CHEST and ABDOMINAL INJURIES PRECIPITATE DELIVERY

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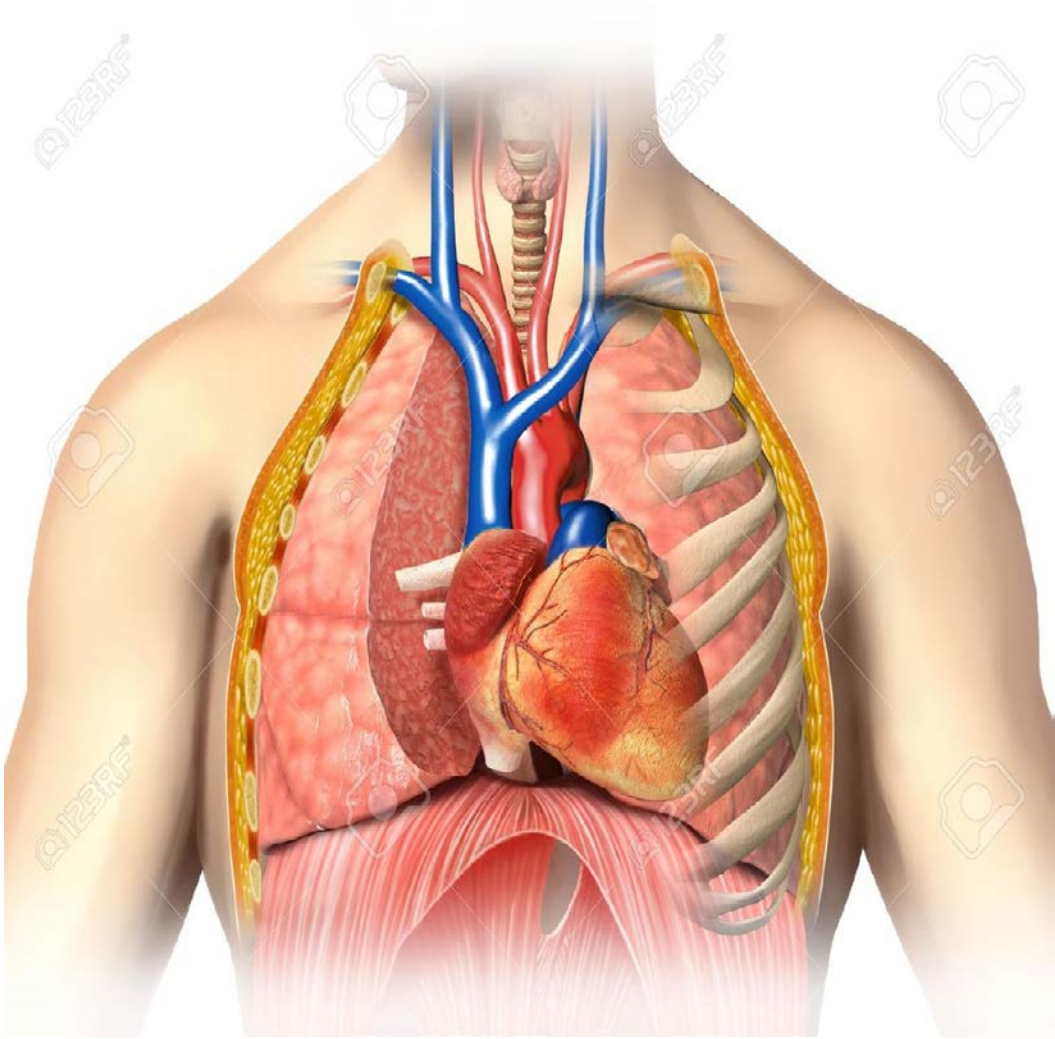
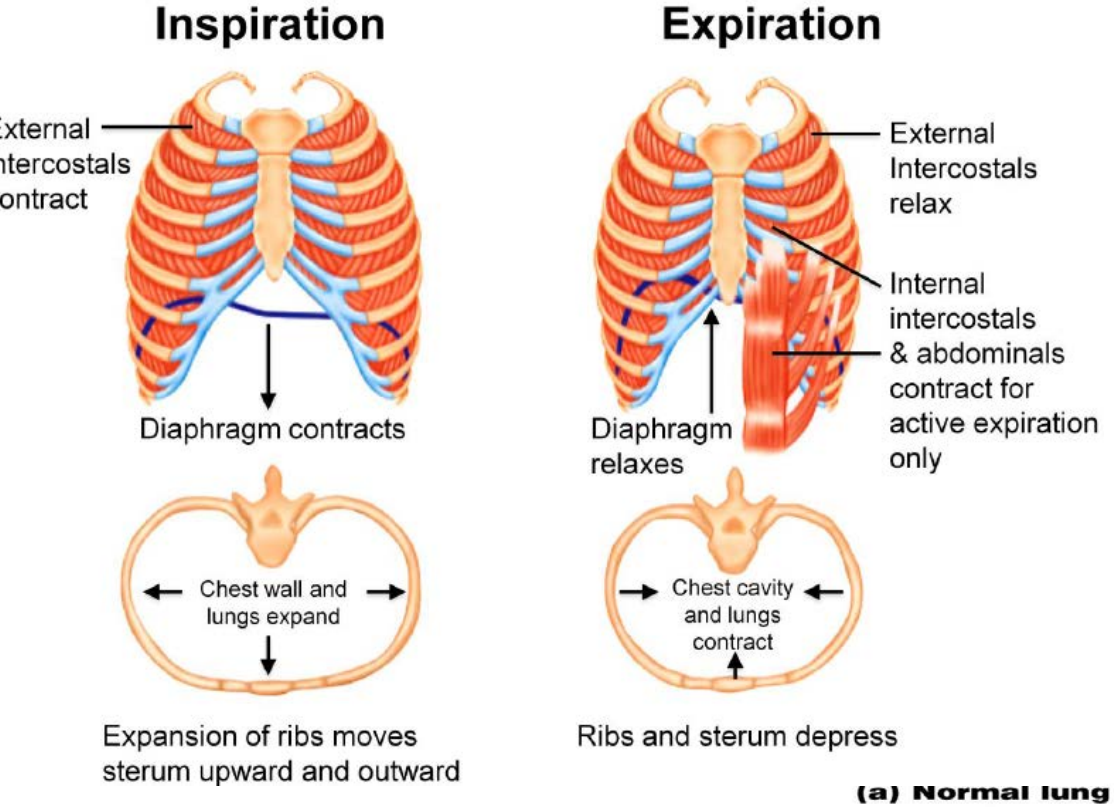
CHEST INJURIES

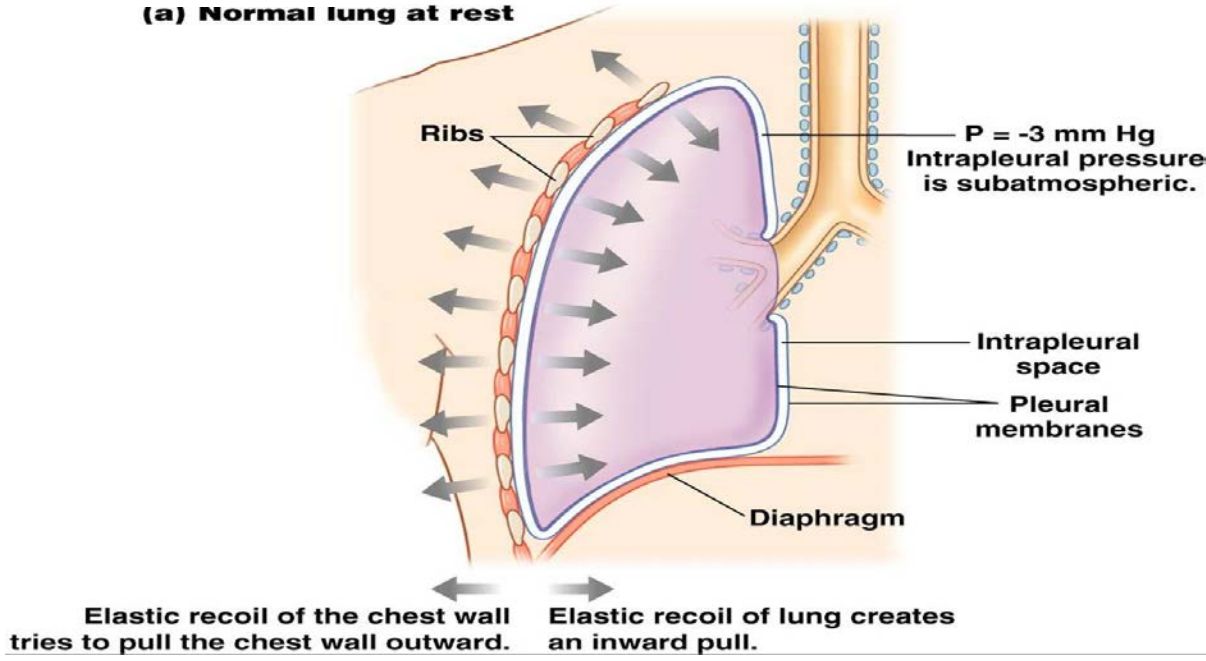
Chest anatomy

- Internal organs of chest:
  - Lungs and airways
  - Heart and large vessels
  - Esophagus
  - Lymphatic vessels
- Chest wall:
  - Ribs and breastbone (sternum)
  - Intercostal muscles
  - Auxiliary breathing muscles
  - Parietal pleura
  - Diaphragm
  - Thoracic spine



Physiology of breathing





Chest injuries

- **Nonpenetrating** blunt: traffic accidents, falls, compressions
- **Penetrating** – open: gunshot, puncture wounds

- Chest wall (contusion, bleeding, fracture of ribs or sternum, hemothorax, rupture of diaphragm)

+ possible damage of intrathoracic organs:

- Heart + great vessels (tamponade, contusion, rupture of aorta,)
- lungs + airways (contusion, obstruction or airways disruption, PNO)
- esophagus (rupture)
- Lymphatic vessels (chylothorax)

- **All complications can lead to death!!!!!!**

Symptoms:

- Possible deterioration of consciousness
- Dyspnea and/or breathing abnormalities
- Signs of shock

