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Differential Diagnosis for Disorders of the Hip and Pelvis in Physically Active Individuals

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Introduction

• Patients presenting with symptoms in the hip and pelvic region present unique challenges
• The large number of adjacent structures can make examination and treatment of the hip and pelvic region a challenging process
• Active individuals may experience pain originating from numerous intra and extra-articular sources
• An organized screening and evaluation process is crucial for effective differential diagnosis in this population
Objectives

- Describe the structures of the hip and pelvic region that may potentially be involved in pathological conditions of the hip and pelvic complex
- Describe the relevant components of a patient’s history in regard to evaluating conditions of the hip and pelvic complex
- List the important components of the lower quarter screening process when evaluating individuals with potential pathology of the hip and pelvic complex
- Describe, appropriately evaluate, and recognize treatment implications for the following conditions of the hip and pelvic complex: labral tears, osteoarthritis, stress fractures, athletic pubalgia, osteitis pubis, and pelvic floor dysfunction

Course Outline

- Introduction
- Review of Relevant Hip and Pelvic Anatomy
- History and Implications in Hip and Pelvic Pathology
- Principles of Lower Quarter Screening
- Specific Conditions of the Hip and Pelvic Complex
  - Intra-articular Conditions of the Hip
  - Stress fractures of the proximal femur and pelvis
  - Osteitis Pubis
  - Athletic Pubalgia
  - Pelvic Floor Concerns (brief discussion)
- Question & Answer
Disclosures

- No personal disclosures/conflicts
- No institutional disclosures/conflicts

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- The Interactive Hip Software
- Primal Pictures
Anatomical Review of the Hip and Pelvic Region

Osteology
Femoral Neck

- Angulation in frontal (inclination) and transverse planes (declination/torsional)
- Angles change throughout development
- Variations from normal values can affect joint stability, lower extremity alignment, and injury patterns

Trabecular Pattern:
1. Arcuate Bundle
2. Supporting Bundle
3. Trochanteric Bundle
4. Accessory Bundle
+ “Zone of Weakness”
**Pelvic Complex**

**Innominate**
The innominate bones articulate with the sacrum to form a closed ring with three joints:
- Left and right sacroiliac joints
- The pubic symphysis

**Function:** Transmit forces between the lower extremities and the spine

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**Innominate**
Secondary to its inferior orientation, the acetabulum overhangs the femoral head. The degree of overhang typically ranges between 30 to 40 degrees and is termed the **Center Edge Angle (Angle of Wiberg)**. Smaller Center Edge Angles (<20 degrees) have been associated with congenital dislocations.
Acetabular Labrum and Capsuloligamentous Structures

Acetabular Labrum

Fibrocartilagenous ring attached to periphery of the acetabulum
- *Internal Surface*: Attached to acetabular rim and transverse acetabular ligament
- *Central Surface*: Lined by articular cartilage continuous with that of the acetabulum
- *Peripheral Surface*: Attaches to joint capsule at the base

continued
**Acetabular Labrum**

Functions to increase joint stability
- Increases coverage of femoral head
- Works in combination with capsule to create “ball valve effect” (non-weight bearing)

Preservation of joint integrity
- Potential role in decreasing consolidation (tissue layer compression secondary to fluid leaving the matrix) of articular cartilage
- Increased contact stress and consolidation of articular cartilage noted with labral compromise

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**Hip Joint Capsule and Ligaments**

- Dense, relatively inelastic, fibrous capsule
- Attachments
  - Proximal/medial: Acetabular rim
  - Distal/lateral: Base of femoral neck
  *2/3 of the femoral neck is intracapsular*
- Thickest anterior/superior, thinnest posterior/inferior
- Reinforced by extra-articular ligaments
Pelvic Complex Ligaments

Review of Hip and Pelvic Musculature
Primary Hip Muscles

- **Flexion**: Iliopsoas, Rectus Femoris, TFL
- **Extension**: Gluteus Maximus, Hamstrings
- **Abduction**: Gluteus Medius, Gluteus Minimus, TFL
- **Adduction**: Adductor Magnus, Longus, Brevis, Gracilis
- **External Rotation**: Piriformis, Obturators, Gemelli, Quadratus Femoris
- **Internal Rotation**: Not the PRIMARY function of any muscle

