

ATLS (Advanced Trauma Life Support) Assessment of a trauma patient

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Content

- ▶ What is an ATLS approach to managing trauma patients
- ▶ What are the key components of primary survey and secondary survey
- ▶ How to recognise and manage life-threatening conditions during ATLS

What is the ATLS approach?

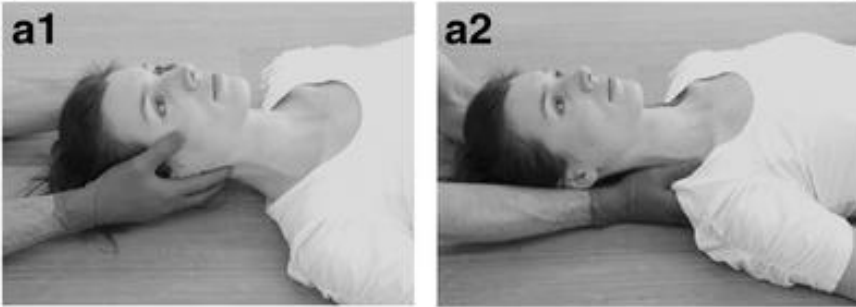
- ▶ The advanced trauma life support approach was developed by the American college of surgeons.
- ▶ It provides you with a safe and reliable method for the immediate management of injured patient
- ▶ It is a variant of the A-E assessment you are all familiar with.
- ▶ It includes the assessment of the patients condition, resuscitation and stabilisation of a patient.
- ▶ There are 3 surveys included in the ATLS approach: Primary, secondary and tertiary.

Primary survey

- ▶ Initial assessment and management of a trauma patient. It is conducted in order to identify and treat imminent life threats and prevent complications.
- ▶ In a real life setting there will be multiple simultaneous activities occurring in order to resuscitate and stabilise the patient. Not necessary linear.
- ▶ **A**- airway + c-spine control
- ▶ **B**- breathing
- ▶ **C**- circulation + exsanguinating external haemorrhage
- ▶ **D**-disability
- ▶ **E**-exposure

C-spine control

Manual in-line stabilization



Minimale immobilization



Immobilization in 30°-supine position without cervical collar



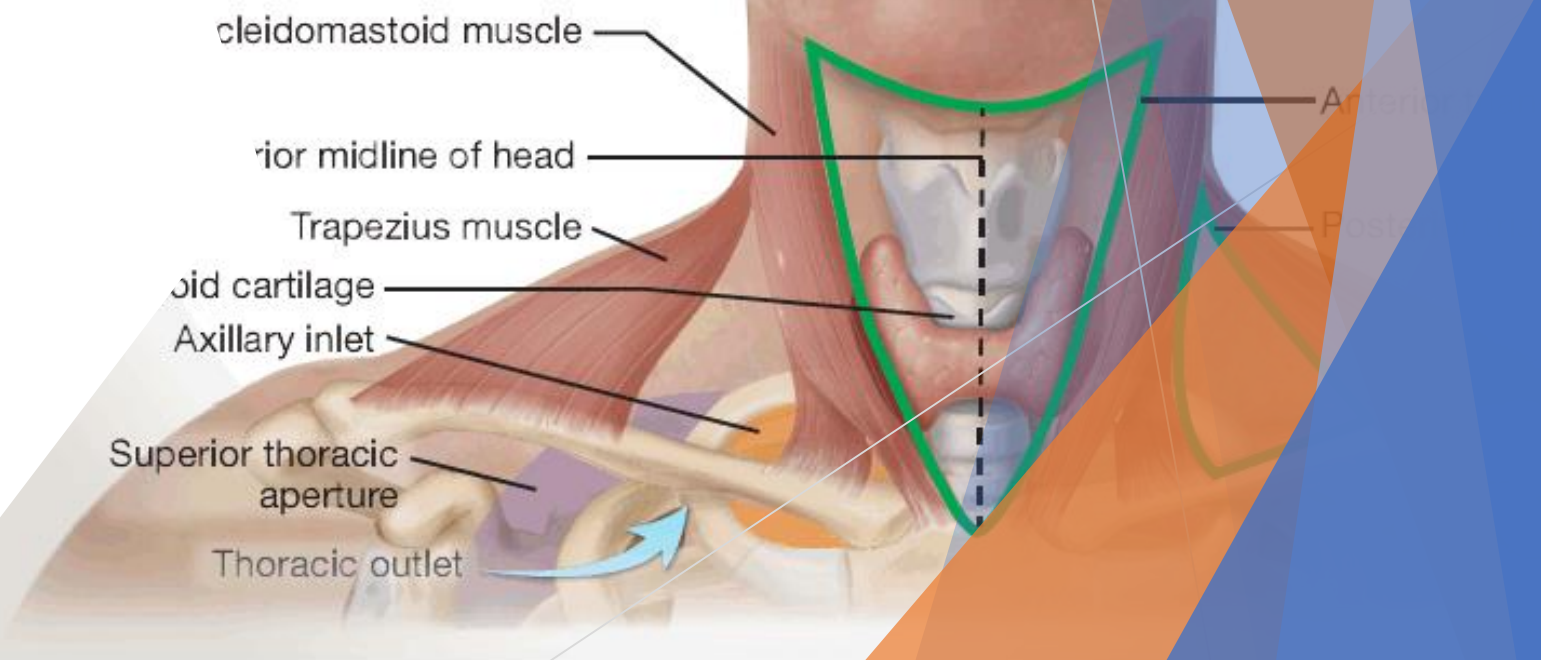
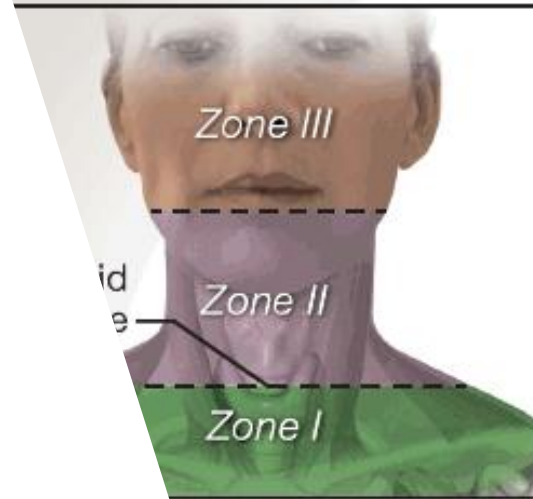
Complete immobilization



