THE SPECIALIZED YOUTH ATHLETE AND AVOIDING BURNOUT

George Friedhoff D.O.
St. Vincent Charity Spine and Ortho Group

Success.
19 y/o lacrosse player p/w with 3 days of persistent axillary pain and swelling especially with weight-lifting. Pain remains despite reduction in overhead training but still practices lacrosse. PE-localized swelling with tenderness and firmness over left axilla. Supine there is prominent venous structures with left UE > right. Which of the following is the presumed diagnosis?

a) Superficial phlebitis  
b) Pectoralis major tear  
c) Labral tear  
d) Effort induced thrombosis  
e) Lymphangitis
Objectives

I. Define Sports Specialization

II. Recognize and Interpret Overuse Syndrome

III. Identify High Risk Injuries

IV. Develop Prevention Plan
D.O.’s Do It Better

Osteopaths (D.O.s)
- 60% Primary Care
- Back Pain
  - 84% of providers
- Foot Pain
  - 41% of providers

Allopaths (M.D.’s)
- 35% Primary Care
- Back Pain
  - 31% of providers
- Foot Pain
  - 10% of providers
Youth Participation

- 27 million youth between 6 to 18 y/o in team sports
- National Council of Youth Sports
  - 60 million participate in some form of organized sports
- Less than 6 y/o in organized sports
  - 1997: 6%
  - 2008: 12%
Defining Sport Specialization

• Intense year round training with exclusion of other sports?
  • Hours spent in Sport A > Sport B & Sport C

• Not a “single focus” but also training time

• Starting sooner & sooner(Age Limit)

• Multiple teams during single season
Introduction To Overuse

- Centers For Disease Control and Prevention
  - > 5 million children suffer sport-related injury annually
- Year-Round Specialized Training
- Safe Kids Survey
  - 9 out of 10 parents underestimate length of recovery
- 25% of adult athletes
Burnout & Overtraining Syndrome

- Open Access Journal of Sports
  - 80% of youths quit by age 15

- Non-functional overreaching

- Overtraining Syndrome
  - Series of psychological, physiological and hormonal changes that result in decreased performance
  - Fatigue
  - Lack of Enthusiasm

TABLE 5. Factors Related to Burnout in Young Athletes

<table>
<thead>
<tr>
<th>Environmental Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extremely high training volumes</td>
</tr>
<tr>
<td>Extremely high time demands</td>
</tr>
<tr>
<td>Demanding performance expectations (imposed by self or significant other)</td>
</tr>
<tr>
<td>Frequent intense competition</td>
</tr>
<tr>
<td>Inconsistent coaching practices</td>
</tr>
<tr>
<td>Little personal control in sport decision making</td>
</tr>
<tr>
<td>Negative performance evaluations (critical instead of supportive)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Personal Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perfectionism</td>
</tr>
<tr>
<td>Need to please others</td>
</tr>
<tr>
<td>Nonassertiveness</td>
</tr>
<tr>
<td>Unidimensional self-conceptualization (focusing only on one’s athletic involvement)</td>
</tr>
<tr>
<td>Low self-esteem</td>
</tr>
<tr>
<td>High perception of stress (high anxiety)</td>
</tr>
</tbody>
</table>
Preventing Overtraining/Burnout

1) Keep practice fun

2) Take 1-2 days off per week

3) Permit longer scheduled breaks from training & competition focusing on cross-training

4) Be in tune with their bodies

Organizations
- National Youth Sports & Safety Institute( www.NYHSI.org)
Who Is Responsible?

- 1-Coaches
- 2-Parents
- 10-Child

"OK, I'll move ballet back an hour, reschedule gymnastics, and cancel piano... you shift your violin lesson to Thursday and stop soccer practice... that gives us from 3:15 to 3:45 on Wednesday the 16th to play."
Clinical Presentation

- Vague MSK complaints
- Pain
- Decreased Performance
- Limping
- Swelling

Physical Exam
- Stature
- Strength
- Flexibility
TABLE 6. Symptoms of Overtraining Syndrome/Burnout\textsuperscript{180,187,188}

