MUSCULOSKELETAL INJURIES

Disaster Response Emergency Medical Care

Todd Miner
University of Colorado School of Medicine
Wilderness & Environmental Medicine Section

With graphic and layout assistance by Onilia Zorio

Goals

- Assess musculoskeletal injuries
- Differentiate between functional and non-functional
- Identify vascular or neurologic complications
- Demonstrate splinting of long bone injuries
- Describe assessment of dislocations
- List reasons for evacuation

Functional or Not?

- Ability in field to distinguish between a break, sprain, or dislocation very difficult
- Treatment very similar
- Bottom line: Is it stable or not? Is body part functional or not? Can it be used?
- If not functional, can it be made functional with RICE, with a splint?

Determining Functionality

Determine if functional

- Ask patient to move and use
- What is range of motion?
- Can it be used, or might be used with RICE or splinting
- Pain best prevention from creating additional damage

If not immediately functional

- Rest can make a difference – 24 hour swelling curve
- RICE (rest, ice, compression, elevation)

Splinting - If rest and/or RICE not possible or not sufficient

Treatment – RICE

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Pain Control for Musculo-Skeletal Injuries

- Cold
  - Snow or ice (insulated)
  - Cold water immersed or in zip lock bag/camelback
- OTC drugs
  - Tylenol or Ibuprofen
  - Maximize dosages for both simultaneously
- Supportive care
  - Distraction
  - Massage
  - Touch
- Splinting

Why Splint

- Prevents further damage
- Reduces pain
- Encourages rest
- Provides compression, reducing swelling
- Can assist with functionality

Splinting

For **bone** – immobilize joint on either side (“above and below”) of the bone

For **joint** – immobilize bone on either side of the joint

A good splint is…..

ADJUSTIBILE

- Due to swelling
- Due to loosening during treatment or transport
- Tape can't be adjusted
- "One and done" does not work for splints
- The longer to definitive care the more often the splint should be examined/adjusted

7 Step Splinting Treatment

1. Expose injury
2. Control any bleeding and clean any wounds
3. Check CSM* distally for damage to blood vessels or nerves

*Circulation, Sensation, Movement

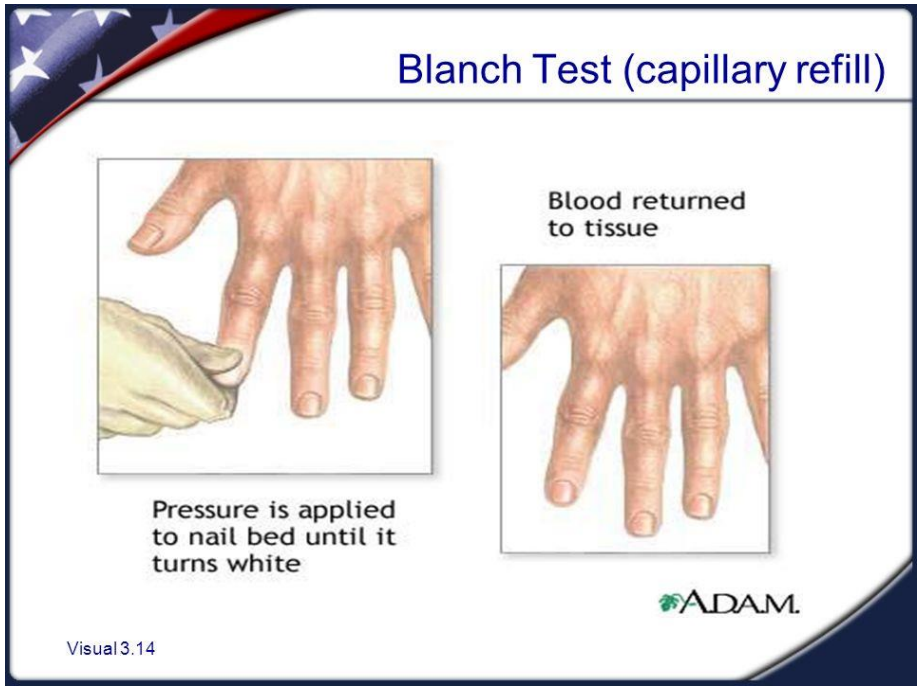
Treatment (Continued)