It is important to maintain the normal anatomical alignment and restrict the motion of the **spinal cord**.

A) Airway

- ▶ Assessment of airway patency and stability and a plan for airway management should be considered if required.
- ▶ Three main airway life threats need to be assessed and managed:
 1. **Airway obstruction:** form of blood, vomit, dislodged teeth- suction)
 2. **Blunt or penetrating neck injury:** how can this compromise the airway?
 3. **Reduced consciousness:** can lead to hypoventilation and hypoxia



Airway management

- ▶ Steps:
 - ▶ Airway manoeuvres
 - ▶ Airway adjuncts
 - ▶ Supraglottic airway devices
 - ▶ Intubation
 - ▶ Specialist airway techniques

Airway manoeuvres

- ▶ **Head tilt, chin lift**

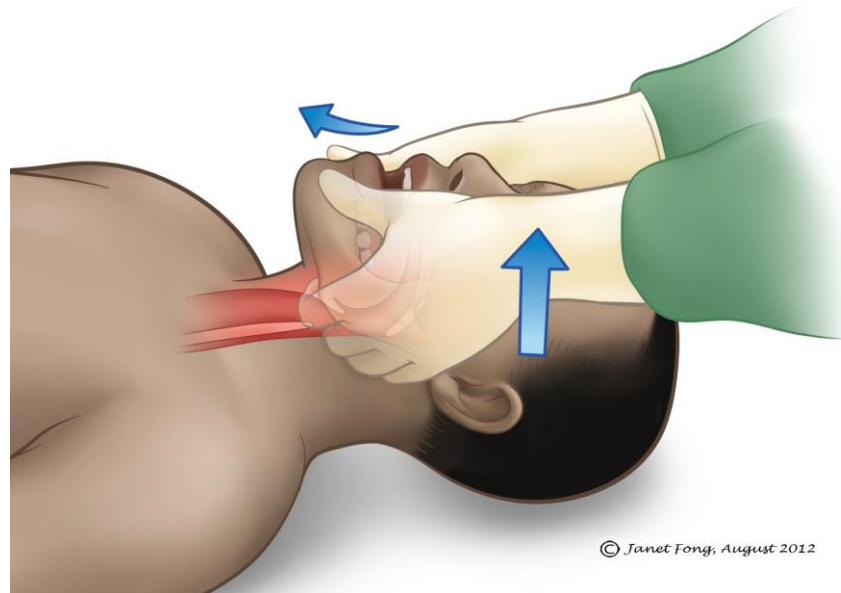
- ▶ Contraindications:

- ▶ C-spine injury

- ▶ **Jaw thrust:** used in C-spine injury and restricted neck movement.

- ▶ Contraindications:

