CHEST INJURIES

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CHEST INJURIES

- 3-4% of all injuries
- 8% of patients hospitalized due to injuries
- 65% of patients who died at the accident place

CLASSIFICATION OF THE CHEST INJURIES

(American Association for Surgery of Trauma)

- Injuries of the chest wall
- Injuries leading to respiratory failure
- Injuries leading to hypovolemic shock
- Injuries leading to infection/sepsis

CLASSIFICATION OF THE CHEST INJURIES

INJURIES OF THE CHEST WALL

- Contusions
- Hematomas
- Rib fractures
- Skin scapes
- Superficial wounds

CLASSIFICATION OF THE CHEST INJURIES

INJURIES LEADING TO RESPIRATORY FAILURE

- Open pnemothorax
- Closed pneumothorax
- Tension pneumothorax
- Hemothorax
- Flail chest
- Lung contusion
- Rupture of the diaphragm
- Burst of the trachea/bronchi

CLASSIFICATION OF THE CHEST INJURIES

INJURIES LEADING TO HYPOVOLEMIC SHOCK

- Burst of the lung
- Wounds of the heart
- Wounds of the big vessels

INJURIES LEADING TO INFECTION/SEPSIS

- Esophageal perforation

DIAGNOSTICS OF THE CHEST INJURIES

ANAMNESIS

- Pain (severe, light, superficial), dyspnoea, hemoptysis
- Time, action and force of trauma
- Another diseases (especially of respiratory and circulatory system)

PHYSICAL EXAMINATION

- heart rate, blood pressure, respiration rate
- color, temperature and moisture of the skin
- state of consciousness
- other injuries

DIAGNOSTICS OF THE CHEST INJURIES

LOCAL EXAMINATION

- external signs of the injury
- respiratory movements
- deformation of the chest
- subcutaneous emphysema
- displacement of the trachea
- local and transferred pain
- breath sounds
- cardiac action

DIAGNOSTICS OF THE CHEST INJURIES

ADDITIONAL EXAMINATIONS

- X-ray pictures of the chest
- X-ray pictures of the sternum and spine
- CT, MRI
- Ultrasonography
- Electrocardiogram
- Bronchoscopy / esophagoscopy

DIAGNOSTICS OF THE CHEST INJURIES

LABORATORY TESTS

- Blood tests (blood type, morphology, haemostasis)
- Blood gasometry (partial pressure of oxygen and carbon dioxide) – PO_2<50mmHg and PCO_2>50mmHg – indication for mechanical ventilation (respirator)

Thoracocentesis
(punction of the pleural cavity)

- The procedure fast and simple
- Leads to diagnosis (air or blood)
- Emergency treatment of tension pneumothorax
- Therapeutic procedure in the case of small pnemothorax or hemothorax

INJURIES OF THE CHEST WALL

- Contusions
- Hematomas
- Rib fractures
- Skin scapes
- Superficial wounds

- Analgesics drugs
- Intercostal nerve block
- Adhesive strapping
- Respiratory rehabilitation
- Mucolytics

PNEUMOTHORAX

OPEN

- becouse of injuries penetrating into pleural cavity
- must be converted promptly to closed pneumothorax

CLOSED

- becouse of leasion of the lung or its spontaneous rupture (emphysemotous bullae)

TENSION

- large amount of air under pressure enters the pleural cavity
- often subcutaneous emphysema
- emergency state requiring fast reaction

PNEUMOTHORAX

TREATMENT

- Observation (no symptoms of respiratory disfunction)
- Punction of the pleural cavity (thoracocentesis)
- Drainage of the pleural cavity (insertion of a chest tube and suction till full expansion of the lung)