<table>
<thead>
<tr>
<th>Symptom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fatigue</td>
</tr>
<tr>
<td>Depression</td>
</tr>
<tr>
<td>Bradycardia or tachycardia</td>
</tr>
<tr>
<td>Loss of motivation or interest</td>
</tr>
<tr>
<td>Hypertension</td>
</tr>
<tr>
<td>Sleep disturbances</td>
</tr>
<tr>
<td>Insomnia</td>
</tr>
<tr>
<td>Irritability</td>
</tr>
<tr>
<td>Agitation</td>
</tr>
<tr>
<td>Decreased self-confidence</td>
</tr>
<tr>
<td>Anxiety</td>
</tr>
<tr>
<td>Nausea</td>
</tr>
<tr>
<td>Loss of appetite</td>
</tr>
<tr>
<td>Weight loss</td>
</tr>
<tr>
<td>Lack of mental concentration</td>
</tr>
<tr>
<td>Heavy, sore, stiff muscles</td>
</tr>
<tr>
<td>Restlessness</td>
</tr>
<tr>
<td>Frequent illness</td>
</tr>
</tbody>
</table>

TABLE 7. Diagnosis of Overtraining Syndrome/Burnout\textsuperscript{180,189}

**History**
- Decreased performance persisting despite weeks to months of recovery
- Disturbances in mood
- Lack of signs/symptoms or diagnosis of other possible causes of underperformance
- Lack of enjoyment participating in sport
- Inadequate nutritional and hydration intake
- Presence of potential triggers: (a) increased training load with adequate recovery, (b) monotony of training, (c) excessive number of competitions, (d) sleep disturbance, (e) stressors in family life (parental pressure), (f) stressors in sporting life (coaching pressure and travel demands), (g) previous illness.

**Testing (if indicated by history)**
- Consider laboratory studies: complete blood count, comprehensive metabolic panel, erythrocyte sedimentation rate, C-reactive protein, iron studies, creatine kinase, thyroid studies, cytomegalovirus and Ebstein-Barr virus titers.
- Profile of Mood States (POMS): A psychometric tool for a global measure of mood, tension, depression, anger, vigor, fatigue, and confusion.\textsuperscript{169}
Early specialization

**Ericsson**
- 10,000 hours of deliberate practice to achieve expertise
- Strong correlation between performance level & training hours
- Problems – elite performers don’t always attain 10,000 hours
- Evidence of higher attrition & negative health outcomes

Early diversification

**Cote**
- More diverse range of skills developed through variety of sports
- Promotes development of intrinsic motivation, increased self-involvement
- Talent transfer across sports (cognitive and physical)
- Evidence from tennis (age 15), but still compile enough hours
Trends In Sports Specialization

- Children 6 Years Or Younger
  - 9% in 1997
  - 12% in 2008

- 77% of HS AD’s Notice Trend

- ↑ USTA (70% by 14 & 95% by 18)

- Growing Number of Travel Leagues
the
SPORTS
GENE

INSIDE THE SCIENCE OF EXTRAORDINARY ATHLETIC PERFORMANCE

DAVID EPSTEIN
SENIOR WRITER, SPORTS ILLUSTRATED
Risk Factors For Overuse Injury

Intrinsic Risk Factors
  Growth-Related Factors
    Susceptibility of growth cartilage to repetitive stress
    Adolescent growth spurt
  Previous injury
  Previous level of conditioning
  Anatomic factors
  Menstrual dysfunction
  Psychological and developmental factors—athlete specific

Extrinsic Risk Factors
  Training workload (rate, intensity, and progression)
  Training and competition schedules
  Equipment/footwear
  Environment
  Sport technique
  Psychological factors—adult and peer influences
Classification of Overuse Injuries

1) Pain In Affected Area After Physical Activity

2) Pain Without Restricting Performance

3) Pain With Restricting Performance

4) Chronic Pain Even At Rest
### Overuse Injuries: Predisposing Factors

#### Extrinsic Factors
- Training Errors
  - Excessive Volume
  - Excessive Intensity
  - Rapid Increase
  - Sudden Change in Type
  - Inadequate Recovery
  - Faulty Technique
- Equipment
- Psychological Factors
- Environmental Conditions
- Inadequate Nutrition