- ▶ Mandibular trauma

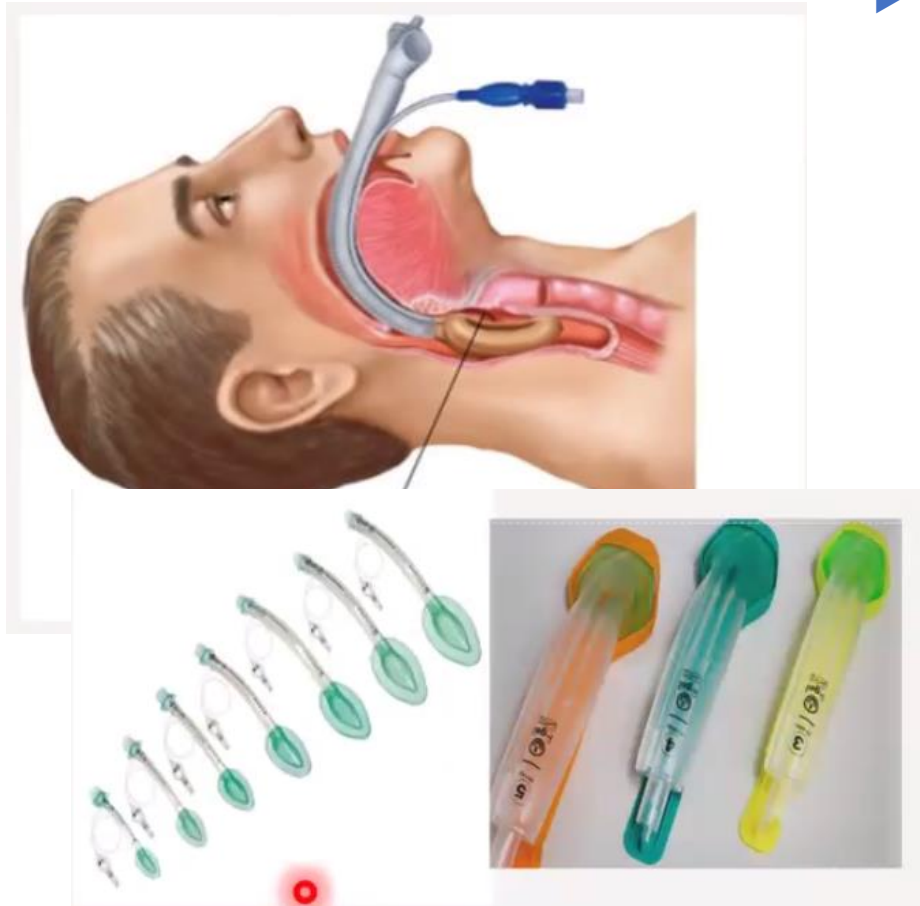


Airway adjuncts

- ▶ **Oropharyngeal airway: guedel airway.**
 - ▶ Indications: Unconscious patient with relaxed upper airway muscles. If GCS drops to less than 8-then intubate.
 - ▶ Contraindications: Conscious patients who are able to maintain airways themselves (risk of gag reflex), trismus, jaw injuries
- ▶ **Nasopharyngeal airway: flexible rubber tube which goes through nose and ends at base of tongue.**
 - ▶ Indications: If not able to use oropharyngeal airway due to patient being semi awake with an intact gag reflex.
 - ▶ Contraindications: Base of skull fracture, Nasal injury, Nasal obstruction
- ▶ **Suction:** only suction where can see



Supraglottic airway management



- ▶ Supraglottic airway devices lie above laryngeal outlet
 - ▶ **Laryngeal mask airway:** for fasted patients.
 - ▶ Indications:
 - ▶ First line in cardiac arrest
 - ▶ Attached to ventilation machine which allows spontaneous ventilation +/- low-level positive pressure ventilation supplementation during surgery
 - ▶ Contraindications:
 - ▶ High risk of aspiration
 - ▶ Long term ventilation required
 - ▶ GCS>8

Infraglottic airway management

▶ Intubation:

- ▶ **Endotracheal tube:** flexible plastic tube with cuff on end which sits inside trachea. Fully secures airway and is gold standard. Tube is inserted through vocal cords. Done under general anaesthetic and paralysis.

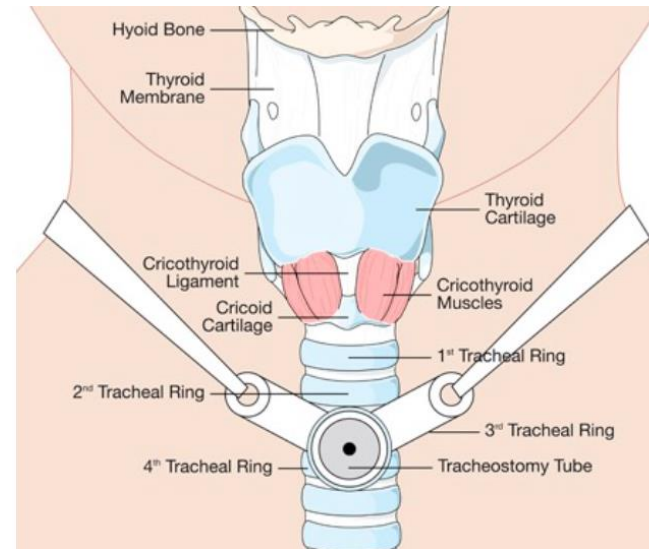
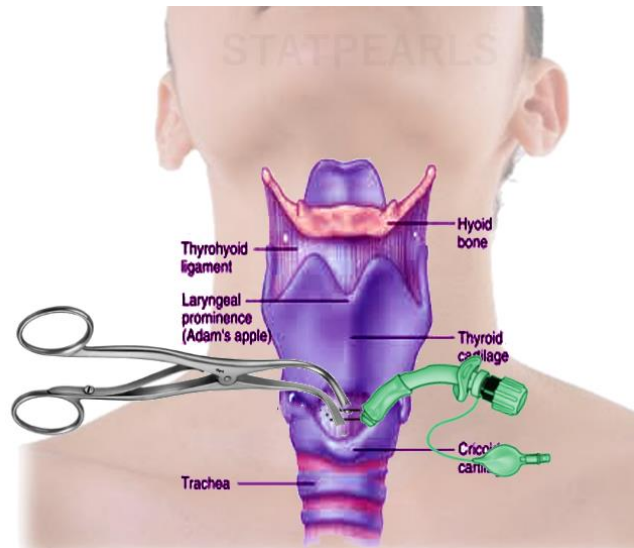
▶ Indications:

- ▶ Risk of aspiration
- ▶ GCS <8
- ▶ Potential airway obstruction: i.e. burns, epiglottitis, neck haematoma



Infraglottic airway management

- ▶ Specialist airway techniques: infraglottic airway - lies below laryngeal inlet.
 - ▶ **Tracheostomy:** surgical hole made in trachea, through which a tracheostomy tube is passed. Attached to ventilation bag/ machine. Done if intubation fails.
 - ▶ **Cricothyroidotomy:** if all else has failed.