FLAIL CHEST

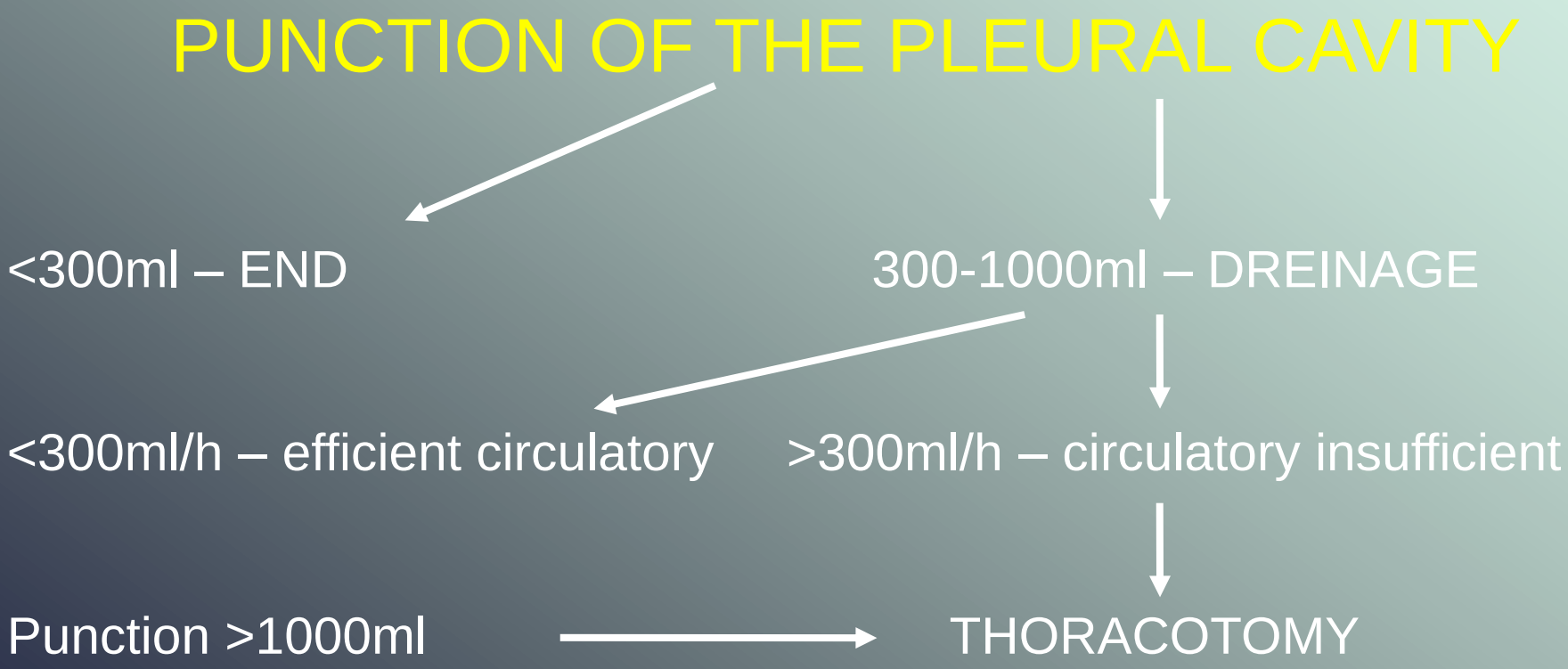
- double fractures of a few (at least 4) neighbouring ribs
- paradoxical motion of the chest (on inspiration the flexible area is pulled inward and pushed outward on expiration – ventilatory efficiency is obviously decreased)
- little disfunction of ventilation – immobilization with adhesive strapping (no circumferential)
- significant pulmonary disfunction – mechanical ventilation with respirator – eliminates paradoxical motion (as long as necessary even many weeks)

LUNG CONTUSION

- at 50% of patients with severe blunt toracic injuries
- it may lead to adult respiratory distress syndrome (ARDS)
- it is necessary to controll blood gasometry every 6-8 hours
- in the presence of ventilation abnormalities early mechanical ventilation with positive end-expiratory presure (PEEP)