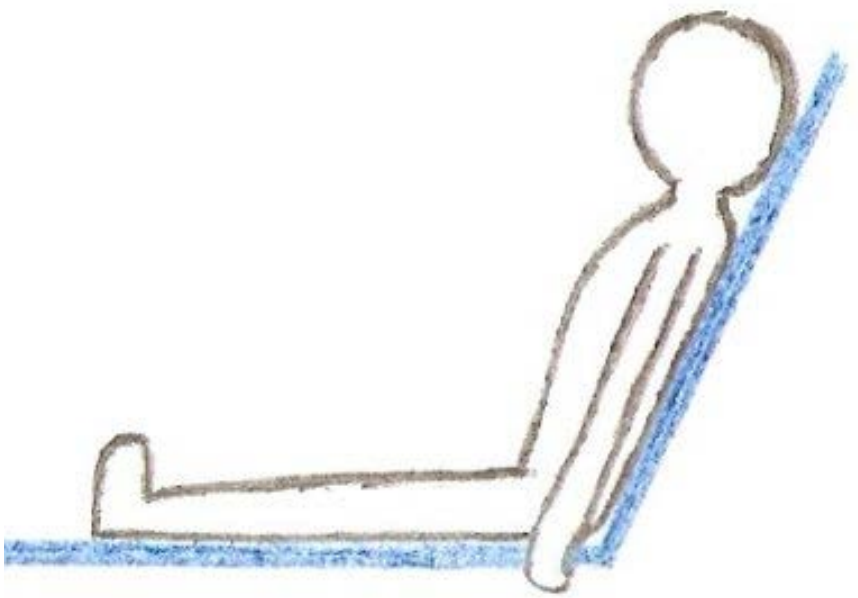
- Pain (especially during moving or coughing)
- Bruises
- Edemas (swelling of affected area)
- Chest wall deformities
- Open fractures
- bleeding
- Paradoxical movement of chest wall (Flail chest)
- Blood coughing
- Signs of spine injuries (spinal cord)
- Dilatation of cervical (neck) veins
- cyanosis

First Aid

- Always **call ambulance**
- Check vital functions (check them continuously – possible deterioration in any time) – eventually start CPR!!
- **Positioning** (Fowler vs. Recovery position)
- Dont pull foreign objects out of a chest wall!!
- **Compresion of bleeding** and sterile dressing
- (other procedures will be specified…)

- (anti-shock therapy)- non specific- TRANSPORT
- (Stop life-threatening bleeding)

Positioning when chest injury (Fowler position)

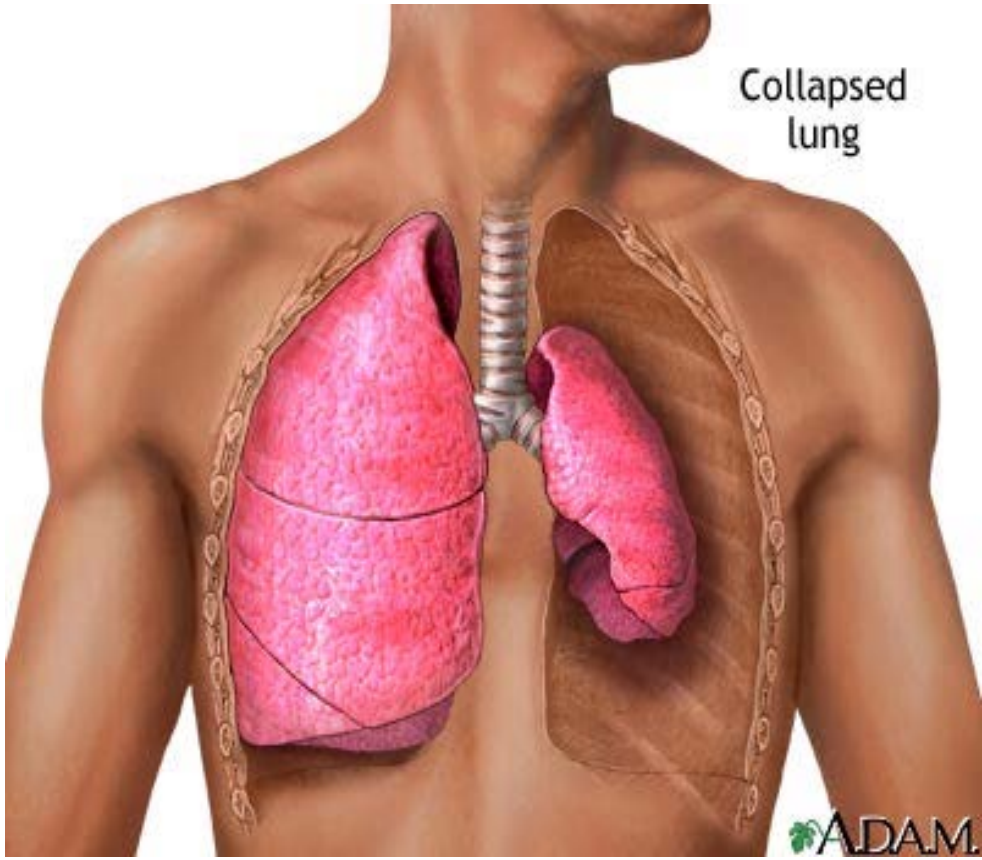


- **conscious patients ONLY!**

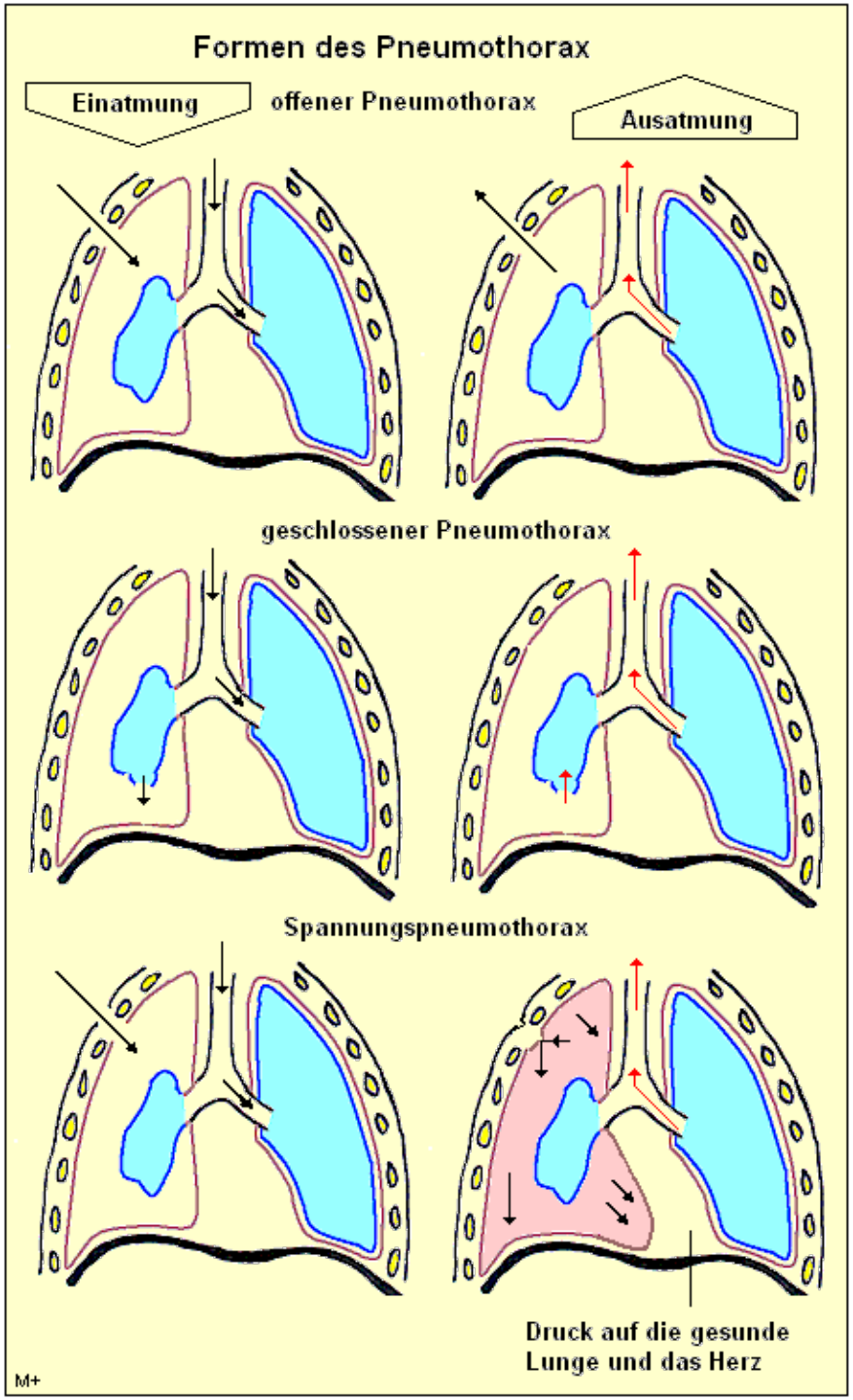
Pneumothorax

- **Closed**
- **Open**
- **Tension**

- Causes:
  - Spontaneous rupture of lung (emphysema, tumor, inflammation, congenital malformation)
  - Blunt contusion of chest wall, blast wave)
  - Penetrating wound of chest wall (stab, gunshot, laceration)
  - Injury by rib fragment
  - Iatrogenic (thoracic OP , CVC)



