Hockey Groin Injuries and Athletic Pubalgia

L. Michael Brunt, M.D.

Washington University School of Medicine
St. Louis, MO

Team Surgeon
St. Louis Blues
Surgical Consultant
St. Louis Cardinals
St. Louis Rams

Disclosure: {I DO} have a financial relationship with any commercial interest.

*Types of financial relationships and the companies with whom I have relationships are as follows:

Ethicon Endosurgery Grant  Honorarium  Speaking/Teaching
Groin Injuries in Athletes

Background

• Groin injuries in athletes are a common problem in sport
• Symptoms may be diffuse
• Regional anatomy is complex
• Difficult to diagnose and treat accurately (numerous causes)
• May result in significant loss of playing time

Background/Incidence

• Most common in sports with repetitive twisting, turning, kicking motions at high speed (soccer, ice hockey, football)
• Most are soft tissue injuries; adductor most common muscle group injured
• Do not typically result from direct physical contact
Regional Anatomy of the Groin

Pubic Joint = large complex rotational joint that involves both pubic symphyseal bones and the entire anterior pelvic musculo-skeleton around these bones (Meyers WC Oper Tech Sports Med 2005;13:55-61)
Rectus/Adductor Anatomy: Sagittal View

Groin Injuries: Differential Diagnosis

- Pelvis
  - Traumatic fracture or contusions
  - Stress related fractures
  - Osteitis pubis
- Muscular strains
  - Rectus, iliopsoas, hip flexor, adductor, oblique strains
- Hip Injuries (labral tears, FAI, arthritis)
- Sports hernia/athletic pubalgia
- Inguinal hernia
- Non-athletic causes
General Approach: History

- Acute vs. chronic
- Pain localized, diffuse, radiates?
- Activating, alleviating factors (rest, activity)
- Predisposing factors (prior injury, change in training regimen)
- Mechanism of injury

Adductor Strains

- Adductor strains common in sports
  - Renstrom: 62% of sports groin injuries involved adductor longus (Br J Sports Med 1980;14:30-6.)
- Often Hx of sudden injury; chronic adductor problems are common in athletic pubalgia
Analysis of Risk Factors 1


- Prospective study 1998-99 NHL training camp and regular season

- Risk factors for groin injury
  - <18 sports-specific training sessions off-season (RR 3.4)
  - History of previous groin or abdominal strain (RR 2.9)
  - Veteran player status (veteran > rookie) (RR 5.7)

Analysis of Risk Factors 2

- Tyler TF et al: Prospective study of hip strength/flexibility in one NHL team

- Adductor:abductor strength ratio greatly decreased on side of injury

Analysis of Risk Factors 2

- Players with adductor strength < 80% of abductor strength were 17x more likely to sustain an adductor strain

- Adductor strengthening reduced incidence from 3.2/1000 to 0.71/1000 player game exposures

Adduction:Abduction Strength Ratio

From Tyler TF et al.

Sports Hernia/Athletic Pubalgia: Terminology

- Sports hernia or athletic hernia

- Posterior abdominal wall deficiency

- Hockey groin syndrome

- Athletic pubalgia – indicates broader array of chronic injuries around the pubis
Sports Hernias/Athletic Pubalgia

- Chronic inguinal/lower abdominal pain
- Minimal/subtle exam findings
- Pain occurs during extremes of exertion
  - sudden starts/turns/cutting movements
  - propulsive skating movements, slapshot
  - kicking (soccer/football)
- Pain limits sudden accelerating movements

Athletic Pubalgia: Clinical Presentation

- May also have pain with coughing, sneezing, getting out of a car
- Associated adductor symptoms are often present (40-60%)
- Onset is usually insidious; only c. 30% assoc. with a specific precipitating event
Diagnosis and Exam

- Tender medial inguinal canal/lower rectus abdominus
- Dilated external ring
- Palpable gap over inguinal floor
- Pain with resisted trunk rotation, resisted situps
- Absence of inguinal hernia

