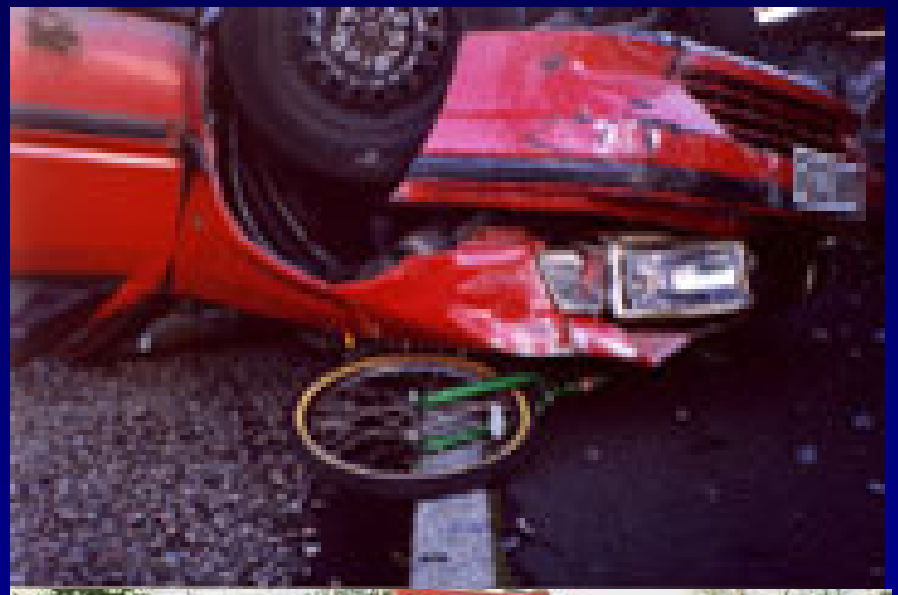
The trauma child

European Resuscitation Council

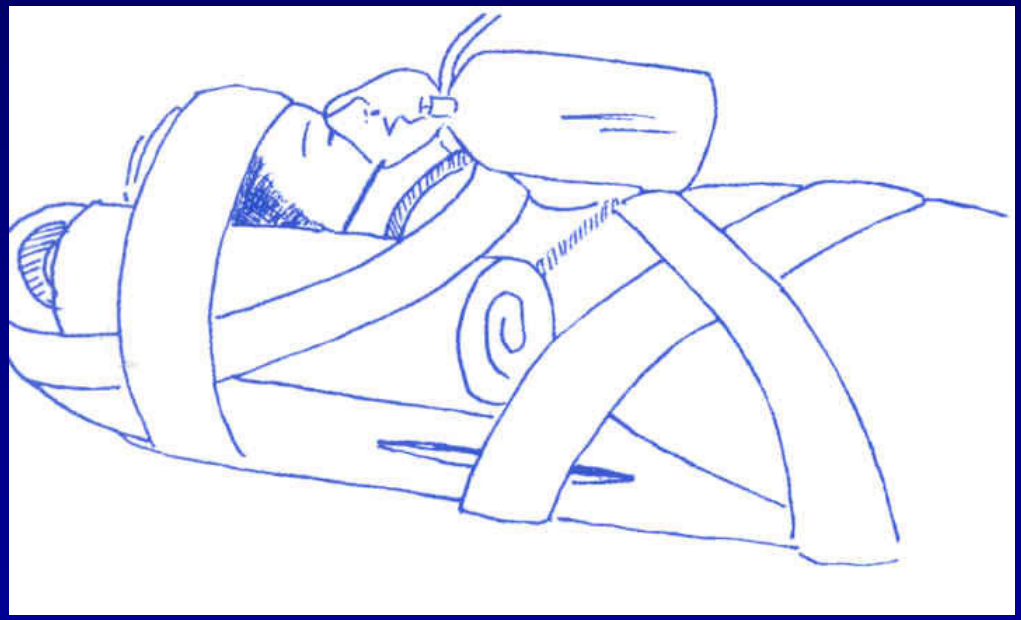
Incidence of Trauma in Childhood

- ✓ Leading cause of death and disability in children older than one year all over the world



Structured approach

- ✓ Primary survey and resuscitation
- ✓ Secondary survey
- ✓ Emergency treatment
- ✓ Definitive care