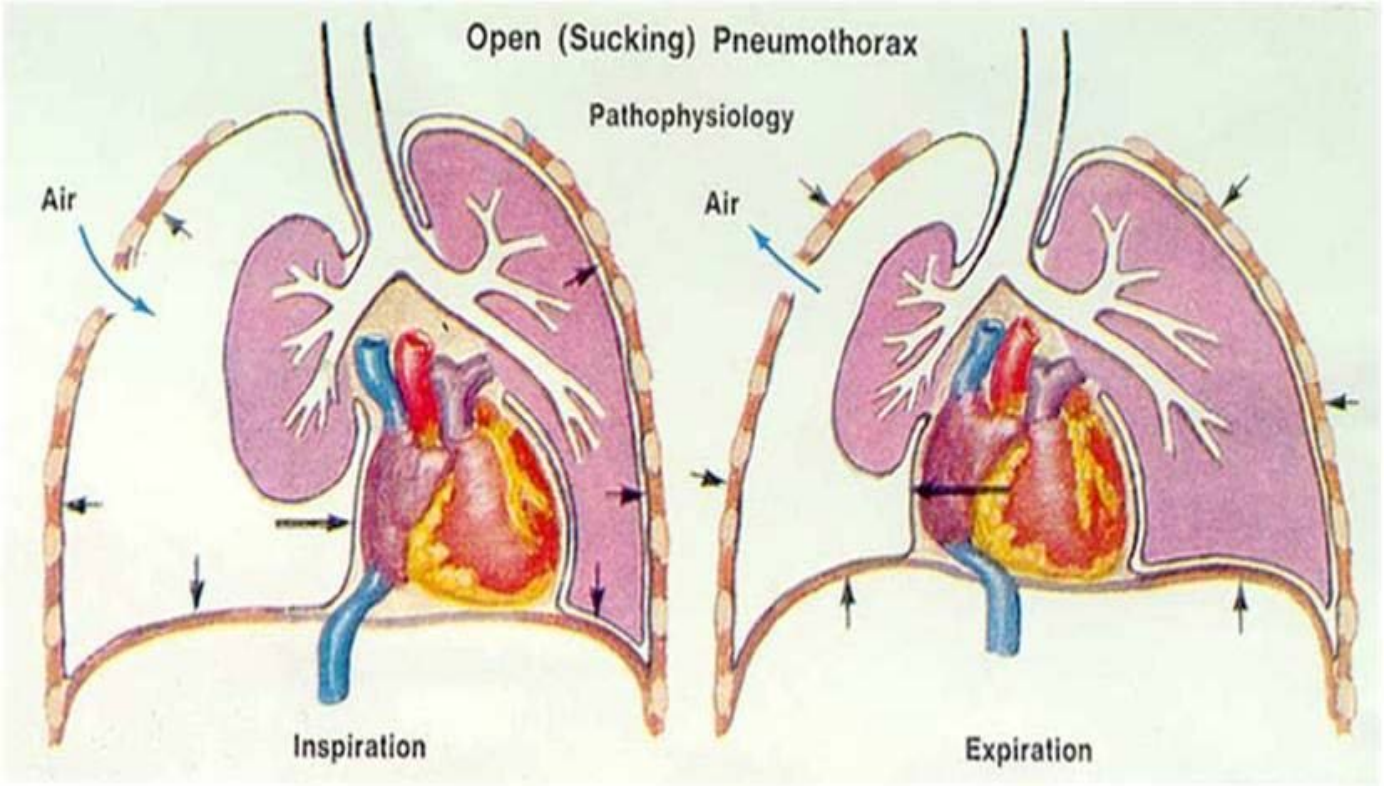
Formen des Pneumothorax



Pneumothorax – clinical findings

- Sudden sharp pleural pain
- attenuation/ vanishing of breath sounds
  Restricted breathing excursions on affected side
- Exhausting shallow and rapid breathing
- Restlessness, dyspnea, cyanosis
- Cough, hemoptysis
- ***Development of shock like a common complication***

Open Pneumothorax



First aid

- Call ambulance + Assess vital functions
- Calm down (advise regular calm breathing)
- Positioning (Fowler vs. Recovery position)
- Don't pull out items! (fixation and sterile dressing of chest wall)

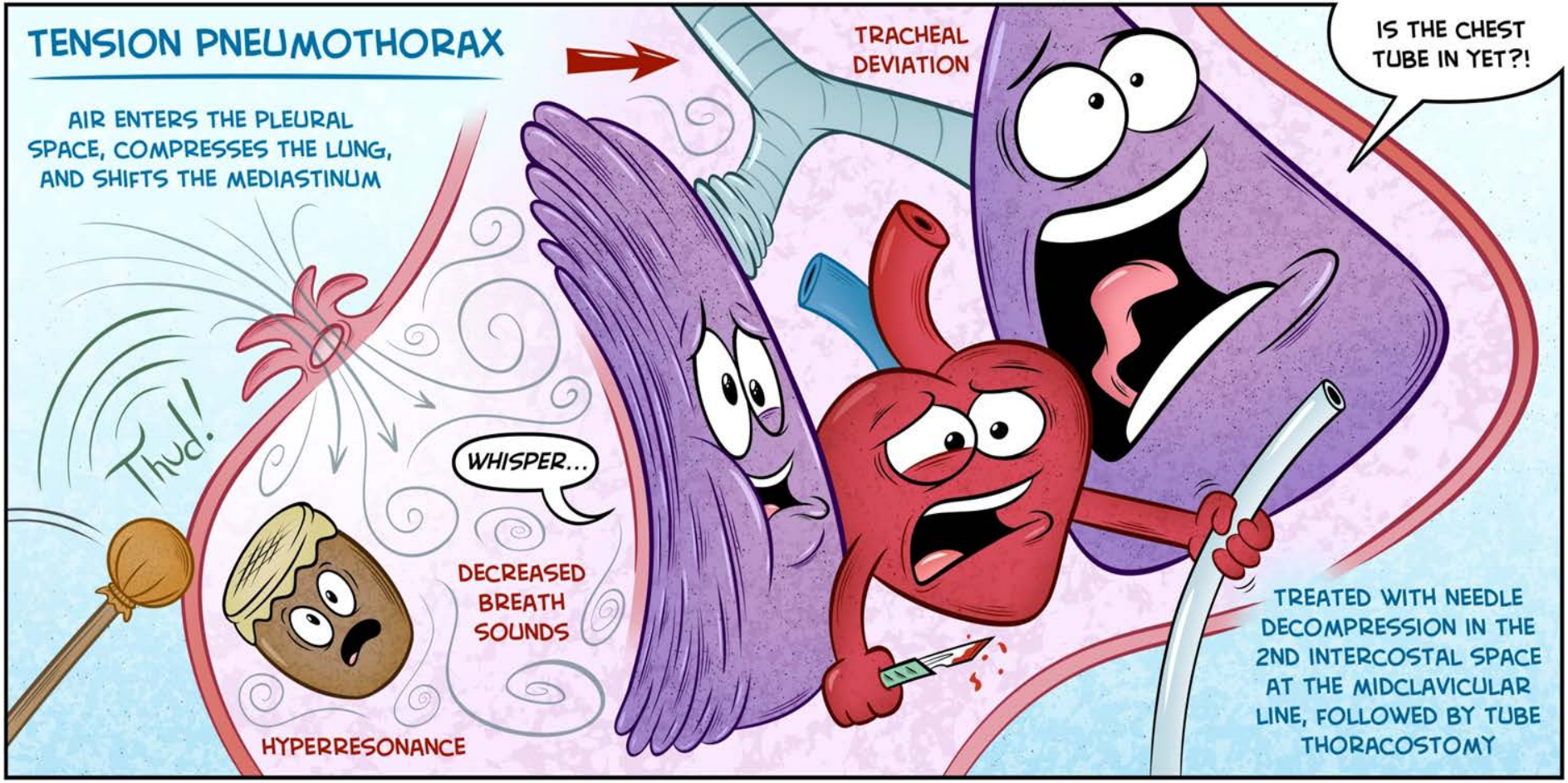
- **Never close open wound** (just clear and leave open wound, or sterile dressing without compression)

- (in case of need anti-shock therapy)

Semi-permeable dressing vs ERC 2015?

- **First aid treatment for an open chest wound**
- The correct management of an open chest wound is critical, as the inadvertent sealing of these wounds by the incorrect use of occlusive dressings or device or the application of a dressing that becomes occlusive may result in the potential life-threatening complication of a tension pneumothorax. A decrease in the incidence of respiratory arrest and improvements in oxygen saturation, tidal volume, respiratory rate and mean arterial pressure has been shown using a non-occlusive device in an animal model. It is important that an open chest wound, especially with associated underlying lung damage, is not occluded and that the inside of the chest is in open communication with the external environment.
- **2015 First Aid Guideline**
- Leave an open chest wound exposed to freely communicate with the external environment without applying a dressing, or cover the wound with a non-occlusive dressing if necessary. The use of occlusive devices or dressings can be associated with the potentially life-threatening complication of a tension pneumothorax**.** Control localised bleeding with direct pressure