Athletic Pubalgia: Abdominal Muscle Testing

<table>
<thead>
<tr>
<th>Test</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tender inguinal floor/rectus</td>
<td>80.3%</td>
</tr>
<tr>
<td>Weak inguinal floor</td>
<td>90.2%</td>
</tr>
<tr>
<td>Pain resisted sit-up</td>
<td>63.8%</td>
</tr>
<tr>
<td>Pain resisted trunk rotation</td>
<td>73.3%</td>
</tr>
<tr>
<td>Pain resisted adduction</td>
<td>57.6%</td>
</tr>
<tr>
<td>Inguinal hernia (clinically suspected)</td>
<td>1.0%</td>
</tr>
</tbody>
</table>
Diagnostic Imaging: MRI

MRI Rectus Abdominus Tear:
Transverse T2-weighted image

White line = separation between pubis & rectus

Intact attachment on the left
MRI: Adductor Tear

Pathophysiologic Mechanisms

- Rectus tendon injury, rectus/adductor complex
- Posterior abdominal wall/inguinal floor defect
- Inguinal/gential neuropathy
Mechanism 1: Rectus Tendon Injury

Torn Side

Normal Side

Mechanism 2: Posterior Abdominal Wall Injury

- Weakness of the posterior wall of the inguinal canal (transversalis fascia/obliques)
- Increased stress/tension across pubis
- ? compresses an afferent nerve (genital branch of the genitofemoral nerve – Muschawek)

From U Muschawek w permission
Mechanism 3: Ilioinguinal/Iliohypogastric Nerve Abnormality

- Nerve entrapped in scar tissue or tear in external oblique (Montreal group - R Brown et al)
- Wash U Experience: Nerve abnormality in 27.9%

Clinical Entities of Athletic Pubalgia

- Pure rectus abdominus (unilateral or bilateral) – 31%
- Rectus abdominus/unilateral adductor – 39%
- Pure adductor syndromes – 21%
- Severe osteitis variant – 8%
- Iliopsoas variant – 4%
- Baseball pitcher/hockey goalie syndrome – 4%
- Rectus femoris variant – 3%
- High rectus abdominus variant – 2%
- Female variant – 2%
- Dancer’s variants - <1%
- Etc, etc....
## Surgical Findings: WUMC Experience

<table>
<thead>
<tr>
<th>Condition</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attenuated external oblique</td>
<td>96.7%</td>
</tr>
<tr>
<td>Damaged or torn internal oblique</td>
<td>80.3%</td>
</tr>
<tr>
<td>Weak or disrupted floor</td>
<td>100%</td>
</tr>
<tr>
<td>Rectus tears or laxity</td>
<td>80.3%</td>
</tr>
<tr>
<td>Nerve abnormality</td>
<td>27.9%</td>
</tr>
<tr>
<td>Inguinal hernia</td>
<td>2.0%</td>
</tr>
<tr>
<td>Cord lipoma</td>
<td>18.3%</td>
</tr>
</tbody>
</table>
Surgical Indications

- Symptoms that limit athletic performance
- Failure of 6-8 weeks of conservative therapy
- Exclusion of other diagnoses/pathology

Athletic Pubalgia

- 60 pts with chronic groin pain and suspected sports hernia and 3-6 months of groin symptoms
- Randomized into operative or physiotherapy groups
  - Surgery: Lap extraperitoneal (TEP) mesh repair
  - Conservative: 2 mos PT, oral anti-inflammatory, corticosteroid injections
- Outcomes measures:
  - VAS pain at 1,3,6,12 months
  - Partial or full recovery to sports activity

PRT: Surgery vs Nonoperative Management
PRT: Surgery vs Nonoperative Management

<table>
<thead>
<tr>
<th>Return to Sport</th>
<th>Operative (N=30)</th>
<th>Conservative* (N=30)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 month</td>
<td>20 (67%)</td>
<td>6 (20%)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>3 months</td>
<td>27 (90%)</td>
<td>8 (27%)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>12 months</td>
<td>29 (97%)</td>
<td>15 (50%)</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

*After 6 mos, 7 of 30 athletes in conservative group underwent surgery

Inguinal Canal Anatomy
Surgical Approaches

- Primary pelvic floor repair
  - Meyers (modified Bassini type ± adductor release)
  - Muschawek - minimal repair ± genital n. neurectomy

- Open anterior mesh repair
  - ± ilioinguinal neurectomy

- Laparoscopic (posterior) mesh repair

Athletic Hernia: Primary Pelvic Floor Repair

- Modified Bassini type repair (reattachment of rectus to pubis)
- “Adductor release” – division of anterior epimysial fibers of adductor longus
Munich Technique