4. Pad, pad, pad
5. Add rigidity (SAM splint, stick, rolled up magazine, sleeping pad, etc.)
6. Wrap tightly and with adjustable ace wrap, bandanas, cordage, etc.
7. Check CSM (if compromised re-adjust)

There is nothing magical about these 7 steps, they merely provide a consistent framework

Compromised CSM

- If CSM is compromised on initial exam, realignment or reduction or rapid transport to definitive care ideal
- Less than two hours from definitive care probably best to transport to definitive care
- If CSM is compromised at conclusion of splinting, re-do splinting, it's probably too tight



Disaster Medicine Splinting

Importance of Padding

- Patient is likely to have splint on for hours, even overnight or for days
- Padding is critical to prevent open sores or skin ulcers from developing
- **No part of the rigid material should be in direct contact with skin or just one layer of clothing – pad, pad, pad**
- Padding around bony prominences and along edges of splint is particularly important
- Extensive padding, when compressed, also adds to stability
- Use clothing, bandanas, towels, etc. for padding

Splinting Tricks – Big Picture

- Disaster medicine is a team sport, use patient and others' hands to help
- Lay out materials before getting started
- For a bone focus on immobilizing the joint above and below; for a joint focus on immobilizing the bone above and below
- Padding is key
- Tightly wrapping helps increase compression, stability, and pain control
- Readjustments are inevitable; ensure wrapping is adjustable to deal with this and swelling

Improvised Rigidity

- Sticks
- Tool handles
- Cardboard
- Rolled magazines
- Seat cushions
- Rolled throw rugs, bath mats, etc.
- If item is hard, it’s usually easier to pad the rigid object really well rather than patient’s limb

SAM Splints

- SAM splints are the most commonly used manufactured form of rigidity
- Thick, adjustable aluminum sheet wrapped in thin foam
- Provides excellent rigidity for wrist/lower arms, ankles, C-spine protection

SAM Splints

- Recommended way is to use in “sugar tong” configuration, but many other ways possible *(see next slide)*
- Putting “V” or curve down length of SAM splint will make more rigid
- Foam around SAM splint is insufficient padding; do not let any part of SAM splint touch bare skin or just one layer of clothing; additional padding on patient’s limb necessary for long wilderness extractions
- SAM splint can also be used for seat insulation!

Lower Arm Sugar Tong

- Can be used for lower arm (ulna/radius) or wrist injury
- Remember to bend elbow <90° with palm facing chest
- If using SAM splint start with it bent in half like sugar tong and keep very snug around elbow
- Picture has grossly inadequate padding and wrapping for disaster splinting

Splinting Ankle

- Ideally footgear comes off
  - Allows visual examination and check of CSM
  - Can be painful for patient: totally loosen laces, tongue, etc.
  - May be difficult to get back on due to swelling
- If patient carried out, keep footgear off
- If patient limping to help, put footgear back on
  - Makes splinting easier
  - Can be difficult to re-check CSM when splint done
  - Make sure wrap does not go under foot

Splinting Ankle with SAM Splint

- Sugar tong method works best if bulky footgear (boots) kept on foot
- If no footgear, figure 8 wrap works well
- Either way, start with middle of SAM splint under the arch or center of the foot (not back by the heel)
- Don’t forget padding
- If patient will be limping to help be sure wrap doesn’t go under foot where it will be very quickly worn through
- A tightly tied bandana around the ankle can help

Splinting Lower Leg

- Difficult to splint due to need to immobilize both ankle and knee
- Simplest way to splint is to build good ankle splint and then good knee splint
- Ideally overlap with ankle splint with knee splint

Buddy Splinting

- Uses body or body part, and clothing, for rigidity and padding
- Especially appropriate for fingers, femur, elbow/humerus/shoulder
- For fingers & femurs, pad between body parts and bind firmly together