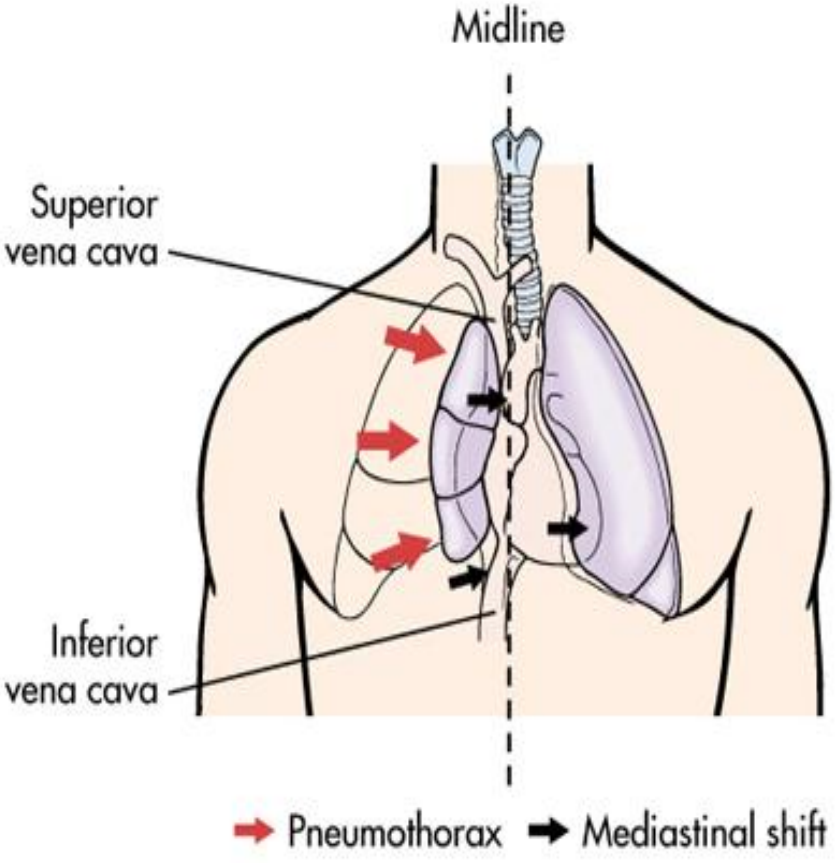
Tension pneumothorax

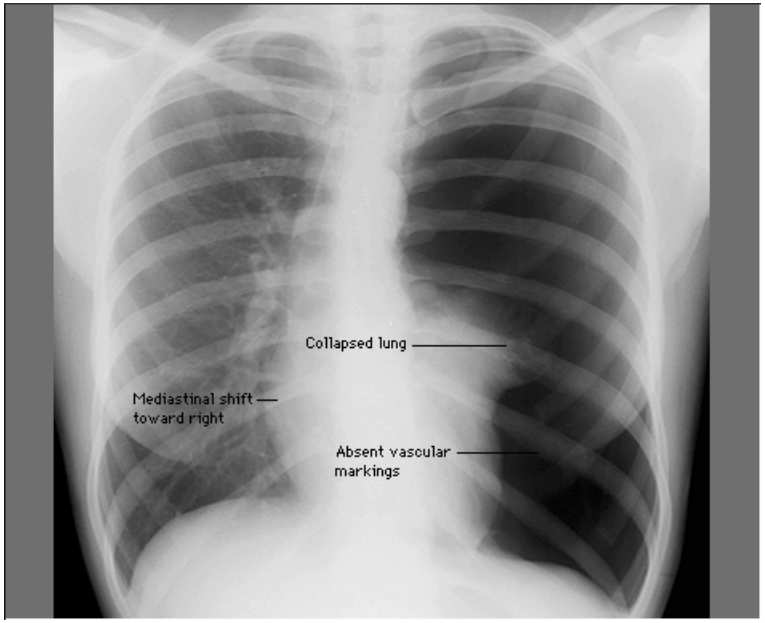


Tension pneumothorax

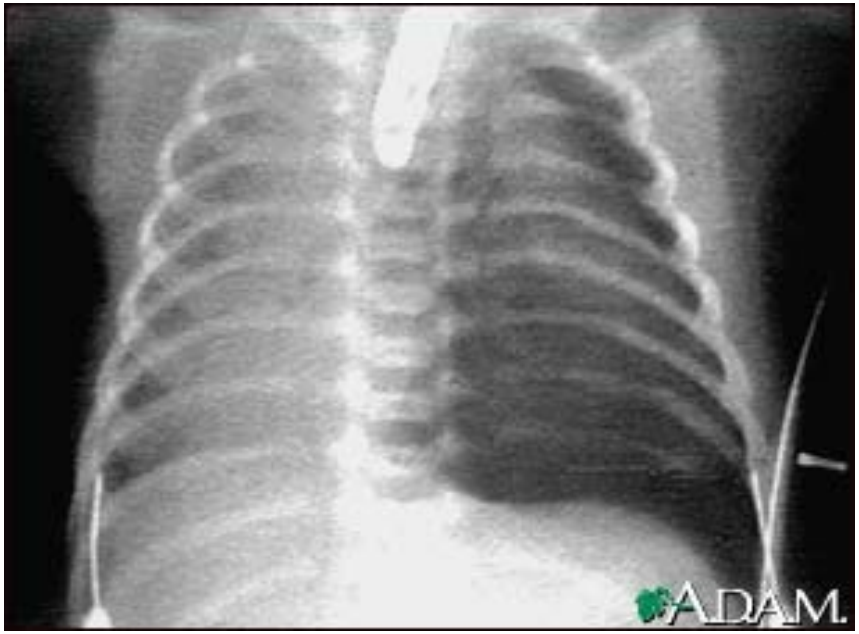
- Life-threatening condition!!!!
- Air leak into pleural cavity during inspiration, but no flow out when expiration due to valve mechanism
- Increasing pressure in pleural cavity (lung collapse , mediastinal shift, compression/rotation of heart and large vessels, compression of unaffected lung)

- Causes:
  - Chest wall defect (most common puncture, gunshot, laceration)
  - Blunt chest injury (chest wall injury with rib fragment)
  - Blast wave effect (explosion)




Collapsed lung
Mediastinal shift toward right
Absent vascular markings


Collapsed lung
Pneumothorax
Displaced diaphragm
Mediastinal shift


A.D.A.M.

Tension PNO – clinical findings

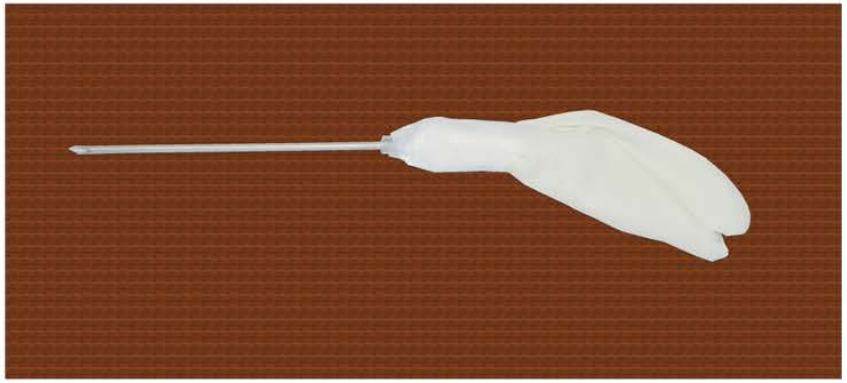
- Sudden sharp pleural pain, cough and/or hemoptysis
- Serious deteriorating dyspnea (cyanosis, exhasuting shallow and rapid breathing)
- **Signs of obstructive shock** (tachycardia,hypotension, restlessness, paleness, neck veins distension)

- (Subcutaneous emphysema)
- Prominence of intercostal and supraclavicular spaces
- No/weak breathing sounds, breathing excursions on affected side , hypersonor(drum) percusion
- Weak heart sounds

First Aid

- Puncture of 2 – 3 intercostal space, by upper edge of lower rib (during insertion loud fizz)

- large bore cannula, with improvised valve



Subcutaneous emphysema

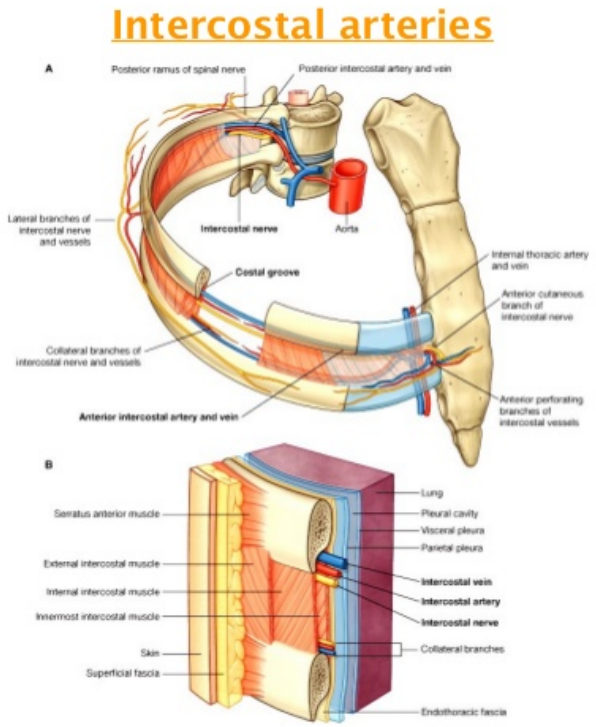
- Subcutaneous layer filled with air bubbles (Rib fracture causing lung injury)
- Small - observation, without any special treatment
- Quickly increasing, spreading onto neck, abdomen, groins – puncture of subcutaneous layer with large bore cannulas (with improvised valves (e.g.. finger from rubber hand glove))

Hemothorax

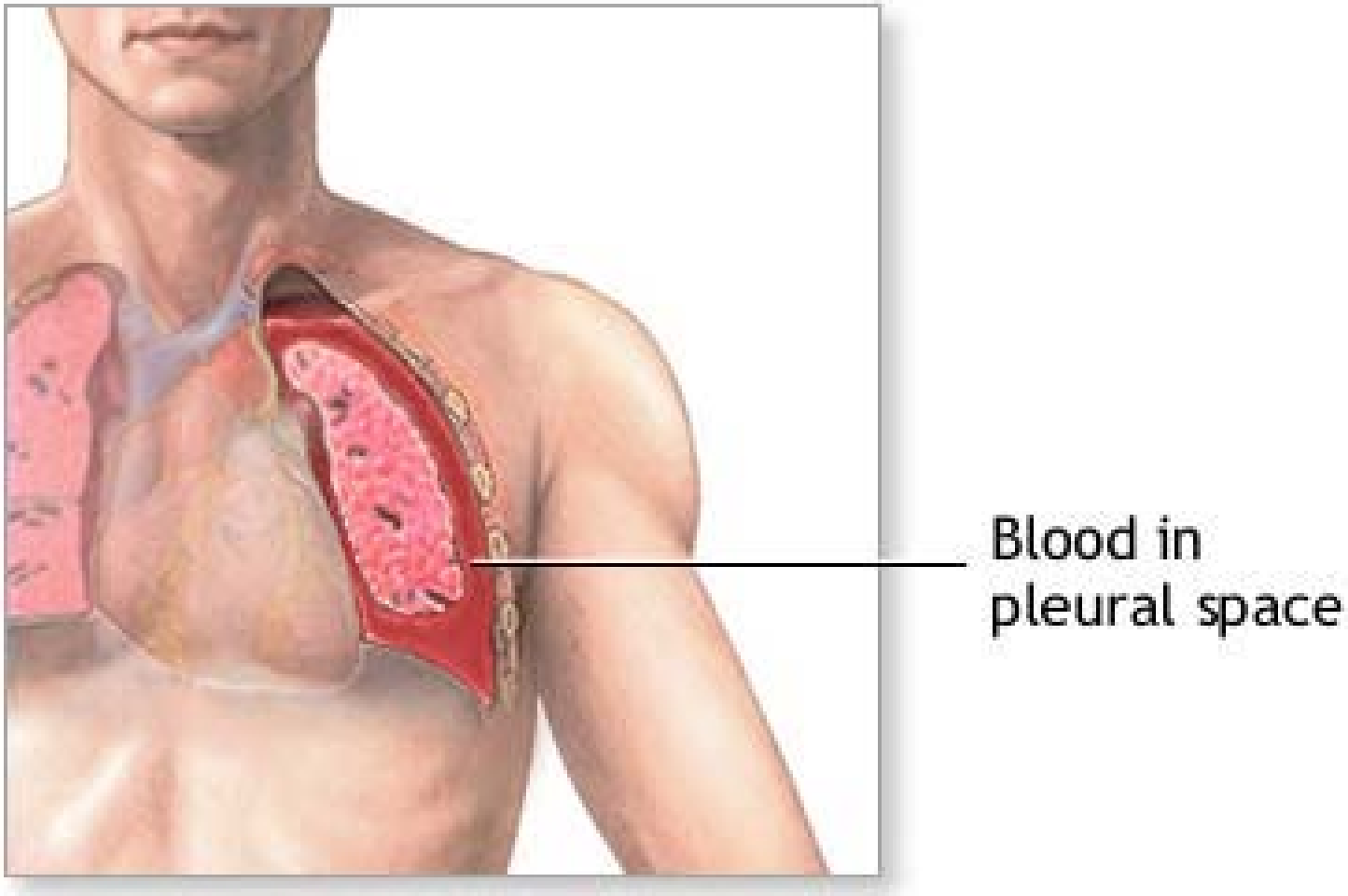
- Blood in pleural space
- Penetrating injury / contusion of chest
- **> 1500ml leads to hypovolemic hypotension (hemorhagic shock)**