- Only the defect is opened (sound tissue remains intact)
- Contains only preperitoneal fat, no hernia sack
- If necessary resection of the genital branch of the genitofemoral nerve

From U Muschawek w permission

WUMC St. Louis:
Anterior Mesh Approach

- Inguinal floor repair using a tension free mesh approach (lightweight polyprolene mesh)
- Anesthesia: local with sedation (93%)
- Selective ilioinguinal neurectomy
• Retrospective review of 107 repairs in 98 professional hockey players

• All had Gore-tex mesh repairs and iliopsoas nerve resection; 3 had prior laparoscopic repairs

• 97 of 98 players returned to play

• 3 recurrences (3%) requiring re-repair


Successful outcomes reported with lap. repair by some groups

• 55 athletes with chronic groin pain; Occult hernias identified laparoscopically in 20 (36%) (van Veen RN et al. Surg Endosc 2007;21:189-193)

• Pubalgia recurrences reported. ? adequately addresses pathophysiology
Laparoscopic Repair in Athletic Groin Injuries

- Used in highly selected athletes by our group
- Prior open inguinal surgery
- Demonstrable rectus tendon injury on MRI

Results of Surgical Treatment: Selected Series

<table>
<thead>
<tr>
<th>Type Repair</th>
<th>Center</th>
<th>N</th>
<th>F/U</th>
<th>Interval to RTP</th>
<th>Success</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open Primary</td>
<td>Meyers-Philly</td>
<td>5218</td>
<td>24 mos</td>
<td>Up to 3 mos</td>
<td>95.3%</td>
</tr>
<tr>
<td>Open Primary</td>
<td>Muschawek - Munich</td>
<td>129</td>
<td>--</td>
<td>4 wks</td>
<td>--</td>
</tr>
<tr>
<td>Open Mesh</td>
<td>Joesting - Minnesota</td>
<td>45</td>
<td>12 mos</td>
<td>--</td>
<td>90%</td>
</tr>
<tr>
<td>Open Mesh</td>
<td>Brown - Montreal</td>
<td>98</td>
<td>--</td>
<td>--</td>
<td>97%</td>
</tr>
<tr>
<td>Open Mesh</td>
<td>Brunt-St Louis</td>
<td>169</td>
<td>11 mos</td>
<td>--</td>
<td>91%</td>
</tr>
<tr>
<td>Laparoscopic</td>
<td>Van Veen - Rotterdam</td>
<td>55</td>
<td>6 mos</td>
<td>3 mos</td>
<td>91%</td>
</tr>
<tr>
<td>Laparoscopic</td>
<td>Evans - UK</td>
<td>287</td>
<td>3 mos-4 yrs</td>
<td>4 wks</td>
<td>90%</td>
</tr>
</tbody>
</table>
Sports Hernia
Diagnosis and Treatment Highlighting a Minimal Repair Surgical Technique
John M. Minnich, MD, John B. Hanks, MD, Ulrike Muschaweck, MD, L. Michael Brunt, MD, and David R. Diduch, MD
Return to Play Guidelines

- Concept of early return to training (Muschawek 3-4 days)
- Should be based on symptomatic progression
- Sports specific activities as soon as symptoms allow (2.5-3 weeks)
- Will vary by nature of injury, unilateral or bilateral repair, type of repair

Athletic Pubalgia: Post Surgical Rehab

- 7-10 days: relative rest, short walking
- 2-3 weeks: incline walking, pool exercises, start biking 2 wks, start ART 4 wks
- 2-3 weeks: hip stretching, progressive resistive exercises

From Ray Barile, ATC
St. Louis Blues
**Athletic Pubalgia:**
*Post Surgical Rehab*

- 3-5 weeks: increase speed, function, volume and intensity to maximum, progress to full sprinting, cutting drills

- 5-7 weeks: advanced exercises, progress to game play

Modified from Ray Barile, ATC
St. Louis Blues

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**Athletic Groin Injuries**

**Summary**

- Multi-disciplinary team approach to evaluation and management of chronic athletic groin pain (athletic trainer, orthopedist, physical therapist, general surgeon)

- Surgery indicated for sports hernia/athletic pubalgia after failure of conservative treatment

- Postop rehab important in facilitating return to sport