#### Intrinsic Factors
- Malalignment
- Muscle Weakness
- Muscle Imbalance
- Lack of Flexibility
- Sex
- Size
- Body Composition
- Other
  - Genetic Factors
  - Endocrine Factors
  - Metabolic Conditions
<table>
<thead>
<tr>
<th>Location</th>
<th>High Risk</th>
<th>Low Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hip/Pelvis</td>
<td>Femoral neck (tension-sided)</td>
<td>Femoral shaft stress fracture</td>
</tr>
<tr>
<td>Back (lumbar spine)</td>
<td>Pars interarticularis stress fracture</td>
<td>Congenital spondylolysis, pedicle stress fracture</td>
</tr>
<tr>
<td>Leg</td>
<td>Anterior cortical tibial stress fracture</td>
<td>Medial tibial stress fracture, fibular shaft stress fracture</td>
</tr>
<tr>
<td>Ankle</td>
<td>Medial malleolar stress fracture, talar dome osteochondral defect, talar neck stress fracture</td>
<td>Distal fibular stress fracture</td>
</tr>
<tr>
<td>Foot</td>
<td>Tarsal navicular stress fracture, fifth metatarsal proximal diaphyseal stress fracture, sesamoid stress fracture</td>
<td>Second, third, fourth metatarsal stress fractures, cuboid</td>
</tr>
<tr>
<td>Knee</td>
<td>Patellar stress fracture, osteochondritis dissecans of femoral condyle or patella</td>
<td>Tibial tubercle and inferior patellar pole apophysitis</td>
</tr>
<tr>
<td>Shoulder/arm</td>
<td>Effort thrombosis</td>
<td>Proximal humeral physeal stress fracture</td>
</tr>
<tr>
<td>Elbow</td>
<td>Osteochondral dissecans capitolium, apophyseal non-union of medial epicondyle</td>
<td>Medial epicondyle apophysitis</td>
</tr>
<tr>
<td>Wrist</td>
<td>Distal radial physeal stress injury</td>
<td></td>
</tr>
</tbody>
</table>
Thoracic Outlet Syndrome

- Costoclavicular space-clavicle and 1st rib
- Hyperabduction syndrome
- Overhead sportspeople
  - Poor posture-scapular protraction
  - Scapular dyskinesia
  - Anterior tilt
Thoracic Outlet Syndrome Presentation

• Symptoms - pain, numbness & weakness
• Venous engorgement
• Clinical tests
  • Adson’s test - enhances sensitivity with doppler flow
  • Roos test - most sensitive
Thoracic Outlet Syndrome Management

- Physical Therapy
  - Pectoral and scalene stretching
  - Joint mobilization of 1st rib
  - Scapular and scapulothoracic mobilization
  - Thoracic extension and brachial plexus exercises
  - 3 to 6 months
- Anticoagulation & thrombolysis
- Thoracic outlet decompression
  - Unresponsive neurogenic
  - Vascular compromise
Axillary Vein Thrombosis “effort thrombosis”

- Paget-von Schrotter Syndrome
- Compression
  - Costoclavicular Space
  - Clavicle & 1st rib
  - Subclavian Muscle & 1st rib
- Presentation - fatigue & heaviness
- Physical Exam
  - Superficial veins prominent
- Venography
- Rest and Anticoagulation
Little Leaguer’s Shoulder

- Olsen et al.
  - 6 innings with 7.9 months versus 4 innings with 5.5 months
- 11-13 years of age
- Proximal humeral physis
  - Repetitive rotational stress

<table>
<thead>
<tr>
<th>Age (y)</th>
<th>Maximum Pitches Per Game</th>
</tr>
</thead>
<tbody>
<tr>
<td>7-8</td>
<td>50</td>
</tr>
<tr>
<td>9-10</td>
<td>75</td>
</tr>
<tr>
<td>11-12</td>
<td>85</td>
</tr>
<tr>
<td>13-16</td>
<td>95</td>
</tr>
<tr>
<td>17-18</td>
<td>105</td>
</tr>
</tbody>
</table>
Little Leaguer’s Shoulder Management

- Radiographs-Gasser & Carson
  - Widening
  - Sclerosis
  - Cystic changes
- Treatment
  - Progressive throwing program
  - Proper mechanics
  - 3 months

**TABLE 2. Little League Baseball Rest Requirements for Pitchers**
Age 16 Years and Under

<table>
<thead>
<tr>
<th>Pitches</th>
<th>Days Rest</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-20</td>
<td>No calendar day</td>
</tr>
<tr>
<td>21-40</td>
<td>1 calendar day</td>
</tr>
<tr>
<td>41-60</td>
<td>2 calendar days</td>
</tr>
<tr>
<td>&gt; 61</td>
<td>3 calendar days</td>
</tr>
</tbody>
</table>
Little League Elbow