Buddy Splinting – Arms/Shoulders

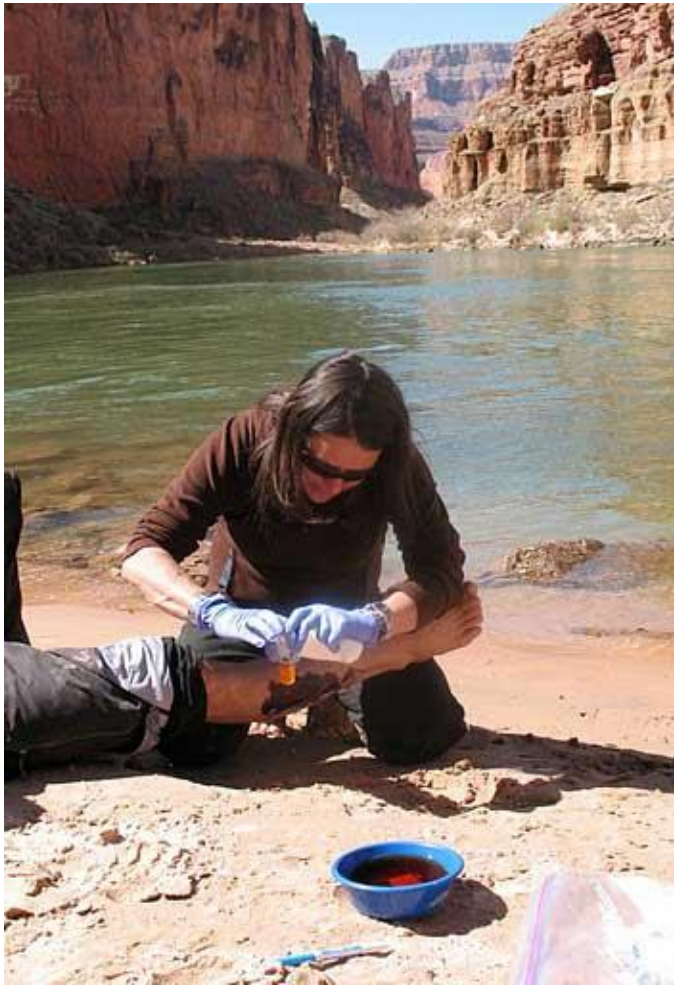
- Hold arm against stomach with elbow bent <90 degree, hand flat against chest (like saying Pledge of Allegiance)
- Pull up front of shirt or jacket over the forearm and elbow (t-shirts, hoodies, fleece, soft shell all work well
- Put “button” (large pebble, pill bottle, etc.) under both layers of outside garment, high on the other side of the chest from the injury
- Grab button from outside of garment, pulling away from body
- Wrap cord, hair tie, rubber band, etc. around button to secure button
- Can swath if helpful

Slings

- Disadvantages
  - Slings difficult to make comfortable over long time
  - Slings use up more resources
- Use shirt or jacket to create buddy splint
- Put elbow of affected side in jacket sleeve
- Put arm in partially buttoned (best) or zipped shirt or jacket
- Swath can help

Open Fractures

- A fracture where a bone end sticks out the skin, also called compound fracture
- The bone end may retract back into the skin or may still be sticking out
- Open fractures very prone to serious infection (18% in one study)
- Not uncommon (~25% of lower leg fractures are open)
- Clean wound, irrigate bone end
- Cover wounds with sterile dressings
- Splint



