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Limb Injuries

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Learning Objectives

- Student will understand mechanisms of injuries.
- Student will learn the symptoms and first aid for fractures.
- Student will learn the symptoms and first aid for joint injuries.

Injury

Definition

- Sudden incident affecting the organism from outside and damaging it.
- Traumatic event → leads to trauma



https://www.nairaland.com/attachments/7847973_14gruesomesportsinjurieshatshockedspectators3_jpega5a5854ff12cb61ddcb2e43fe33fe804

Statistics

- Trauma = Leading cause of mortality in youth (< 40 years)
- 40% of trauma - in traffic accident
- Injuries of limbs – cca 50 % of all trauma.

Limb

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



<https://www.semanticscholar.org/paper/Assessment-of-micro-dose-biplanar-radiography-in-in-Lerisson-Amzallag-Bellenger/cd7a308d15204089126cd00d00f3cb37d21fef5c/figure/11>

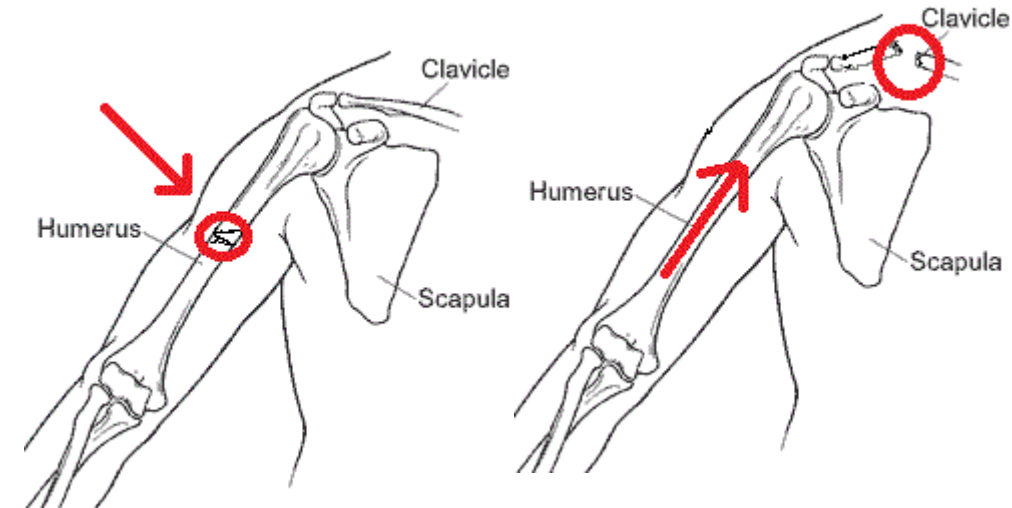
Trauma Mechanisms

Force:

- **direct**
- **indirect**

- high power – short time
- low power – long time

- fatigue fracture → abnormal force on normal (healthy) bone
- pathologic fracture → low force + abnormal (pathologic) bone - osteoporosis, bone tumors, metastases



<https://boneandspine.com/upper-limb-structure-and-functions/>

Ideas

- contusion (contusio)
- dislocation, luxation (luxatio)
- sprain (distorsio)
- fracture (fractura)

Injured tissue

skin, mm., tendons,
vessels, nerves

joint

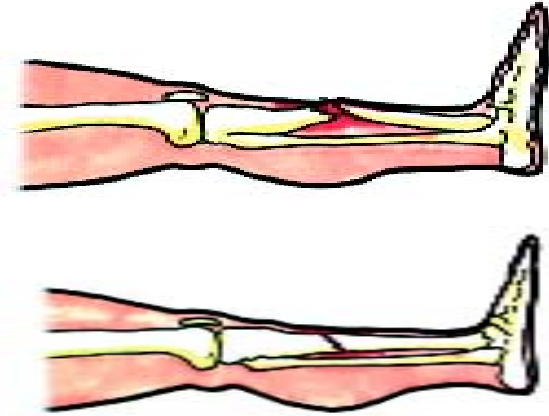
bone

Fractures - Classification

- closed and open
- (incomplete and complete)
- (dislocated x non-dislocated)

- Based on mechanism: traumatic x fatigue x pathologic

- Based on fracture line:
 - transverse, oblique, spiral,
 - block fractures (ribs)
 - multi-fragment, comminuted, complex fracture
 - compressive fracture



Fractures - Symptoms

- hear/feel "crunch"
- visible free end of bone, hole in the skin (open fractures)
- pain
- limb deformity
- swelling (compare to other limb)
- non-anatomical position
- abnormal movement
- crepitation ("shaking" of bone fragments)
- sensitivity and blood circulation disorders
- signs of blood loss - hemorrhagic shock



<https://metrosafety.ca/first-aid-tips-for-fractures/>

Fracture of Clavicle



Blood loss associated with fractures

- ribs – 150 ml
- humerus – 500 ml
- forearm bones – 250 ml

- pelvis – 2000 (5000!) ml
- femur – 1500 ml
- tibia – 650 ml

- In case of complicated fracture (more fracture lines, fragments) – higher blood loss !