Primary survey and resuscitation

A - Airway and Cervical Spine stabilisation

B - Breathing, Oxygenation, Ventilation and Control of pneumothorax

C - Circulation and Haemorrhage control

D - Disability, Neurological status, AVPU, Pupils

E - Exposure and Environment

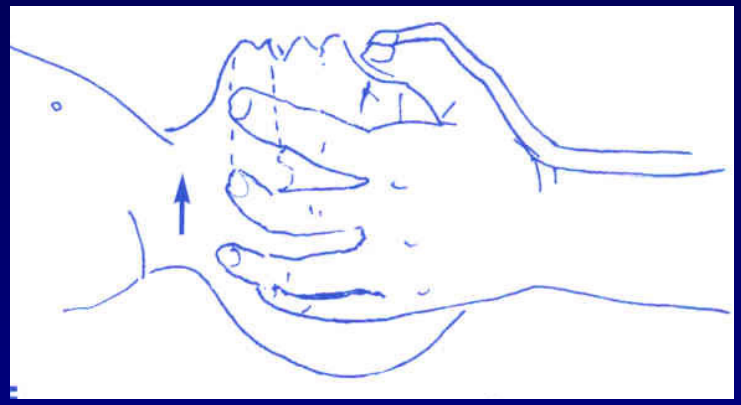
Primary survey and resuscitation

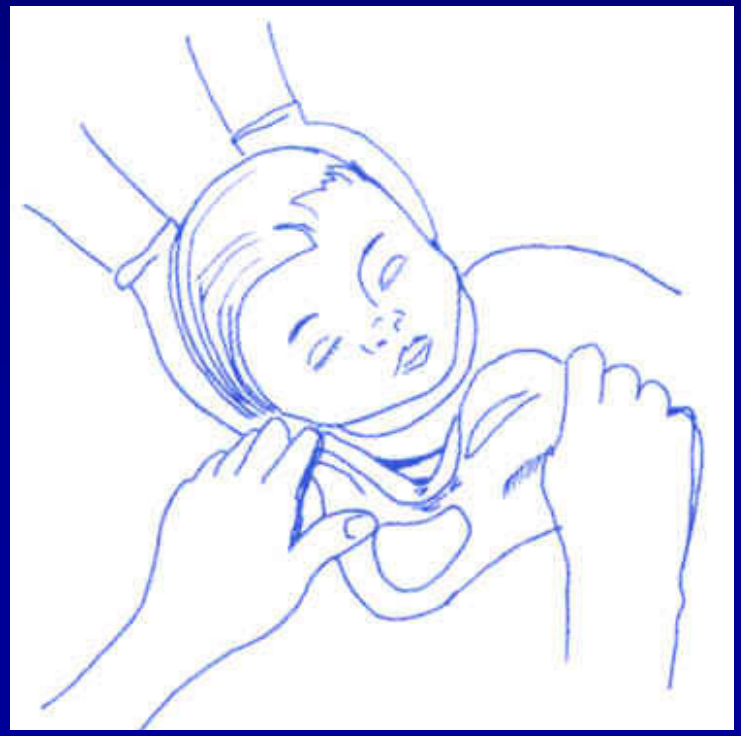
Treat first what kill first

Airway
and Cervical Spine Stabilisation

- ✓ Jaw-thrust manoeuvre
- ✓ Clearance of the airway
- ✓ Secure the airway
- ✓ In-line cervical stabilisation
- ✓ Placement of a cervical collar

  (and sand bags)





Breathing and Ventilation

- ✓Look - listen - feel
- ✓Effort of breathing
- ✓Oxygen at highest concentration
- ✓Bag-mask ventilation
- ✓Intubation and ventilation
  - impending airway compromise
  - inadequate support from bag-mask
  - prolonged or controlled ventilation needed

