

# Injuries of the extremities and pelvis




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# Statistic:

- Trauma is leading cause of death up to 40 years of age.
- 40% of injuries occur in traffic.
- Limb injuries account for about 50% of all injuries.
- Often underestimated blood loss and pain.



# **Injury = trauma**

- An injury (as a wound) to living tissue is caused by an extrinsic agent / force

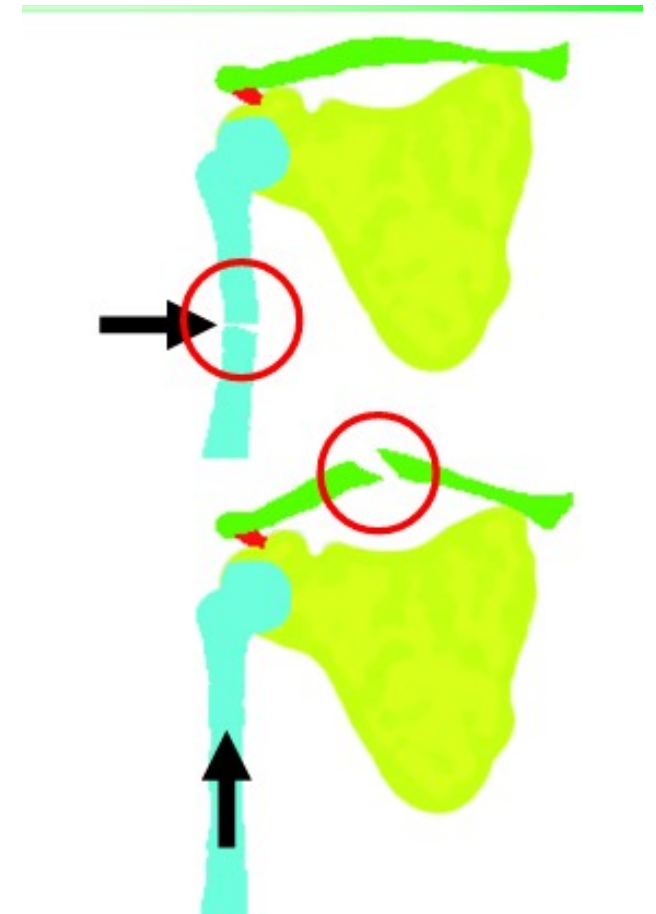
# Limb:

- bones
- joints
- muscles, tendons
- nerves
- vessels
- skin



# Force

- direct
- indirect
  
- great force shortly
- low force for long time
  
- pathologic fracture  
= low force + sick bone



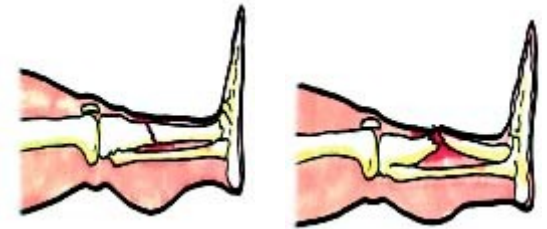
# Wounds - First Aid

- Minor injuries are disinfected and covered with a bandage.
- For major wounds:
  - hemostasis
  - immobilize the limb
  - Do not extract foreign bodies from the wound.
  - Shorten only if they prevent transport.  
(needle is not „foreign body“ = pull the needle)
  - EMS transport to a medical facility.



# Types of Fractures

- Closed x Open
- Stable x Unstable
- dislocated x nondislocated
- by origin: traumatic x pathological



