SPORTS INJURIES IN TEENS

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DISCLOSURES

• None

• Other than...
OBJECTIVES

• Review common injuries seen with the teenage athletic population
• Overuse injuries
• What injuries not to miss
• Return to play considerations
• Discuss a few hot topic issues
CASE #1

- It is the last conference game of the regular season and you are playing your cross town rival in football. It is a close game in the second half. The 17 year old senior starting running back for the football team gets close to the first down but is tackled awkwardly. He gets up slowly but is able to get to the sideline under his own power but is clearly in pain.
WHAT NEXT?

• Have him evaluated and cleared by the athletic trainer?
  • Is there an athletic trainer?
• Does one of the football coaches make the call regarding injury severity and return to play?
• Does the player decide for himself?
• Is the team physician in the stands or on the sideline?
CASE #1 - EVALUATION

- Player is walking with a limp. Reports pain on the outside of his right ankle. No numbness or tingling. Ankles are taped as they usually are for games. His ankle seems mildly stiff but has relatively good passive plantar flexion and dorsiflexion. Lateral pain is reproduced with passive inversion. There is tenderness anterior and distal to the lateral malleolus. No tenderness over the posterior aspect of the lateral malleolus, base of 5th metatarsal or medial malleolus.
LIGAMENTS

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TENDONS

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ACUTE ANKLE SPRAIN

• One of the most common injuries encountered in primary care
• Vast majority (85%) are lateral ankle sprains secondary to inversion type injuries
• Medial ankle sprains of the deltoid ligament are much less common (5%)
• High ankle sprains, or syndesmotic injuries, are also less common (10%)
• Grading severity:
  • Grade 1 - Stretch injury
  • Grade 2 – Partial tear
  • Grade 3 – Complete tear
HISTORY

- Ask about mechanism of injury
- Frequently will be described as “rolling the ankle”
- Often will hear a pop
- Did they step on someone else’s foot or was this a non-contact injury
- Could they continue to walk
- Prior history of ankle sprain or fracture
- If seeing them in the office ask if they regularly tape their ankles for practices and games or if they regularly use some form or ankle brace
CASE #1

- Mechanism fits with lateral ankle sprain
- History consistent with a few ankle sprains in the past but never with complication or prolonged recovery
- Tenderness in the area of the ATFL and CFL
- No bony tenderness
TREATMENT AND RETURN TO PLAY

• With lower grade 1-2 ankle injuries during a game can do sideline testing to consider return to play during the same game.

• There must be no clinical concern for fracture.

• Strength testing: Dorsiflexion, Plantar flexion, External and Internal Rotation

• Active testing:
  • Jog in straight line
  • Straight line sprints with quick stops
  • Zigzag running

• If they can pass the above tests with acceptable levels of pain/discomfort they may be allowed to return to the remainder of the game with further evaluation at the end of the game.
IN OFFICE EVALUATION

• X-ray or no x-ray?

• Ottawa Ankle Rules – Apply to 5 to 55 year old individuals

A series of ankle x-ray films is required only if there is any pain in malleolar zone and any of these findings:
• Bone tenderness at A
• Bone tenderness at B
• Inability to bear weight both immediately and in emergency department

A series of ankle x-ray films is required only if there is any pain in mid-foot zone and any of these findings:
• Bone tenderness at C
• Bone tenderness at D
• Inability to bear weight both immediately and in emergency department
TREATMENT OPTIONS

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TREATMENT OVERVIEW

• Early: Decrease pain and swelling:
  • RICE (Rest, Ice, Compression, Elevation)
  • May need protected weight bearing or walking boot initially based on pain level
  • Quickly try to progress to a lace up brace or air cast

• Mobilization:
  • Early passive mostly pain-free range of motion
    • Ankle dorsiflexion
    • ABCs with great toe three times daily

• Physical therapy to focus on regaining range of motion and strength is critical
• Focus on proprioceptive strength. “We need to work on getting your balance back”
• No good evidence that surgery is beneficial, even with 3rd degree sprains

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GENERAL RETURN TO PLAY GUIDELINES

