Athletic Pubalgia: Assessment & Management

Introduction

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- 20 years of sports medicine experience
- Assistant Professor - High Point University in the Department of Physical Therapy
- 10 Seasons as Team Physical Therapist & Assistant Athletic Trainer for the Florida Panthers of the NHL
- President & Owner of Finish First Physical Therapy and Athletic Conditioning
- Certified Manual Therapist - Ola Grimsby
- Certified A.R.T Hip, Pelvis and LE Practitioner

OBJECTIVES

1. Recognize the anatomical structures and pathophysiology associated with athletic pubalgia.
2. Identify causative pathomechanical factors that contribute to the development of athletic pubalgia.
3. Identify key components of the lower extremity biomechanical video analysis.
4. Identify surgical interventions used to repair athletic pubalgia.
5. Define “pelvic balancing.”
6. Select appropriate assessment and rehabilitation techniques designed to treat and prevent athletic pubalgia.
7. Compare and differentiate athletic pubalgia rehabilitation protocols.
8. Choose appropriate outcome measurement tools to facilitate return to sport decisions.

Athletic Pubalgia

- “Chronic inguinal or pubic area pain in athletes that is exertional only & not explainable by a palpable hernia or other medical diagnosis”
  Meyers, et al. (2000)

- “Micro-tears of rectus abdominis muscle at the pubic insertion often times with an adductor component”

Arcuate Line

- Occurs about 1/3 of the distance from the umbilicus to the pubic crest
- Very important landmark dividing the lower abdominal wall
- Helps explain the vulnerability in athletes and possible predisposition to this injury

Athletic Pubalgia

- Athletic Pubalgia (AP) is a chronic debilitating syndrome that affects many athletes.
- Challenge for conservative interventions.
- A suggested paradigm as a framework for clinical decision making has been proposed.

Rectus Abdominis Component

- Inserts on the pubic symphysis bilaterally
- Concentric trunk flexion
- Eccentric control of the anterior pelvic tilt position.
- This eccentric force production puts tremendous stress on the vulnerable posterior abdominal wall

Adductor Component

- Muscular imbalance between lower abdominal weakness and adductor tightness
- High percentage of athletes report a prior history of adductor strains
- Possible adhesion of the adductors develop

Pubic Symphasis Shearing

- Lower fibers of TrA and IO compress the superior pubic symphysis
- This action needs to be coordinated with the pelvic floor inferiorly
- Achieve a net compressive effect of the pubic symphysis

Summary of Forces

Pelvic Model Demonstration

- A: Rectus is eccentrically stabilizing an anteriorly rotating pelvis
- B: Adductors stabilizing hyperabduction
- C: Shearing force being stabilized by TrA and Int Obl

Pathomechanics

- Abdominal hyperEXT & thigh hyperABD forces shear pubic symphysis as “pivot point” for force transfer
- Progressive micro-tearing of rectus abdominus at pubis insertion
- Often accompanied by adductor pathology

Hx & Sxs of Athletic Pubalgia

- Lower abdominal pain w/exertion (100%)
- Completely stopped competitive activity @ time of eval (96%)
- Pain absent/minimal @ rest (92%)
- Distinct MOI w/exertion recalled (91%)
- Pain in inguinal canal near Rect. ABD. mm. insertion on pubis/symphysis (82%)
- Pain w/resistive ADD reported (67%)
- Pain unilateral (57%), bilateral (43%)
- 91% c/o pain progressing unilateral then bilateral
- Pain w/coughing, sneezing, valsalva (10%)
- Lower abd., inner thigh, and testicular areas
- Failed response to conservative tx
**MD: Physical Exam**

- Pain w/ADD RROM (88%)
- Pain w/Trunk Flexion ROM (46%)
- ADD Longus insertional tenderness (36%)
- Pubic/peripubic tenderness (22%)
- Direct pubic symphysis tenderness (9%)
- Inguinal/lower ABD. Tenderness (7%)
- Testicular pain (1%)
- Pre-op palpable mass (0%)—NO herniations

