

Musculoskeletal Injuries Splinting

Lt. Russell D. Armstrong
Fire Prevention Officer
Stevens County Fire District No.1

Objectives

- To review the assessment of a patient with an extremity injury
- To review types of extremity injuries
- To review the care of a patient with an extremity injury
- To review types of splints

Musculoskeletal Injuries

- Scene Size-up
 - Mechanism of Injury
 - Look for clues of where injuries could be
- Initial assessment
 - Need for spinal immobilization
 - ABC's
- Rapid Trauma Assessment vs. Focused Trauma Assessment
 - What is the difference

Scene Size-up



Assessment of Musculoskeletal Injuries

- Scene size-up
 - Dispatch may indicate MOI and number of patients.
 - Observe for hazards and safety threats.
 - Try to identify MOI.
 - Use BSI precautions.
 - Consider need for law enforcement, ALS, or additional ambulances.

General Impression

- Assess level of consciousness.
- Chief complaint
- Mechanism of injury

Airway and Breathing

- Ensure there is an open airway.
- Ensure there is adequate breathing.
- Provide oxygen to relieve anxiety and improve perfusion.



Circulation

- Check pulse
- Check for adequate perfusion
- Check for and control bleeding
- Check skin color, temperature, and condition
- Treat for shock if necessary

Transport Decision

- Consider rapid transport for a patient with airway or breathing problems or significant bleeding or significant MOI (even if patient appears stable)
- Maintain high index of suspicion for patients with bilateral fractures of the long bones

Transport Decision

- Use a backboard to splint the whole body rather than individual extremities
- Patients with simple MOI may be assessed and stabilized on scene

Baseline Vital Signs

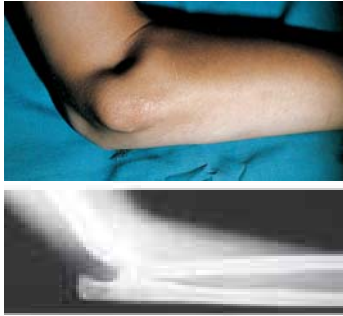
- Assess pulse rate, rhythm, and quality
- Assess respiratory rate, rhythm, and quality
- Assess blood pressure
- Assess skin condition
- Assess pupil size and reaction to light

Focused Trauma Assessment

- Focused physical exam
 - Focus on the isolated injury, the patient's chief complaint, and the body region affected.
- Rapid physical exam
 - Assess from head to toe for DCAP-BTLS.
 - Do not delay transport if significant bleeding.
 - Stabilize cervical spine.
 - Secure patient to backboard.

Assessing Suspected Extremity Injuries

- Expose
- Assess injury
 - Fracture
 - Dislocation
 - Sprain
 - Strain



Fractures

- Closed fracture
- Open fracture
- Non-displaced fracture (hairline fracture)
- Displaced fracture



Signs and Symptoms of Fracture

- Deformity
- Tenderness
- Guarding
- Swelling
- Bruising
- Crepitus
- False motion
- Exposed fragments
- Locked joint

Signs and Symptoms of Dislocation

- Marked deformity
- Swelling
- Pain aggravated by movement
- Tenderness on palpation
- Locked joint
- Numbness or impaired circulation to the limb or digit

Mechanism of Injury

- Direct blows
- Indirect forces
- Twisting forces
- High-energy injury
- A slight force can fracture a bone that is weakened by a tumor or osteoporosis

Interventions

- Assess overall condition, stabilize ABCs, and control serious bleeding.
- Secure critically injured patients to a long backboard.



Interventions

- Check circulation, motor function, and sensation before and after splinting.
- Stabilize in the most comfortable position that allows for good circulation distal to the injury.
- If there are no life-threatening injuries, may stabilize patient more completely at the scene.

Splinting

- Helps prevent
 - Further damage to muscles, spinal cord, nerves, and blood vessels by broken bone ends
 - Laceration of the skin
 - Restriction of distal blood flow
 - Excessive bleeding
 - Increased pain
 - Paralysis of extremities from damaged spine

General Principles of Splinting

- Expose the area.
- Note and record distal pulse, sensation and movement.
- Cover all wounds with a dry, sterile dressing.
- Do not move the patient before splinting unless there is an immediate hazard.