Summary Airway mx:

1st line - head tilt/chin lift

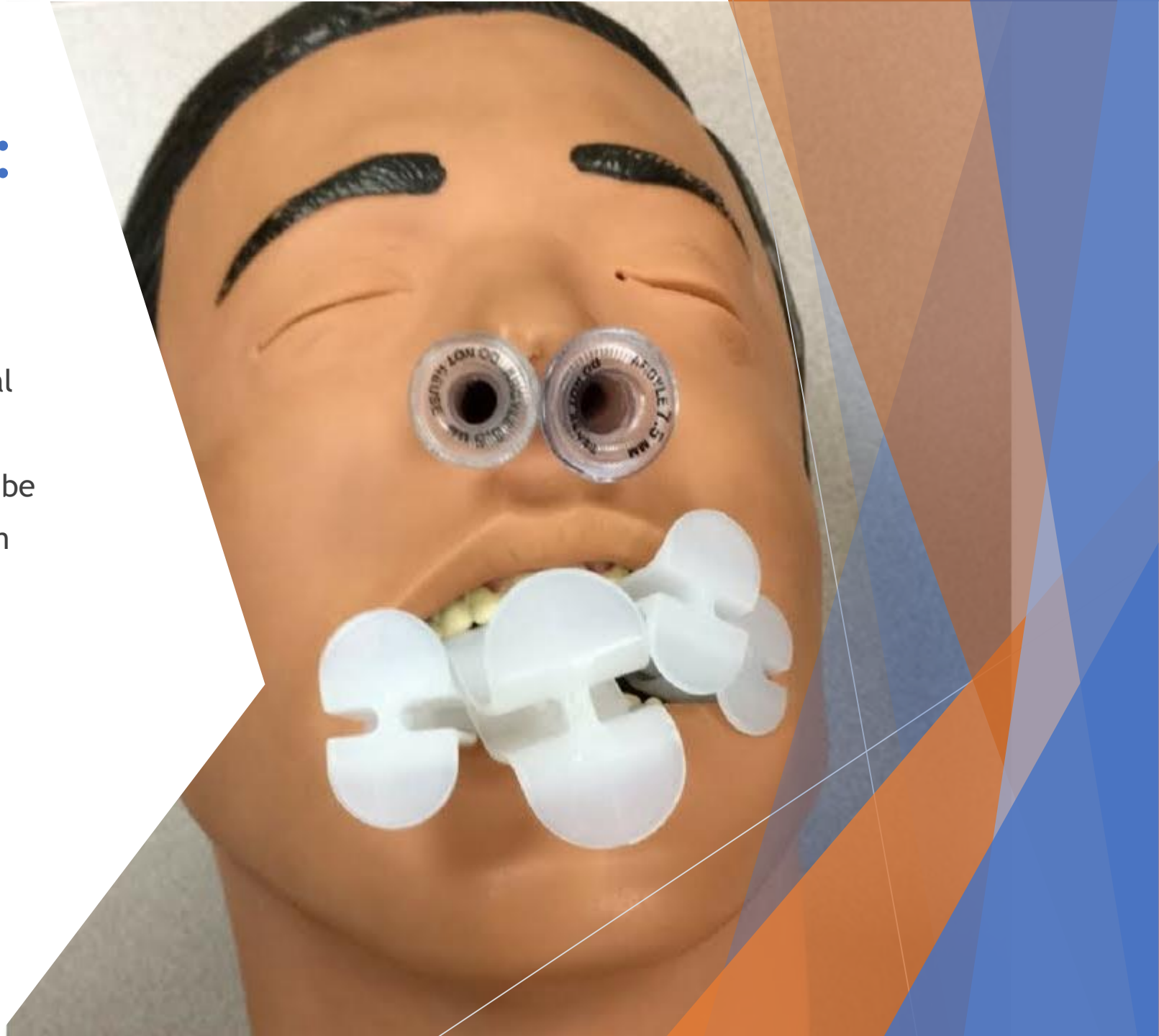
2nd line - Guedel airway or nasopharyngeal

3rd line- Laryngeal face mask

4th line - Intubation using endotracheal tube

5th line - Tracheostomy if failed intubation

6th line - Cricothyroidotomy if all else has failed.



B) Breathing

- ▶ Assessment of the chest is paramount and the chest should be fully exposed for any open wounds, bruising or obvious deformities. RR, sats and resp effort should be noted.
- ▶ Palpation of the chest in all quadrants.
- ▶ Auscultation for breath sounds- axillae.
- ▶ Mobile chest x-ray should be performed with pelvic and lateral neck x-ray at earliest opportunity.
- ▶ Oxygen target 94-98% (COPD patients 88-92%)
- ▶ What are the main life threatening chest traumas we are looking out for?

C) Circulation

- ▶ Assessment is focused on detecting and managing shock or reduced tissue perfusion. Most common cause - hypovolemic shock.
- ▶ Assess HR, BP, Peripheral circulation (pale, clammy)
- ▶ Gain IV access- 2 large bore cannulas. If difficulty getting access what would you do?
- ▶ FAST scan - (Focused Assessment with Sonography in Trauma) if it is available and staff are trained in its use.

