Andrea Blits, SPT, MEd, ATC

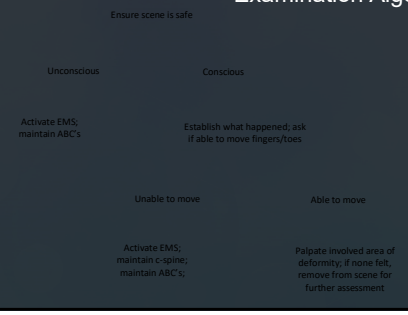
Evaluation and Management of Acute Pediatric Orthopedic Conditions

General Overview

General Injury Management

- HISTORY
  - Past medical history
  - History of present condition
- INSPECTION
  - Obvious deformity
  - Functional assessment
  - Swelling/discoloration
- PALPATION
  - Areas of tenderness
  - Deformity
  - Temperature change
- JOINT AND MUSCLE FUNCTION ASSESSMENT
  - Active Range of Motion (ROM)
  - Manual Muscle Test (MMT)
- NEUROLOGICAL ASSESSMENT
  - Sensory
  - Motor
  - Reflex
- VASCULAR ASSESSMENT
  - Capillary refill
  - Distal pulses

Examination Algorithm



ROM Assessment

Abnormal Passive Range of Motion End-Feels	
End-Feel	**Description**
Soft	Occurs earlier or later in a joint anticipated to have a firm/hard end-feel.
Firm	Occurs earlier or later in a joint anticipated to have a soft end-feel.
Hard	Occurs earlier or later in a joint anticipated to have a soft end-feel.
Spasm	Joint motion is halted by involuntary or voluntary muscle contraction.
Empty	No end feel exists due to pain.

MMT Assessment

Grading Systems for Manual Muscle Tests		
Verbal	**Numerical**	**Clinical Findings**
Normal	5/5	Patient can resist maximal pressure; unable to break resistance.
Good	4/5	Patient can resist moderate pressure.
Fair	3/5	Patient can move the limb against gravity.
Poor	2/5	Patient can move the limb in a gravity-eliminated position.
Trace	1/5	Patient cannot produce movement, but contraction is visible or palpable.
Zero	0/5	No contraction visible or palpable.

Equipment Fitting

- Crutches
  - Handgrip at wrist crease
  - 20-30deg bend in elbow
  - 2-3 finger width between axillary pad and axilla
  - Position crutches at a 45deg angle from foot
- Slings
  - Firm against elbow
  - Shoulder relaxed, not elevated or depressed
  - Wrist should be supported within sling

Transfers

- Two person carry
  - Used to pick a patient up off the floor
  - One person at the head, the other at the lower leg
  - Patient MUST have arm strength and ROM
- Partial stand pivot
  - Transfer from one surface to another
  - Patient's knees should be in between practitioner's knees
  - Wrap arms around patient
  - Lift with legs, not arms

Concussions

Examination of Concussion

- Consider diagnosis of concussion if the patient demonstrates one or more of the following:
  - Mental status change
  - Physical or somatic changes
  - Behavioral changes
- Concussion assessment tools: SCAT 3

Concussion Signs and Symptoms

Area	Signs and Symptoms
Brain	Amnesia Confusion Disorientation Irritability Incoordination Dizziness Headache
Ocular	Blurred vision Photophobia Nystagmus
Ears	Tinnitus Dizziness
Stomach	Nausea Vomiting
Systemic	Unusually fatigued

Behavioral Signs and Symptoms

Sign	Behavior
Vacant Stare	Confused or blank expression
Delayed Verbal and Motor Response	Slow to answer questions or follow directions
Inability to Focus	Easily distracted, unable to complete tasks
Disorientation	Walking in wrong direction, unaware of person, place and time
Slurred or Incoherent Speech	Rambling, disjointed, incomprehensible speech
Gross Incoordination	Stumbling, inability to walk straight
Heightened Emotions	Distraught, crying, emotional responses out of proportion
Memory Defects	Evident by retrograde/anterograde testing

Provance et al.

- Severity determined by nature of head injury, burden on the athlete, and duration of post-concussive symptoms.
- Cardinal signs include confusion and amnesia.
- Do NOT allow return to play/activity without complete resolution of symptoms.
- Monitor closely first 48 hours.
- Be mindful of accommodations.
- Must have physician clearance to return to all activity.

Broglio et al.