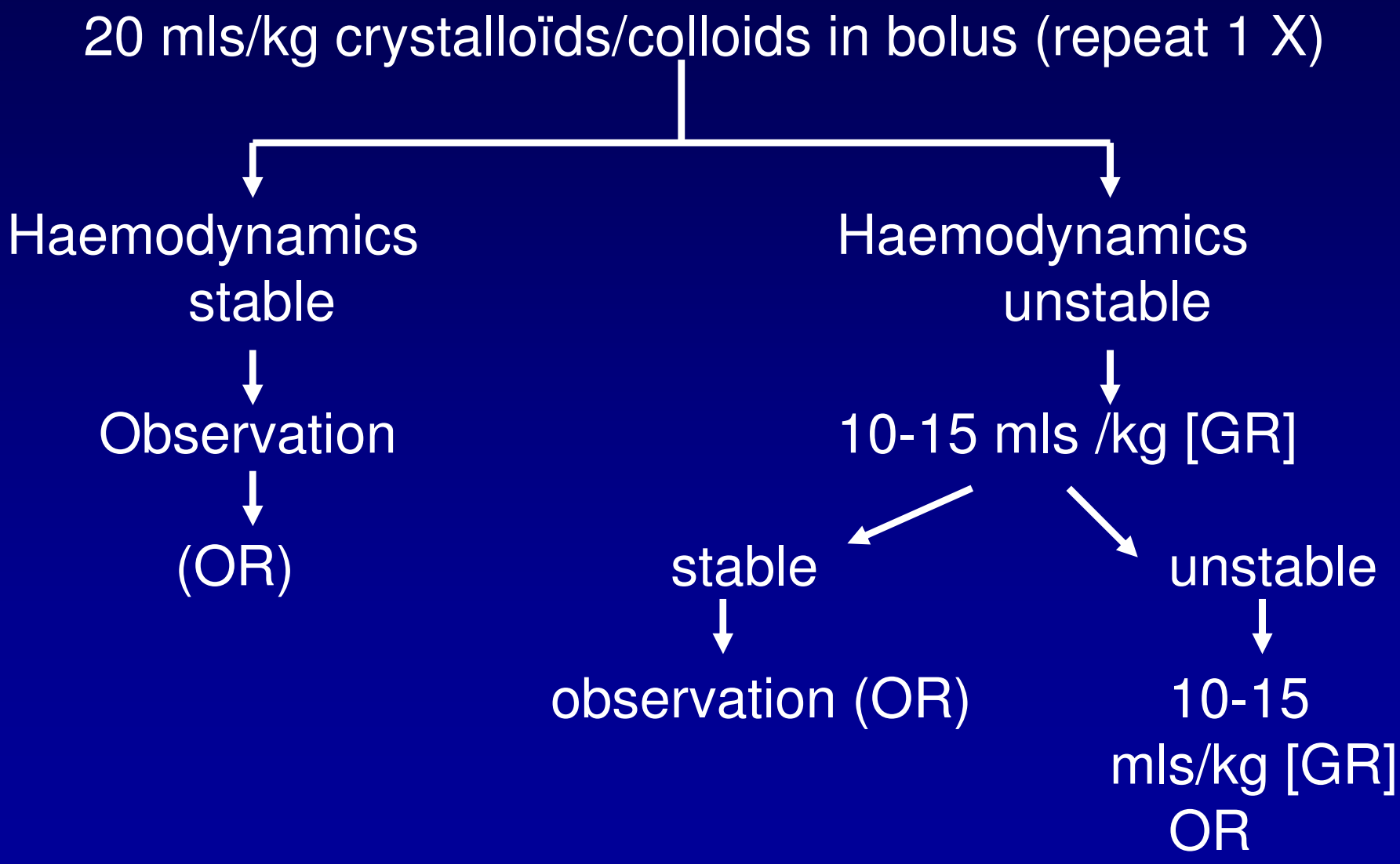
Circulation
and Haemorrhage control

- ✓ Cardiovascular signs
  - heart rate
  - blood pressure
  - capillary refill
- ✓ Control of haemorrhages
- ✓ Vascular access (2 large cannulae)
- ✓ Evaluation of blood loss
- ✓ Fluid resuscitation
- ✓ Transfusion

Systemic response to haemorrhagic shock

	< 25 %	25 - 40 %	> 40 %
Heart	Tachycardia	Tachycardia	Tachycardia Bradycardia
BP	Normal	Normal or decreased	Decreased
Pulse	Normal /reduced	Weak	Severely reduced
CNS	mild agitation	Lethargic	Coma, reacts to pain
Skin	Cool, pale	Cold, mottled Cap Refill ↗	Cold, pale

Fluid administration



Disability
and Neurologic Screening Examination

- ✓ AVPU
- ✓ Pupillary size and reactivity
- ✓ Posture

Exposure

- ✓ Full exposure
- ✓ Remember the heat loss and embarrassment

Secondary survey

- ✓ Complete the primary survey and resuscitation
- ✓ If deterioration of the child's condition: go back to the primary survey
- ✓ Head to toe and front to back
- ✓ Observation, palpation, percussion, auscultation
- ✓ 3 X-Ray (C Spine, Thorax, Pelvis)

AMPLE

Allergy

Medication

Past Medical History

Last Meal

Environment (history of accident)