Control of catastrophic haemorrhage

Aims of resuscitation:

1. Stop bleeding - tourniquets, pressure, splinting
2. Replace volume - you start with a hypotensive resuscitation with fluids which means you don't drive up their blood pressure to normal- too much watery blood will dislodge any clots made to stop the bleeding
3. Restore Hb - Blood products
4. Address underlying cause

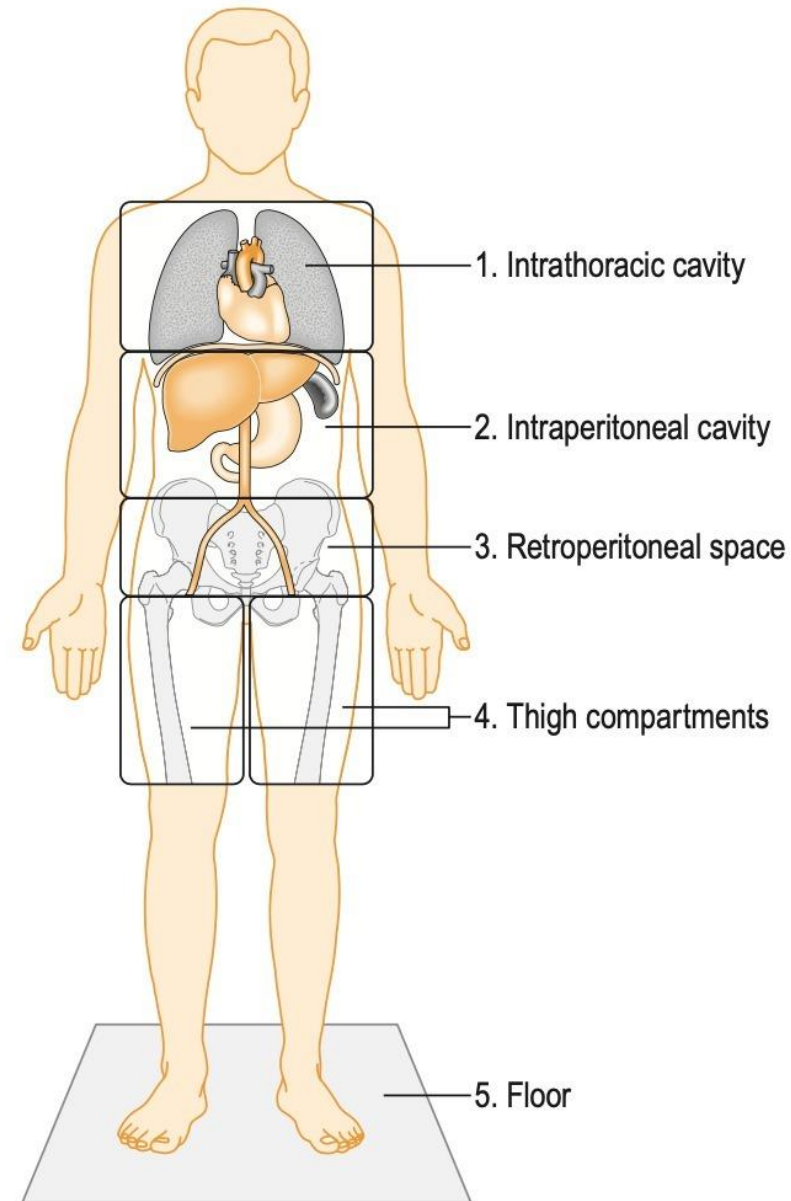
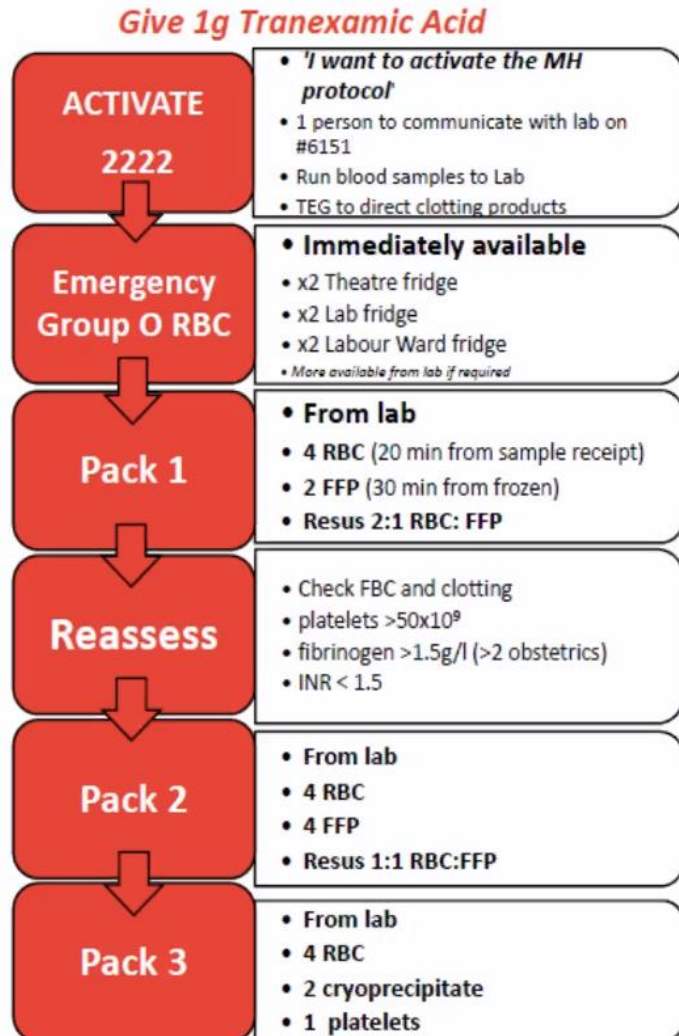


Fig. 2.1 Sources of haemorrhage after trauma.

