Overuse Injuries In Young Athletes: Treatment and Prevention

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Organized Sports For Children: Benefits vs. Risks

- Emotional & social growth
- Fitness, safety
- Skills, facilities

Organized Sports

BENEFITS

- Emotional & social growth
- Fitness, safety
- Skills, facilities
Organized Sports

CONCERNS

- Emotional stress
- Endurance/heat stress
- Injury

Major Risk: Sports Related Injury

1. Children age 5-14 risk group 59.3/1000 vs 25.9/1000
   Conn JM, Annest JL, Gilchrist J. Sports and recreation related injury episodes in

2. SRI 41% of all musculoskeletal injury in ER
   Damore DT, Metzl JD, Ramundo M, Pan S, Van Amerongen R. Patterns in

3. Incidence of SRI increasing, 80% increase over 6 years
   Jones SJ, Lyons RA, Sibert J, Evans R, Palmer SR. Changes in sports injuries to

Acute injuries vs. Overuse injuries
Acute Injury

1. Fracture
2. Contusion
3. Sprain
4. Strain

Injuries

1. Acute trauma
2. Overuse injury

Overuse Injury

1. Stress fracture
2. Tendinopathy
3. Chondromalacia
4. Bursitis
5. Fasciitis
Repetitive Microtrauma

Overuse Injuries

- Free play
- Physical education
- Organized sports

Recurrent microtrauma and anatomical or physiologic predisposition

“STRESS SYNDROME”
Risk Factors

• Host
• Environmental

Risk Factors: Sports Injuries

**HOST**
• Anatomic alignment
• Muscle-tendon imbalance
• Fitness level
• Growth & maturation
• Nutrition
• Gender

**ENVIRONMENTAL**
• Training
• Conditioning
• Surface
• Footwear
• Equipment
• Coaching
Case Report
15 yr old male

Hx: Overuse; knee pain; limp
PE: No local findings
Dx: Muscle strain
RX: Ice, NSAIDS

Risk Factors: Host

• Anatomic alignment
• Muscle-tendon imbalance
• Fitness level
• Growth & maturation
• Nutrition
• Gender
“Trouble with knees? Check your feet!”

George Sheehan
Risk Factors: Host

- Anatomic alignment
- **Muscle-tendon imbalance**
- Fitness level
- Growth & maturation
- Nutrition
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Cybex Testing

Right lower extremity: strength 30 degrees/sec

<table>
<thead>
<tr>
<th>Muscles</th>
<th>Mean</th>
<th>S.D.</th>
<th>Range</th>
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<tbody>
<tr>
<td>Quadriceps</td>
<td>69.8</td>
<td>17.1</td>
<td>43-90</td>
</tr>
<tr>
<td>Hamstrings</td>
<td>40.6</td>
<td>6.3</td>
<td>28-48</td>
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<tr>
<td>Dorsiflexors</td>
<td>8.3</td>
<td>2.0</td>
<td>6-12</td>
</tr>
<tr>
<td>Plantarflexors</td>
<td>50.3</td>
<td>13.3</td>
<td>35-78</td>
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</tbody>
</table>
Risk Factors: Host

- Anatomic alignment
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- **Fitness level**
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Risk Factors: Host

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  - Nutrition
  - Gender
Overgrowth Syndromes: The Knee

1. Patellofemoral stress syndrome
2. Osgood-Schlatters disease
3. Patella tendonitis

Risk Factors: Host

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Risk Factors: Host

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The Female Athlete Triad

- Amenorrhea
- Osteopenia
- Disordered eating

overuse injury: stress fracture

Risk Factors: Environmental

- Training
- Conditioning
- Surface
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- Equipment
- Coaching
Sports Training: The Young Athlete

How much is enough?
How much is too much?

“Sometimes we learn how much is enough by observing how much was too much”

Training: Pollack, 1968

<table>
<thead>
<tr>
<th>INT (VO2 Max)</th>
<th>DUR (Mins)</th>
<th>Rate INJ</th>
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<tbody>
<tr>
<td>70%</td>
<td>40 x 4</td>
<td>12%</td>
</tr>
<tr>
<td>85%</td>
<td>15 x 3</td>
<td>22%</td>
</tr>
<tr>
<td>85%</td>
<td>45 x 3</td>
<td>54%</td>
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</table>

Overtraining: The Young Athlete

- Performance
- Fatigue
- Growth
- Endocrine
- Injury
Volume/Progression

- 20-22 hours / week
- 10% rule
Overuse Syndromes

• Types of training
• Amount of training
• Rate of training

Risk Factors: Environmental

• Training
• Conditioning
• Surface
• Footwear
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• Coaching

Fitness

• Cardiovascular/metabolic
• Musculoskeletal
  • Strength
  • Flexibility
  • Endurance
• Body composition
• Psychological

Risk Factors: Environmental

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Child Athlete at Risk

- Growth tissue
- Growth process
- Coaching / training
**Child Athlete at Risk**

- Growth tissue
- Growth process
- Coaching / training

**Sites of Injury**

**Growth Cartilage**

- Growth plate
- Joint surface
- Joint apophysis
Gymnastics

- Back
- Wrist

Wrist Pain: Gymnast

- Navicular stress fracture
- Distal radius/ulnar physis
- Dorsal capsulitis
- Tendinitis
- AVN
Sites of Injury
Growth Cartilage

- Growth plate
- Joint surface
- Apophysis

Little League Elbow
Recommendations

Early Recognition of Symptoms

- Pain
- Flexion contracture
- Tenderness

*These are nature’s warning signals!*

Little League Elbow: Training Volume / Intensity

1. Little League Baseball. 1986
   6 innings / wk

2. Iwase T, Ikata MD, Kashiwaguch M.
   Tokushima University
   4,049 baseball – age 9-12
   Rec: 300 pitch/wk  50/day

Little League Elbow: Training Volume/Intensity

USA Baseball Medical and Safety Advisory Committee: 2004

<table>
<thead>
<tr>
<th>Age</th>
<th>Maximum Pitches per Game</th>
<th>Maximum Games per Week</th>
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<tbody>
<tr>
<td>8-10</td>
<td>50</td>
<td>2</td>
</tr>
<tr>
<td>11-12</td>
<td>65</td>
<td>2</td>
</tr>
<tr>
<td>13-14</td>
<td>75</td>
<td>2</td>
</tr>
<tr>
<td>15-16</td>
<td>90</td>
<td>2</td>
</tr>
<tr>
<td>17-18</td>
<td>105</td>
<td>2</td>
</tr>
</tbody>
</table>

*Recommendations were modified with permission from the USA Baseball Medical & Safety Advisory Committee.*
Sites of Injury
Growth Cartilage

- Growth plate
- Joint surface
- Apophysis

Osgood-Schlatter Disease
Avulsion fracture of the epiphysis of the tibial tuberosity near the attachment of the ligamentum patellae
**Overuse Injuries In Children**

**Case Report**

**16 y/o female hurdler**

Hx: Overuse; 6 mo. activity related mid-foot pain

Working Dx: “foot sprain”

PE: Pain w/ provocative I inversion, tight TA

Diagnosis: stress fracture tarsal navicular

**Case Report**

**15 y/o male soccer player**

Hx: 6 mo. knee pain; chondromalacia; no response to PT, orthotics

PE: Thigh atrophy: night pain

Diagnosis: osteogenic sarcoma proximal tibia
Sports Medicine is Preventive Medicine

Enhancement Performance

Sports Medicine
Sports Science
Prevent Injury

Prevention of Sports Injuries

Children
- Participation match
- Conditioning
- Training
- Rules
- Equipment
THANK YOU!!

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