BACK PAIN IN THE ADOLESCENT ATHLETE

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Jesse

• Clinical History
  – 16 yo young man 1 year h/o LBP
  – Symptoms began during football game
  – Symptoms worse with activity, sports
  – Symptoms better lying down
  – No leg pain
  – PT with temporary improvement
  – NSAIDs helped initially
• Exam
  – TTP lumbar spine
  – Pain with extension
  – Strength 5/5 BLE
  – Sensation intact BLE
  – Reflexes symmetric
Prevalence of Back Pain in Athletes

• 50-80% general population across all ages
• 15-30% athletes
  – Less common younger ages
  – Sport Specific
• Most common sports
  – Football players
  – Gymnasts
  – Divers
Types of Injuries

- **Acute Trauma**
  - Rugby players
  - Football players
  - Hockey players

- **Repetitive microtrauma (overuse)**
  - Extension/flexion/torsion
  - Gymnasts
  - Dancers
  - Offensive lineman
Functions of the Spine

- Flexibility of motion in six degrees of freedom

Flexion and Extension

Left and Right Side Bending

Left and Right Rotation
Your spine consists of three primary sections:

- **Cervical**—Neck
- **Thoracic**—Upper back
- **Lumbar**—Lower back
## Regional Characteristics

<table>
<thead>
<tr>
<th>Movement</th>
<th>Cervical</th>
<th>Thoracic</th>
<th>Lumbar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexion/extension</td>
<td>Flexion/extension Lateral Flexion Rotation</td>
<td>Rotation Limited Lateral Flexion</td>
<td>Flexion and extension Limited Lateral Flexion</td>
</tr>
</tbody>
</table>
Anatomy Lumbar Spine

A
Superior articular facet
Spinous process
Transverse process
Mammillary process
Accessory process
Pedicle
Spinal canal

B
Inferior articular facet
Lamina

C
Superior articular facet
Pars interarticularis
Transverse process
Body
Spinous process
Inferior articular facet
Vertebral foramen
Pedicle
• Cartilage and Secondary Ossification centers are prone to injury.
Sources of Back Pain

- Discogenic
- Facet Joints
- Paraspinal musculature
- Ligamentous
- Deformity
Risks For Injury

- Prior back injury
- Decreased ROM
- Poor conditioning
- Excessive Loading
- Poor Technique
- Abrupt increase in training
Evaluation

• History
  – Mechanism of injury (if traumatic)
    • Position of spine
    • Force
  – Duration of symptoms
  – Rate of onset
  – What sports/activities cause pain
  – Aggravate/Alleviate
Evaluation

• ROS
• Treatment History
  – Self restriction
  – Athletic Trainer
  – PT
  – Chiropractor
  – Acupuncture
  – Medications
Evaluation Red Flags

- Fever
- Weight Loss
- Malaise
- Night Pain
- Neurologic Abnormalities
- Morning Stiffness
Physical Exam

• Postural Abnormalities
  – Scoliosis
  – Kyphosis

• Spine ROM
  – Pain with flexion or extension

• Palpation
  – Cervical
  – Thoracic
  – Lumbar
  – SI joints
Physical Exam

• Neurologic Exam
  – Motor
  – Sensory
  – Reflexes
  – Provocative maneuvers

• Imaging
  – Symptoms greater than 2-4 weeks
Strain/Sprain

- Overuse
- Extreme ROM
- Usually self limited
- Ice/heat
- NSAIDs
- TENS
- PT
  - Strengthen core
  - Avoid aggravating motion
  - Proper technique
Discogenic

- Annular tear
- +/- extrusion of nuclear material
- Initially back pain from pain fibers in annulus
- Radicular symptoms may be present initially if large extrusion or may develop over time
Disc Herniation

- Worsened with flexion and valsala
- L4-5 and L5-S1 90% cases
- Adolescent population rarely neurologic findings
- Check for strength and sensation, especially L4-S1
- Reflexes Quad and Achilles
- Straight leg raise
Disc Herniation

- Diagnosis with MRI
- Treatment
  - Rest
  - NSAIDs
  - PT
  - ESI
  - Rarely discectomy in adolescents
  - Good natural history with non-op
Degenerative Disc

• Uncommon in adolescents
• Pain with disc loading
• Early disc collapse, initially identified on MRI
• Education
• Rest until symptoms subside
• PT-core strengthening
Spondylolysis/Spondylolisthesis