- Humeral origin of UCL
- 8-15 years of age
- Medial elbow pain with throwing
- Widening of apophysis
- Rest & biomechanical assessment
<table>
<thead>
<tr>
<th>Age</th>
<th>Limits Per Game</th>
<th>Rest Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>17-18 years</td>
<td>105/day</td>
<td>76 or more pitches → 4 days rest</td>
</tr>
<tr>
<td></td>
<td></td>
<td>61-75 pitches → 3 days rest</td>
</tr>
<tr>
<td></td>
<td></td>
<td>46-60 pitches → 2 days rest</td>
</tr>
<tr>
<td></td>
<td></td>
<td>31-45 pitches → 1 day rest</td>
</tr>
<tr>
<td></td>
<td></td>
<td>01-20 pitches → 0 days rest</td>
</tr>
<tr>
<td>15-16 years</td>
<td>95/day</td>
<td>66 or more pitches → 4 days rest</td>
</tr>
<tr>
<td></td>
<td></td>
<td>51-65 pitches → 3 days rest</td>
</tr>
<tr>
<td></td>
<td></td>
<td>36-50 pitches → 2 days rest</td>
</tr>
<tr>
<td></td>
<td></td>
<td>21-35 pitches → 1 day rest</td>
</tr>
<tr>
<td></td>
<td></td>
<td>01-20 pitches → 0 days rest</td>
</tr>
<tr>
<td>13-14 years</td>
<td>95/day</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11-12 years</td>
<td>85/day</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-10 years</td>
<td>75/day</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7-8 years</td>
<td>50/day</td>
<td></td>
</tr>
</tbody>
</table>

*From The Little League® Pitch Count Regulation Guide for Parents, Coaches and League Officials; with permission.*
## Shoulder Overuse Prevention

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Maximum number of pitches/game</th>
<th>Suggested pitch types</th>
</tr>
</thead>
<tbody>
<tr>
<td>8–10</td>
<td>52</td>
<td>8 years – fastball</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10 years – change-up</td>
</tr>
<tr>
<td>11–12</td>
<td>68</td>
<td>Fastball, change-up</td>
</tr>
<tr>
<td>13–14</td>
<td>76</td>
<td>Fastball, change-up</td>
</tr>
<tr>
<td></td>
<td>14 years – curveball</td>
<td></td>
</tr>
<tr>
<td>15–16</td>
<td>91</td>
<td>Fastball, change-up</td>
</tr>
<tr>
<td></td>
<td>16 years – slider</td>
<td></td>
</tr>
<tr>
<td>17–18</td>
<td>106</td>
<td>Fastball, change-up,</td>
</tr>
<tr>
<td></td>
<td>curveball, slider</td>
<td></td>
</tr>
</tbody>
</table>
Pars Interarticularis

- Insidious Onset
  - 48.5% youth athletes with back pain
  - Progression to non-union - 14-70%
- Oblique plain films
  - Scotty Dog
Management

Imaging of Choice

• MRI
  - No radiation
  - 85% & 95%
• SPECT scan
  - Radiation
  - 85%
• MRI vs. SPECT

Treatment Plan

• Goal-Pain Free
• Rest-3 months
  - 57 youth soccer players (optimal results)
• Physical Therapy
• Bracing?
Endurance Athletes

- American Academy of Pediatrics
  - Triathlons Are Safe

- Marathons
  - 10% Rule
  - Heat Stress

- Nutrition
  - Total Caloric Intake
  - Iron
  - Calcium
Growth And Development

- Menarche
- Amenorrhea
- Pre-Selection
- Female Triad
- Boys vs. Girls
Will **Early** Specialization Get Me To the Pros?

- Swimming, diving, gymnastics and figure skating
What is the Goal?