HEMOTHORAX

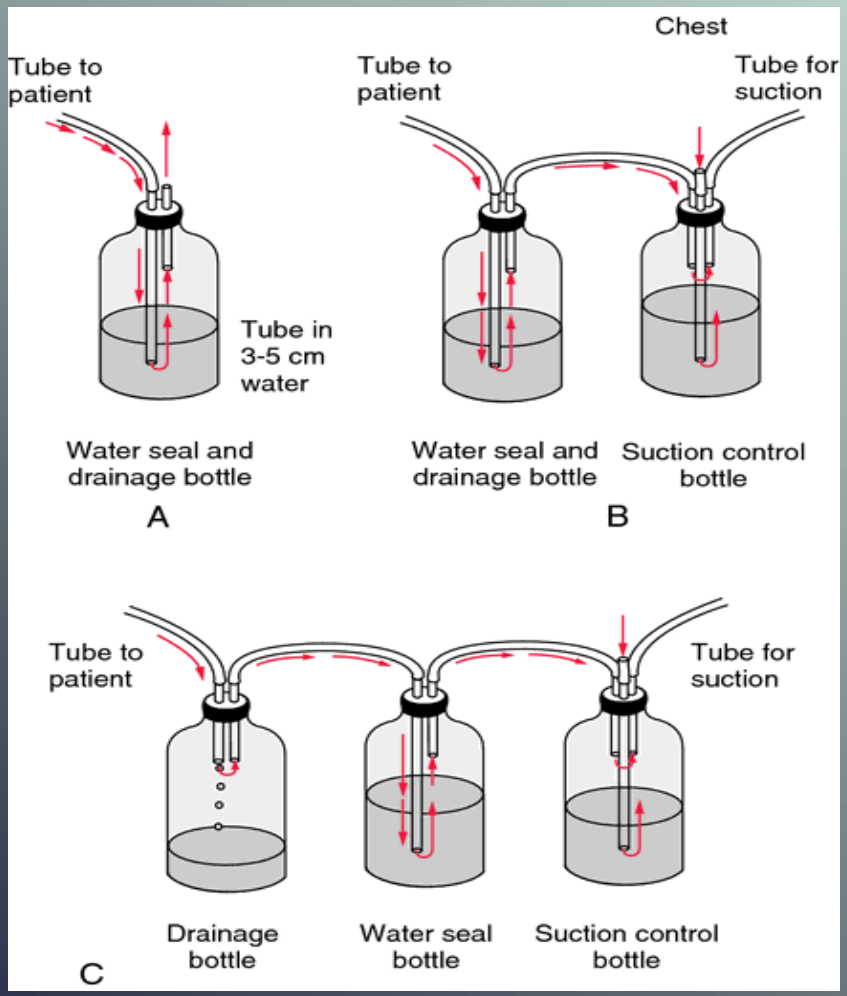
- Becouse of bleeding from the lung or chest wall



DREINAGE PLEURAL CAVITY

- VI-VII intercostal space in the midaxillary line
- Suction negative pressure – 10-15cm of water
- X-ray to controll of lung expansion
- Closure dreinage after 48-72 hours
- After next 24 hours controll X-ray – if the lung is expanded we can remove the dreinage

DREINAGE PLEURAL CAVITY



TRAUMATIC RUPTURE OF THE DIAPHRAGM

- Becouse of blunt or sharp trauma
- Over 90% on the left side
- Usually related to other multiple injuries
- Provides to respiratory failure
- Diagnosis is based on the presence of abdominal organs in the chest (X-ray, CT)
- Indication for operative treatment (prefered abdominal incision for better exploration for visceral injuries)

LUNG LACERATION

- Dreinage cavi pleurae at first
- If there is no effect – thoracotomy – usually suture of the lung is enough

BURST OF THE TRACHEA/BRONCHI

- Usually death in the place of accident
- Recostruction (operative) of continuity of respiratory tract

HEART INJURIES

HEART CONTUSIONS

- becouse of blunt injuries
- ECG signs and treatment are similar to myocardial infarction
- in severe cases mechanical assistance with the intra-aortic baloon pump may be reqiured

PENETRATING WOUNDS

- exsanguination is the most cause of death
- sometimes cardiac tamponade (compression of the heart by blood in the pericardial sac) helps to save the patient
- indication to operative therapy – V-th inercostal space on the left side

WOUNDS OF THE BIG VESSELS

- Mortality at the accident site – 95%
- Symptoms of hypovolemic shock
- For diagnosis the best is angioCT
- Indication for rapid surgery
- The median sternotomy is the incision of choice
- Usually required extracorporeal circulation
- The best results - endovascular surgery (stent-graft)

INDICATIONS FOR THORACOTOMY

RAPID

- Penetrating wounds with injury of the heart or big vessels and symptoms of hypovolemic shock
- Cardiac tamponade

URGENT

- Injuries of the esophagus and diaphragm
- Persistent heamorrage into pleural cavity

  (dreinage >300ml during 3-4 hours with symptoms of hypovolemic shock)
- Persistent air leak without lung expansion with symtpoms of respiratory respiratory insufficiency

INDICATIONS FOR THORACOTOMY

DELAYED

- Hemothorax which can't be evacuated with dreinage (blood clots)
- Purulent complications (pleural empyema, phlegmon of the mediastinum)
- Pleural adhesions making impossible lung expanding (decortication – removing fibrine membrane off the lung)