Fractures – First Aid

- **SSSABC**
- open fractures - **sterile cover** of the wound
- minimize movement of the injured limb
- don't do repositioning
- don't use splints

- lower limbs → 155
- upper limbs → you can transport to the hospital, arm sling.

- Do NOT eat, drink, smoke (surgery may be necessary)!

Immobilization

No EMS in 60 minutes

- **Bandages:**

- elastic - immobilization of the joints
- arm sling – for the upper limb

- **Splints:**

- classic (“Crammer”)
- Vacuum
- improvised (rolled blankets, magazines, sticks)

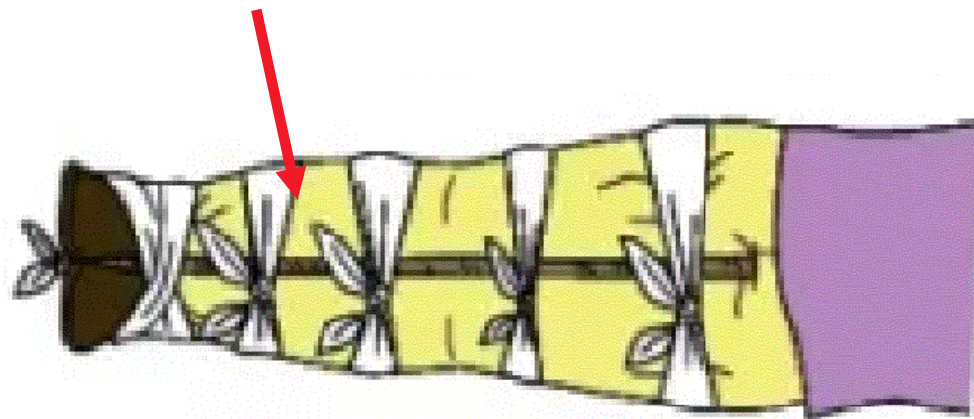


<https://ucebnice.horskaslužba.cz/cz/zdravotni-obecna-cas/zachranarske-postupy-a-technika-horske-sluzby/vyprostovani-polohovani-fixace>

Splinting Technique



- **joint above and below** the broken bone **should be immobilized**
- **underlay** with gauze or clothing on exposed areas end of plate + bone protrusions (ankle, knee, elbow)
 - there is a risk of bruising, nerve damage
- fix the splint with bandages, scarves, improvised parts of clothing



<https://www.bezpecnecesty.cz/cz/autoskola/teoreticke-znalosti/zdravotnicka-priprava-prvni-pomoc>