Sources of bleeding:

- Rib fractures (cca 100 ml from one rib),
- **trauma of intercostal artery**
- trauma of a. thoracica interna,
- trauma of a. subclavia,
- trauma of thoracic aorta
- rupture of Thoracic aorta aneurysm
- trauma of great vessels (15%).



- **Clinical findings:**
- Percussion dullness, attenuation/vanishing breathing sounds (auscultation)
- dyspnea
- cyanosis
- Blood compress lung, restrict ventilation



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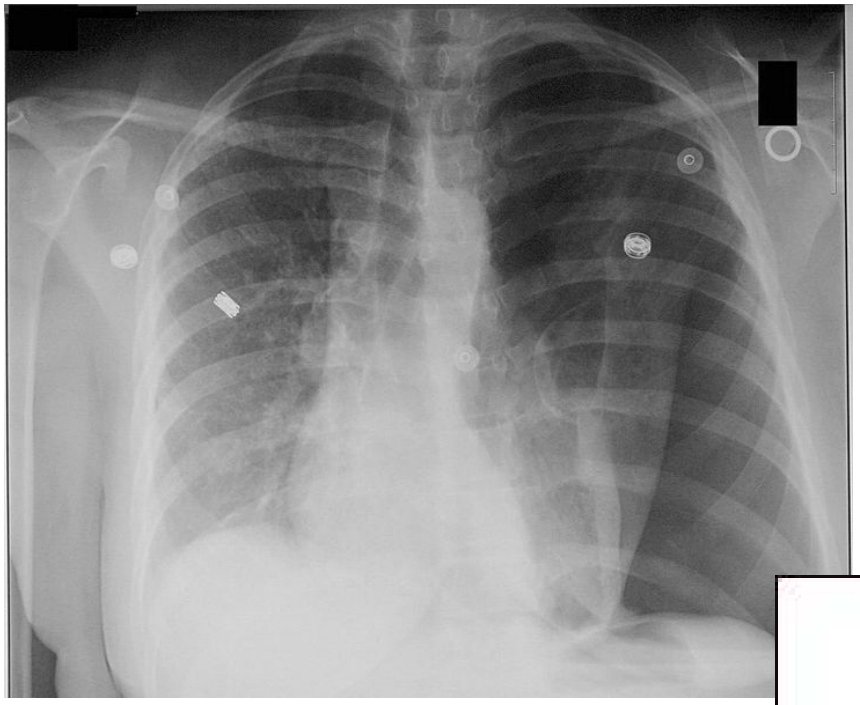
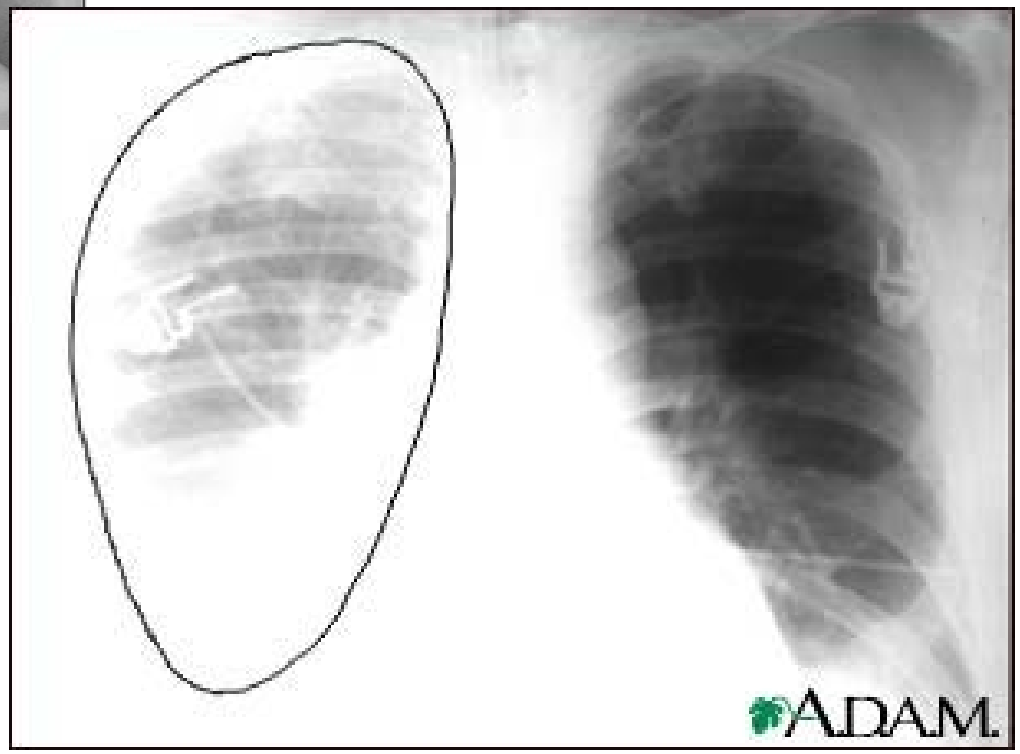



A.D.A.M.

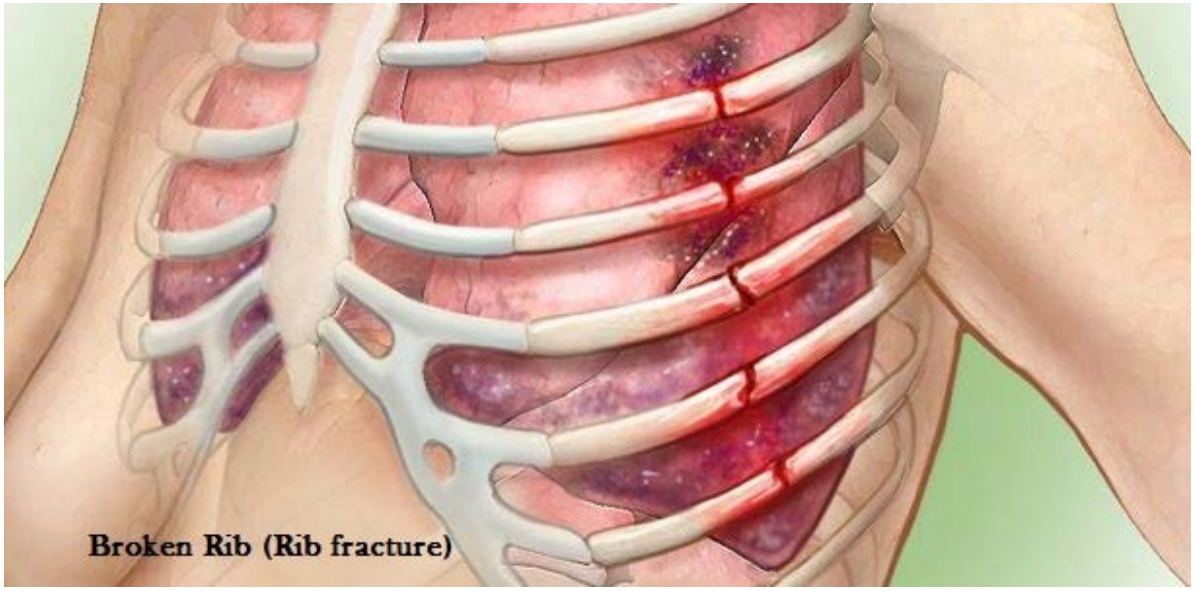
Hemothorax - First Aid

- **Check vital functions**

- **Fowlers position** if possible (conscious)
- Anti-shock therapy
- **Transport to hospital (ambulance mainly)**

Rib fractures

- Isolated / serial (at least 3 adjoining ribs) / multiple
- Simple x Complicated

