EMS Subspecialty Certification Review Course

Orthopedics
1.2.2.1 Fractures/Dislocations
   1.2.2.1.1 Splinting Using Nontraditional Materials
   1.2.2.1.2 Reductions without Anesthetics

Version: 2017

Question

- Which of the following is an indication for reduction of an elbow dislocation without anesthetics?
  A. No IV access
  B. Patient located in a ravine with a prolonged extrication time
  C. Open fracture/dislocation
  D. Dislocation is on dominant side

Learning Objectives

Upon the completion of this program participants will be able to:
- Classify and Define various types of Fractures and Dislocations
- Describe how to assess and treat a patient suspected of having a fracture or dislocation
- Identify proper splinting techniques, including the use of traction splints for femur fractures
- Discuss compartment syndrome and its symptoms
- Discuss the use of nontraditional splints
- Discuss when dislocation reduction without anesthesia might be appropriate
Assessment

- Begins with ABCD, then attention to life/limb threatening injuries
- Decisions for treatment are situation dependent

Fractures

- Classification/Description
  - Open vs Closed
  - Exact anatomic location
  - Direction of the fracture line
  - Alignment/Displacement
  - Descriptive modifiers
  - Classification/Naming schemes
Open v. Closed: most rudimentary way to classify a fracture: Open = break in skin integrity around the fracture site
Location: left vs right, name of the bone, and standard reference points (surgical neck, tubercle, intertrochanteric, etc.)
Direction: Transverse, oblique, spiral, comminuted, etc.
Alignment/Displacement: DISTAL fragment is reference point for description relative to PROXIMAL fragment
Descriptive Modifier: Avulsion, Compression, Pathologic, Greenstick
Classification/Naming schemes: Salter Harris, Colles, Smiths, Monteggia

Patient Assessment

- Size up and initial assessment
- EXPOSE!
- CMS (circulation, motor, sensory)
- Splint
- Analgesia
- Dressing open fractures

Size up: don’t get distracted by a painful injury and forget about the less obvious life threatening injury
Fully expose the injury
PMS: what are we assessing for? Injuries to the vessels and nerves
Splinting: Purpose of splinting: reduce further injury, reduce pain, 1-2 bones, splint individually. Multiple bones, secure to backboard and immobilize the whole body.
Pain control: typically underutilized often for fear of overmedication or side effects. Consider the drug and it’s properties (fentanyl vs Dilaudid). Consider the dose and know your patient, his/her age, body habitus, etc.
Dressing: moist gauze over exposed bone
Splinting 101

• General Principles:
  – Equipment selection: Pneumatic vs rigid
  – Realignment vs. Position Found
  – Immobilize the joints above and below the fracture site, when possible
  – Padding
  – Wrapping
  – Assess and Reassess
  – Document, document!

Pneumatic (inflatable): Advantages = see thru, compression of low pressure bleeding, radiolucent, easy to apply, reusable; Disadvantages = expensive, ? Compartment syndrome (inflate until firm but still indents)
Rigid: Aluminum, cardboard, ladder, wood (spine board)
Realignment when no pulse, dusky, or severe deformity exists
Generous padding to prevent skin necrosis and breakdown
Wrapping: circumferential wrap to secure the splint, should be expandable to allow for swelling
Assess and Reassess: CMS before and after, and Document what was done!

“Traction” Splints

• Indication: swollen, painful, deformed thigh
• Contraindication: known or suspected pelvic fracture, knee fracture, or near amputation
  – ? Open fracture
• Bipolar vs Unipolar
• Downsides
“traction” is a misnomer. Really there is application of countertraction. Bipolar: 2 rods, leg suspended between, slightly less stable during patient movement; Unipolar: single rod, countertraction pressure can be measured, more stable as rod is positioned against the pubic bone generally. “Pull Traction”: actually inaccurate. Pain is from spasm, and spasm takes several minutes to stop. Sager (unipolar) can be applied to countertraction of 10% the person’s body weight in pounds (recommended). Check PMS before and after application of the splint. Downsides: 2 people to apply, prolonged scene times, peroneal nerve injury, tissue necrosis, urethral injury, distal ischemia. Some evidence discusses use of pain meds as equivalent to traction splint with less downside.

Pelvic Fractures

- Mechanism: falls, MVC/MCC, Crush Injury
- Signs/Symptoms:
  - Shock (venous hemorrhage)
  - Pelvic pain with movement or compression
  - Shortened limb
  - Unexplained bladder pressure
- Assessment: AVOID compression
- Treatment
  - Minimize movement, permissive hypotension?, pelvic binders
- Trauma Center

Special Emphasis

- Unstable Pelvic Fractures
  - Can lead to exsanguination
  - Field treatment with compressive binder can be lifesaving
Compartment Syndrome

- Swelling in tight fascial compartment produces irreversible damage to the vessels and nerves that pass through that compartment
- Examples
- Symptoms: 5Ps (which one FIRST!)
- Caution when splinting
- Prehospital Care

Examples: anterior tibia, forearm, wrist and hand
Pain, Pallor, Paralysis, Paresthesias, Pulseless
Tight splints and wraps can also produce compartment syndrome
Prehospital Care: elevate, ice packs, loosen dressings over the site, immediate transport
Dislocations

• Definition: complete loss of continuity between 2 articulating surfaces (luxation)
• Subluxation
• Shoulder>Knee>Elbow
• Watch Out!

Subluxation: partial dislocation, some of the articulating surfaces remain in contact, may have preserved ROM. Usually splint in position of comfort and treat pain. Rural and backcountry EMS may have protocols for reduction; reduction may be required in situations where loading the transport vehicle cannot be achieved (e.g. inferior shoulder dislocation, helicopter w cramped compartment).

Most common: ANTERIOR Glenohumeral, then Knee and then elbow
Watch out: axillary nerve injures with GH dislocations, median nerve as well as brachial artery injuries with elbow dislocations, AVN with hip dislocations. Hip dislocations require extreme force and one should look carefully for other injuries.
Patient Assessment

• Two most common symptoms of dislocations:
  – Pain in the involved joint
  – Loss of range of motion of the involved joint
  – Deformity of the joint typical of dislocation such as the shoulder

• Neurovascular status is paramount! Always assess circulation/sensation distally

Special Emphasis

• Special Considerations: Areas of potential neurovascular injury!
  – Hip
  – Knee
  – Elbow

Splinting
Splinting

• Three Key Elements:
  – Padding (protect the skin)
  – Rigid
  – Reinforced/Secured
• Same principles as with fractures
• Assess CMS before AND after splinting
• Realign vs Position Found

“Nontraditional” Splints

• Essentially, anything you can find that will safely and comfortably secure the injured part and minimize movement
• Don’t forget padding!
• Examples:
  – Pillows, Sleeping bags, Clothing
  – Tree branches, ski poles, Backpack frame
  – Water bottle (weighted traction)
  – Don’t forget, “buddy” taping

Reduction without Anesthetics
Reductions without Anesthetics

• Two Common Scenarios
  1. Austere environment
  2. Pulseless or neurologically devastated extremity
• Communication with the patient is the key
• Assess CMS before/after the procedure

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Take-Home Points

- **Take Home**
  - Assessment of the CMS both BEFORE and AFTER care
  - Treatment: splinting and pain control
  - Use of traction splints: indications/contraindications
  - Nontraditional splinting techniques: think outside the box
  - Special considerations for dislocations (AVN, popliteal injury, etc.)
  - Reduction without anesthesia: importance of good communication with the patient
  - Field tx of pelvic fx w binder: potentially lifesaving