

H09: Extremity Trauma

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Reviewed:

Introduction

Extremity trauma is a common, potentially life-threatening phenomenon. Injuries to the limbs include fractures and bleeding, which should be immobilized and controlled, respectively. Paramedics should endeavour to resolve neurological or vascular compromise wherever possible.

Essentials

- Bleeding from limbs can be life threatening. Control using direct pressure. Apply tourniquets as necessary.
- If a limb is pulseless and severely angulated, it should be repositioned to allow for the restoration of pulses.
- Fractures require stabilization with good splinting practices.

Additional Treatment Information

- Altered sensation, a loss of a pulse, or cold and dusky skin in a limb distal to a fracture or dislocation is an indicator of neurological or vascular compromise. This is a limb threatening injury, and is time critical.
- The general principles of reducing a fracture are:
 - Provide procedural analgesia ([→ CPG E08](#))
 - Irrigate open wounds with 500 mL to 1 L of saline
 - Apply traction and gentle counter-traction in the line of the limb
 - If required, further manipulation should be done while the limb is still under traction
 - Splint the limb following reduction
- Amputated limb portions should be rinsed with cool sterile saline prior to being wrapped in loose, saline-moistened sterile gauze. The limb can then be placed inside a plastic bag and kept in a cool, protected place while being transported with the patient. Do not immerse the amputated limb in water, do not allow the limb to warm, and do not place directly on ice, or use dry ice to cool.
- The use of traction splints should be reserved for isolated, closed, mid-third femur fractures. In major trauma cases, or with multiple injuries, splint the injured leg to the opposite leg and use a clamshell to immobilize.

Referral Information

- Patients with a limb threatening injury must be transported to a trauma center. Follow local guidelines for orthopedic trauma for fractures.
- Isolated knee or ankle injuries may be evaluated using the [Ottawa Knee and Ankle Rules](#), and may not require transport.
 - Ottawa Ankle Rule: bone tenderness at the posterior edge, or tip, of either the lateral or the medial malleolus, or the inability to bear weight for four steps (both immediately after injury and in the emergency department) requires imaging to assess.
 - Ottawa Knee Rules: knee x-rays are required if:
 - Patient age > 55, or
 - Isolated tenderness of the patella and no bone tenderness of knee other than the patella, or
 - Tenderness at the head of the fibula, or
 - The patient is unable to flex the knee to 90 degrees, or
 - The patient is unable to bear weight for four steps (both immediately after injury and in the emergency department), or
 - The patient is unable to transfer weight twice onto each lower limb, regardless of whether they are limping.

General Information

- Fractures are a condition in which there is a break in the continuity of a bone. It may be caused by direct force or indirect impact. The aging process causes significant changes to the skeletal system; bones become less flexible, more brittle, and more susceptible to fractures. As well, pathological conditions such as tumours of the bone, periosteum, or cartilage or other diseases can also increase the likelihood of fractures.
- Fractures are characterized by deformity, swelling, pain, bruising, crepitus, and instability.
- Fractures are categorized as:
 - Closed; surrounding skin remains intact□
 - Open/Compound; disruption in the surrounding skin with or without protruding bone ends
- Dislocations are a separation of two bones where they meet at a joint. In a complete displacement of a bone end from its normal joint position, the bone sits in an abnormal position. Risks associated with dislocations include trapping, compressing, or tearing of the blood vessels and nerves. Dislocations are usually characterized by obvious deformity, pain, swelling, and immobility of the joint.
 - Paramedics should exercise a high degree of suspicion with possible knee dislocations (as distinct from patellar dislocations): assume that a significant underlying arterial injury exists, requiring careful management. Consultation with CliniCall is encouraged.

Interventions

First Responder

- Control life threatening bleeding
- Direct pressure to sites of obvious ongoing blood loss
- Rapid application of tourniquet for catastrophic extremity injury or significant bleeding uncontrollable through direct pressure
 - → [PR03: Tourniquets](#)
- Stabilize obvious fractures

Emergency Medical Responder – All FR interventions, plus:

- Consider wound packing to control ongoing bleeding
 - → [PR04: Wound Packing](#)
- Splinting
- Consider traction splint for isolated mid-third femur fracture with prolonged transport

Primary Care Paramedic – All FR and EMR interventions, plus:

- Consider vascular access and fluid replacement
 - → [D03: Vascular Access](#)
- Consider [tranexamic acid](#)
- Provide analgesia as required.
 - → [E08: Pain Management](#)

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Consider procedural sedation for re-positioning fractures
 - → [PR17: Procedural Sedation](#)

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Consider blood products for significant hemorrhage

Evidence Based Practice

[Extremity Trauma](#)

[Limb Amputation / Mangled / Major Hemorrhage](#)

References

1. International Trauma Life Support. Utilization of traction splints with open femur fractures. 2011. [\[Link\]](#)
2. The Ottawa Rules. [\[Link\]](#)