• Ideally have pain free, full range of motion
• When they have minimal symptoms with activities of daily living they can progress to straight line running
• When strength is normal in addition to the normal range of motion and they are tolerating straight line running then they can be cleared to return to more sport specific activities such as sprinting, cutting and pivoting
• Functional brace for all activities (practice, game play, other recreational activities) for at least the remainder of that sport season and possibly into the future
• Improving evidence that prophylactic bracing in high risk sports is beneficial to reduce risk and severity of sprains
IMPORTANT CONSIDERATIONS

• “AKA Things Not to Miss”
• Fractures, including Salter Harris I growth plate fracture
• Syndesmotic Injury/High Ankle Sprain
• Osteochondral Defect (OCD) usually of the talar dome
• Base of 5th metatarsal fracture
• Midfoot sprain – Lisfranc injury
HIGH ANKLE SPRAIN

- Injury to the inferior tibial fibular ligament and syndesmosis
- Usual mechanism is a planted foot with a forced external rotation force
- Tenderness over the anterior ankle just proximal to the joint line. The tenderness may extend up the syndesmosis for a number of cm.
- Injury can extend proximally all the way to the fibular head - Maisonneuve Fracture
- Pain reproduced on exam by passive dorsiflexion and external rotation
- Tape test above the ankle helps to relieve pain
- Conservative treatment is not as effective and may need surgical stabilization if there is widening of the ankle mortise
SYNDESMOTIC INJURY / TALAR DOME OCD
CASE #2

- 14 year old high school girl decides to try out for the cross country team. Starting in July she starts to run a couple of miles a few times per week. Starting in early August she starts practice with the team and is running every day, sometimes up to 5 miles. She starts to notice pain and soreness in her right leg that is worse with running, especially longer runs. It generally improves with rest, but will last at least 30 minutes after running and seems to be getting worse. No known injuries. No prior history of leg pain. No numbness or tingling.
EXERTIONAL LEG PAIN

• Shin splints – Medial Tibial Stress Syndrome

• Diffuse pain along the medial tibial border that is worse with exercise and is reproducible on exam

• May improve somewhat with warm-up but will typically worsen again with ongoing exercise

• Improved with rest

• May progress to persistent/constant pain

• Risk factors: knee valgus, over pronation at the foot/ankle, significant changes in training volume and intensity

• Treatment is activity modification, ice, physical therapy, orthotics, NSAIDs

• Radiographs done to rule out stress fracture

• Differential diagnosis can include chronic exertional compartment syndrome, muscle/tendon dysfunction, popliteal entrapment
STRESS FRACTURE

- Pain is more focal compared to MTSS, although these two things are on a spectrum.
- Risk factors: High mileage, training errors, rapid change in training intensity or volume, leg length inequality, female gender.
- Pain reproduced by percussion, fulcrum test, hop test.
- X-ray frequently normal, sometimes show a periosteal reaction and sometimes the “dreaded black line”.
- Have a low threshold to obtain MRI of the lower leg as it is diagnostic.
- Location Matters:
  - Proximal fractures take longer to heal. Medial tibia has a compressive force and heal quicker than anterior tibia fractures that have a distractive/tensile force.
TREATMENT

• Offload forces on affected bone
  • Walking boot, may need crutches
  • Long leg stirrup brace preferred – Cochrane Review
  • Discussion of proper training techniques with patient, parent, coach
  • Consider surgical intervention (Tibial rod)

• Screen for other contributing factors
  • Previously undiagnosed eating disorders/inadequate caloric intake
  • Female athlete triad: Disordered Eating, Amenorrhea, Osteoporosis
  • Check vitamin D, thyroid, consider DXA
RETURN TO PLAY

• Return can be quite prolonged – frequently up to 12 weeks

• First goal is pain free while protected/immobilized. Once pain free with ADLs and pain free on exam may return to lower impact activities such as cycling/elliptical

• Gradual return to running, starting at 5 minutes with remainder of exercise with cross training (10% rule)

• Adequate number of rest days

• Special circumstances
  • With lower risk injuries may consider immobilization with ADLs and modified participation in their sport to allow them to complete season. Need thorough discussion of possible risk with athlete and parents
CASE #3

- 13 year old male soccer player with pain with running and kicking the ball about 2/3 of the way through the soccer season. No known injury. Gradual onset. Maybe a little swelling over the front of the knee. It hurts worse with going up and down stairs and with sitting in class for a long time. No prior history of knee pain. He has been able to continue to play and has not missed any games or practices.
ANTERIOR KNEE PAIN