The lethal triad



Lethal triad of trauma can occur as a consequence of blood loss:

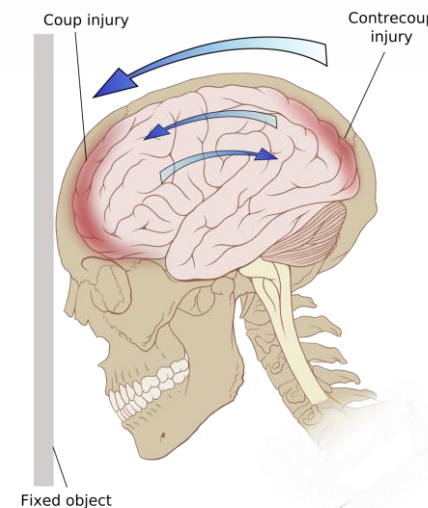
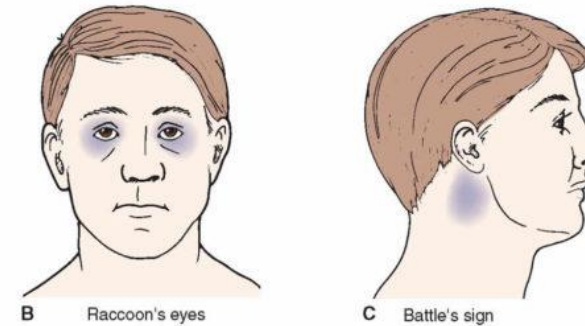
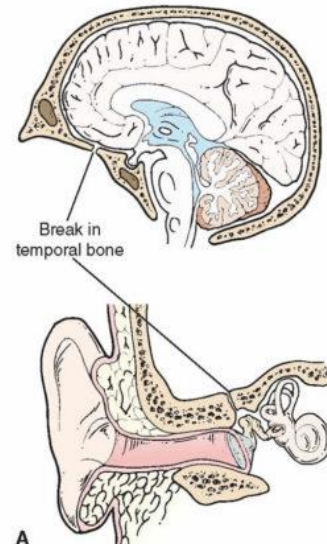
1. **Acidosis** if pH drops to 7.1-
However, in trauma patients the major contributor is poor perfusion to the tissues. Cells utilise anaerobic metabolism instead of the normal aerobic metabolism, resulting in the production of lactic acid as a by-product.
2. **Hypothermia** -low temps also affects clotting. Haemorrhagic shock
3. **Coagulopathy**- low fibrinogen can affect clotting. Losing clotting factors through blood loss.

D) Disability and E) Exposure

- ▶ Assessment of consciousness GCS
- ▶ BM
- ▶ Risk of hypothermia

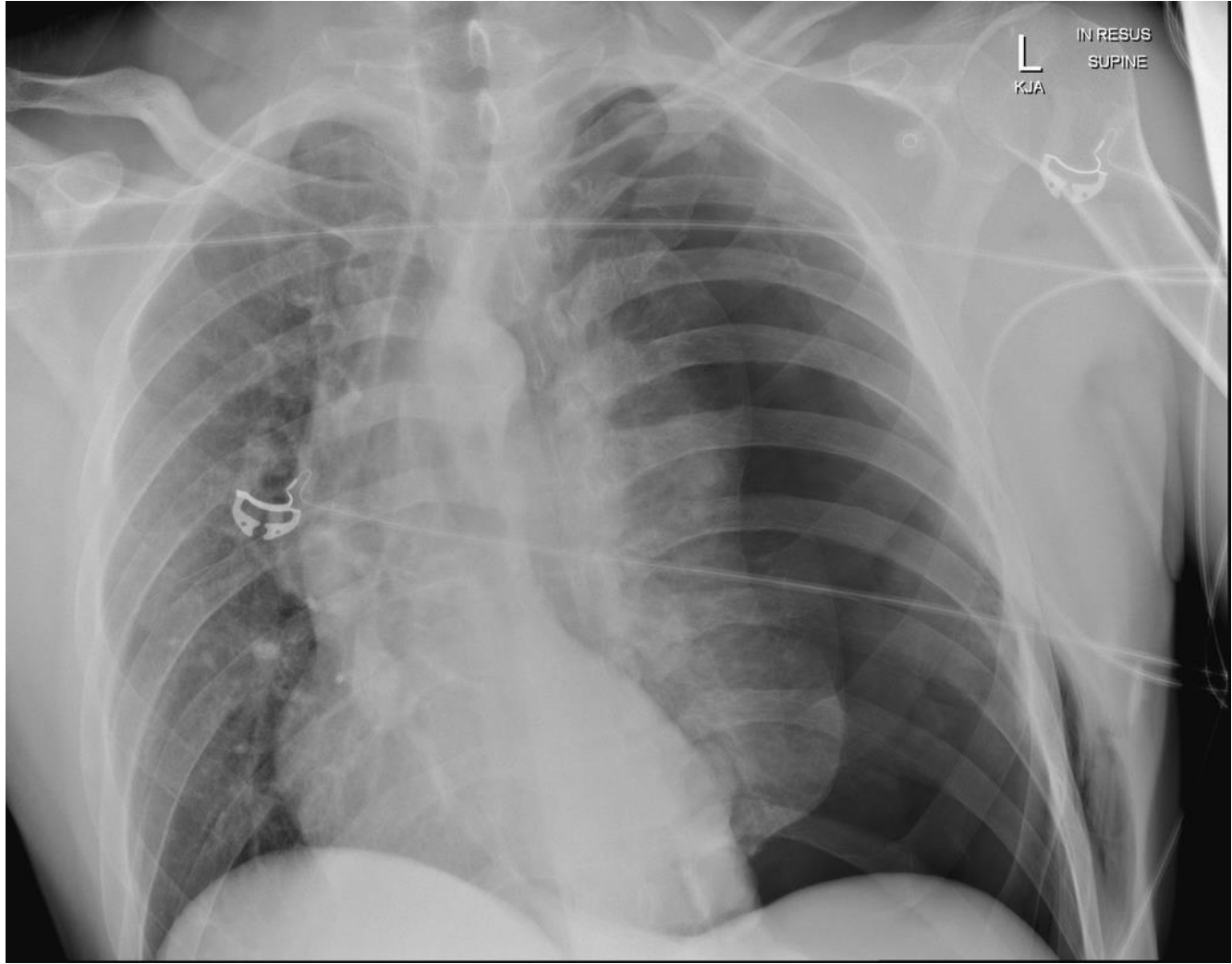
Secondary survey and Tertiary survey - head to toe examination