**Considerable** force is needed to break a bone unless it is diseased or old



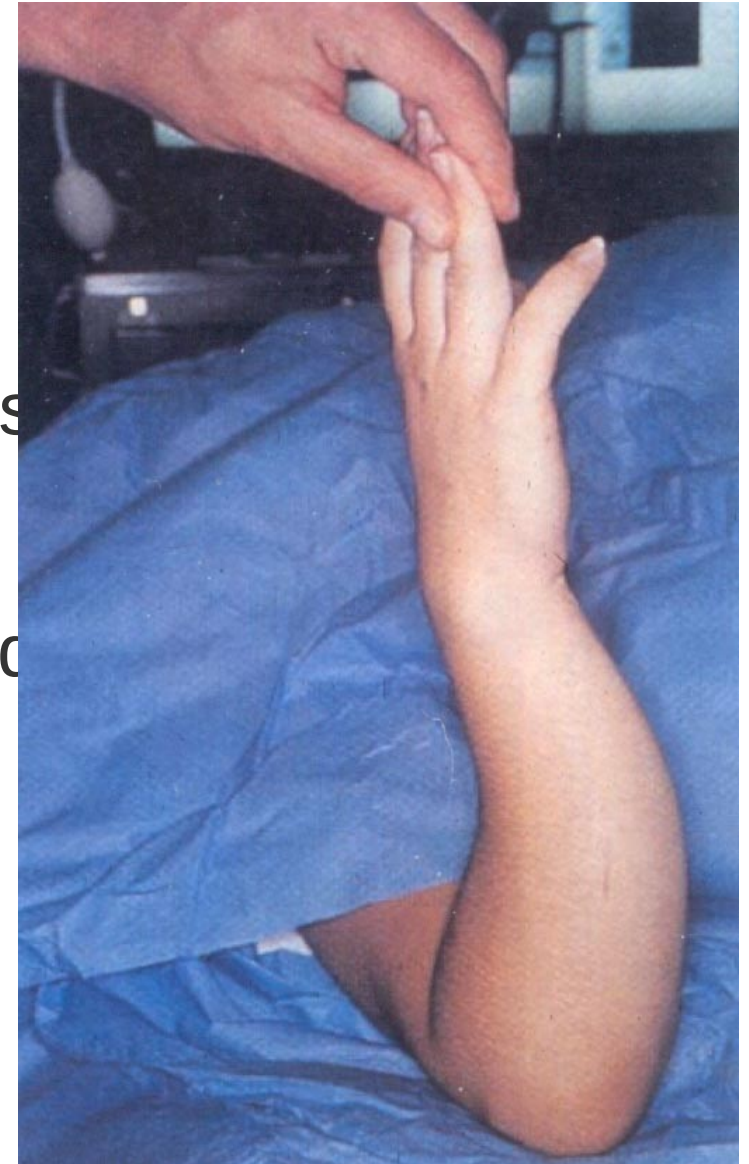
# Open fracture

- Broken bone ends can pierce the skin surface or wound over the fracture



# Closed fracture

- Skin is intact
- Bones may be displaced
- Damage to other internal tissues
- Internal bleeding, shock!
- FA – immobilize to an unaffected
- Transport to a hospital