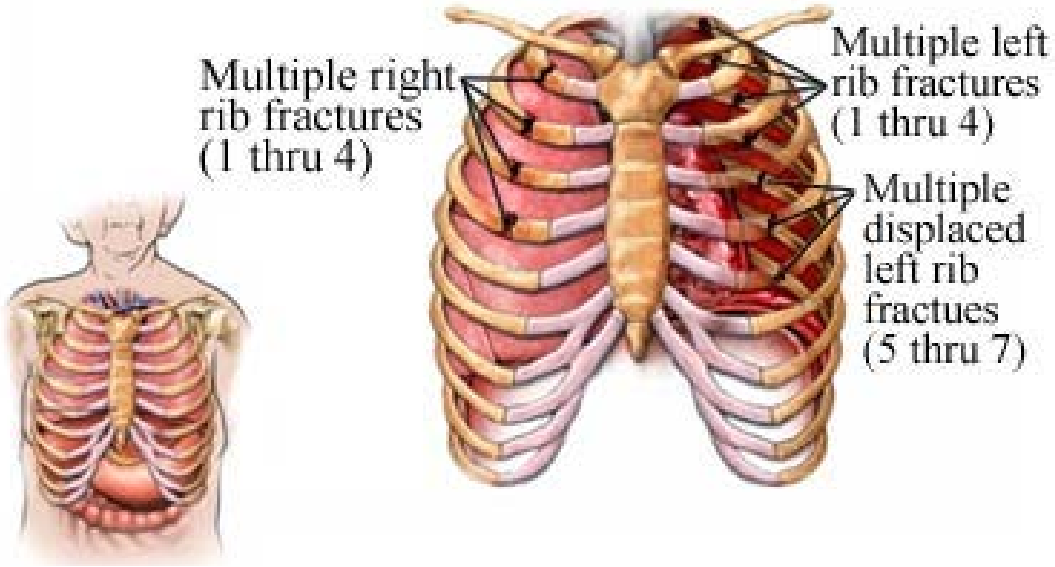


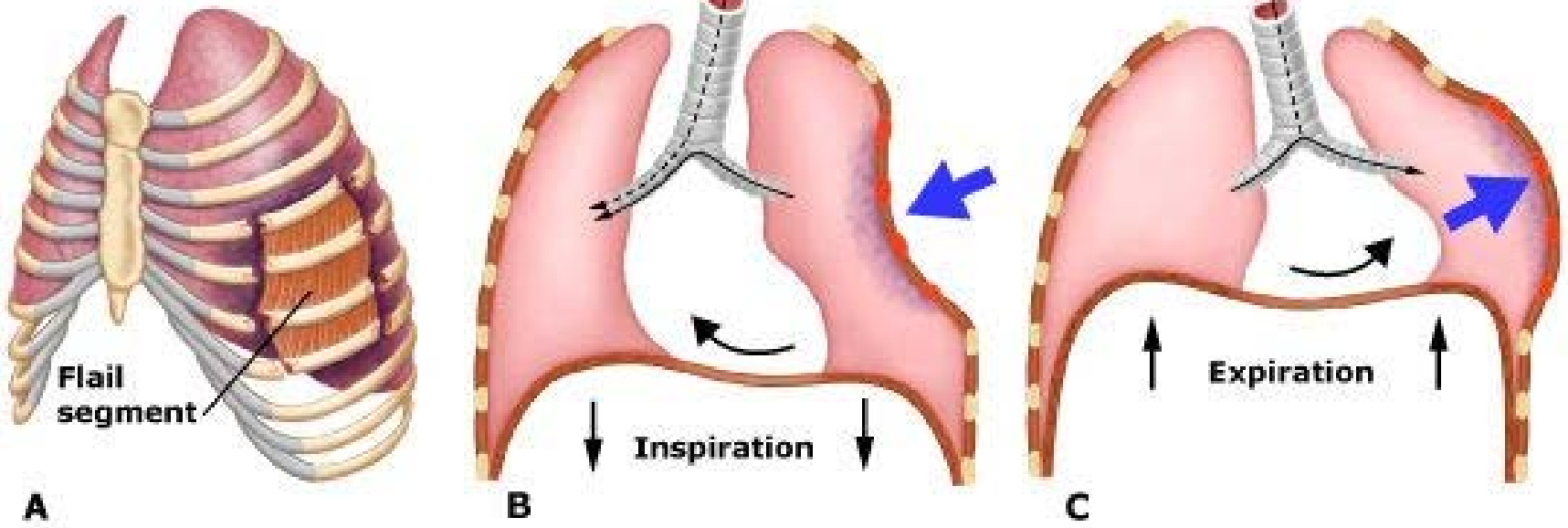
- Clinical findings:
- **Most frequent** fractures are **from 4th To 9th Rib**
- Upper 3 ribs are protected by upper limb bones – their fracture means presence of great force – **indicates possibility of severe chest trauma!**
- **Lower rib fractures tend to be associated with abdominal injuries** (spleen, liver)
- Always think about associated injuries!

Flail (instable) chest

- High energy insult (high probability of other serious damage of intrathoracic organs (lung contusion))
- Double serial fracture (two parallel lines of fractures, segment fracture)
- Paradoxical movement (Segment of chest wall looses continuity with rest of ribcage and does not follow breathing excursions)

- Same signs as for simple rib fractures (+ sometimes respiratory insufficiency)
- Treatment - positive pressure ventilation, analgesia, sometimes surgical fixation


Multiple right rib fractures (1 thru 4)
Multiple left rib fractures (1 thru 4)
Multiple displaced left rib fractues (5 thru 7)


Flail segment
A
Inspiration
B
Expiration
C

Rib fractures – First aid

- Fowler position or lying position on injured side
- Restrict affected chest wall movement by bandage or fixation by upper limb and triangular bandage
- In case of severe respiratory insufficiency – support ventilation (done by professionals)
- Good analgesia, icing
- Transport (via ambulance to hospital)

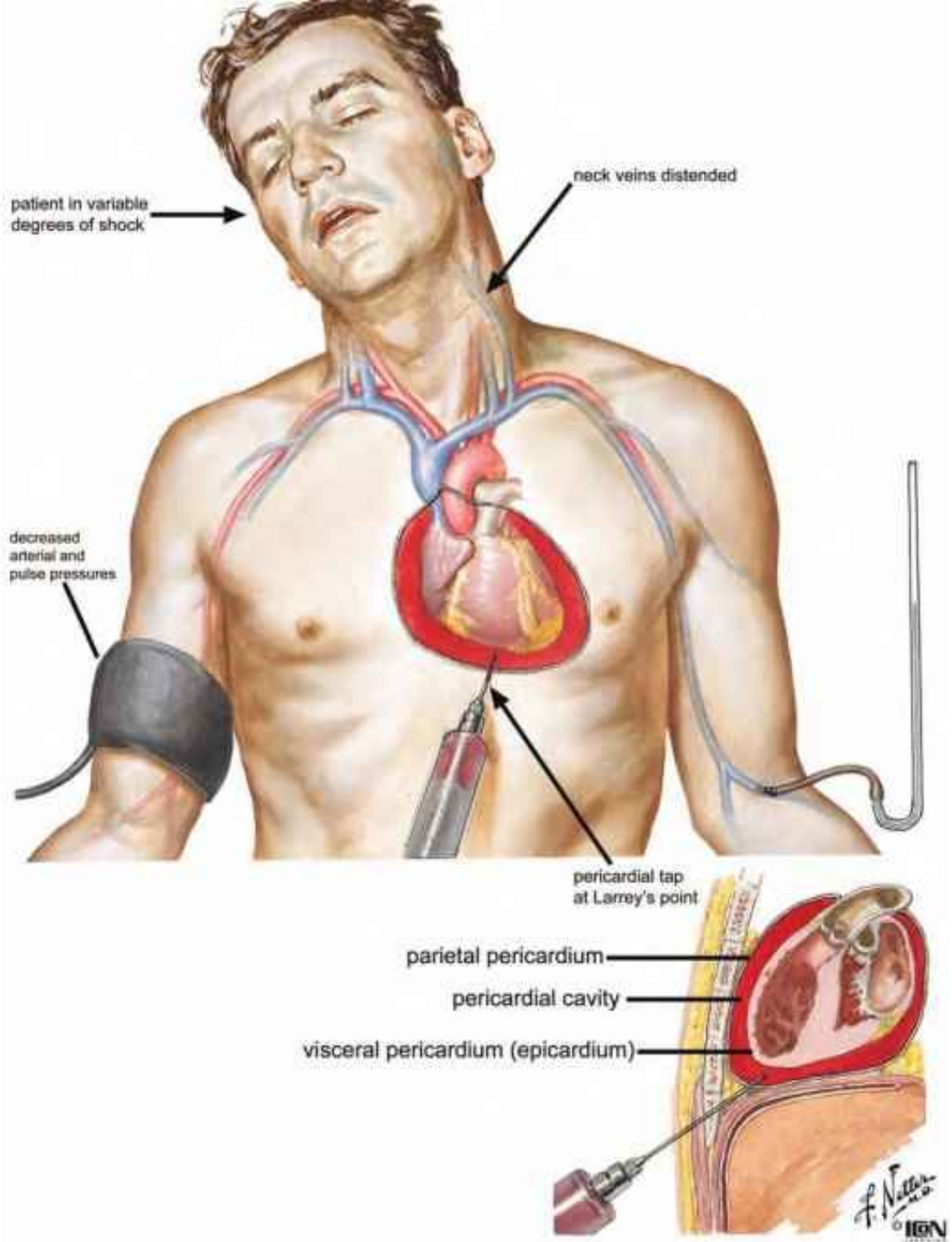
Hemopericardium, Tamponade

- Presence of blood in pericardium
- Open injuries of chest (stab, gunshot), rarely in blunt injuries
- Even small amount of blood may lead to critical restriction in cardiac filling during diastole

- **Imminent life-threatening situation!!!**

Cardiac tamponade

- **Signs of obstructive shock**
- **Beck trias**:
  - Distension of neck veins due to raise of central venous pressure (CVP) (CAVE! Increasing systemic hypotension)
  - damped heart sounds
  - low BP
- **Kussmaul sign** (pulsus paradoxus):
  - Decrease of systolic blood pressure during inspiration over 10 mmHg
- Also nontraumatic causes
- **Pericardiac puncture is not part of first aid**


patient in variable degrees of shock
neck veins distended
decreased arterial and pulse pressures
pericardial tap at Larrey's point
parietal pericardium
pericardial cavity
visceral pericardium (epicardium)