Upper Limb



<https://survivormedic.wordpress.com/2013/04/23/improvised-splint-1/>



https://www.fsps.muni.cz/sdetmivpohode/kurzy/tv/pohybovy_aparat.php

Lower Limb



<https://freehubmag.com/shorts/bmg-splinting>

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Lower Limb



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Lower Limb

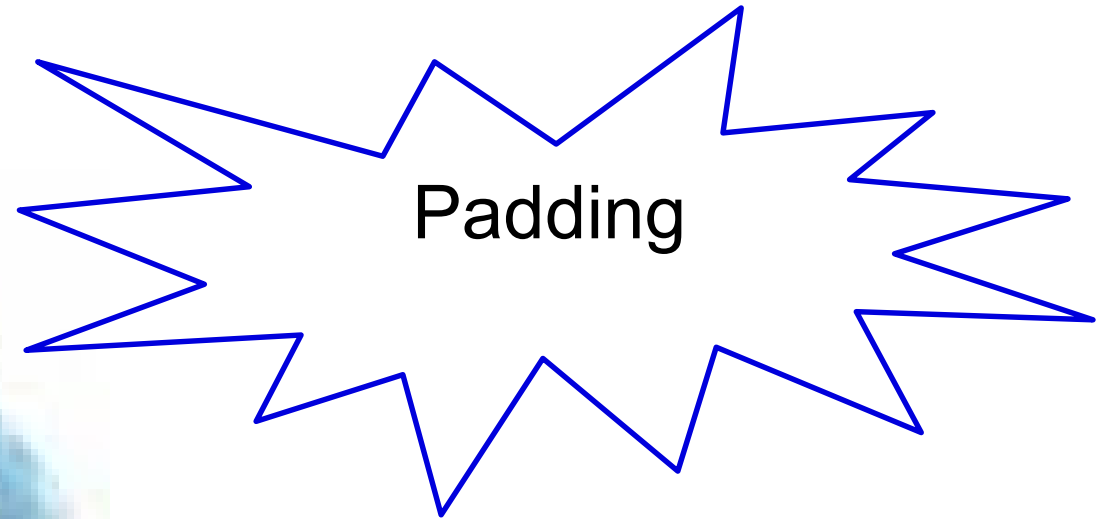
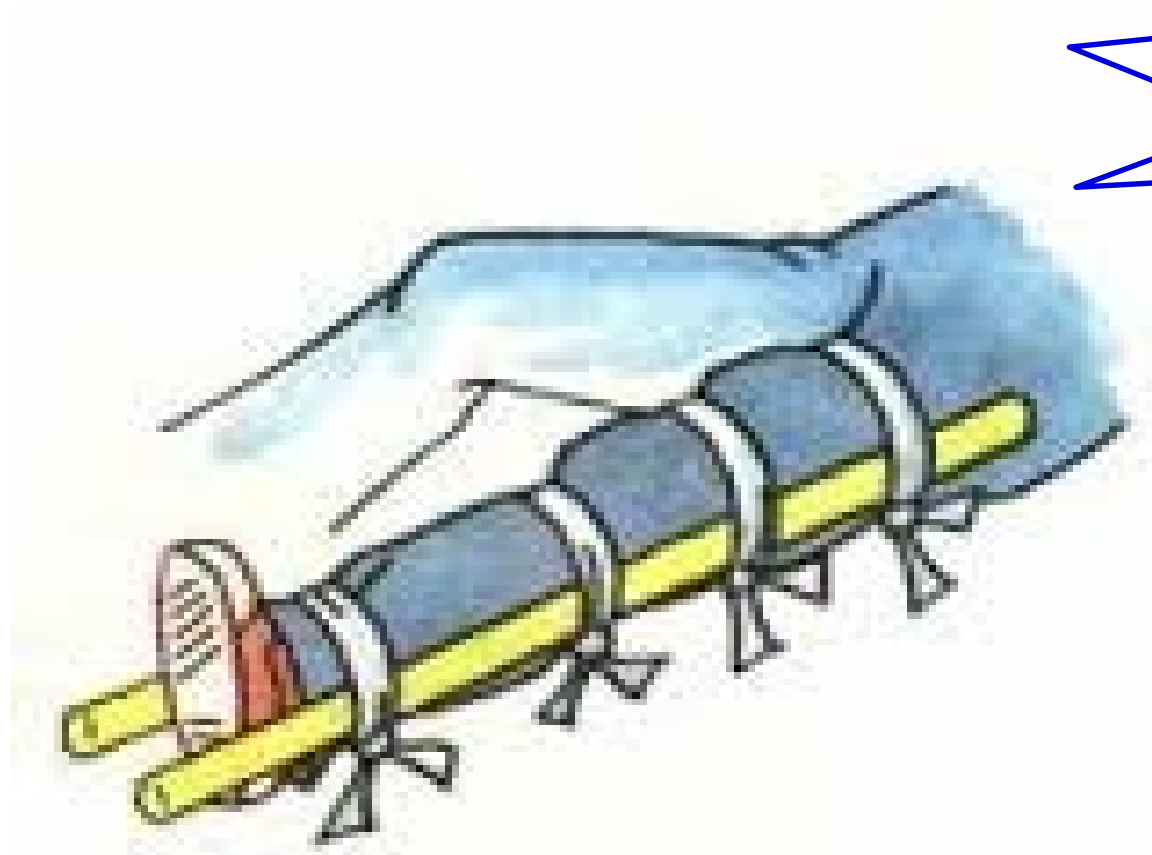


<https://freehubmag.com/shorts/bmg-splinting>

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Lower Limb

- What is wrong?



Lower Limb Injuries in the Snow

- ensure safety = mark the "X,"
place of the cross ski
- unclip the binding
- do not take off your shoes,
just loosen the buckles
- call mountain service



https://www.fsps.muni.cz/sdetmivpohode/kurzy/tv/pohybovy_aparat.php

Pelvic Injuries



https://wikem.org/wiki/Open_book_pelvic_fracture

Pelvic Injuries

- internal bleeding
 - shock
 - pain

FA: SSSABC

- EMS (suspect pelvic injury)
- Heat retention

- Don't try to walk



<https://cub.co.jp/Flat-Pack-Reflexcell-Hypothermia-Prevention-575945/Sporting-Goods.shtm>

Shoulder Dislocation



<https://www.huangortho.com/shoulder-dislocation-and-instability-labrum-tear>



https://www.fsps.muni.cz/sdetmivpohode/kurzy/tv/pohybovy_aparat.php

Luxation

- Mechanism: after short-term displacement of the joint surface they do not return to their original position
- Injury: articular capsule damage (always), surrounding structures, nerves and bone vessels
- Symptoms: joint deformity, blockage of movement, spring resistance, swelling, disorders of sensitivity and blood circulation in the limb
- First Aid: as fracture

Sprains

- Mechanism: after short-term displacement of the joint surfaces they return to their original position
→ torn ligament, damage to one or more ligaments
- Injury: articular capsule damage, muscles, surrounding structures.
- Signs: frequent blood hematoma formation, pain (often a two-phase course), swelling, movement restriction.
- First Aid: immobilization, fasting = surgery, transport to the hospital, cooling



https://cs.wikipedia.org/wiki/Podvrtnut%C3%AD_kotn%C3%ADku

Learning Outcomes

- Student is able to describe symptoms of fractures and basics of first aid.
- Student is able to describe the symptoms of joint injuries and basics of first aid.

Resources

- http://www.fsps.muni.cz/sdetmivpohode/kurzy/tv/pohybovy_aparat_php
- http://www.cervenyriz.eu/cz/standardy/zdroje/Standardy_prvni_omoci.pdf

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