  *Meyers, et al. (2000)*

**PT: Paradigm Approach**

- Examination Sequence:
  1. Patient history including outcome measures
  2. Observation
  3. Triage/Screening/Sensitive Test
     - Rule out Non-AP sources of pain
  4. Motion Testing
     - AROM/PROM/Accessory motions
  5. Palpation
  6. Muscle Testing
  7. Special testing
  8. Physical Performance Measures

  *Hegedus, et al., (2012)*

**MRI**

- In 2006, Dr. Meyers and leading radiologists developed an “MRI of the pelvis that is 92% accurate.”
- “This MRI of the pelvis can reveal other problems, such as “soft” musculoskeletal findings, tiny avulsions fractures, peculiar edema patterns, or intrinsic hip pathology.”
- “It is both sensitive and specific for various injuries about the pubic symphysis specifically for rectus abdominis and adductor pathology.”

**Surgical Categories**

1. **Primary Repair Under Tension**
   - Meyers-Core Muscle Repair
2. **Primary Repair-Tension Free**
   - Dr. Muschaweck Minimal Repair Germany
3. **Mesh Repairs**
   - Laparoscopic Biologic/Synthetic

**Primary Repair Under Tension**

  *Meyers, et al. (2000)*

- **Pelvic Floor Repair (Core Muscle Repair)**
  - Refers to a broad surgical reattachment of the inferolateral edge of the rectus abdominis muscle with its fascial investment to the pubis.
- **Adductor Release**
  - Refers to complete division of the anterior external sheath of the adductor longus about 2-3 cm from the pubic insertion.

**Dr. Meyers: Historical Perspective**

- In 1987: one basic problem- the rectus abdominis
- In mid-90’s: that number was increased to three- RA alone, combination with an adductor or adductor alone
- In 2008: they recognize at least 17 different soft tissue structures/procedures
- All these different structures can exist in various combinations
**Tension Free Repair Technique**


- Localized bulge in the posterior wall of the groin canal during valsalva
- Dynamic Real-Time Ultrasound for diagnosis
- Creates a window from the weakened posterior wall
- A tension-free fascia lip is sutured
- The genito-femoral nerve is most often resected because of damage

**Laparoscopic Procedures**

- Repair with biologic or synthetic mesh; fixed with tacks or fibrin glue
- Reinforce the transversalis fascia using a minimal access laparoscopic technique
- Potentially less adhesion; aesthetics
  
  *Edelman, (2006)*

**Pelvic Balancing**

- Based on the length-tension relationship
- Reciprocal Inhibition
- Antagonist Activation Theory
- Neural Motor Patterning
- Adaptive Shortening vs. Hypertonicity

**Adaptive Shortening**

- Muscle strains heal via scar tissue that decreases tensile strength and elasticity
- Treatment and rehab must be directed at the adhesion
- Manual releases such as ART are needed to restore normalized muscular movement

**Hypertonicity**

- Increased muscle tone will shorten normal non-injured tissue
- Alters length-tension ratios
- Rotation occurs around non-physiologic joint axis
- DO NOT passively stretch
- DO NOT release
- KEY: Inhibit/Activate

**Thoracolumbar Fascia & Posterior Chain**

- “training of the gluteus maximus, latissimus dorsi, and erector spinae can help increase force closure by strengthening the posterior layer of the thoracolumbar fascia”

  *Vleeming, et al. (1995)*
The Core: Closed System

- Exercises need to be designed to include all sides of this closed system
  - Richardson, et al. (1999)
- Motor control and sequential motor planning is crucial
- Pelvic floor muscles stabilize pubic symphysis

Diaphragm & Pelvic Floor

- Roof and Floor of the closed system
- Inspiration: both depress allowing the lungs to fill
- Exhalation: both elevate assisting stability of the spine and pelvis

Summary: Pelvic Balance

- Appreciate how the anterior sling shortens over time in a flexion based society
- Decide treatment interventions based on tonicity and/or adaptive shortening
- After lengthening/inhibiting the shortened anterior sling, activation of the posterior sling is crucial to achieve a balanced pelvic position

Tensegrity

- Definition - tensional integrity or floating compression.
- It's a structural principle based on the use of isolated components floating inside a net of continuous tension.
- The stability of the system comes from the tension within it.
- Direct comparison to human anatomy and how the body moves.