* [Image of hip muscles]
Pelvic Floor Muscles

Muscles of the pelvic outlet, spanning from the peritoneum to the perineum regions
Abdominal Musculature

Muscles of the Trunk

- Rectus major
- Rectus abdominis
- External oblique
- Internal oblique
- Transverse abdominis

Neurovascular Structures
Lumbar Plexus Branches

- Iliohypogastric
- Ilioinguinal
- Genitofemoral
- Lateral Femoral Cutaneous
- Obturator
- Femoral
- Lumbosacral Trunk

Sacral Plexus Branches

- Nerve to Quadratus Femoris and Gemellus Inferior
- Nerve to Piriformis
- Nerve to Obturator Internus and Gemellus Superior
- Superior Gluteal
- Inferior Gluteal
- Posterior Femoral Cutaneous
- Sciatic Nerve
**Vasculature**

- Superior Gluteal Artery
- Inferior Gluteal Artery
- Internal Pudendal Artery

**Gluteal Region Arteries**

- Superior Gluteal Artery
- Inferior Gluteal Artery
- Internal Pudendal Artery
**Hip & Pelvic Bursae**

- Identify inappropriate patients (immediate referral)
  - Immediate referral
- Identify patients of concern
  - Additional diagnostic testing?
  - Consider future referral?
- Determine single vs. multiple regions of involvement
- Prioritize examination approach for specific regions
  - Hip joint
  - Pelvic girdle
  - Lumbosacral complex
The Layered Concept
### Classification-Based Treatment

- Hip vs Lumbosacral Spine
  - Eval and Treat Lumbosacral Pathology
- Extra vs Intra-Articular
  - Eval and Treat Extra-Articular Pathology

- Traumatic Impingement
- Hypomobility/OA Hypermobility

(Martin & Kivlan. *Topics in Geriatric Rehabilitation*, 2013)

### Structured Approach for Hip and Pelvic Pain

(Reiman et al, 2014)

- Patient interview
  - Self-reported “Red Flags”? Identify serious concerns (immediate referral)
- Observation
  - Obvious signs of distress or inappropriate presentation Rule in/out overlapping body regions
- Screening Examination (high sensitivity)
  - Lumbosacral region
  - Hip Identify specific pathology
- Decision for further PT evaluation, or referral
- Disorder-specific Testing (high specificity)
- PT Diagnosis
- Treatment Approach

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History and Implications in Hip and Pelvic Pain

Key History Components for Differential Diagnosis of Hip Pain

- Onset?
  - Suspicion when onset is insidious
  - Related to recent life-event or change in status?
    - Pregnancy, birth, surgery, change of medications, etc.
- Reports of non-musculoskeletal symptoms
  - Suspicious patterns not consistently reproduced with mechanical movement
  - Reports of systemic symptoms or changes
- Previous injury?
- Developmental disorder history?
  - Increased likelihood of hip joint disorders in young and middle adulthood
- Reports of dysfunction indicative of pelvic floor involvement (may accompany hip or lumbopelvic pain)
  - Urinary and fecal dysfunction
  - Sexual dysfunction
  - Symptoms fluctuating with menstrual cycle
History/Interview

- Onset
  - Traumatic
  - Gradual
  - Insidious

- Symptom Location
  - Anterior (true joint pain, hip flexor muscles)
  - Lateral (trochanteric bursa, ITB)
  - Medial (adductors, pubic symphisis)
  - Posterior (Piriformis, hamstring)

- Symptom Description
  - Pain: joint, muscle/tendon, bursa
  - Stiffness: joint, degenerative changes
  - Parasthesia/numbness: peripheral nerve, radicular cause
  - Burning/shooting
  - Locking

“Red Flags”

- Symptoms
  - Acute hip pain with fever
  - Night sweats
  - Night pain
  - Symptoms unchanged by position or movement
  - Symptoms related to menstrual cycle (relative)

- Potential Issues
  - Tumor
  - Infection
  - Septic arthritis
  - Osteomyelitis
  - Endometrioses
Systemic Causes of Hip and Pelvic Region Pain

