Improving Clinical Diagnostic Decision Making and Treatment for Young Athletes with Low Back Pain

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Objectives
At the end of this session attendees will be able to:
• Describe lumbar injuries common to the adolescent athlete and methods to identify each.
• Assess the value of imaging and patient presentation to plan the course of care.
• Implement interventions specific to the young athlete with low back pain.

Disclosure
• No conflicts of interest or relevant financial relationships to disclose.
Adolescent Athlete LBP

- Growing spine → Variables that do not exist in adult spine
  - Apophyseal injuries
  - Incomplete bony maturation of neural arch possible explanation for injuries to pars interarticularis
- <1% with radicular symptoms
A Youth Athlete with LBP walks into the clinic…

Non-specific LBP

Outcomes for Athletes
Non-specific LBP

Physical conditioning and Manual Therapy found to be most effective \(^{20}\)

**BUT...**

- 67% have continued or a recurrence of LBP. \(^{21}\)
- After 12 weeks of individualized PT \(^{22}\)

**DON'T KIDS JUST GET BETTER?**
Spondylolysis
Short-Term Outcomes
Positive clinical outcomes (Selhorst, 2016)
- Low discharge pain (mean 0.20/10 NPRS)
- 93% released to return to sport

Spondylolysis
Long-Term Clinical Outcomes (Selhorst, 2016)
Time Since Treatment (3 ± 1 years) n=121

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recurrence of LBP</td>
<td>55 (46%)</td>
</tr>
<tr>
<td>Required medical treatment</td>
<td>55 (42%)</td>
</tr>
<tr>
<td>Function (MFS)</td>
<td>7 (6%)</td>
</tr>
<tr>
<td>Pain</td>
<td>3 (2%)</td>
</tr>
<tr>
<td>Same or Higher level</td>
<td>66 (50%)</td>
</tr>
<tr>
<td>Lower level of sport</td>
<td>55 (42%)</td>
</tr>
<tr>
<td>Had to retire due to l</td>
<td>7 (6%)</td>
</tr>
<tr>
<td>Retired but low back not a factor</td>
<td>3 (2%)</td>
</tr>
</tbody>
</table>

Poor Outcome 42% (n=51)

Should We Even Care?
Impact into Adulthood

– More days with LBP as adolescent the greater the risk of LBP as adult.[5]
– Adolescents with low back pain >30 days have a 4 times greater risk of chronic LBP as adult.

Non-Specific (Functional) LBP

• Diagnosis of exclusion
• LBP in pediatric patients cannot be explained by diagnosable causes in up to 78% of initial presenting complaints.[18]
• Management recommendations[19]
  – Combination of exercise and manual therapy

Spondylolysis[2,3,8]
### Spondylolysis

<table>
<thead>
<tr>
<th>Type</th>
<th>Name</th>
<th>Pathogenesis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type I</td>
<td>Dysplastic</td>
<td>Congenital abnormalities</td>
</tr>
<tr>
<td>Type II</td>
<td>Isthmic</td>
<td>Bone stress injury of the pars interarticularis</td>
</tr>
<tr>
<td>Type III</td>
<td>Degenerative</td>
<td>Degeneration of the intervertebral discs</td>
</tr>
<tr>
<td>Type IV</td>
<td>Traumatic</td>
<td>Acute fracture in areas other than pars</td>
</tr>
<tr>
<td>Type V</td>
<td>Pathological</td>
<td>Bone disease, tumor, or infection</td>
</tr>
</tbody>
</table>

#### Isthmic Spondylolysis
- Continuum of the Bone Injury (Herman, 2005)
  - Stress reaction
    - Intraosseous edema with surrounding sclerosis without bone disruption
  - Stress fracture
    - Disruption of bone of pars without a gap or lysis
  - Pars nonunion
    - Complete disruption with a gap
  - Spondylolisthesis
    - Translation of one vertebra on adjacent vertebra

#### Spondylolisthesis

Meyerding Scale
- Grade 1: Slip of 0%-25%
- Grade 2: 25%-50%
- Grade 3: 50%-75%
- Grade 4: 75%-100%
- Grade 5: >100%
Spondy Misconceptions

Increased risk over other sports (Selhorst, 2001) (Rossi, 2001)

Spondylolysis 1.5-4x more likely in males

than females. (Selhorst, 2001) (Rossi, 2001)
**Spondylolysis Healing Potential**

- Potential for bony healing of lesion

- **Acute Spondylolysis**: 68% potential for healing
- **Chronic Spondylolysis**: 0% potential for healing

- No correlation between radiographic and clinical outcomes (Klein 2009)
- Many clinicians still attempt to achieve bony healing

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**Clinical Presentation Spondylolysis**

- Atraumatic, insidious-onset,
- Focal low back pain
  - Leg pain, paresthesia, neuro loss rare
- Pain increases with lumbar extension
- Pain usually worse with activity and reduces at rest
- May complain of pain with impact
  - Running/jumping

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**Spondylolysis Special Tests**