• Pie In The Sky?
  • Professional Pie

• Area of Specialization
  • 0.2%-0.5% make it pro

• Promote Lifelong Physical Activity

• Unfulfilled Childhood Dreams
American Dream
<table>
<thead>
<tr>
<th>Student Athletes</th>
<th>Men’s Basketball</th>
<th>Women’s Basketball</th>
<th>Football</th>
<th>Baseball</th>
<th>Men’s Ice Hockey</th>
<th>Men’s Soccer</th>
</tr>
</thead>
<tbody>
<tr>
<td>High School Student Athletes</td>
<td>538,676</td>
<td>433,120</td>
<td>1,086,627</td>
<td>474,791</td>
<td>35,198</td>
<td>410,882</td>
</tr>
<tr>
<td>High School Senior Student Athletes</td>
<td>153,907</td>
<td>123,749</td>
<td>310,465</td>
<td>135,655</td>
<td>10,057</td>
<td>117,423</td>
</tr>
<tr>
<td>NCAA Student Athletes</td>
<td>17,984</td>
<td>16,186</td>
<td>70,147</td>
<td>32,450</td>
<td>3,964</td>
<td>23,385</td>
</tr>
<tr>
<td>NCAA Freshman Roster Positions</td>
<td>5,138</td>
<td>4,625</td>
<td>20,042</td>
<td>9,271</td>
<td>1,133</td>
<td>6,676</td>
</tr>
<tr>
<td>NCAA Senior Student Athletes</td>
<td>3,996</td>
<td>3,597</td>
<td>15,588</td>
<td>7,211</td>
<td>881</td>
<td>5,192</td>
</tr>
<tr>
<td>NCAA Student Athletes Drafted</td>
<td>46</td>
<td>32</td>
<td>254</td>
<td>678</td>
<td>7</td>
<td>101</td>
</tr>
<tr>
<td>Percent High School to NCAA</td>
<td>3.3%</td>
<td>3.7%</td>
<td>6.5%</td>
<td>6.8%</td>
<td>11.3%</td>
<td>5.7%</td>
</tr>
<tr>
<td>Percent NCAA to Professional</td>
<td>1.2%</td>
<td>0.9%</td>
<td>1.6%</td>
<td>9.4%</td>
<td>0.8%</td>
<td>1.9%</td>
</tr>
<tr>
<td>Percent High School to Professional</td>
<td>0.03%</td>
<td>0.03%</td>
<td>0.08%</td>
<td>0.50%</td>
<td>0.07%</td>
<td>0.09%</td>
</tr>
</tbody>
</table>
Social Risks- “I Just Want To Have Fun”

- Overdependence
- Social Isolation
- Problem Solving Skills
- Maladaptive Behaviors
Money Is The Root Of All Evil

- Youth Sports Movement
  - $7 Billion Industry

- Youth Sports Tourism
  - Fastest Growing Segment in Travel

- Columbus Dispatch
  - Non-profit Groups-$5 Billion/Year in 2010
<table>
<thead>
<tr>
<th>Odds of Going Pro</th>
<th>Odds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Odds of a high school football player making it to the NFL</td>
<td>1 in 6,000</td>
</tr>
<tr>
<td>Odds of a high school baseball player making it to MLB</td>
<td>1 in 4,000</td>
</tr>
<tr>
<td>Odds of a high school basketball player making it to the NBA</td>
<td>1 in 10,000</td>
</tr>
<tr>
<td>Odds of a high school soccer player receiving a full ride to a Div I or II School</td>
<td>1 in 90</td>
</tr>
</tbody>
</table>

The above is taken from a study on youth sports by Michigan State University. It surveyed 10,000 children ages 5-14 nationwide.
A Parent’s Influence

- [YOUTH FOOTBALL PARENT OUT OF CONTROL - YouTube](https://www.youtube.com)
What To Tell Parents?

1) **Well-Rounded Individual Leads To Success**
   - Late Specialization *Works*

2) **Enjoyment/Intrinsic Motivation**

3) **Supportive Not Authoritative**

4) **No** Penalty For Starting Late
World Picture Exclusive

Phelps Goes Bong
Olympic gold medal winner caught with cannabis pipe

vs.

[Images of various people]
Summary

1) Specialization in a single sport before adolescence is discouraged
2) Clinicians should work with parents and coaches to strive for early recognition of overuse injuries
3) Be alert for signs and symptoms of overtraining including decline in performance, weight loss, apathy and fatigue
4) High risk injuries can lead to nonunion, result in chronic pain, and/or lead to the development of degenerative joint disease
19 y/o lacrosse player p/w with 3 days of persistent axillary pain and swelling especially with weight-lifting. Pain remains despite reduction in overhead training but still practices lacrosse. PE-localized swelling with tenderness and firmness over left axilla. Supine there is prominent venous structures with left UE > right. Which of the following is the presumed diagnosis?

a) Superficial phlebitis
b) Pectoralis major tear
c) Labral tear
d) Effort induced thrombosis
e) Lymphangitis
Questions
References