My Athlete Rolled Their Ankle, Now What?:
Lateral Ankle Pain in the Growing Athlete

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Objectives

1. Understand anatomy involved in a lateral ankle sprain and differences between skeletally immature and skeletally mature patients.
2. Understand best treatment options for possible growth plate injuries in skeletally immature patients.
3. Understand role of psychology in the treatment of a lateral ankle sprain.
4. Understand and be able to apply various treatment techniques for lateral ankle sprains, including but not limited to hip abduction strengthening and vestibular training.
5. Understand and be able to execute best return to sport testing options.

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Meet Your Patient

- 11 year old female
- Rock climbing at friend's birthday party
- Rolled ankle when missed footing
- Wants to return to soccer

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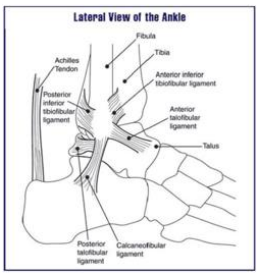
Injury



- Ligamentous order of failure
- Other pertinent structures in region

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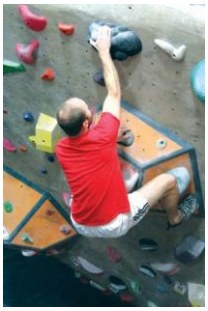
Adult Injury

- Friend's dad also misses footing on other route and rolled his ankle



How Are They Different?

Pediatric	Adult
• Risk of physeal injury – Risk of growth arrest, angular deformity, pain, disability • Growth plate fusion ages – Females: 16-17 years – Males: 18-19 years	• Decreased frequency in this population compared to younger

How common is this?

- Very!!
- Peak lifetime incidence between 15 and 19 years
- Children>adolescents>adults
- Females>males

Urgent Care

- Ottawa ankle rules
- Negative x-ray
- Referral to sports med

Sports Med

- 3 days following injury
- Repeat x-ray
- Anterior drawer test
  - Positive
- Referral to AT or PT with diagnosis of Salter Harris Type I fibular fracture

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Salter Harris Fractures

- SHTI is a clinical diagnosis
  - Growth plates are radio transparent

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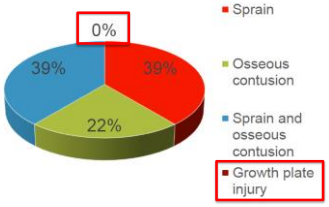
Salter Harris Type I versus Ligamentous Sprain

- 18 children with suspected SHTI underwent MRI



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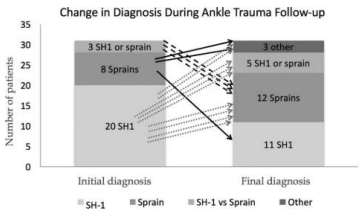
Salter Harris Type I versus Ligamentous Sprain



- 48.5% of diagnoses modified over course of care

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Salter Harris Type I versus Ligamentous Sprain

- Retrospective studies suggesting may be possible to diagnose as one clinical entity secondary to uncertainty

Evaluation

- 6 days post injury
- Repeat ant drawer test
  - Increased reliability once 4-5 days post injury
  - Negative now

Factors of Unfavorable Prognosis

- Controllable
  - Dynamic postural control
  - Hip joint kinematics
- Uncontrollable
  - Sports participation at high level
  - Being a young male
  - Increased BMI
  - Greater body height

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  - Dynamic postural control
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Psychosocial

- Patient has FABQ-PA with 15/24 score
  - Cutoff 13/24
- Negative consequences of injury
  - Anxiety
  - Stress
  - Depression
  - Fear of re-injury

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Interpersonal Fear Avoidance Model

Figure 3. The interpersonal fear-avoidance model of chronic pain. Reprinted from Simons, L.; Smith, A.; Kaczynski, K.; Basch, M. Living in fear of your child's pain: The parent fear of pain questionnaire [38].

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How Do We Treat?

- Effective communication
- Goal setting
- Self-talk
- Imagery
- Relaxation
- Motivation

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How Do We Treat? – Communication

- 4 steps
  - –Engage
  - –Empathize
  - –Educate
  - –Enlist

How Do We Treat? – Goal Setting

- SMART goals
- Involve patient in developing
  - – Patient will demonstrate improved function as noted by ability to participate in 30 minutes of soccer game in 6 weeks.

How Do We Treat? – Motivation

- Open-ended questions
- Affirmation
- Reflection
- Summaries

Treatment – What If We Don't Treat?

- Adult research showing PT>HEP>nothing
- Limited to no pediatric research
  - – Similar benefits in adult population down to 16 years old

Treatment –
What If We Don't Treat?