• Most common location of knee pain in all ages
• Patellofemoral Pain Syndrome (AKA “Runner’s Knee”)—Most common cause of anterior knee pain
  • Secondary to poor patellar tracking/biomechanics
  • Overuse injury
• Patellar enthesopathy – Osgood Schlatter
PATELLOFEMORAL ALIGNMENT

Normal

Lateral displacement, slight lateral tilt

MERCHANT

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PFPS (PATELLOFEMORAL PAIN SYNDROME)
TREATMENT

• Physical therapy to help improve core and hip strength to decrease degree of functional knee valgus
• Decrease exercise load
• Consider short term knee bracing with a patellar stabilization brace
• Address other areas such as IT band tightness – Foam roller
• Surgical referral for recalcitrant cases or in the setting of patellar dislocation
OSGOOD SCHLATTER’S DISEASE

- Boys age 12-14
- Girls age 11-12
- Usually self limited with activity modification—resolves once physis closes
ACUTE KNEE INJURIES

- Case #3:
  - 16 year old female tennis player runs up to the net to hit a backhand slice. As she tries to stop she twists and her knee buckles under her and she hears a pop. She has immediate onset of pain and needs to be helped off the court. She has swelling that starts within 5 minutes and she has difficulty fully extending her leg.
DIFFERENTIAL DIAGNOSIS OF THE ACUTE, SWOLLEN KNEE

- Marked swelling:
  - ACL
  - Acute patellar dislocation
  - Fracture (tibial plateau, patella)

- Mild, delayed swelling:
  - Meniscal tear
  - Knee sprain (deep fibers of MCL)
  - Osteochondral injury/defect
CASE #3 – DIFFERENTIAL DIAGNOSIS

• Acute ACL tear
  • Twisting knee injury with sensation of a pop – 80% likelihood of ACL tear
  • Obtain x-rays to rule out tibial plateau fracture or other acute bony injury
  • Follow up with MRI to confirm ACL tear and evaluate for other injuries
  • Restrict from sport, protected weight bearing, crutches if needed, brace for comfort
  • Orthopedic referral to plan for ACL reconstruction

• Transient patellar dislocation
  • Not as uncommon as you may think
  • Knee immobilizer initially (14 days maximum) with protected weight bearing
  • Transition to patellar stabilization brace and physical therapy
  • Majority of time does not need surgical repair/correction

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KNEE BRACES

Knee immobilizer  Post-Op Hinged  Patellar stabilization
KNEE BRACES

Functional hinged - MCL

Custom Fit Functional - ACL
CASE #4

- A 15 year old baseball pitcher notices right shoulder pain that is worse with throwing. He seems to have lost some velocity of his pitches and he is having more difficulty locating his pitches with more erratic throws. His arm feels tired. He has pain across the outer shoulder and upper arm that extends into his upper back. No numbness or tingling.
SHOULDER PAIN IN A THROWING ATHLETE

• Differential diagnosis
  • Little leaguer’s shoulder (proximal humeral physeal injury)
  • Rotator cuff strain or tear
  • Tear of the glenoid labrum
    • (SLAP Tear – Superior Labrum Anterior to Posterior)
  • Scapulothoracic dysfunction
  • Proximal biceps injury
  • Multidirectional shoulder instability with shoulder subluxation
LITTLE LEAGUER’S SHOULDER

• More typical around ages 11-14
MULTIDIRECTIONAL INSTABILITY

Sulcus sign

Apprehension and relocation

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LABRAL TEARS – O’BRIEN’S TEST
SHOULDER PAIN - TREATMENT

- Help to determine cause
  - Poor throwing biomechanics
  - To many repetitions – many athletes are playing on multiple teams at the same time and taking individual pitching lessons
  - Types of pitches – pitches such as curve ball and slider put too many rotational forces on the shoulder prior to the closure of the growth plates
- Rest or relative rest until pain subsides
- Importance of physical therapy to help improve scapulothoracic function and rotator cuff strength
- Rarely do these need surgical intervention
  - Exceptions include labral tears with persistent pain despite adequate physical therapy and shoulder dislocations
CONCUSSION – HOT TOPIC ISSUE

Do You Know?