The Serape Effect

- Transfers internal force from the trunk to the limbs
- Stretch these muscles to their greatest length in order to create a snap-back effect
- “Muscles must be placed on their longest length in order to exert their greatest force.”

Myofascial Sling System

- Myofascial meridians or trains
- Different names for traditional slings
- Distinct linkage system connecting the body
- Muscle and connective tissue in series (not parallel) which enable transmission of forces over these dynamic links

Consider Your Slings

- Four Total Slings
  - Anterior Oblique
  - Posterior Oblique
  - Longitudinal
  - Lateral

Evidence to Support Myofascial Sling Integration

**TITLE:** Integration Core Exercises Elicit Greater Muscle Activation Than Isolation Exercises

- “results demonstrated that the activation of the abdominal and lumbar muscles was greatest during the integration core exercises that required activation of deltoid and gluteal muscles.”

Slings in the Media

- “One of the keys to hitting powerful shots is the "stretch factor" in your backswing. A big windup of the upper body against a stable lower body creates torsion and the energy needed to produce a lot of clubhead speed.”
  - David Ledbetter, *Golf Digest* (2011)

Identify Eccentric Rotary Collapse

- Biomechanical breakdown of eccentric rotary control.
- Reproducible pattern secondary to anatomical design.
- Loss of triplanar tension & neuromuscular coordination in the sling system.
- Based on the polyarticular muscle chain theory, it will take the entire system to support the body from collapsing.

Rehabilitation & Corrective Exercises

Rehab Focus: Eccentric Rotary Control

- Emphasis is to control lumbopelvic-hip rotary collapse
- Resistance runs through the trunk, increasing core activation
- Dynamic integration of the myofascial sling systems
Internal Rotation vs. Internal Rotation

- Seated/Supine IR Exam
- NWB position of ball on socket.
- Functional considerations of socket moving over ball
- Golf swing (L hip)

Rotary Stability of Stance Limb

- RIGHT LE: Rotary stability from the deep lateral rotators
- Deceleration control of the internally rotating femur
- LEFT LE: Glut med/max; deceleration control of collapsing pelvis
- Implications for exercise prescription

Post-Op Protocols

- POD 2: “walk 1 mile every day”
- POD 7-10: pool-incisions healed
- 1-2Wks: LE PREs; Level 1-2 pelvic stabilizations
- 2-3 Wks: Multiplanar exercises, running progressions
- 3-4 Wks: increase aggression with LE PREs; speed advancement
- 4-5 Wks: sport replication with gradually increasing demand.
- 6-8 Wks: Return to play criteria

Rehab Considerations

- Soft Tissue Mobilizations: flushing massages, early cardio work to facilitate fluid reduction; progress to ART and pin & stretch techniques after 4 weeks
- Exercise Selection: cautious on rectus/adductor contractions to soon; progress uniplanar to multiplanar
- Use pain scales and RPE’s as indicators for progression; criteria vs. time based rehab

Exercise Selection

- Some authors have proposed training for the TrA and obliques as well as other muscles acting to stabilize the pelvis which may improve hip strength. Cowan, S.M., (2004)

Physical Performance Measures:

- Early:
  - Prone hip extension, active hip abduction, Sarhanam Level II
  - Single limb squat and holds (60-70° flexion) 30sec
- Mid-Level:
  - Timed Lateral Step Down Test - (60-70° flexion) 85rpm 3 strikes and total time
  - Plank Tests 30-90sec (all positions: including supine)
  - Lateral Leap & Catch Tests lines at 60% of height: 40 bpm 3 strikes total lines/time
- High-Level:
  - Tuck Jump Assessments - 10 sec knee to chest jumps; utilize video
  - LEFT (Lower Extremity Functional Test) - diamond shaped functional progressions
Criteria Based Return to Play

- Return to Play Criteria:
  - Star Excursion Balance Test (SEBT)
  - Hop Test Battery
    - Vertical Hop
    - Single Hop for Distance
    - Timed Side Hop
    - LSI (un/inv x 100) > 90%
  - Modified Agility T Test
    - Goal is symmetry within 10%