- Pediatric Concussion
  - Recovery may take longer in pediatric populations than in adults
  - Age appropriate assessment tools should be used
  - Post-concussion symptoms should be evaluated by the patient, parent/guardian and teachers
  - Work with administrators/teachers for accommodations
- Home Care
  - Oral and written instructions for parents/guardians
  - Avoid medications and alcohol
  - Eat a balanced diet
  - Limit screen time

Orthopedic Conditions

Nursemaid's Elbow

- History
  - May occur from child abuse or play
- Inspection
  - Radius moves distally in an extended, pronated arm
  - Arm will be held in a flexed and pronated position
- Palpation
  - Painful to palpation
- Functional Assessment
  - Painful with AROM
  - Treatment is manual reduction

Elbow Dislocations

- History
  - Localized pain
  - Axial load on a weightbearing limb (FOOSH)
- Inspection
  - Obvious deformity and edema
- Palpation
  - Disarticulation palpable and tender
- Functional Assessment
  - MMT and ROM should NOT be performed

Tibial Spine Avulsion

- History
  - Possible audible "pop"
  - Occurs when the knee is rotated on a fixed lower leg, OR hyperextension
- Inspection
  - Immediate swelling
- Palpation
  - Palpable swelling surrounding knee joint
- Functional Assessment
  - Immediate pain, weakness, muscle guarding, feeling of instability with ambulation

Ankle Sprains

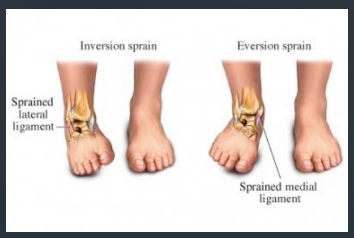
- First Degree (Mild)
  - Involves stretching of the ligament
  - Pain increases with movement
  - Mild point tenderness
  - Possible swelling
- Second Degree (Moderate)
  - Involves partial tearing of ligament
  - Pain with or without movement
  - Point tenderness present
  - Swelling and bruising present
- Third Degree (Severe)
  - Complete tear of ligament
  - Non-functional
  - May not be painful
  - Swelling and bruising present immediately

Examination of Lateral Ankle Sprains

- History
  - Acute onset, possible audible "pop"
- Inspection
  - Swelling, bruising
- Palpation
  - Pain near lateral malleolus
- Functional Assessment
  - Weak and/or painful plantarflexion and inversion

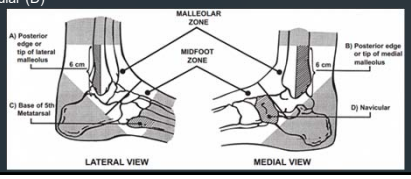
Examination of Medial Ankle Sprains

- History
  - Acute onset, possible audible "pop"
- Inspection
  - Swelling, bruising
- Palpation
  - Pain near medial malleolus
- Functional Assessment
  - Weak and/or painful plantarflexion and eversion



Ottawa Ankle Rules

- Patient unable to walk four steps immediately following injury
- Tenderness at posterior edge of lateral malleolus (A)
- Tenderness at posterior edge of medial malleolus (B)
- Tenderness at base of 5th metatarsal (C)
- Tenderness at navicular (D)



Ankle and Leg Fractures

- History
  - Sharp, localized pain caused by a direct blow
- Inspection
  - May or may not have visible deformity
  - Swelling and bruising may be present
- Palpation
  - Tenderness, possible crepitus, possible palpable deformity
- Functional Assessment
  - Do NOT assess MMT or PROM if fracture is suspected

References

- Begasse de Dhaem, O et al. (2017). Post-traumatic headache: The use of the sport concussion assessment tool (SCAT-3) as a predictor of post-concussion recovery, *The Journal of Headache and Pain*, 18 (60), 1-9.
- Broglio, S. et al (2014). National athletic trainers' association position statement: Management of sport concussion. *Journal of Athletic Training*, 49 (2), 245-265.
- Curtis, E. (2012). Managing 'pulled elbow' in the paediatric emergency department. *Emergency Nurse*, 19 (9), 24-27.
- Giangarra, C., Manske R. (2017). Clinical orthopaedic rehabilitation: A team approach (4th ed.). Elsevier.
- Magee, D. Orthopedic physical assessment (6th ed.). Elsevier.
- Provance, A et al. (2016). Management of sport-related concussion in the pediatric and adolescent population, *Orthopedics*, 39 (1), 24-30.
- Starkey, C., Brown, S., Ryan, J. (2009). Examination of orthopedic and athletic injuries (3rd ed.). Jaypee.

Contact Information

- Andrea Blits, SPT, MEd, ATC
- amblits@shockers.wichita.edu