- Rheumatic arthritis
- Crohn’s disease
- Psoriasis
- Reiter’s syndrome
- Systemic lupus erthematosus
- Genitourinary tract infection
- Endometriosis & reproductive organ issues
- Neoplasm

Visceral Pain Referral

- **Spleen:** Left shoulder
- **Myocardial:** Neck, jaw, left shoulder
- **Kidney Disorder:** Low back, left shoulder
- **Appendicitis:** Lower abdomen and right groin
- **Pancreatic Injury:** Left shoulder, low back, and middle left abdomen
- **Gallbladder:** Right shoulder and mid-scapular region
- **Stomach and Upper/Small Intestines:** Left shoulder
Previous Injury

- Fracture
  - Increased risk for OA development
- Dislocation
  - Potential for undiagnosed labral or cartilage injuries
- Avulsion injury/significant strains
  - Incomplete healing
  - Nerve entrapment in scar tissue
- Avascular necrosis event
  - Residual impact on bony integrity
Medical and Developmental History

• The hip, back or other lower extremity injuries
• Breach birth
• Childhood Disorders
  • Developmental Dysplasia of the Hip
  • Legg Calve Perthes Disease
  • Slipped Capital Epiphysis

Pelvic Floor and Female Hip Pelvis Concerns

• Remember urinary incontinence, pelvic pain, and girdle dysfunction are not exclusive to females
• Unique anatomy and specific life events such as pregnancy, delivery, and menopause predispose the female population to specific concerns
• Pelvic muscle dysfunction
  • Urinary difficulties
  • Evacuation difficulties
  • Sexual dysfunction
  • Often accompanying musculoskeletal symptoms
    • Hip pain
    • Lumbopelvic pain
Lower Quarter Screening
Considerations for Hip and Pelvic Conditions

History/Intake Drives Evaluation Algorithm

- Refer
- Screen
  - Sensitivity concerns
- Region-Specific Evaluation
  - Specificity concerns
  - If multiple regions are implicated, prioritize level of involvement
Lumbosacral Involvement?

- Pelvic landmark palpation
- Lumbar AROM Testing
- Sensory
- Motor exam

* Determine if spine is primary or contributing factor

Lumbosacral Screen
(Cheatham & Kolber, 2015)

- Prone Instability Test
  - SN = 72%, SP = 58%
- Neural Tension Tests (discogenic symptoms)
  - Straight Leg Raise; SN=97%, SP=57%
  - Sitting Slump; SN = 83%, SP=55%
  - Prone Knee flexion; SN=84%, SP=NT
- Thigh Thrust Test
  - SN=88%, SP=69%
  - Cluster of findings more useful for SIJ dysfunction
Hip Joint Screening

- Clinical Tests for intra-articular involvement
  - Flexion Adduction Internal Rotation (FADIR)
    - SN = 99%, SP = 25%; screen for femoral acetabular impingement (FAI)
  - Flexion Abduction External Rotation (FABER)
    - SN 53%-81%, SP = 25%-71%; highly variable results

Functional Screening of the Hip Region

- Examine for symptom provocation or movement dysfunction that may signify specific regional involvement
- May further guide physical examination
- May provide information regarding aggravating factors that is not available through singular impairment measures (strength, ROM, etc.)
- Also allows consideration of symptom timing
  - Pain that occurs after walking specific time (R/O claudication)
  - Symptoms that occur after sitting prolonged time (R/O spinal involvement)
  - Pain when lifting heavier objects (R/O hernia pathology)
Gait

- Concern with gross deviations/compensation, not finite measurements
- Difficulty with weight bearing
  - Fracture
  - Intra-articular disruption
- Pelvic drop in frontal plane (Trendelenberg)
  - Gluteal weakness or tear
- Compensatory trunk movement
  - Exaggerated backward trunk swing
    - Weak hip flexors of “swing” leg
    - Weak/painful extensors of “stance” leg

Functional Screening of the Hip Region

- Recreate tasks reported as symptomatic by the patient
- Re-affirm symptom distribution/pattern
- Correlate symptom to physical performance
- Utilize results to drive more specific evaluation
- Observe for “inappropriate” responses
  - i.e. total giving way of lower extremity with minor task
Functional Screening of the Hip Region

