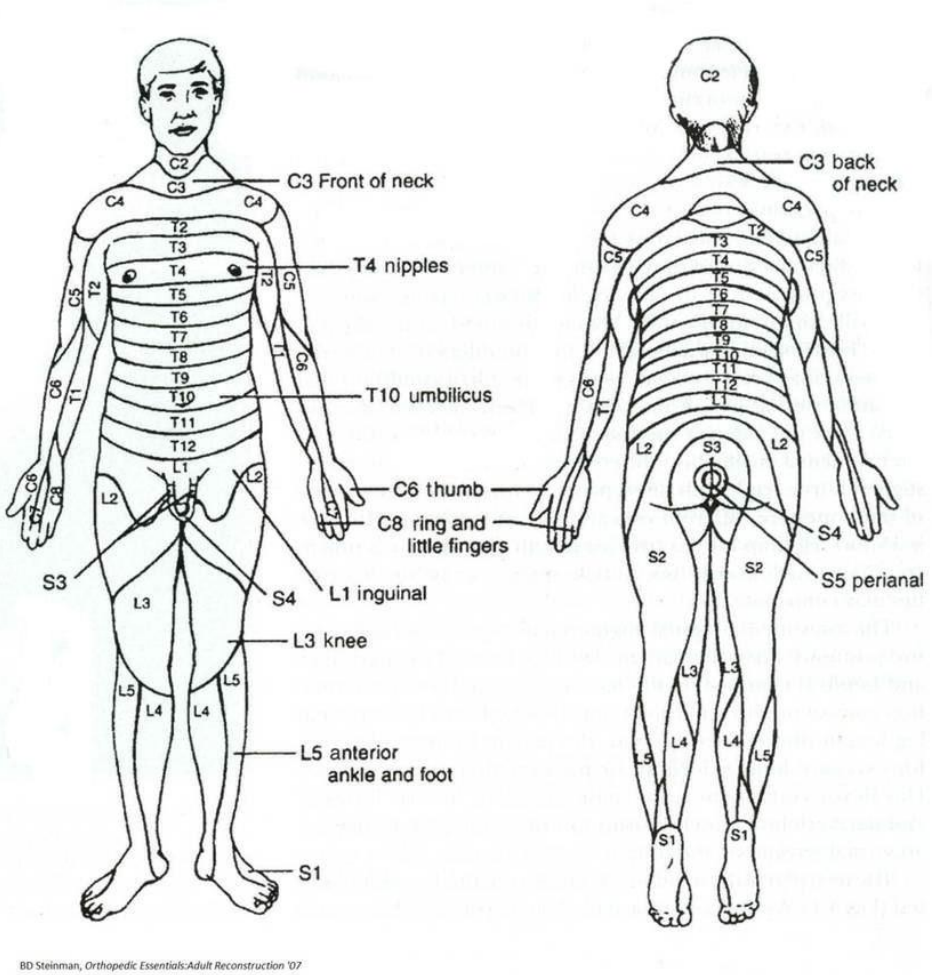
-L2 –S1 Motor, sens & reflex

**Vascular**

**Special**

**-Pace (Sitting test Piriformis)**

*-Resist Abd & ExRot →**buttock pain***




BD Steinman, *Orthopedic Essentials:Adult Reconstruction '07*

# Exam: *Supine*

**<u>Palpation</u>: Hip Flexor, groin/Conjoint tendon/superficial inguinal ring/rectus abdominis, adductor tendon**

**<u>ROM:</u>**

**<u>Tests:</u>**

***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***:

**<u>Psoas Tests</u>**:

**Snap** (Internal Snapping):

FABER to Extension neutral rot

**Ludloff**

Flex Hip @90° & knee @0°

Supine Apprehension Test

# Supine: ***Labrum Tests***

McCarthy Flex both, Ex Rotate one +Pop

Labrum Stress: Flex to Ext & rotate

DEXRIT Dynamic Ex Rotate

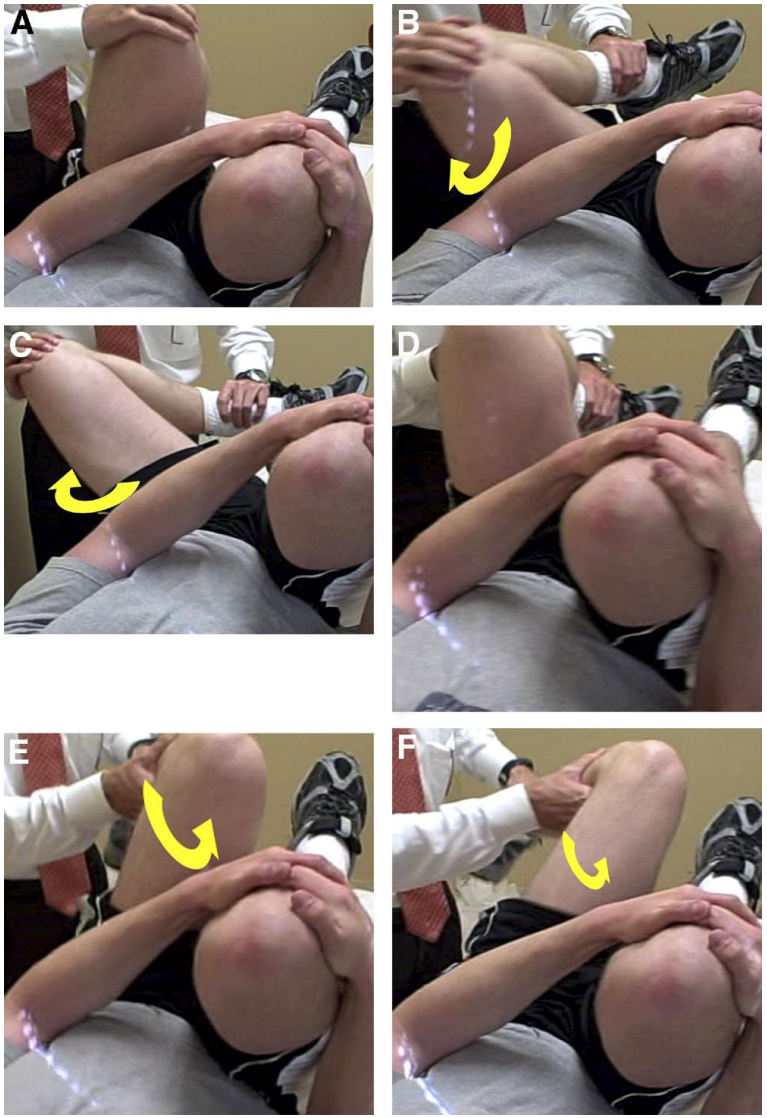
DIRI Dynamic Int Rotate

Scour's Flexion axial load

Butterfly Ab Flex IR