- Effects of lack of physical activity



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Treatment –
Initiation of Supervised Rehabilitation

- Earliest possible initiation of rehab leads to
  - Improved function (FAAM)
  - Decreased pain
  - Increased satisfaction
  - Increased physical activity
  - Decreased prevalence of functional ankle instability
  - Quicker recovery time
- Safe to initiate walking early

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Treatment –
Early Initiation

Benefits


Risks


- Growth plate closure
  - Growth arrest
  - Angular deformity
  - Pain
  - Disability

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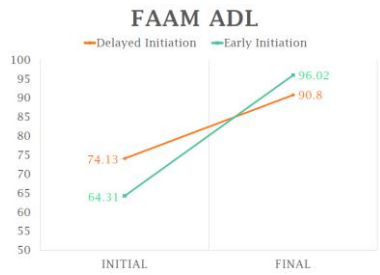
Treatment –
Early Initiation



6.8 points

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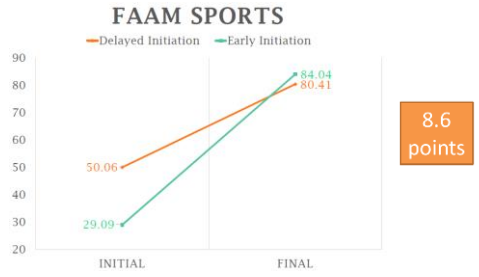
Treatment – Early Initiation



8.6 points

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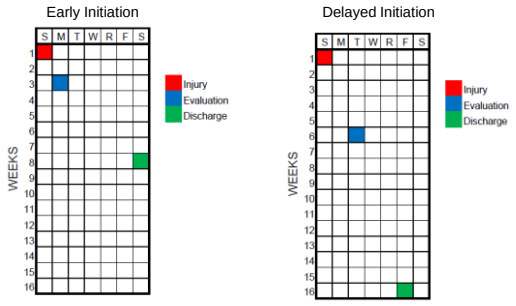
Treatment



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Treatment Essentials

Strength/ Power

Proprioception

Coordination/ Agility

Function

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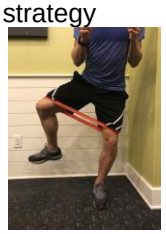
Treatment – Hip abduction strengthening

- Use of hip strategy to compensate for decreased strength of ankle strategy
- Variations of typical include:
  - Standing fire hydrant



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Treatment –
Hip abduction strengthening

- Use of hip strategy to compensate for decreased strength of ankle strategy
- Variations of typical include:
  - Standing hip glute series



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Treatment –
Hip abduction strengthening

- Use of hip strategy to compensate for decreased strength of ankle strategy
- Variations of typical include:
  - SL RDL to heel raise


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Treatment –
Hip abduction strengthening

- Use of hip strategy to compensate for decreased strength of ankle strategy
- Relate to soccer:
  - Reverse lunge to kick


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Treatment –
Hip abduction strengthening

- Use of hip strategy to compensate for decreased strength of ankle strategy
- Relate to soccer:
  - Side steps with ball drills

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Treatment – Vestibular

- Chronic ankle instability related to central nervous system
- Training needs to include:
  - VOR inducing head movements
  - Plyometrics with visual change of direction

Treatment – Vestibular

- Suggested treatment protocol
  - Single leg stance progression with X1 progression
    - 60 bpm to start progressing to 120 bpm
    - Increase difficulty of surface, base of support

Treatment – Vestibular

- Suggested treatment protocol
  - Single leg hop to stabilization
    - 10 seconds of X1 head turned following landing
    - Increase difficulty of bpm, surface, distance, UE assistance

Treatment – Vestibular

- Suggested treatment protocol
  - Unanticipated hop to stabilization
    - Grid hop with random sequence
    - 10 seconds of X1 head turns following each landing
    - Increase difficulty of bpm, response time

Treatment –
Vestibular

- Benefits
  - Improved gaze stabilization vertical compared to traditional training
  - No significant differences in dynamic visual acuity or gaze stabilization horizontal
  - No adverse effects

Treatment –
Return to Sport Testing

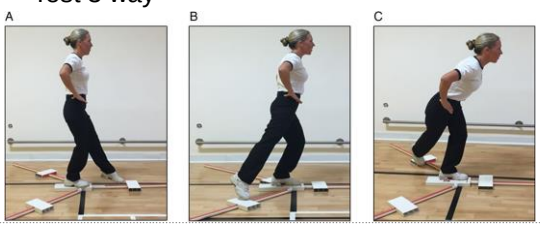
- Strength/power
- Proprioception
- Coordination/agility
- Function

Treatment –
Return to Sport Testing

- Single leg hop for distance
  - Moderate evidence for ankle instability

Treatment –
Return to Sport Testing

- Best evidence: Star Excursion Balance Test 3 way

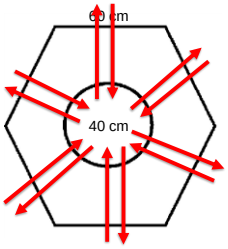


Treatment –
Return to Sport Testing

- Best evidence: Star Excursion Balance Test 3 way
  - Determines unstable versus stable ankle
  - Injury predictor
    - Composite score <94%
    - Anterior reach difference 4cm or greater

Treatment –
Return to Sport Testing

- Hexagon hop
  - Moderate evidence for ankle instability
  - 4 10 second hop sequences
  - 1 point for each out and back hop performed without touching any lines



Treatment –
Return to Sport Testing

- Foot and Ankle Ability Measure
  - Best psychometric properties
  - Valid in athletic population
  - Minimal Clinically Important Difference
    - ADLs: 8%
    - Sports: 9%

Treatment –
Return to Sport Testing

- Single leg hop for distance: 92%
- Star Excursion Balance Test
  - Composite: 95%
  - Anterior reach: 3cm
- Hexagon hop: 85%
- Foot and Ankle Ability Measure
  - ADLs: 100%
  - Sports: 90%

Questions?

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