- 54 y.o. female recreational tennis player with onset of groin pain over last 2 weeks
  - Differential Diagnoses
    - OA
    - “Strain”
    - Stress fracture/reaction
    - Lumbopelvic involvement
  - Physical Exam: unremarkable (symmetrical strength, normal ROM), except for minor soreness at end-range IR of hip
  - Gait observation: unremarkable
  - "On-court" observation: groin pain with sudden stops (onto heel) and pivoting that places hip in relative IR
  - Once pain is present, all weightbearing activities become more uncomfortable

Joint Hypermobility Screen

- Joint hypermobility may predispose individuals to injuries of the hip joint and lumbosacral structures
- Categories of Hypermobility
  - Generalized
  - Focal (acquired with trauma or repetitive force)
- Brief screen of joint tissue integrity may be useful in diagnosis and prognosis
- May guide treatment recommendations
Generalized Hypermobility

• Not always pathological
• Can be related to disorder
  o Ehlers Danlos
  o Marfans
• Look for history of multipoint involvement
• May be correlated with impaired motor control during specific tasks
• Beighton Score
Intra-articular Hip Joint Injuries

Labral Injury

• **Description**
  - Damage of the fibrocartilage structure
  - Pain distribution
    - Groin (primary)
    - Lateral (less common)
  - Possible mechanical symptoms
    - “clicking” or “catching”
  - Most often activity dependent
  - Physical deformity extremely rare

• **Differential Diagnoses (for localized causes)**
  - Osteoarthritis
  - Stress fracture
  - Athletic pubalgia
  - Hip flexor Strain

Acetabular Labral Injuries

Traumatic Impingement Hypermobility Hypomobility

Labral Injury OA
Acetabular Labral Injuries

• Causes
  o Trauma (less common)
    • Forced hyperextension and external rotation on planted lower extremity
    • Hyperflexion
  o Femoral acetabular impingement (most common)
    • Damage secondary to repetitive bony contact
  o Hypermobility (capsuloligamentous, bony, combined)
    • Passive structures are excessively loaded and fail over time
Femoral Acetabular Impingement (FAI)

Femoral Acetabular Impingement (FAI)

- Occurs when there is decreased joint clearance between the femur and the acetabulum
- Two types have been described:
  - Cam: Femoral deformity
  - Pincer: Acetabular deformity
Alpha Angle: CAM FAI

Presentation of focal anterior over-coverage of hip. Acetabular retroversion is defined as anterior wall (AW) being more lateral than posterior wall (PW), whereas in normal hip anterior wall lies more medially. This cranial acetabular retroversion can also be described by figure-8 configuration.

Cross-Over Sign (Pincer FAI)
FAI Characteristics

- Cam lesions more common in young athletic males
- Pincer lesions more common in middle aged athletic women

Spectrum of FAI-related Joint Pathology

Femoral Acetabular Impingement
  ↓
  Altered joint mechanics
  ↓
  Labral Lesions
  ↓
  Chondral Damage
  ↓
  Osteoarthritis
FAI Progression to Early Arthritis?

- Bedi et al. (2013) examined cartilage degradation markers in athletes with FAI
- Found elevated levels of the inflammatory C-reactive protein (CRP; 276%) and cartilage oligomeric matrix protein (COMP; 24%) when compared to controls
- These changes indicate elevated cartilage turnover and systemic inflammation associated with osteoarthritis

Clinical Presentation of FAI

- Clinical Tests
  - Numerous tests for FAI have been described
  - No tests demonstrates good specificity – primary utility is screening (Riemen et al, 2015)
    - FADIR
    - FABER
  - Diagnosis of symptomatic FAI is dependent on a “cluster” of findings
    - Groin pain
    - Pain with specific activities, typically involving repetitive or deep flexion
      - Squatting
      - Sitting
    - Relatively younger
    - No severe loss of ROM, with IR and flexion potentially being affected
    - Potential mechanical symptoms
    - Clinical tests (above) may be helpful in combination with other findings
    - Other differential diagnoses ruled out
FAI Prognosis and Treatment Implications