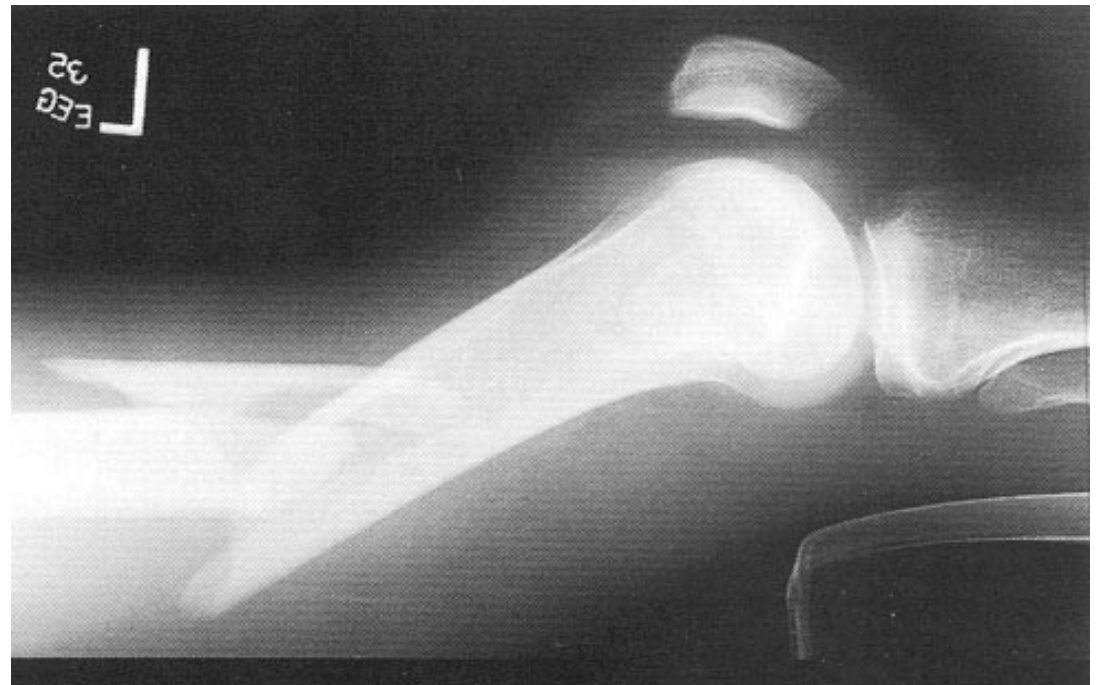
# Stable fractures

- The broken bone ends do not move (incompletely broken, jammed together)
- Wrist
- Shoulder
- Ankle
- Hip



# Unstable fractures

- The broken bone ends can easily move out of position
- The bone is completely broken or the ligaments are torn (ruptured)
- Damage to blood vessels, nerves, organs!

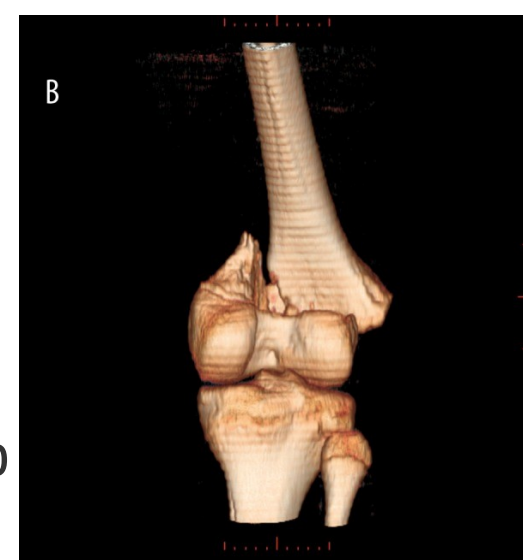




# SIGNS AND SYMPTOMS

Some or all:

- deformity = A visibly out-of-place or misshapen limb by side difference in circumference
- intense pain at the site, crepitus (heard or felt)
- tenderness
- loss of power to limb
- Swelling [oedema] = longer circumference
- Bruising [suffusion]
- Numbness and tingling [anaesthesia]
- Broken skin with bone protruding
- Limitation or unwillingness to move a limb
- associated wound and blood loss .... SHOCK
- nausea, pale, cool, clammy skin; rapid, weak pulse



# Fractured Patella



**Crepitus** - the sounds of bone ends clicking or rubbing against each other

# Blood loss during fracture

- ribs - 150 ml
- humerus - 500 ml
- forearm - 250 ml
- pelvis - 2000 (5000!) ml
- femur (diaphysis) - 1500ml
- shinbone - 650 ml
- in case of a complicated fracture to double



# Evaluation of circulation

- Nail blanch test (capillary refill test)
- Pulses

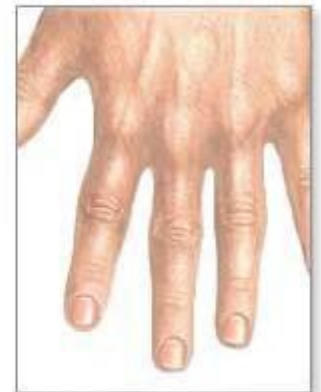
## Impaired circulation

- Swolen, conjested limb
- Blue skin, painfull stretching of skin
- Pale, waxy skin
- Tingling



Pressure is applied to nail bed until it turns white

Blood returned to tissue



# Evaluation of circulation



radial pulse



posterior tibial pulse

# Fractures - First aid

- DRsABC
- In open fractures sterile wound dressing
- Do not move with an injured leg
- Do not correct
- Do not splint if EMS is available
  - lower limb = 155
  - upper extremity can be transported by car to the hospital.
- Do not eat, drink or smoke  
(fasting before possible surgery)



# Injuries of the pelvis

- Large blood loss (internal bleeding)  
= Shock, frequent injuries of the organs of pelvis  
minor
- Call EMS
- Do not change position
- Do not try to walk



# Immobilization

- Bandages:
  - Immobilization of joints
  - Arm sling
- Splints:
  - Ladder
  - Vakuum
  - Rolled up blankets, magazines, clubs, bars ...