- ▶ Head
- ▶ Maxillofacial
- ▶ Neck and cervical spine
- ▶ Chest and lungs
- ▶ Heart
- ▶ Abdomen
- ▶ Genitourinary
- ▶ MSK- thoracic and lumbar spine
- ▶ MSK extremities
- ▶ Neurological
- ▶ Skin





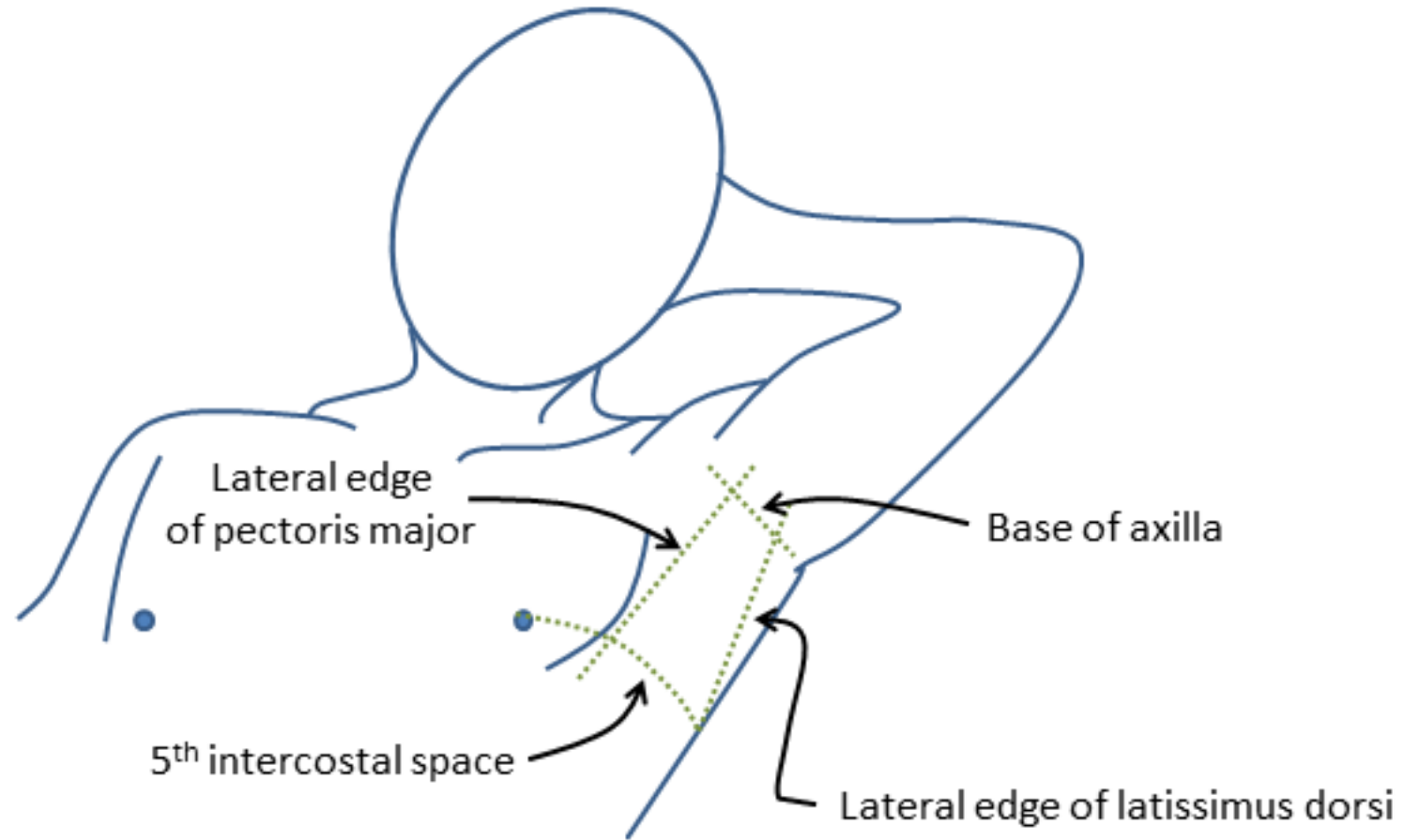
A run through the major trauma conditions



Tension pneumothorax

- ▶ A 'one way valve' leak allows gas into pleural space which cannot leave.
- ▶ **Signs:** Haemodynamic instability, pleuritic chest pain, tachycardia, raised JVP, tracheal displacement, hyperresonance on percussion, clammy and cyanosed.
- ▶ **X-ray signs:** mediastinal shift to opposite side, flattening/ eversion of diaphragm.
- ▶ **Management:**
 - ▶ Immediate decompression: insertion of a large bore needle into 2nd intercostal space in the midclavicular line of affected side.
 - ▶ Definitive management: insert closed chest suction tube.