- If the clinical presentation leads to impression of FAI, conservative treatment measures are recommended.
- If the patient is unresponsive to conservative treatment, additional imaging may be warranted:
  - Radiographs (FAI)
  - MRA (labral tear)
  - Diagnostic injection (confirmatory for source of symptoms)
- Surgical options are available for patients with ongoing pain and functional limitations related to intra-articular pathology related to FAI:
  - Arthroscopy
    - Osteoplasty (proximal femur or acetabular rim)
    - Labral debridement, repair, or reconstruction
  - Open osteoplasty correction of FAI

Hip Joint Hypermobility
The Hypermobile Patient (know the underlying cause)

**Boney Architecture**
- Mis-shaped Femoral Head
- Femoral Deformity: Coxa valga, increased femoral version
- Shallow Acetabulum
- Anteverted Acetabulum

**Primary Capsulo-labral Compromise**
- Universal laxity
- Focal Laxity
- Ligamentum Teres Deficiency

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**Dysplasia**

**Shallow Acetabulum**
- Predisposes the hip to subluxation and abnormal contact stresses on the femoral head
- Associated with hyperplastic labrum and degeneration
- Dysplastic hip can load labrum up to 5x above normal
- Cannot treat underlying bony pathology arthroscopically
Capsulo-ligamentous Laxity

**Ligamentous Laxity**

May be noted in conjunction with bony abnormalities

**Two Categories:**

- Generalized: connective tissue disorders (Ehler’s-Danlos, Marfin’s, etc.)
- Focal: iliofemoral ligament attenuation

Clinical Presentation of Focal Hypermobility

**Clinical Presentation**

- Often reports pain during repetitive activity
- Often involved in activities requiring significant flexibility: dancing, gymnastics, etc.
- Examine for hip and lumbopelvic weakness

**Clinical Tests**

- Positive log roll test (anterior)
  - No metrics available regarding sensitivity or specificity
- Apprehensive with long axis distraction
  - (anterior or general)
Focal Hypermobility

• Typically acquired
• Most often is an anterior hypermobility
• Symptoms often associated with activities requiring repetitive extension or external rotation
• Associated with acetabular labral tears

Hypermobility Prognosis and Treatment Implications

• If the clinical presentation leads to impression of hypermobility, conservative treatment measures are recommended
• If the patient is unresponsive to conservative treatment, additional imaging may be warranted
  o Radiographs (identification of dysplasia)
  o MRA (labral pathology)
  o Diagnostic injection (confirmatory for source of symptoms)
Hypermobility Prognosis and Treatment Implications

- Moderate or greater dysplasia has association with early onset hip OA (<50 years; Gala, Clohisy, Beaule, 2016)
- Unresponsive cases with hip dysplasia may be candidates for hip preservation procedure
  - Periacetabular osteotomy (PA)
- Focal capsular-ligamentous hypermobility has better prognosis for conservative treatment, however surgical options exist for unresponsive cases
  - Arthroscopy to address attenuated/torn structures and labral pathology

Hip Osteoarthritis

- Description
  - Global cartilage loss and loss of joint space
  - Wide-spread loss of normal joint structure and related loss of function
  - Often the cumulative result of an earlier injury pattern progressing over time
    - Previous injury
    - Acetabular labral tear
    - Dysplasia (early onset OA)
    - Avascular necrosis
- Differential Diagnoses
  - Acteabular labral tear (pre-arthritic)
  - Rheumatic variants
  - Strain
  - Stress fracture
  - Osteitis Pubis
Clinical Presentation of Hip Osteoarthritis

- **Examination Findings** (Cibulka et al, 2009)
  - Moderate anterior and/or lateral pain, most often prominent during weight bearing
  - Pain often prominent in morning, then subsiding in <1 hr
  - Typically >50 years of age (numerous exceptions: previous injury, dysplasia history, medication-induced AVN, etc.)
  - Progressive loss of ROM, notable IR (<15 degrees), then flexion (capsular pattern)
  - Decreased joint mobility or symptom relief with long-axis distraction
  - Related loss of strength

- **Clinical Tests** (Sutlive et al, 2008)
  - FABER/Patrick
    - SN=.57, SP=.71
  - Scour
    - SN=.62, SP=.75

Clinical Criteria for Hip Osteoarthritis

- Hip internal rotation less than 15°,
- Hip flexion less than or equal to 115°
- Age greater than 50 years

Or...