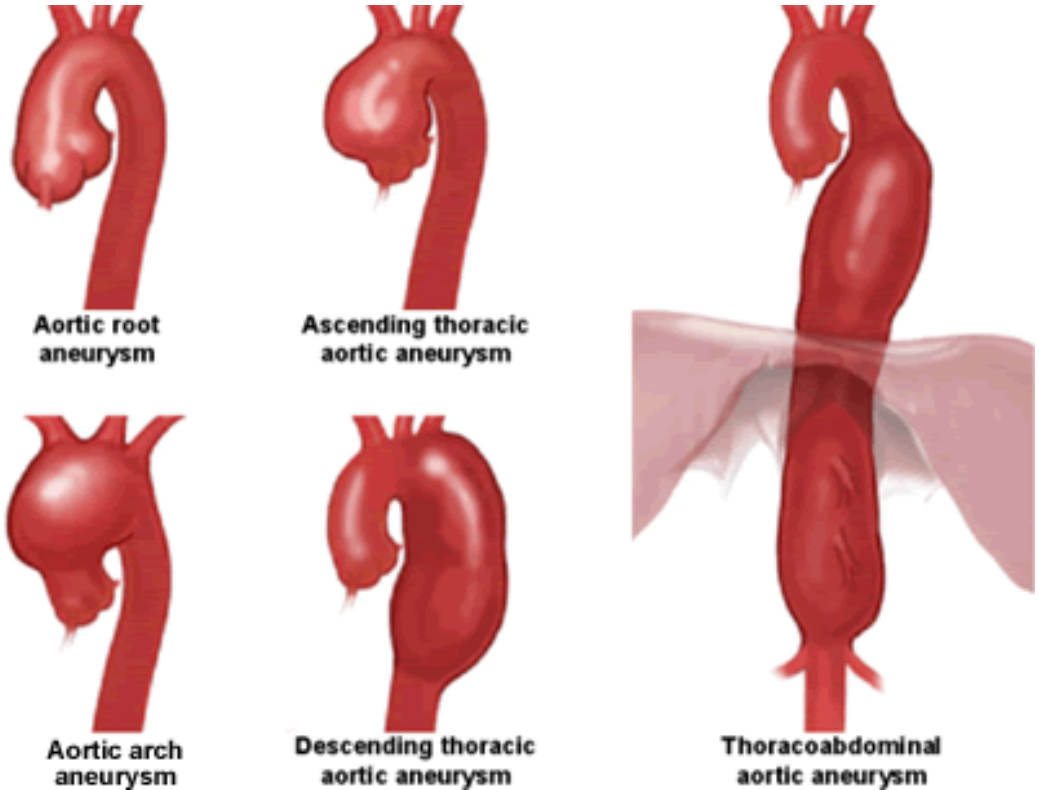
Traumatic dissection/ rupture of aorta

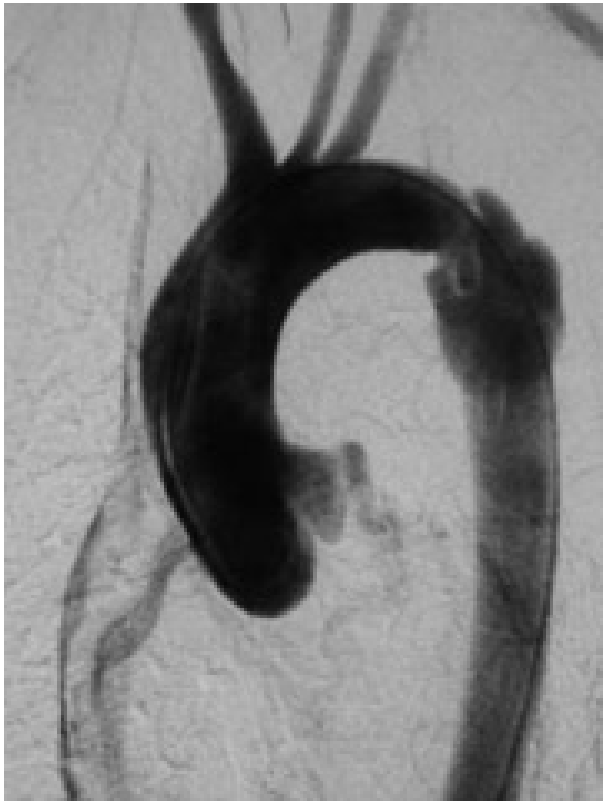
- Usually caused by deceleration,
- Occasionally associated with heart tamponade
- **most frequent cause of death in traffic accidents and falls (in 90% fatal at place of accident)**
- Survival only when incomplete rupture (just intima of vessel wall)

- **Clinical findings :**
- Usually cruel sharp pain („feel of tearing“, sign often unpresent or masked by condition)
- Frequent signs of hemorrhagic shock
- Pulsations present at upper limbs, not femoral arteries,
- Various neurological findings (according compressed arterial branch)

First aid

- Immobilization
- Anti-shock therapy
- Early transport to hospital (surgical intervention)





Other chest injuries

- Blunt heart trauma – cardiac contusion
- Lung contusion
- Diaphragmatic rupture
- Large airways injury (larynx, trachea, bronchi)
- **Esophageal injury**

First aid:

- Elementary principles of first aid (mentioned)

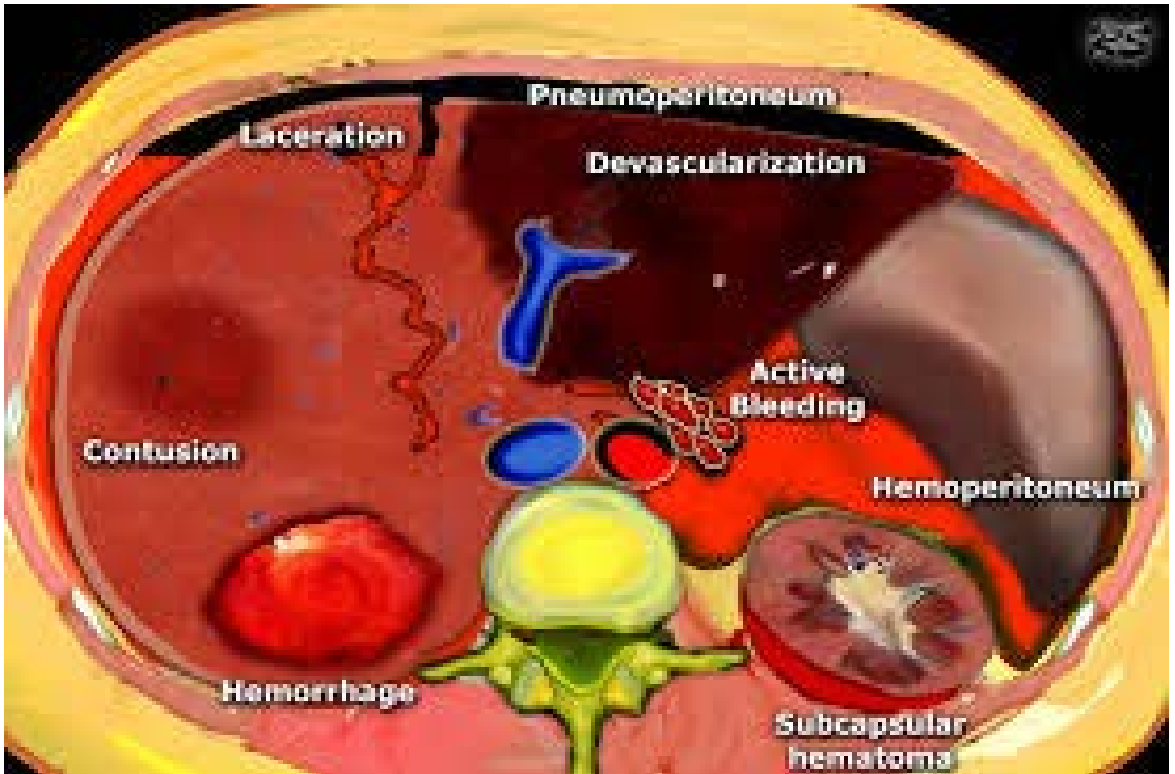
ABDOMINAL INJURIES

Abdominal injuries

- **Closed (Blunt)**
- **Open** (non-penetrating vs. Penetrating)

- **Dangerous for:**
  - **Possible great bleeding of abdominal organs** (spleen, liver, kidney)
  - **Serious infection,** when GIT perforated

- Signs of injuries don't have to be obvious! (with associated injuries (head, chest))


Pneumoperitoneum
Laceration
Devascularization
Active Bleeding
Contusion
Hemoperitoneum
Hemorrhage
Subcapsular hematoma

Blunt abdominal injuries

- Mechanisms: pressure, blow, fall on firm object

- Signs:
  - pain
  - Hemorhagic shock may develop
  - With other associated injuries is general condition worse

- **First Aid:**
  - Vital functions (may worsen in a time)
  - Nothing orally (no fluids or pain killers
  - Transport
  - Supine position with bent supported knees
  - Consider anti-shock therapy

Open abdominal injury

- **Penetrating x nonpenetrating** (into abdominal cavity or not)

- **First aid:**
  - Stop bleeding by direct pressure
  - Do not remove foreign bodies in wounds, but fix them (and cover by sterile dressing)
  - **Do not try to put protruded organs (e.g.. bowel) back, cover them with wet sterile dressing**
  - Supine position with bent knees
  - Anti-shock therapy , quick transport

PRECIPITATE DELIVERY

Precipitate delivery

- Spontaneous delivery lasting less than 2 hours
  (shortened 1. stage of delivery, will be specified)

- Especially in multiparas with relaxed pelvic/ perineal floor, strong uterine contractions or in small fetuses
- In most case goes physiologically and without complications

- **Risks:**

  Maternal :
  - tissue laceration (cervix, vagina, perineum)
  - Bleeding
  - infections

  Neonatal :
  - intracranial bleeding due to sudden decompression
  - umbilical cord rupture (bleeding out)
  - Infections
  - Hypothermia
  - Asphyxia (suffocation)

Physiological Delivery

- Pregnancy normally **38-42 weeks**

1. stage, opening (primipara 10-12h, otherwise 6-8h)