# Arm Sling



Support their bad arm

Check for circulation

# Ladder Splint

a flexible splint consisting of two stout parallel wires with finer cross wires



RTG

# Vakuum splint





# How to (out door)

- immobilizing one healthy joint above and below disability
- Underlay protrusions of bone (heel, knee, elbow)  
- prevent pressure sores, nerve damage
- splint, bandages, scarves,  
improvised parts of the clothing



# Upper extremity

- All fractures can be immobilized by securing the extremity to the chest.



# Lower extremity

- All fractures can be immobilized by securing the injured extremity to the opposite lower extremity.



# Tips and tricks – on the snow

- Unpin binding
- Do not remove the shoes, just allow powders
- Call the mountain rescue service



# Dislocation = luxation

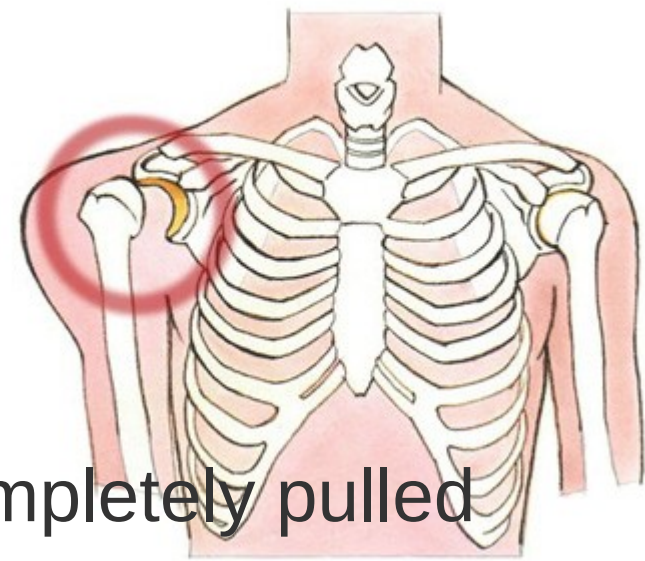
- shoulder



# Dislocated joint



# Dislocation



- Joint injury = bones are partially / completely pulled out of position.
- strong force / muscle contraction
- Signs: deformity, severe pain, **swelling**, difficulty in moving.
- I.A.: Do not reposition. Prevent movement, Support.  
EMS  
Do not allow the person to eat  
(general anesthetic may be needed)

# Strains and sprains

- soft structures – ligaments, muscles, tendons.
- Tissues are stretched, twisted or torn by violent or sudden movements.
- Pain, tenderness, hematoma, difficulty moving. swelling, bruising.
- I.A.:  
Rest,  
Ice / cold compress  
Compress  
Elevate





# Decollmant = rolling



- Undesirable separation of two or more physiologically and functionally conjoined structures.

Based on the extent and location immediately creates a subcutaneous hematoma.

- In the early posttraumatic period still does not hurt
- poorly perfused skin = pale.

# Crush syndrom = backfilling



# Crush syndrom



- Syndrome of backfilling; Syndrome of compression and contusion
- Cause: direct damage to the muscles and soft tissue = ischemia, leak of the fluid into the tissues; toxic substances from damaged tissues
- symptoms: soft tissue swelling, hypovolemic shock, renal failure
- I.A: rescue, treatment of hypovolemic shock, transport to a medical facility (EMS)