- Hip internal rotation greater than or equal to 15°, along with
- Pain with hip internal rotation
- Duration of morning stiffness of the hip less than or equal to 60 minutes
- Age greater than 50 years

  sensitivity, 86%; specificity, 75% (Altman, 1991)
Clinical Prediction Rule for Hip OA (Sutlive et al, 2008)

- 5 possible clinical predictors for diagnosis
  - Pain aggravated with squatting
  - Lateral or anterior hip pain with the scour test
  - Active hip flexion causing lateral hip pain
  - Pain with active hip extension
  - Passive range of hip internal rotation less than 25°

- If at least 4 out of 5 variables were present, the positive likelihood ratio was 24.3 (95% CI: 4.4-142.1), increasing the posttest probability of hip OA to 91%.

Hip OA Prognosis and Treatment Implications

- Typically, symptomatic and functional changes related to hip OA are slow-developing
- Prognosis is related to extent of radiographic changes
- Clinical practice guidelines for conservative treatment of hip OA exist (Cibulka et al, 2009)
- THA is a well-established option for end-stage OA not responsive to conservative treatment
- The time of progression from initial diagnosis to THA procedures is highly variable and patient dependent
Femoral and Pelvic Stress Fractures

• Description
  o Mechanically induced fracture of the proximal femur or pelvis
    • Repetitive overload that overcomes normal structural properties
      o Example: overtraining
    • Loading that overcomes compromised structural properties
      o Example: fracture occurring with osteopenia

• Differential Diagnoses
  o Acetabular labral tear
  o Hip flexor strain
  o Hip adductor strain
  o Iliopsoas bursitis
  o Osteochondral lesion
  o Hip OA

• Many cases with delayed diagnosis, average of 14 weeks (Hershmen, 1990)
• No reliable clinical tests to differentiate type of stress fracture
  o Not important for initial referral situation as imaging will differentiate
  o If suspected, immediate referral should be initiated
• Diagnostic imaging
  o Plain Radiography (AP, frog-lateral)
    • Rule out other conditions (OA, tumor, etc.)
    • Examine for displacement
  o Bone scan
    • Demonstrates increased focal uptake of radiotracer at site of fracture ("hot spot")
    • May read negative for first 24 hours after fracture development
  o MRI
    • Ideal in sensitive and specificity
    • Yields information about surrounding tissue (differential diagnoses)
Femoral Neck Stress Fractures

- Femoral neck fractures account for 6.6% of stress fractures in runners (Fredericson, 2006)

- Anatomical Classification
  - Compression sided
    - Inferior region of femoral neck
    - Conservative management
  - Tension sided
    - Superior region of femoral neck
    - ORIF

Femoral Neck Stress Fractures

- Clinical Presentation
  - Pain
    - Groin & anterior thigh most common
    - Potential for lateral thigh and more rarely in gluteal region
    - Potential for medial knee pain
    - Often reproducible with end-range IR and overpressure
    - May be reproducible with SLR or MMT for flexion and/or abduction
  - Functional
    - Initially pain during or after strenuous activity (running)
    - Progresses to affect lower level activity (walking)
    - In acute stages, can be painful at rest or at night
  - Clinical Tests
    - Patellar-pubic Percussion Test
Patellar-Pubic Percussion Test

- Patient in supine position
- Stethoscope placed over pubic tubercle
- Clinician listens through stethoscope as they tap the ipsilateral patella
- SN=95%, SP=86%, +LR 6.1, for non-displaced fracture


Pelvic Stress Fracture

- 1.6% of stress fractures in distance runners (Fredericson, 2006)
- Pubic Ramus
- Palpable rami pain
- May also demonstrate + patellar-pubic percussion test (Segat, 2016)
**Femoral and Pelvic Stress Fractures**

- Femoral neck and pelvic stress fractures present closely to a number of differential diagnoses
- Activity level and medical history should be thoroughly discussed
- Because the repercussions of missed diagnosis can be severe, referral should be considered when unsure
- With appropriate diagnoses and follow-up conservative treatment, the majority of hip and pelvic stress fractures resolve
- Tension side femoral neck stress fractures are the more likely to require ORIF

