Initiation of Physical Therapy in Pediatric Patients with Lateral Ankle Pain:
A Retrospective Review

Meghan Cass, PT, DPT
Mitchell Selhorst, PT, DPT, OCS
What is lateral ankle pain?

- Lateral ankle sprain
- Anterior or posterior impingement
- Syndesmotic injury
- Peroneal tendinopathies
- Calcaneal fractures
- Lateral malleolar fractures
- Fifth metatarsal fractures
- Peroneal neuropathy
Prevalence
Risk factors in Pediatrics
Age differences

Pediatric
- Risk of physeal injury
  - Risk of growth arrest, angular deformity, pain, disability
- Growth plate fusion ages
  - Females: 16-17 years
  - Males: 18-19 years

Adult
- Decreased frequency in this population compared to younger
Treatment differences

Pediatric

3-4 weeks

Adult

7-10 days
Salter Harris Fractures

• Salter Harris Type 1 is a clinical diagnosis
  – Result of inversion ankle injury
  – Tenderness and swelling at distal fibular growth plate
  – Limited weight bearing
Salter Harris Fractures

• Salter Harris Type 1 is a clinical diagnosis
  – Growth plates are radio transparent
Salter Harris Type I Fracture

- 18 children with suspected SHTI underwent MRI

Boutis 2010
Salter Harris Type I Fracture

- 31 children with suspected SHTI underwent MRI

Hofsli 2016
Salter Harris Type I versus Ligamentous Sprain

- 135 children with suspected SHTI underwent MRI
Salter Harris Type I versus Ligamentous Sprain

Boutis 2016
Salter Harris Type I Fracture

• 48.5% of diagnoses modified over course of care
## Low Risk versus High Risk

### Low Risk
- Isolated pain, tenderness or both of
  - distal fibula below level of the joint line
  - Adjacent lateral ligaments
- With or without edema or ecchymosis

### High Risk
- Any other findings
- Need for guarded immobilization period with repeat radiographs

Boutis 2001
Low Risk versus High Risk

Low Risk

• None with findings had high risk final diagnosis

High Risk

• 45 of 226 had high risk final diagnosis

Boutis 2001
Salter Harris Type I versus Ligamentous Sprain

• More recent literature suggesting may be possible to diagnose as one clinical entity secondary to uncertainty
Purpose

• This study’s purpose was to determine if time to initiation of PT affects outcomes in pediatric patients with lateral ankle pain following an inversion mechanism of injury
  – Function
  – Return to activity
  – Safety
Methods

- Retrospective chart review
- Inclusion:
  - The patient has been treated by Nationwide Children’s Hospital Sports and Orthopedic Physical Therapists for any of the following diagnoses:
    - primary diagnosis of unspecified lateral ankle pain following inversion mechanism of injury
    - lateral ankle pain secondary to ankle sprain, lateral ankle sprain, Salter Harris type 1 fracture
  - January 2017 to July 2018
- Exclusion:
  - Age >18
  - cast immobilization
  - confounding injuries (i.e. other concurrent injuries, such as a MVA with multiple injuries)
  - Initial Foot and Ankle Ability Measure unable to achieve MCID improvement
Outcomes

Primary Outcome
• Function (Foot and Ankle Ability Measure)
• Return to activity (Time to Discharge)

Secondary Outcome
• Adverse reactions
Sample Size

A priori calculations determined a sample size of 86 necessary (43 in each group)

- $\text{Alpha} = 0.05$
- $\text{Beta} = 0.20$
- $\text{MCID of FAAM ADL} = 8$
- $\text{Standard deviation} = 13.2$
Sample Size

- 251 patients with lateral ankle pain
- 202 patients completed therapy
  - 118 >3 weeks
  - 84 <3 weeks
Data Analysis

• We used an Analysis of Covariance to assess between group differences

• Covariates
  – Age
  – Initial FAAM score
  – Initial pain
Compiled patients with lateral ankle pain treated at NCH Sports & Ortho PT from 2017-2018 (n=2427)

Final cohort established (n=251)