General Principles of Splinting

- Stabilize the joints above and below the fracture.
- Stabilize the bones above and below the joint.
- Pad rigid splints.
- Maintain manual stabilization while applying splint.
- Use constant, gentle, manual traction to align deformities to splint.

General Principles of Splinting

- If you encounter resistance to alignment, splint in the position found.
- Stabilize suspected spinal injuries on a backboard.
- If the patient has signs of shock, align the limb in the normal anatomic position and provide transport (total body stabilization).
- When in doubt, splint.

General Principles of In-Line Traction Splinting

- Pulls the body structure in the direction of its normal alignment
- The most effective way to realign a fracture of the shaft of a long bone
- Excessive traction can be harmful.
- Do not attempt to reduce the fracture or force bone fragments into alignment.

General Principles of In-Line Traction Splinting

- Goals
 - Stabilize the fracture
 - Align the limb to be placed in splint
 - Avoid potential neurovascular compromise
- The amount of traction required usually does not exceed 15 pounds.
- The direction of traction is always applied along the long axis of the limb.

General Principles of In-Line Traction Splinting

- Grasp the foot or hand.
- Initial pull causes discomfort for the patient, but this should subside quickly.
- If the patient strongly resists traction or if it causes more pain that persists, stop traction and splint in the position it is in.

Rigid Splint



Zippered Formable (Air) Splint



Un-zipped or Partially Zipped Air Splint



Health Training Network
INLAND NORTHWEST HEALTH SERVICES

healthtraining.inhs.org | inhs.org

Vacuum Splint



Health Training Network
INLAND NORTHWEST HEALTH SERVICES

healthtraining.inhs.org | inhs.org

Hare Traction Splint



Health Training Network
INLAND NORTHWEST HEALTH SERVICES

healthtraining.inhs.org | inhs.org

Sager Traction Splint



Health Training Network
INLAND NORTHWEST HEALTH SERVICES

healthtraining.inhs.org | inhs.org

Contraindications for Traction Splints

- Injuries of the upper extremity
- Injuries close to or involving the knee
- Injuries of the hip
- Injuries of the pelvis
- Partial amputations or avulsions with bone separation
- Lower leg, foot, or ankle injuries



healthtraining.inha.org | inha.org

Ongoing Assessment

- Repeat the initial assessment and vital signs.
- Assess interventions and treatments.
- Reassess distal pulse, motor, and sensation if a splint was applied.



healthtraining.inha.org | inha.org

Communication and Documentation

- Include a description of injuries.
- Report problems with ABCs.
- Report whether fractures are open and whether circulation is compromised.



healthtraining.inha.org | inha.org

Communication and Documentation

- Provide complete descriptions of injuries and MOI.
- Assess and document presence or absence of circulation, motor function, and sensation distal to the injury before you move an extremity, after manipulation or splinting, and on arrival at hospital



healthtraining.inha.org | inha.org

Question 1

- Which of the following can be a sign or symptom of a femur fracture?
 - a. Absent or diminished pulse
 - b. Bruising
 - c. Crepitus
 - d. All of the above

Question 2

- In-line traction provides which of the following to the patient with a suspected femur fracture?
 - a. Reduces fracture to near anatomic alignment
 - b. Decreases perfusion to the distal area of the fracture
 - c. Increases the possibility of hemorrhage
 - d. All of the above

Question 3

- Hypotension is a common finding in an isolated femur fracture.
 - a. True
 - b. False

Question 4

- Principles and methods of knee immobilization can be carried over to the elbow immobilization.
 - a. True
 - b. False

Question 5

- Signs of vascular compromise include all *except*?
 - a. Delayed capillary refill
 - b. Loss of pulse
 - c. Loss of sensation
 - d. Pale, cyanotic, cool or cold skin

Secret Question

- What percent of patients who have a femur fracture have an associated injury?
 - a. 100%
 - b. 80%
 - c. 60%
 - d. 40%

Answer to the Secret Question

b. 80%

Scene Safety is Always #1



Questions?

Questions?

**Contact: Carolyn Stovall
509-242-4263
1-866-630-4033
stovalc@inhs.org
Fax: 509-232-8168**



healthtraining.inhs.org | inhs.org