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**Osteitis Pubitis**

- Description: Inflammation of the pubic symphysis through several potential mechanisms
  - Repetitive athletic activity
  - Degenerative or rheumatic causes
  - Urological/gynecological procedures or pregnancy (non-infectious)
- Differential Diagnoses
  - Athletic Pubalgia (extra-articular component)
  - Adductor Strain
  - Lower abdominal strain
  - Pubic ramus stress fracture
  - Pelvic floor dysfunction
  - Infectious pubic inflammation
- Osteomyelitis
Osteitis Pubitis

• Clinical Presentation
  o Onset
    • Acute
    • Gradual
  o Pain Distribution
    • Central symphysis region
    • Proximal adductor region
    • Lower abdomen
    • Genital region
  o Functional Limitations
    • Gait: swing phase
    • Pivoting
    • Sport specific: cutting, jumping, kicking
Osteitis Pubitis

• Clinical Presentation (contd.)
  o Muscle Imbalances
    • Tightness
      o Rectus abdominus*
      o Adductor
      o Iliopsoas
      o Rectus Femoris
    • Strength Asymmetries – weakness
      o Adductors*
  * Muscles attach in proximity to each other and can create an antagonistic imbalance (Rodriguez, 2001)

• Onset
  • Acute
  • Gradual

• Sport Participation
  • Soccer (3-5%)
  • Hockey
  • Football
  • Running

o Male > Females
  • May be subject to reporting bias in the literature

o May be present in conjunction with other conditions
  • FAI
  • Athletic Pubalgia (shares risk factors and may be part of syndrome)
  • Adductor strains
Osteitis Pubitis

- Clinical Examination
  - History is imperative
  - Rule out other structures
    - Hip (clinical tests)
    - Extra-articular (MMT, length-testing, palpation)
  - Clinical Tests: minimal description
    - Multiposition adductor squeeze (for pain)
    - No significant data on testing methodology
  - Often does not become apparent until patient does not respond to conservative treatment
  - Imaging to confirm in non-responsive cases
    - Plain Radiography
      - Surface irregularities and degeneration
    - MRI
      - Edema

Pubic Symphysis Gap Test

Osteitis Pubitis

- Prognosis and Treatment Implications
  - Recovery course can be 4 – 9 months
  - Conservative Treatment
    - Activity modification
    - Physical therapy
    - Corticosteroid injection
    - NSAIDs
  - Surgical Options
    - Arthrodesis
    - Symphysis resection
    - Disc curettage
    - Mesh stabilization

Athletic Publagia/Sports Hernia

P = psoas
I = iliacus
Description of Athletic Pubalgia

- Not a hernia in the traditional sense
- Disruption of the posterior inguinal wall or anterior pubic attachments
- A general term describing chronic pubic/inguinal pain that is not intra-articular
- **Syndrome:** multiple causes are possible
- Initially described in the 1980’s and becoming more recognized
- Differential diagnosis is imperative and imaging interpretation can be difficult

![FIGURE 2. A proposed mechanism of a sports hernia. Hackney cites an imbalance existing between strong adductor muscles (arrow) and relatively weak lower abdomen, which may lead to attenuation or avulsion of the pelvic floor structures (as shown in inset). Reprinted with permission from Anderson et al.](image)

Unverzagt, et al., 2008

Involved Structures

- Often, the pubic symphysis AND....
- The musculotendinous insertions in proximity: abdominal group, hip flexors, hip adductors
- Most often function to control some combination of excessive extension or rotation of the abdomen and excessive abduction of the thigh

![Meyers, et al., 2007](image)
Mechanism of Onset

- Repetitive forces to pubic symphysis or tendinous insertions of the adductors and rectus abdominus
- “High-energy twisting activities where abnormal hip ROM and resultant pelvic motion leads to shearing across the pubic symphysis”
- Often from trunk hyperextension and thigh hyperabduction in athletes with strong adductor muscles over-powering lower abdominal muscles
  - football, hockey, soccer
- More commonly observed in males vs. females

Clinical Presentation

- **Signs and Symptoms:**
  - chronic pain, often occurring only during exertion. Often described as sharp burning pain localized to the lower abdomen and inguinal region, that later radiates to the adductor region and potentially testicular region.
Differential Diagnosis