Head trauma

ASSESSMENT

- ✓ History of injury
  - mechanism, consciousness, vomiting...
- ✓ General assessment
  - ABC, bruises, lacerations, fractures, ...
- ✓ Brief neurological evaluation in the primary survey (AVPU, Pupils)
- ✓ Glasgow Coma Scale (secondary survey)

GCS Eye opening (E4)

0 - 1 YEAR	> 1 YEAR
4. Spontaneously	4. Spontaneously
3. To shout	3. To verbal command
2. To pain	2. To pain
1. No response	1. No response

GCS Best Verbal Response (V5)

0 - 2 YEARS

5. Appropriate cry, smiles
4. Cries
3. Inappropriate cry
2. Grunts
1. No response

2 - 5 YEARS

5. Appropriate words/phrases
3. Inappropriate words
4. Cries-screams
2. Grunts
1. No response

GCS Best motor response (M6)

0 - 1 YEAR	> 1 YEAR
6. Moves adequately	6. Obeys command
5. Localise pain	5. Localise pain
4. Flexion withdrawal	4. Flexion withdrawal
3. Decorticate	3. Decorticated
2. Decerebrate	2. Decerebrated
1. No response	1. No response

Trauma crânien

Prevention of hypoxia

- Early intubation and maximal oxygenation

Prevention of ischaemia

- Aggressive shock treatment
- Prevention & treatment Intracranial Hypertension
- Prevention hyperglycaemia
- Prevention and treatment of seizures

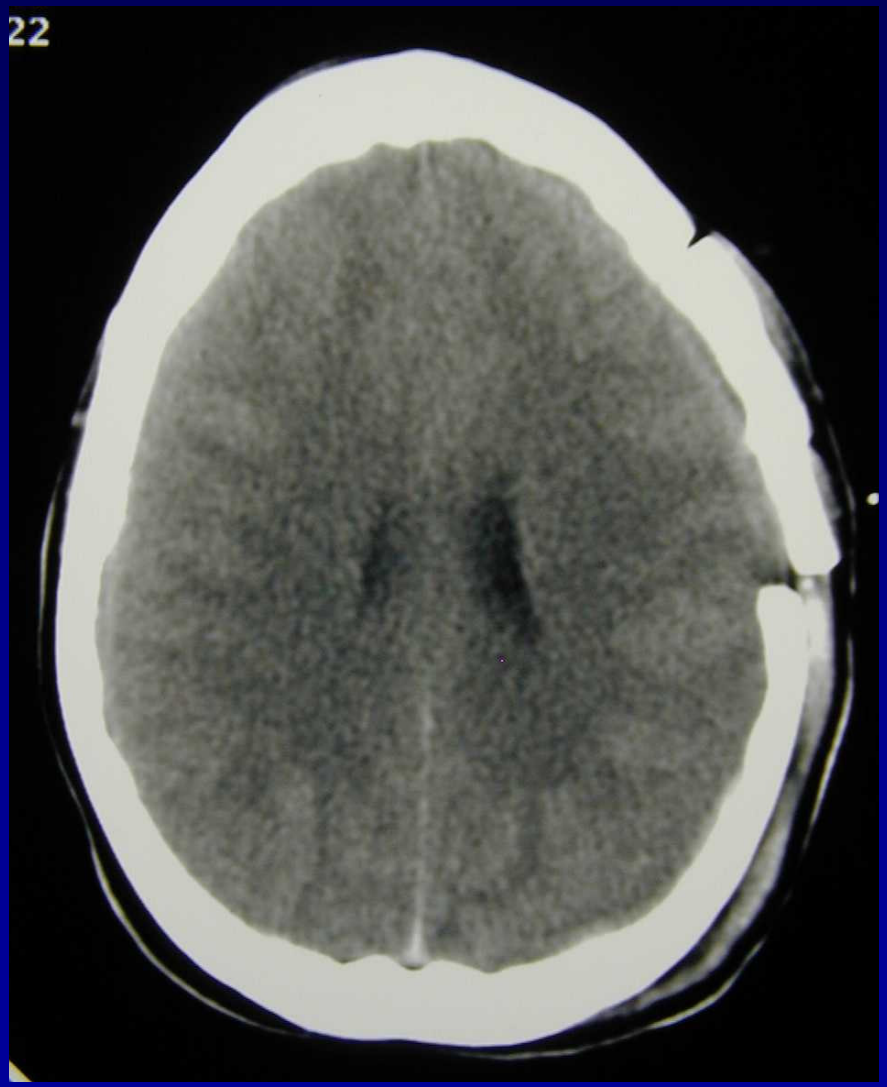
(diazepam, lorazepam, diphantoïne)