- (No special tests indicated for spondylolysis)

Clinical Examination of Spondylolysis

- Physical findings and clinical examination unreliable indicator of bony spinal pathology (Alqarni, 2015)
- Imaging primary means of diagnostic confirmation (Tofte, 2016)

Spondylolysis Imaging

- 2 view Radiographs
- SPECT/CT
- MRI
- Normal (Beck et al, 2013)
- Spondylolysis
Background

Identify a cluster of patient characteristics to maximize clinical diagnostic sensitivity

Methods

- Retrospective chart review

Spondylolysis

| Yes | Retrospective chart review: MRI and/or SPECT |
|     | Logistic regression analysis was performed to identify variables associated with acute spondylolysis |

| No  | Retrospective chart review: MRI and/or SPECT |

| Age | 15.0 ± 1.8 | 14.5 ± 1.6 | 15.1 ± 1.8 |
| Sex (% female) | 570 (56%) | 97 (43%) | 473 (59%) |
| Reports pain with extension | 743 (71%) | 201 (88%) | 542 (68%) |
| Pain at rest | 2.0 ± 2.4 | 2.0 ± 2.3 | 2.0 ± 2.4 |
| Pain with activity | 6.8 ± 2.3 | 7.4 ± 1.9 | 6.5 ± 2.3 |

Results

- 1,025 adolescent athletes with LBP treated at NCH sports medicine between 2009-2016
Discussion

1. Conservative care initially with PT
2. Advanced imaging with failure to progress

Conclusion

• Cluster of three patient characteristics with potential in ruling out spondylolysis
• Potential in assisting with clinical diagnosis of spondylolysis
  – Prospective research needed for validation
Considerations when working with young athletes

• Not just “patient-centered” care
  – More “family-centered”
  – Consistent communication is key
  – Involve parents in decision-making process
  – Must ensure buy-in from patient AND parents
    • Will help with attendance/compliance
    • Frequently update parents on progress
      • Don’t just rely on child to give updates
Psychosocial Screening of Young Athletes

- **Pain Catastrophizing Scale**
  - Parent and Child scales
- **Fear-Avoidance Beliefs Questionnaire**
  - Physical Activity Subscale (FABQ-PA)
- **Kinesiophobia**
  - Tampa Scale for Kinesiophobia
- **Depression**
  - PHQ-9 modified for adolescents (PHQ-A)

Spondylolysis vs Non-specific LBP Treatment

Spondylolysis non-surgical treatment:

- [Breathing](https://chiroup.com/the-role-of-the-diaphragm)
- [TA](#)
- [Multifidus](#)
- [Glutes](#)
- [Scapular Stabilization](#)
Breathing

- Diaphragmatic breathing
  - Effective oxygenation
  - Modulates intra-abdominal pressure
  - Deep abdominal activation
  - Contributes to trunk stability
  - Muscle relaxation and tension relief
  - Increased concentration
- Lateral rib expansion/opening back of rib cage
- Progression
  - Supine → Hooklying on ball → Sitting → Standing

Kolar 2012

http://chiroup.com/role-diaphragm-breathing-right

Feedback Positions:

I don't get this…
I'm BORED!
**TA Progression**

- Marching
- Straight Leg Raise
- Straight Leg Raise with Crunch
- 90/90 Heel Taps
- 90/90 Fall Outs

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**Multifidus**

- Activation of multifidus prone
  - UE lifts
    - Palpate directly lateral to spinous process

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**The Problem**

"Swell the multifidus muscle under my fingers"
**Multifidus Progression**

**Glute Progression**

**Scapular Stabilization Progression**
Mobility

- SL balance
- BOSU step-ups
- SL RDL with or without feedback
- Lunge on unstable surface
- Flexion Progression

Stability Progression

- SL balance
- BOSU step-ups
- Star excursion balance
- Lunge on unstable surface
Extension Progression

Rotation Progression
Compensatory patterns

Goal of Advanced Exercises

Medicine Ball Exercises
TRX Exercises

Turkish Get Ups

Extension
The Just for Fun Series

Sport Specific: Soccer

The Just for Fun Series
Sport Specific: Basketball

Sport Specific: Volleyball

Sports Specific: Performance Sports
Sports Specific:
Wrestler/BJJ

How do we get to this?
How do we get to this?

Back Handspring Progression

How do we get to this?
Serve Progression

How do we get to this?

Blocking Progression
Know the demands of the athletes sport

Know the level of the athlete

- Many sports have designated levels
- If not, the number of hours per week can be a guide

Cheating when you don’t know

Data-Based Interval Hitting Program for Female College Volleyball Players
Cheating when you don’t know

• Consult other clinicians
• Consult the internet
  – YouTube
  – Wikipedia
  – Google

Return to Sport Criteria

• Consider the risks and benefits
• Pain free at end range of all lumbar motions
• Completed 2 weeks of return to sport activity in physical therapy without pain
• Patient reported no difficulty or pain with return to sport

Resources