NFL CONCUSSION LITIGATION

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CONCUSSION CURRENT STATE OF TREATMENT

• Consensus Statement on Concussion in Sport: 4th International Conf. Zurich 2012
  • Definition: Concussion is a brain injury and is defined as a complex pathological process affecting the brain, induced by biomechanical forces
  • No same day return to play at the high school or collegiate level for concussion or suspected concussion
  • Treatment is physical and cognitive rest until asymptomatic with a standardized, gradual reintroduction of exercise followed by clearance to return to play
  • The majority of concussions (80-90%) resolve within a 7-10 day period, however this may be longer in children and adolescents
  • CTE represents a distinct abnormality in tau protein with an unknown incidence in athletic populations and there has not been a cause and effect relationship determined between CTE and concussions or exposure to contact sports

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IOWA SENATE STUDY BILL 3044

- Approved 8-6 (party line vote) on Feb 15, 2016 in the Iowa Senate Education Committee
- Sent to Senate floor for debate, yet to be taken up as of mid March
- Would require the home team at high school varsity collision sports to provide a licensed athletic trainer or other expert to assess concussions and other injuries
- Collision sports defined as football, soccer, wrestling, hockey and lacrosse
- About half of Iowa’s schools provide some form of athletic training coverage or other experts at school events
- Some lawmakers estimate the cost of compliance to be between $2,000 to $5,000 annually

Petroski, W. Iowa lawmakers split on anti-concussion sports bill. The Des Moines Register. February 15, 2016
PRACTICAL EVALUATION

SCAT3™
Sport Concussion Assessment Tool – 3rd edition
For use by medical professionals only

What is the SCAT3™?

A computerized concussion assessment tool that permits a doctor to make a fast, accurate decision on return to play by using a CEC (Canadian Concussion Centre) protocol.

SIDELINE ASSESSMENT

Indications for Emergency Management

If any of the following signs are present, or if the patient is concussed, the patient should be excluded from the activity and seen by a doctor:

- Dizziness
- Memory loss
- Slurred speech
- Vomiting
- Loss of consciousness
- Shaking or trembling
- Seizure
- Difficulty keeping balance

Potential signs of concussion:

- Amnesia (a memory gap)
- Nausea or vomiting
- Dizziness or dizziness
- Fatigue
- Headache
- Loss of balance

Maddocks Score™

The Maddocks Score™ is a tool that allows for the assessment of the severity of concussion. It is a subjective measure that is used to determine the severity of a concussion.

1. Glasgow Coma Scale (GCS)
   - 15 (normal)
   - 12-14 (mild)
   - 11-10 (moderate)
   - 9-8 (severe)

2. Memory composite (verbal)

3. Memory composite (visual)

4. Visual motor speed composite

5. Reaction time composite

6. Impulse control composite

Total Symptom Score

Scores in bold type indicate scores that exceed the Risk Indice (R) values and should be reviewed with a doctor. Scores that do not exceed the R indices may still be clinically significant.

ImPACT® Clinical Report

Exam Type Baseline Post-concussion Post-concussion Post-concussion Post-concussion Post-concussion

Table

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# RETURN TO PLAY PROTOCOL

<table>
<thead>
<tr>
<th>Rehabilitation stage</th>
<th>Functional exercise at each stage of rehabilitation</th>
<th>Objective of each stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. No activity</td>
<td>Symptom limited physical and cognitive rest</td>
<td>Recovery</td>
</tr>
<tr>
<td>2. Light aerobic exercise</td>
<td>Walking, swimming or stationary cycling keeping intensity &lt;70% maximum permitted heart rate No resistance training</td>
<td>Increase HR</td>
</tr>
<tr>
<td>3. Sport-specific exercise</td>
<td>Skating drills in ice hockey, running drills in soccer. No head impact activities</td>
<td>Add movement</td>
</tr>
<tr>
<td>4. Non-contact training drills</td>
<td>Progression to more complex training drills, eg, passing drills in football and ice hockey May start progressive resistance training</td>
<td>Exercise, coordination and cognitive load</td>
</tr>
<tr>
<td>5. Full-contact practice</td>
<td>Following medical clearance participate in normal training activities</td>
<td>Restore confidence and assess functional skills by coaching staff</td>
</tr>
<tr>
<td>6. Return to play</td>
<td>Normal game play</td>
<td></td>
</tr>
</tbody>
</table>
THANK YOU!