Dislocations

Signs

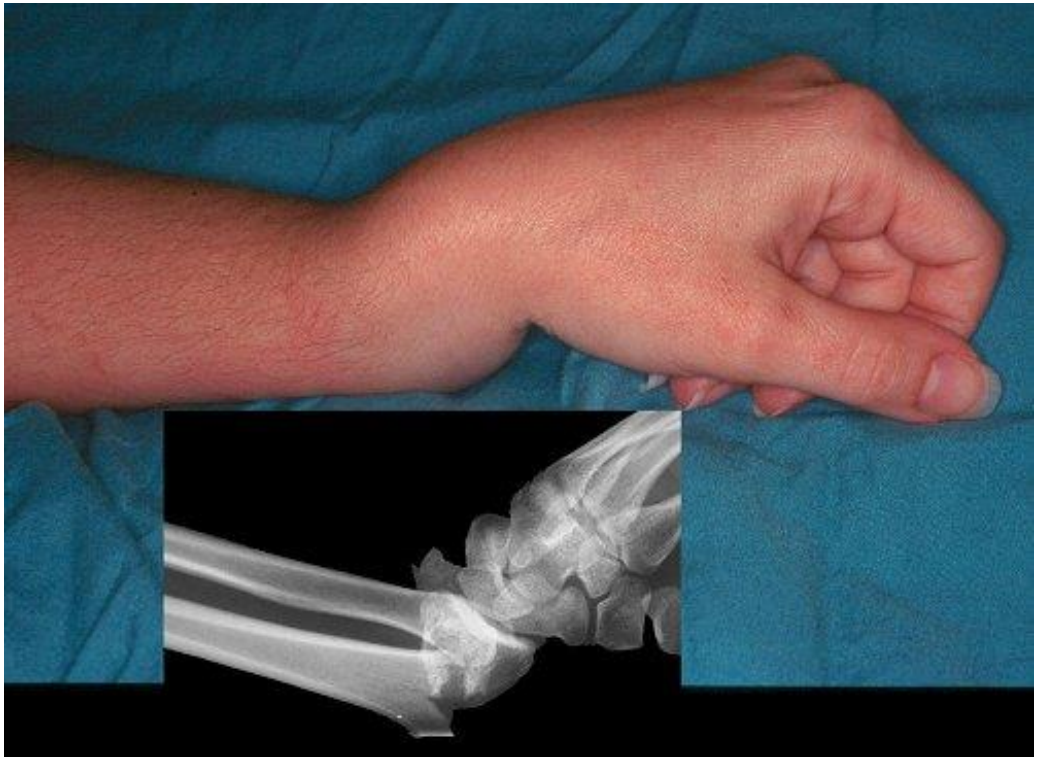
- Deformity
- Inability to move joint
- Significant pain
- May be impossible to distinguish from other injuries

Treatment

- Treat as fracture
- Splint
- Treat for pain

Red Flag Evacuation Musculoskeletal Injuries

- Compromised CSM
- Open (or suspected open fractures)
- Severely angulated fractures



Musculoskeletal Injuries Summary

- We don't have x-ray vision. Main question: Is limb functional or not?
- If not can RICE or splinting make it functional or at least help?
- RICE – Rest, Ice, Compression, Elevation
- Seven steps of splinting
  1. Expose
  2. Look for and clean any wound
  3. Check CSM
  4. Pad, pad, pad
  5. Add rigidity
  6. Wrap
  7. Re-check CSM
- For bone injury stabilize joint above and below, for joint, stabilize bone above and below

Musculoskeletal Injuries Summary

- A good splint is adjustable, compact, and effective at immobilization
- Padding crucial for wilderness; prevents open sores from rubbing
- Rigidity can come from sticks, poles, pads, packs, SAM splints
- Wrapping should be done tightly and done with ace wrap, bandana, ripped up clothing, cordage (with padding)
- Buddy splinting effective way to splint fingers, upper arm, femur
- Clothing with button trick effective way to deal with upper arm injuries and/or to avoid need for sling

Musculoskeletal Injuries Summary

- Open fractures should be carefully cleaned and reduced if necessary; big worry is infection
- Pelvis fractures associated with major trauma, internal injuries, high fatality rate; pelvis binding can help reduce space and thus internal bleeds
- Knee and ankle strains/sprains common; RICE, ace wrap or splinting may be helpful
- Dislocations can be difficult to differentiate from fractures, treat as fractures

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