• Terminology
  – Spondylolysis
  – Spondylolisthesis
  – Spondylosis
  – Isthmus
  – Pars Interarticularis
Spondylolysis

- Result of repetitive extension activities with axial loading
  - Gymnasts, divers, lineman, volleyball
- Most asymptomatic
- 13% chronic pain
Evaluation

• LBP worse with activity
• Hamstring tightness → stiff-legged gait with shorter stride length
• TTP lumbar spine including paraspinals
• Palpable step off
• L5 nerve irritation → Exiting Nerve
Evaluation

- Upright x-rays lumbar spine with flexion and extension
  - JBJS no added value with oblique views
- SPECT
- MRI
- Limited CT
Treatment

• Activity restriction
• Bracing $\rightarrow$ earlier bracing more likely to obtain osseous union
• Surgical Treatment
  – 6 months non-op treatment
  – Debilitating pain
Jesse’s clinical course

• Having already tried PT and activity restriction we elected trial bracing
• Pain somewhat improved with activity restriction but unable to compete
• Symptoms began to effect sleep and school work
SPONDYLOLYSIS!
• Spondylolysis unique to humans due to standing upright and being biped
  – Lumbar lordosis unique to humans

• Most of our lordosis L4-5 and L5-S1 discs
  – 85-95% bilateral defects at L4 or L5
Source of leg pain
Leg pain

Hamstring Muscles

Semitendinosus

Biceps Femoris

Semimembranosus
Spondylolysis

- Meta analysis The Spine Journal 2015
  - Incidence of 6% at age 6
  - No cases in neonates
  - → acquired not congenital
  - Prevalence 11% athletes vs 3% non-athletes
  - Identified 47% adolescents with back pain
• Unilateral can evolve to bilateral
• Unilateral more likely to heal than bilateral
• 43-74% progress to spondylolisthesis
• Short term prognosis good, few requiring surgery
  – Not related to bony healing
• Long term prognosis less optimistic
Evaluation Protocol

- Plain x-rays
- MRI child/adolescent with low back pain greater than 3-4 weeks
- Limited CT in area of concern for high signal pars or pedicle
# Types of Spondylolysis

<table>
<thead>
<tr>
<th></th>
<th>Type 1</th>
<th>Type 2</th>
<th>Type 3</th>
<th>Type 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>MRI</td>
<td>High Signal STIR/T2</td>
<td>High Signal STIR/T2</td>
<td>High Signal STIR/T2</td>
<td>Nml Signal STIR/T2</td>
</tr>
<tr>
<td>CT</td>
<td>No Fracture</td>
<td>Incomplete Fracture</td>
<td>Complete Fracture</td>
<td>Complete Fracture</td>
</tr>
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</table>
• Diagnose early and treat early
• Theory: don’t neglect a fracture

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<th>Type 3</th>
<th>Type 4</th>
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<tbody>
<tr>
<td>Restrict Activity</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No (except due to pain)</td>
</tr>
<tr>
<td>TLSO</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>PT</td>
<td>After brace</td>
<td>After brace</td>
<td>After brace</td>
<td>Yes, right away</td>
</tr>
</tbody>
</table>
Treatment Protocol

• Type 1 and 2
  – If not pain free after rest, brace
  – Check MRI or CT at 3 months

• Type 3
  – If not pain free after 1 month bracing, make sure brace neutralizes spine (less lordosis)
  – CT at 6 months

• Type 4
  – If painful after PT, brace x 3 months
Results

- **Duration symptoms**
  - Type 1: 8 weeks
  - Type 2: 19 weeks
  - Type 3: 20 weeks

<table>
<thead>
<tr>
<th></th>
<th>Treated</th>
<th>Compliant</th>
<th>Healed</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 1</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>100%</td>
</tr>
<tr>
<td>Type 2</td>
<td>25</td>
<td>25</td>
<td>23</td>
<td>92%</td>
</tr>
<tr>
<td>Type 3</td>
<td>28</td>
<td>22</td>
<td>13</td>
<td>59%</td>
</tr>
<tr>
<td>Total</td>
<td>63</td>
<td>57</td>
<td>46</td>
<td>815%</td>
</tr>
</tbody>
</table>
Key Points

- 50% adolescent athletes with back pain have spondylolysis
- Evaluate early for spondylolysis
- Consider early bracing
Questions
Thank you!
bronsonhealth.com