Excluded (n=2176)
- Age (n=154)
- Other diagnoses (n=974)
- Treatment date (n=726)
- Cast immobilization or inappropriate MOI (n=263)
- Initial FAAM unable to reach MCID (n=59)

Early initiation (n=105)

Delayed initiation (n=146)
## Baseline groups

<table>
<thead>
<tr>
<th></th>
<th>All Patients (n=251)</th>
<th>PT &gt;3weeks (n=146)</th>
<th>PT &lt;3weeks (n=105)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td>14.0 ± 2.5</td>
<td>13.4 ± 2.5</td>
<td>14.7 ± 2.1</td>
</tr>
<tr>
<td><strong>Sex (% female)</strong></td>
<td>176 (70.1%)</td>
<td>105 (71.9%)</td>
<td>71 (67.6%)</td>
</tr>
<tr>
<td><strong>Radiographs</strong></td>
<td>247 (98.4%)</td>
<td>143 (97.9%)</td>
<td>104 (99%)</td>
</tr>
<tr>
<td><strong>MRI</strong></td>
<td>26 (10.4%)</td>
<td>14 (9.6%)</td>
<td>12 (11.4%)</td>
</tr>
<tr>
<td><strong>Athlete</strong></td>
<td>215 (85.7%)</td>
<td>124 (84.9%)</td>
<td>91 (86.7%)</td>
</tr>
<tr>
<td><strong>FAAM ADL initial</strong></td>
<td>69 ± 18.9</td>
<td>72.5 ± 16.5</td>
<td>64.0 ± 20.7</td>
</tr>
<tr>
<td><strong>FAAM Sport initial</strong></td>
<td>40.8 ± 26.4</td>
<td>47.8 ± 25</td>
<td>31.1 ± 25</td>
</tr>
<tr>
<td><strong>Initial Pain</strong></td>
<td>6.0 ± 2.4</td>
<td>6.0 ± 2.5</td>
<td>5.9 ± 2.2</td>
</tr>
<tr>
<td><strong>Number of Visits</strong></td>
<td>7.9 ± 4.4</td>
<td>7.7 ± 4.3</td>
<td>8.1 ± 4.6</td>
</tr>
<tr>
<td><strong>Adherent</strong></td>
<td>131 (52.2%)</td>
<td>76 (52.1%)</td>
<td>55 (52.4%)</td>
</tr>
</tbody>
</table>

*significantly different at baseline
FAAM ADL

Weeks

FAAM Score

6.8 points

Delayed Initiation
Early Initiation

Nationwide Children's
When your child needs a hospital, everything matters.
FAAM Sports

Weeks

FAAM Score

Delayed Initiation  Early Initiation
Discussion

• Earlier initiation of physical therapy resulted in greater improvement in function in less time

• No adverse results seen with early initiation
Chronic Effects of Lateral Ankle Injuries

• Overweight children more likely to have persistence of swelling, weakness, and pain after exercise 6 months after injury

• Adolescent athletes more likely to have functional performance deficits and decreased SL balance and single leg hop strength
Discussion

Benefits

Risks

• Growth plate closure
  – Growth arrest
  – Angular deformity
  – Pain
  – Disability
Discussion

• Previous treatment options limit those with suspected SHTI to later group with delay of healing and return to function
  – All will do well with earlier initiation of physical therapy
  – Using pain and function as a guide with earlier initiation better than delayed initiation of physical therapy
Disadvantages to Immobilization

- Delay in returning to normal activities
- Patient discomfort
- Too tight cast
- Skin ulceration
- Rarely compartment syndrome
Discussion

• Does the growth plate fail as often as we think?
  – Most likely not based on more recent literature
  – Larger prospective studies needed

• Can we use pain/function as a guide for early initiation?
  – Yes!
  – It is safe and effective
  – Larger prospective studies needed
Limitations

• Retrospective review
• Did not include cast immobilized patients as unable to initiate physical therapy prior to removal of cast
Clinical Relevance

• Regardless of suspicion of a growth plate injury, starting PT sooner (<3 weeks) translated to greater improvements in function in a shorter duration of care in this population
Questions?

Meghan Cass
Meghan.Cass@NationwideChildrens.org