# Amputation, semiamputation

- loss of limb
- incomplete separation of limb

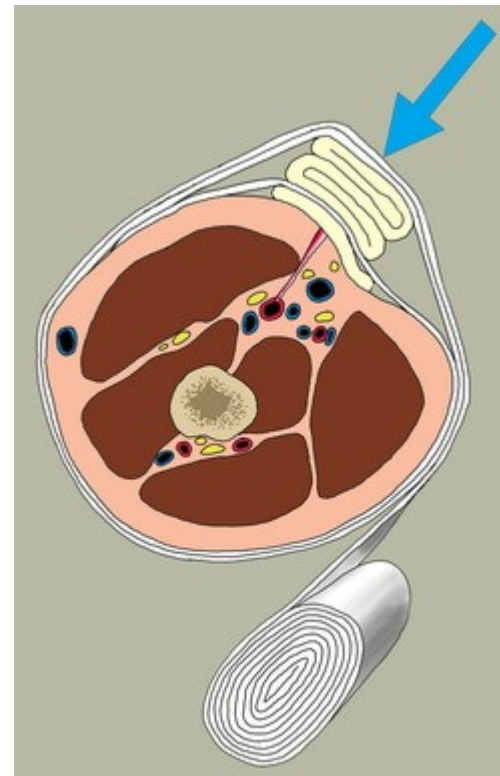
I.A:

- Stop bleeding on the injured limb
  - Massive bleeding = arm, thigh = tourniquet
  - Finger, forearm = pressure bandage on the stump.
- EMS transport the patient to treatment
- Care about body part.
- Do not give false hope

# Stop bleeding

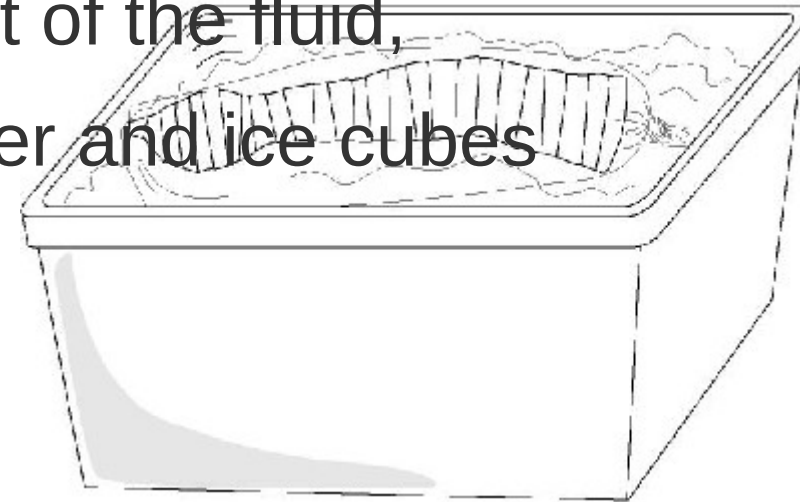


- **tourniquet** = exceptional cases only temporarily in case you need to gain time for applying the pressure bandage - risk of explosion, fire or other danger
- **pressure bandage**



# Body part – First Aid

- Not to hurt yourself!
- Do not forget and do not freeze, do not soak!
- Rinse dirt and pat dry well.
- Wrap it in wet gauze (+normal saline).
- Store in a plastic bag and close it carefully so that air is trapped inside, get the part of the fluid,
- All put into another bag with water and ice cubes



**Wet gauze**

**X**

**snow**



# Correct procedure






# Replantation = after surgery



# A moment of inattention ...



- Hours of operation
- Weeks of rehabilitation
- Uncertain outcome

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- DO NOT forget that saving the victim's life is more important than saving a body part.
  - DO NOT overlook other, less obvious, injuries.
  - DO NOT attempt to push any part back into place.
  - DO NOT decide that a body part is too small to save.
  - DO NOT place a tourniquet, unless the bleeding is life threatening, as the entire limb may be placed in jeopardy.
  - DO NOT raise false hopes of reattachment.

# Acute occlusion of limb arteries

- pain, limitation of sensibility / movement
- cold, pale skin
- missing pulsation
- extended Capillary Refill Time

I.A:

- sit, limb below
- Do not eat, drink or smoke
- EMS





# Literatura

- <http://www.sja.org.uk/sja/first-aid-advice/first-aid-techniques/how-to-make-an-arm-sling.aspx>
- <http://www.sja.org.uk/sja/first-aid-advice/bones-and-muscles.aspx>
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