• Pain and/or weakness with strength testing
• Tightness and/or weakness with flexibility testing
• Potential pain with palpation of specific suspected structures
• ...and negative tests for intra-articular involvement

Athletic Pubalgia

• Confirming Regional Involvement and Diagnosis (cluster approach summary)
  o Symptom description: deep groin, lower abdomen (usually unilateral)
  o Activity
    • Regular training; particularly sprinting, cutting, kicking, lateral movements
    • Associated with exertion: often within 5 minutes, and often decreasing within a day (if resting)
  o Lower abdomen
    • Leg lowering
    • Resisted Situp
    • Pubic Tubercle palpation (22%; Larson, 2014)
  o Thigh
    • Flexibility tests: iliotibial, adductors, abdominal muscles, rectus femoris
    • MMT: hip flexors, adductors (>70% show pain; Larsen, 2014), gluteus medius
    • Adductor origin palpation (59%; Larson, 2014)
  o Rule out primary hip involvement
    • Negative FABER, FADIR, scour
      o FAI has shown association with athletic pubalgia (Voos et al, 2010)
  o Rule out lumbosacral & SIJ involvement (lower quarter screen as appropriate)
Athletic Pubalgia

- Prognosis and Treatment Implications
  - Proper diagnoses is imperative and the syndrome classification necessitates an effective screening process for multiple regions
  - Conservative trial of treatment is typically indicated
    - Impairment-based intervention
    - Rest
    - NSAIDs
    - Corticosteroid injection may be utilized
    - Biological agents considered
  - Various surgical procedures described
    - Laparoscopic
    - Open
    - “Mini” open
  - Though outcome reporting is not consistent, postsurgical studies report >80% “return-to-sport”
  - Further outcome studies required for both conservative and surgical treatment

Pelvic Floor Concerns

- Traditionally focused upon in the female population, urinary incontinence, pelvic pain, and girdle dysfunction are not exclusive to females can affect all ages
- Differential Diagnosis (limited list)
  - Urinary tract infection
  - Hernia
  - Prostate conditions (male)
  - Endometriosis
  - Polyp complications
  - Colitis
  - Lumbopelvic disorders
  - Osteitis pubis
  - STDs
  - Neoplasms
Pelvic Floor Concerns

• Pelvic floor questionnaires are freely available for organized screening approach

• In many cases, appropriate screening is the goal for patients with pelvic floor dysfunction, in an attempt to refer to specialist
  o OBGYN
  o PT with pelvic floor specialization

Female Hip and Pelvic Concerns

• Unique anatomy and specific life events such as pregnancy, delivery, and menopause predispose the female population to specific concerns
  o Pelvic muscle dysfunction
  o Underactive diaphragm
    • leakage
    • Prolapse
    • Sexual dysfunction
  o Overactive diaphragm
    • “Staccato” urination
    • Evacuation issues and/or constipation
    • Myofascial pain/“trigger” points
    • Painful intercourse
History

Concerning Factors
• Poor response to prior appropriate treatment
• Unusual unexpected response to prior specific treatment
• Avoidance of school, work, or other social responsibilities
• Severe depression
• Severe anxiety disorder
• Excessive pain behavior
• Frequent health care provider changes
• Noncompliance with past treatment
• Drug abuse or dependence
• Family, marital, or sexual problems
• History of physical or sexual abuse

Pelvic Floor Concerns

• Examination Findings
  o For most clinicians, physical exam involves ruling out other regions as primary sources
    • Lumbopelvic
    • Hip
  o Decision to refer based upon
    • Results of thorough history
    • Lack of findings in lower quarter screen
    • Presence of any “red flags”
    • Clinician and patient comfort with “bigger picture”
Summary

- Differential diagnoses for the hip and pelvic regions presents a unique set of challenges
- Thorough history and intake is crucial
- A structured examination must be performed
  - Include adjacent areas
  - Higher uncertainty requires greater test sensitivity
  - Greater regional certainty benefits from higher specificity
  - Clusters of related findings add strength to diagnostic decisions
- Overlapping and simultaneous diagnoses are common
  - Determine if any part of the patient’s presentation requires referral
  - Prioritize region of treatment
  - Treat the patient as a “whole”
  - Re-evaluate regularly

Questions?
Thank You!

REFERENCES

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