Prevention et treatment of IC HT

- Head in axis (free jugular veins)
- Maintain adequate systemic BP
- Slight head elevation (15 -max 30°) if threatening ICHT and in absence of low BP
- Ventilation (pCO_2 35-45)
- Hyperventilation in case of ICHT
- Mannitol
- Mean BP > P50

Head trauma

- ✓ Bleeding
- ✓ Fractures
- ✓ Brain tissue exposure

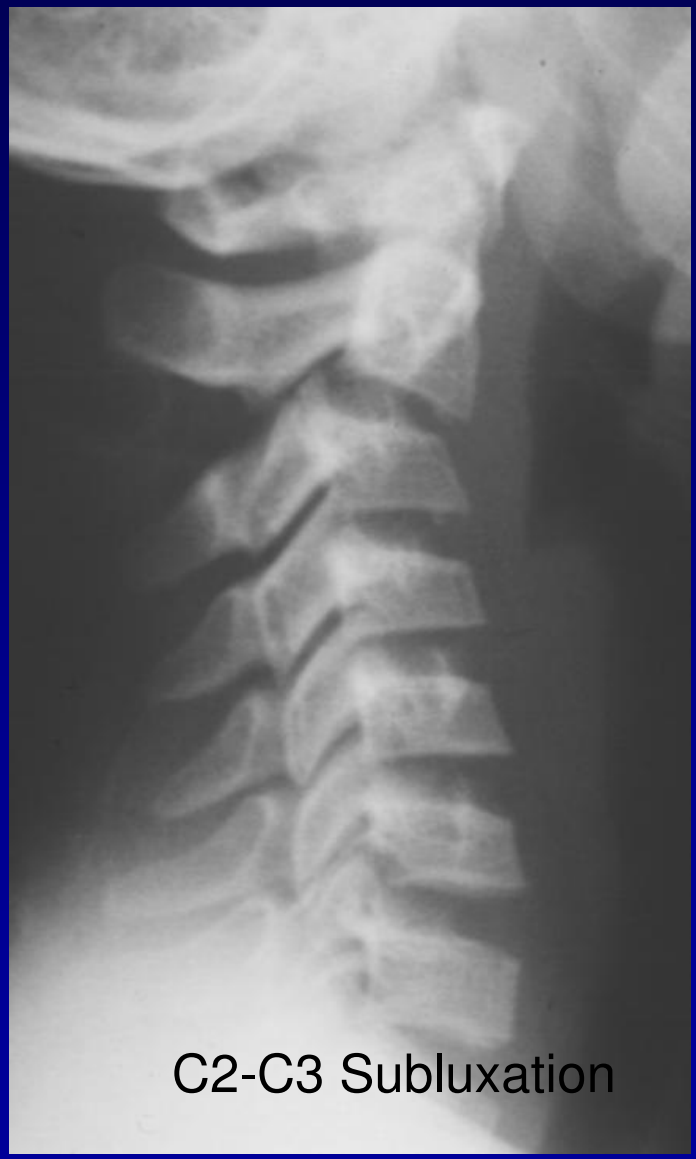


Emergency treatment

- ✓ Not life-threatening
- ✓ To be managed during the first hour

Injuries of the cervical spine

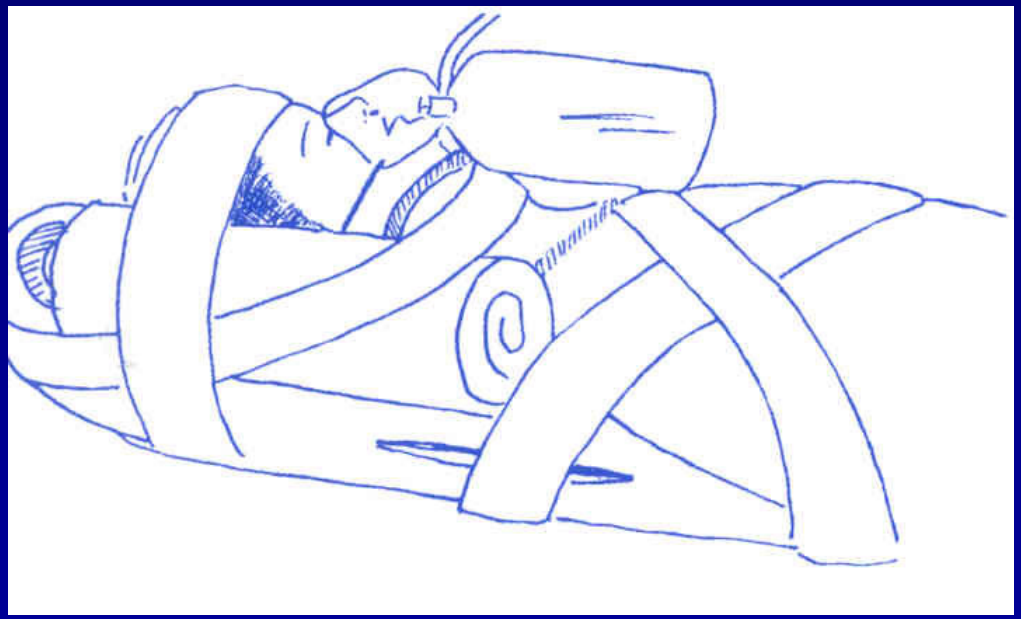
- ✓ Rare in children
- ✓ Devastating if missed