CASE STUDIES:
Putting It All Together

Treatments

- Increase right hip medial rotation
- Posterior rotation of right ilium
- Restore left rotation of lumbar spine
- Improve Tspine extension
- ART to right adductors, hip flexors, soleus
- Activation of the right posterior oblique sling
- Functional integration of all of the above

Athletic Pubalgia Summary

- Accurate diagnosis must be made
- Address all biomechanical causes
- Remember how important prior hx is
- Hypertonicity vs. Adaptive Shortening
- Anterior Eccentric Lengthening
- Posterior Sling Activation
- Assessment must include static and dynamic movements
- Incorporate functional video
- Design a preventative program based on what you find

Rehab Summary

- Rehabilitation and prevention of athletic pubalgia requires a whole system view integrating movement analysis, sling integration, and eccentric controls
- Human movement is based on the production, transmission, and control of rotational energy
- Energy blocks need to be eliminated and energy leaks need to be stabilized
- Your body uses the slings to produce stability which creates efficiency, which enhances performance
- Remember tensegrity, your body moves as a whole, it should train as a whole- every exercise therefore becomes a “core” exercise

Athletic Pubalgia: Assessment & Management

Post-Test
1. Select the statement which best describes athletic pubalgia:

A. Chronic inguinal or pubic area pain in athletes that is exertional only and not explainable by a palpable hernia or other diagnosis.

B. A protrusion of the abdominal cavity contents through the athlete’s inguinal canal.

C. Tissue bulging from an athlete’s lower belly into the upper thigh, just below the groin crease, more often in women in men.

D. A bulging along the midline of the athlete’s abdomen, often noted during exertion.

2. The arcuate line:

A. Splits the rectus abdominus muscle at midline into right and left halves.

B. Is responsible for the separation between the pelvic floor and the abdominal cavity.

C. Is located about 1/3 of the distance from the umbilicus to the pubic crest.

D. Is the vulnerable posterior wall of the abdominal cavity.

3. Which of the following is NOT typical for individuals with athletic pubalgia?

A. Competitive activity is completely stopped.

B. Pain is absent or minimal at rest.

C. Pain radiates up to the chest and thorax.

D. Lower abdominal pain with exertion is experienced.

4. Which of the following describes a surgical pelvic floor repair?

A. A broad surgical reattachment of the inferolateral edge of the rectus abdominis muscle to the pubis.

B. A tension free fascial lip is sutured in the posterior abdominal wall.

C. Approximation of the edges of the rectus abdominis along the midline of the abdomen.

D. Open repair of the inguinal canal where the abdominal contents are pushed back into place and the defect is then sewn closed.

5. Which of the following is NOT associated with laparoscopic surgical repair of athletic pubalgia?

A. Decreased occurrence of adhesions.

B. Reinforcement of the transversalis fascia via a minimal access technique.

C. A tension free fascial lip sutured to the weakened posterior wall.

D. Repair using a biologic or synthetic mesh.

6. Tensegrity can be best described as:

A. Structural integrity

B. Floating compression

C. Compressional integrity

D. Tensional compression
7. Which theory describes how myofascial meridians interconnect throughout the human body allowing movement.

A. Neuromotor Sling
B. Dynamic Reciprocation
C. Fascial Strain
D. Anatomy Trains

8. Which of the following is NOT a principle of Eccentric Rotary Control?

A. Isolated muscle activation in a single plane of movement
B. Control of lumbopelvic-hip rotary collapse
C. Dynamic integration of the myofascial sling systems
D. Resistance runs though the trunk increasing core activation

9. Which of the following is NOT included in the return to play criteria following an athletic pubalgia surgical repair?

A. Star Excursion Balance Test
B. Hop Test Battery
C. Wingate Bike Test
D. Modified T Agility Test

10. Which statement best summarizes the recognition, management, and treatment of athletic pubalgia?

A. Rehabilitation and prevention of AP requires integrating movement analysis, sling integration, and eccentric controls.
B. Tension dictates that a body moves as a whole.
C. Human movement is based on production, transmission, and control of rotational energy.
D. All of the above.

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References
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