**F**lex**ABE**x**R**ot/Patrick

**Traction Relocation Test**



# Physical Exam: Lateral

**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"

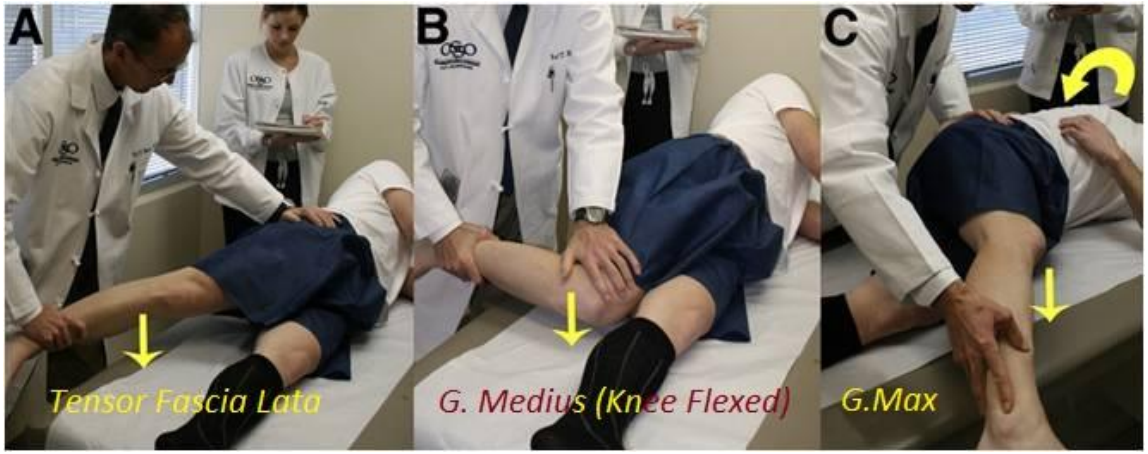
Ext Ex Rot "Apprehension"

**Provocative tests:**

Dynamic Pirformis test

Post Impingement test

Bicycle ITB Pop test



# Exam: Prone

"**Ely"Test** Rectus tightness

**"Craig" test** femoral anteversion

Femoral Nerve Stretch test

Palpation:

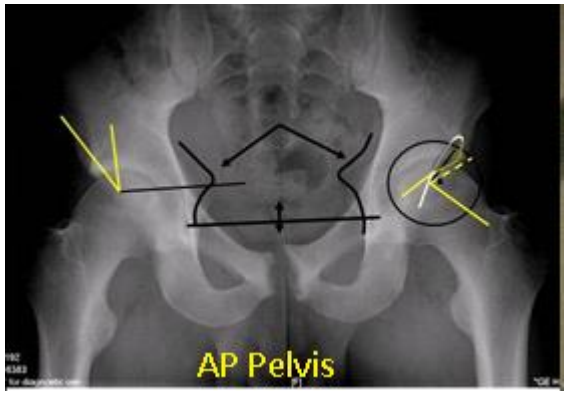
- SI Joint
- Ischium/Hamstring
- Piriformis

# Diagnostic Testing

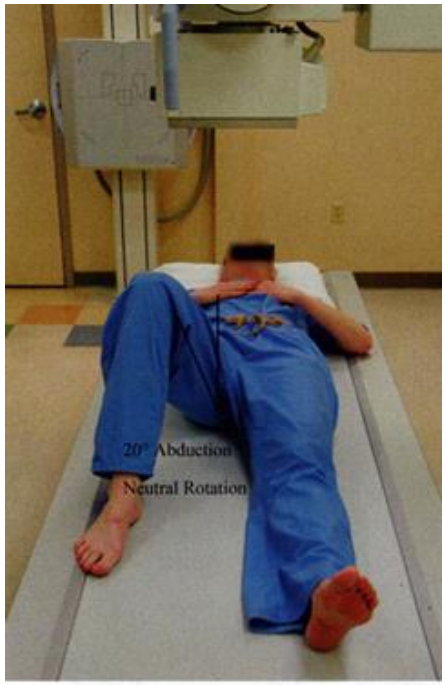
- Xrays
- MRI
- Ultrasound
- Cat Scan
- Diagnostic injections

# Xrays

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








45 Deg Dunn Lateral Technique


False Profile View Xray Technique

# 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 then 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-arthritic 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