C2-C3 Subluxation

Immobilisation

- ✓ Collar
- ✓ Sandbags and tapes



Chest trauma

IMMEDIATELY LIFE THREATENING

- ✓ Tension pneumothorax
- ✓ Massive haematopneumothorax
- ✓ Open pneumothorax
- ✓ Flail chest
- ✓ Cardiac tamponade

DIAGNOSIS IS CLINICAL AND NOT RADIOLOGICAL

Tension pneumothorax

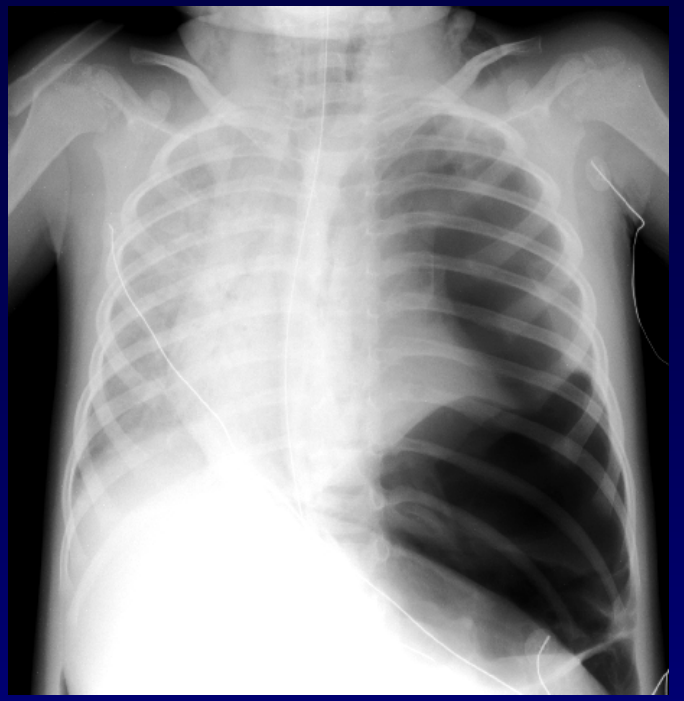
SIGNS

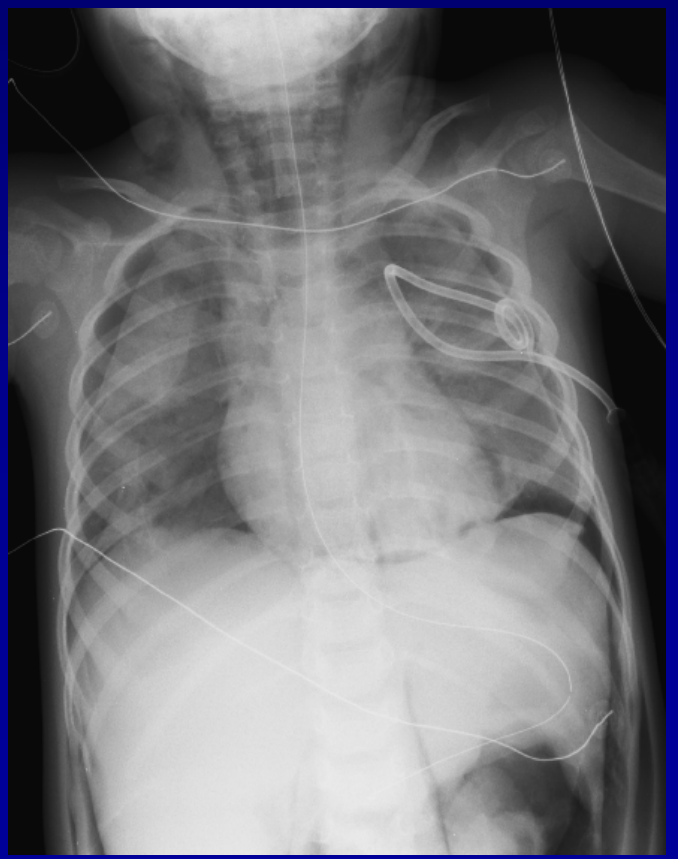
- ✓ Hypoxaemia
- ✓ Obstructive shock
- ✓ Unilateral absence of breath sounds
- ✓ Ipsilateral hypertympanic percussion
- ✓ Asymmetric respiratory movements
- ✓ Neck veins distension
- ✓ Tracheal deviation to the opposite site