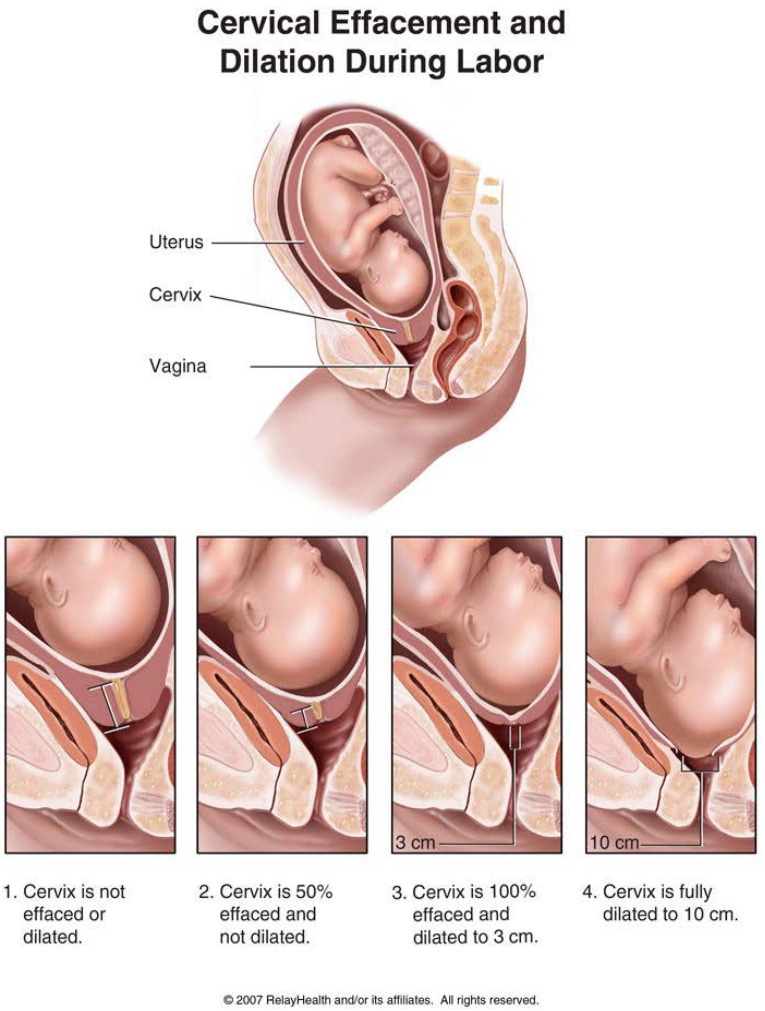
- Begins with occurrence of spasmodic abdominal pain (**contractions**, which are getting stronger, longer and more frequent)
- Occurs dilatation and shortening of cervix, **ends with efface of cervix**

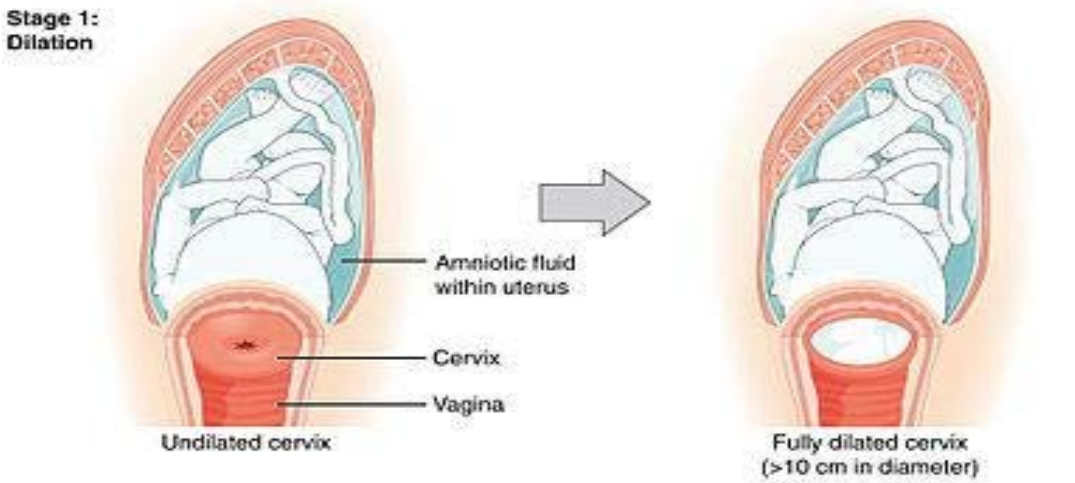
2. stage, expulsion (primipara 10-20min, otherwise 5-10min)

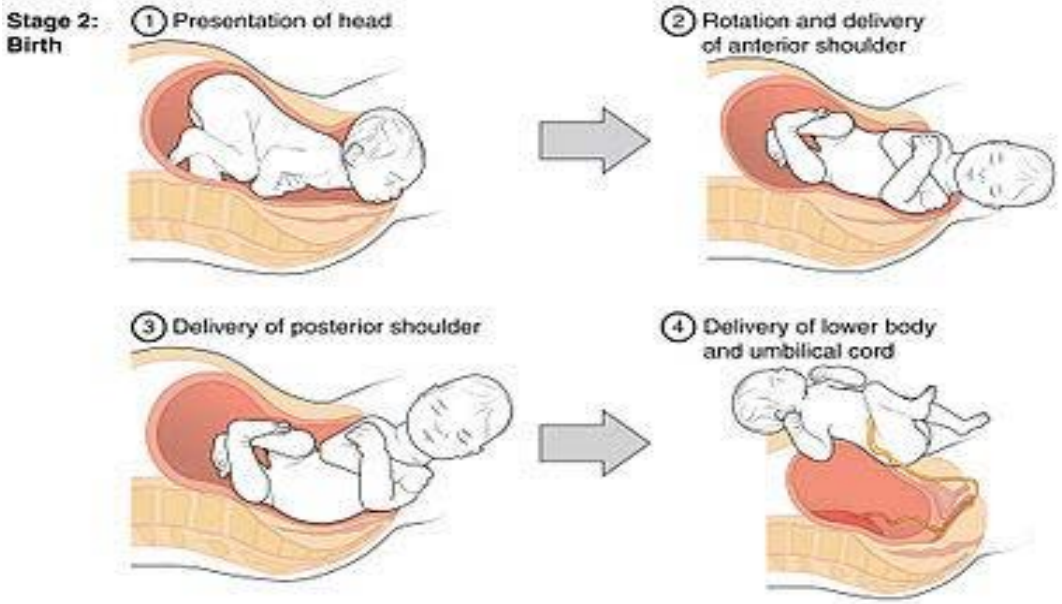
- Begins with efface of cervix and ends with childbirth

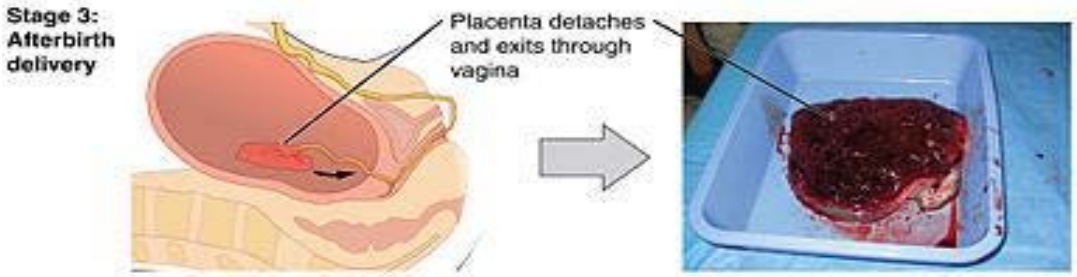
3. stage, delivery of placenta (usually 10-30min)

- From childbirth to placental delivery
- Terminates delivery and starts puerperium




Stage 1:
Dilation
Amniotic fluid
within uterus
Cervix
Vagina
Undilated cervix
Fully dilated cervix
(>10 cm in diameter)


Stage 2:
Birth
1 Presentation of head
2 Rotation and delivery
of anterior shoulder
3 Delivery of posterior shoulder
4 Delivery of lower body
and umbilical cord


Stage 3:
Afterbirth
delivery
Placenta detaches
and exits through
vagina

First Aid

- Immediately transport to (maternity) hospital
- Inform by phone maternity hospital

- Put patient in half sitting position (on blanket, support of head) **on left side** (Prevention of VCI and aorta compression)

- Woman in labour shouldn't in this stage push and should breath **rapid and shallow** during contractions

- If possible note the time of contraction beginning and observe length, intensity and intervals

Precipitate delivery first aid

- **<u>Before delivery try gather:</u>**

- **clean pad under patient** (towel, blanket, jacket etc.)
- **source of heat for newborn** (clean cloth, wrap newborn)
- **2-3 pieces of cloth** -cca 0,5 cm wide for ligature of umbilical cord (wider rubber, lines of textile napkin, part of bandage, shoe laces, part of bra etc.) - **if possible, boil them!**
- **scissors/knife** for cutting umbilical cord (when unsterile, boil it for at least 10mins or use disinfection or at least flame),
- **Sterile/clean dressing of umbilical cord**

Arrangements

- Call ambulance !!!
- From belt down naked, upper part of body should be covered
- Half-sitting position with spread legs and bent knees – quite pleasant surroundings!

<u>Preparation:</u>

- clean/sterile hands/gloves, face mask (clean scarf, napkin)
- + and mentioned tools

Delivery!

- Calm down future mother, rapid and shallow breathing until appears head between labia majora!
- Protect perineum and support head
- By inclination/declination of head help birth of shoulders
- Then pull out newborn (in case of releasing strangulated neck by umbilical cord, don't pull it out until neck release)

- Place newborn between legs of mother
- **Never elevate over the level of mothers abdomen, risk of acute bleed out !**
- As soon as possible clean, dry and wrap – **avoid hypothermia!**
- Ligature umbilical cord on three places (two ligatures by newborn side), at least 8-10 cm from newborn abdomen

- Cover rest of umbilical cord with sterile dressing (on both sides). If you don't have , don't do it

- Place child on mothers chest.

- In normal circumstances newborn starts breathing and screaming
- If not, initiate **CPR !**

Third stage measures

- Never help expulsion of umbilical cord by pulling!
- Expulsed placenta should be put into plastic sack for ambulance (Even small remaining piece of placenta in uterus can cause serious bleeding)
- Mother should be cleaned, covered and created her comfort (Small bleeding after delivery is common)
- Source of bleeding is usually mucosa of uterus – it retraction can be supported by compressive massage just under navel (in case anti-shock therapy)

Always remember!

- Don't help own delivery, **Just protect perineum and head!**
- Until ligature of umbilical cord, **never lift up newborn over level of mothers abdomen or don't put him too low**
- Always **keep placenta and examine its integrity** subsequently!
- Secure **temperature comfort** of newborn!

Abortion

- Expulsion of fetus before 24th week of pregnancy
- Risks:
  - Massive bleeding
  - Development of infection
- Typical spasmodic pain in lower part of abdomen (usually permanent)
- First Aid:
  - Call ambulance
  - Continuous observation – vital function, development of shock
  - Calm down patient
  - Female genitals cover by clean/sterile dressing , compression of bleeding