Tension pneumothorax

TREATMENT

- ✓ Airway opening
- ✓ Oxygenation
- ✓ Urgent pneumothorax drainage
  - needle insertion into the second intercostal space midclavicular line
- ✓ Chest tube insertion
  - fifth intercostal space





Massive haemothorax

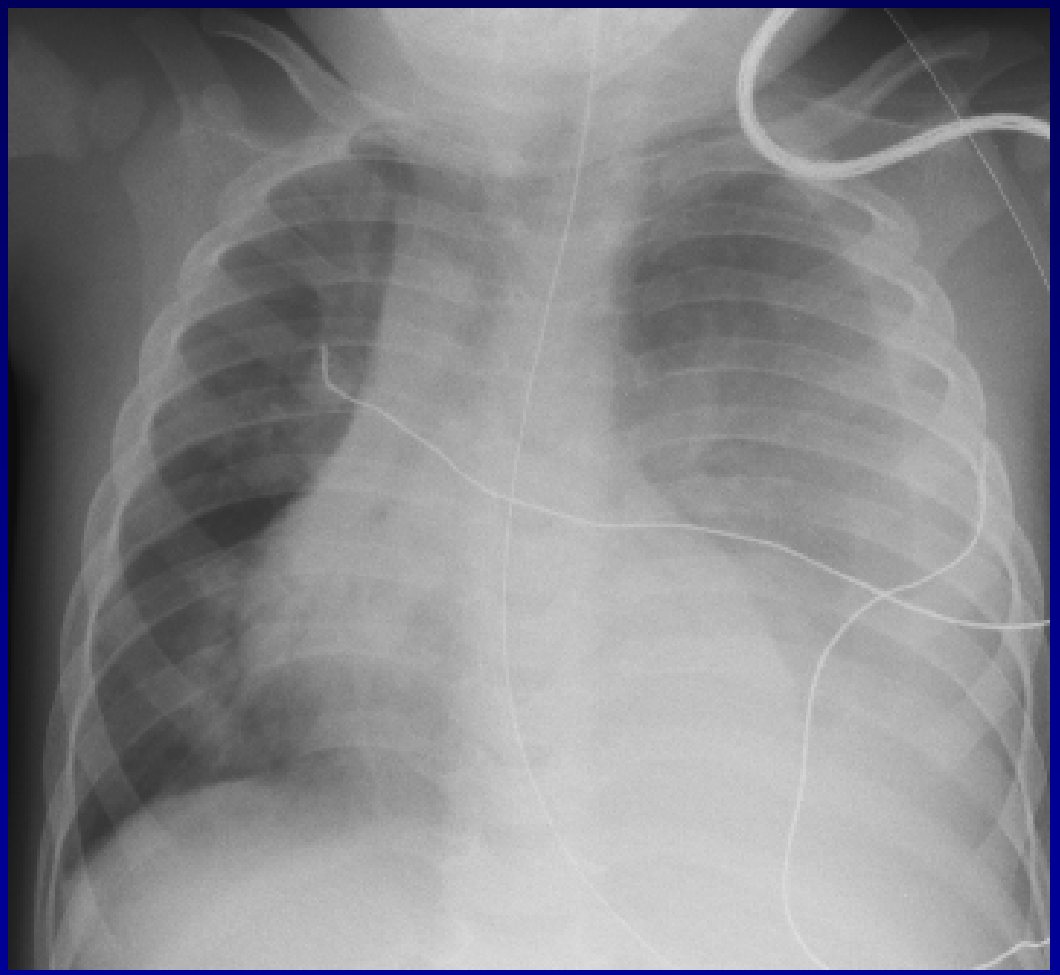
SIGNS

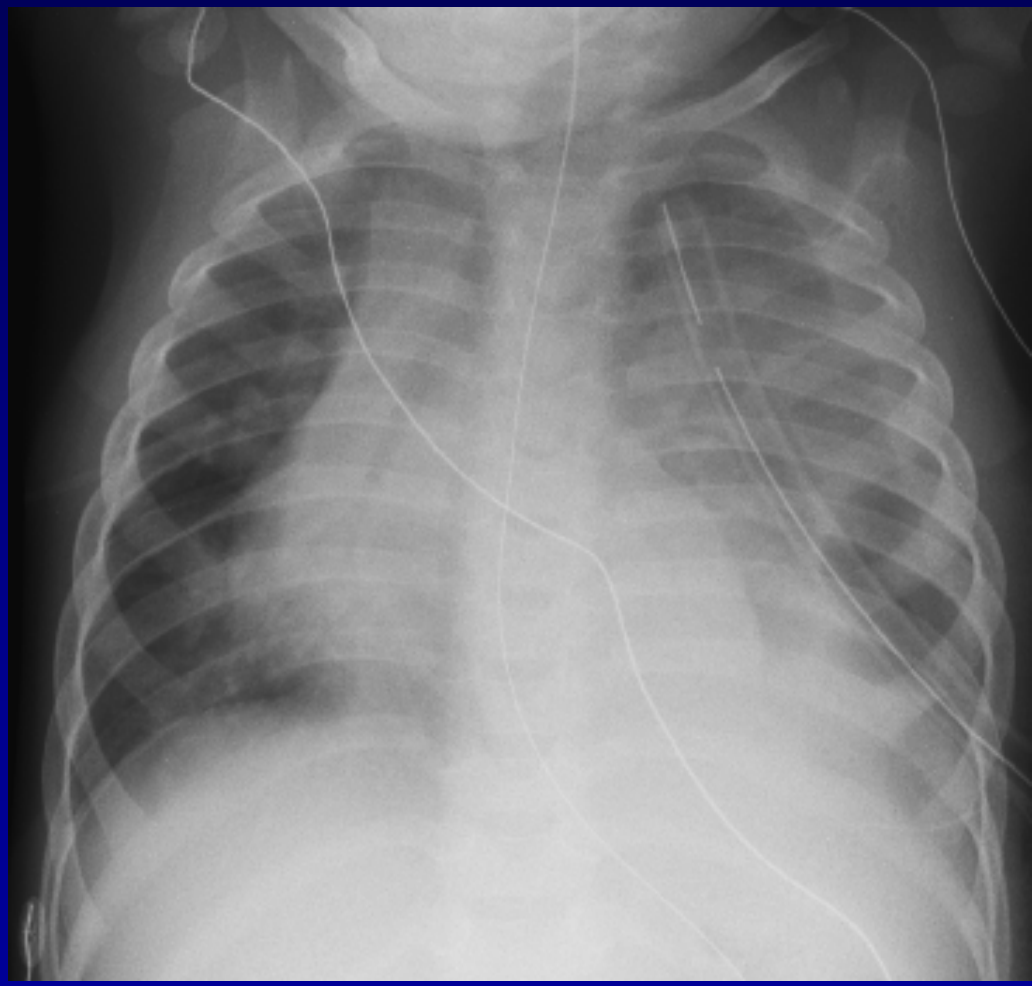
- ✓ Hypoxaemia
- ✓ Hypovolaemic shock
- ✓ Ipsilateraly decreased breath sounds and respiratory movements
- ✓ Ipsilateral dullness to percussion

TREATMENT

- ✓ Oxygenation
- ✓ Vascular access and fluid infusion
- ✓ Drainage
- ✓ Transfusion

Haemotorax





Cardiac tamponade

SIGNS

- ✓ Obstructive shock
- ✓ Muffled heart tones respiratory movements
- ✓ Distended neck veins

TREATMENT

- ✓ Oxygenation
- ✓ Vascular access and fluid infusion
- ✓ Pericardiocentesis
- ✓ Urgent surgical repair

Thorax and abdomen

- ✓ Penetrating injury
- ✓ Vascular injury
- ✓ Suspicion of bowl perforation
- ✓ Refractory shock of abdominal or thoracic origin

Skeletal trauma

- ✓Crush injuries of the abdomen and pelvis
- ✓Traumatic amputation of an extremity
  - Partial
  - Total
- ✓Massive open long-bone fractures

Definitive care

- ✓ Referral
- ✓ Safe transport