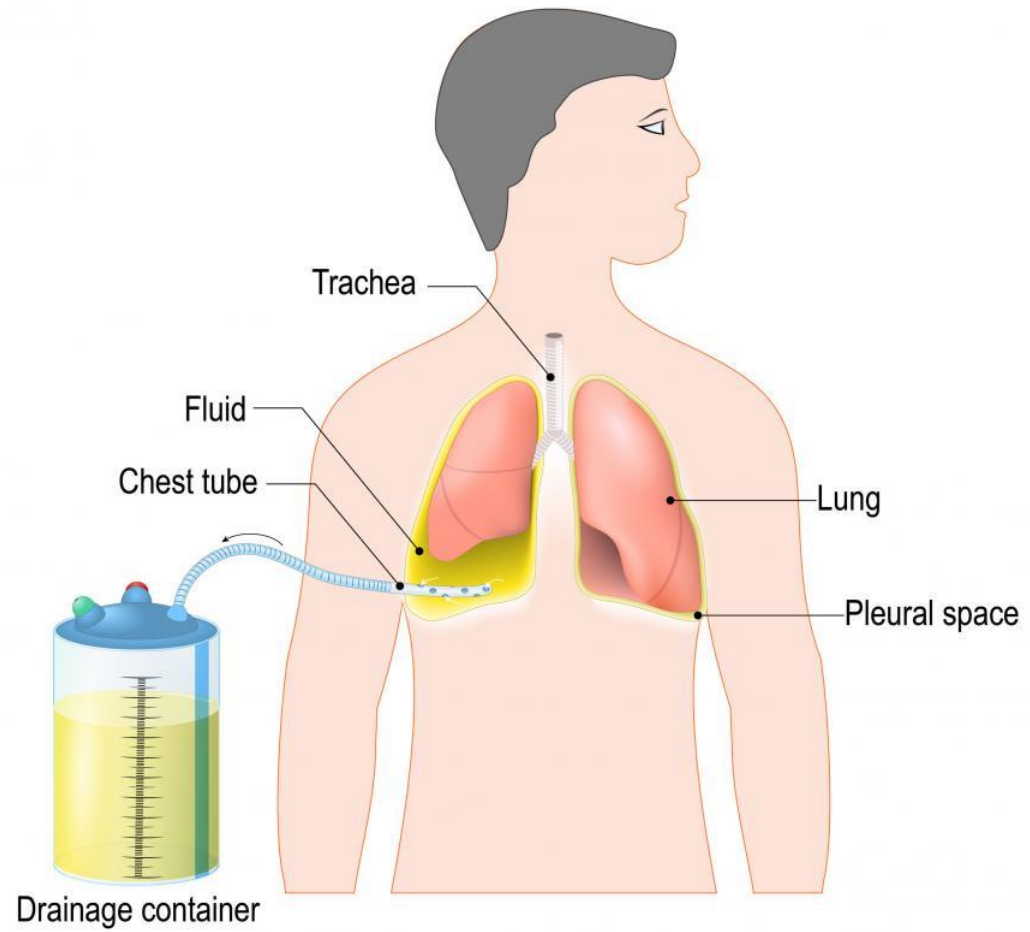
Safety triangle



Size	Color	Length	Flow Rate(ml/min)	Uses	Nursing Consideration
14G	ORANGE	45	250-300	<ul style="list-style-type: none"> Used for adolescent and adult major surgery and trauma infusion of large amount of fluids or colloids 	<ul style="list-style-type: none"> Painful insertion Required large insertion
16G	GREY	45	150-240	<ul style="list-style-type: none"> adolescent and adult major surgery and trauma infusion of large amount of fluids or colloids 	<ul style="list-style-type: none"> Painful insertion Required large insertion
18G	GREEN	45	100-120	<ul style="list-style-type: none"> adolescent and adult major surgery and trauma infusion of large amount of fluids or colloids 	Commonly used
20G	PINK	32	55-80	<ul style="list-style-type: none"> Older children, adolescent and adult Ideal for I.V. infusion and blood infusion Medication administration Emergency management 	<ul style="list-style-type: none"> Easy to insert into small, thin, fragile veins Difficult to insert into tough skin
22G	BLUE	25	22-50	<ul style="list-style-type: none"> Older children, adolescent and elderly adult I.V. infusion with moderate flow rates Medication administration 	<ul style="list-style-type: none"> Insertion to tough skin is difficult
24G	YELLOW	19	23	<ul style="list-style-type: none"> Infant toddler, older children Major surgery and trauma among children Can administer fluids and medication 	<ul style="list-style-type: none"> Less painful Insertion to tough skin is difficult
26G	VIOLET	19	10-15	<ul style="list-style-type: none"> Neonate, infant and elderly adults Suitable for infusion but infusion rate is low 	<ul style="list-style-type: none"> Insertion to tough skin is difficult and less painful

Chest drains

- ▶ A chest drain is a tube inserted into the pleural cavity creating a one-way valve allowing movement of air/ liquid out of cavity. Inserted using a Seldinger technique.
- ▶ Placed in safe triangle: mid axillary line of the 5th intercostal space. Borders: anterior edge of latissimus dorsi, lateral border of pectoralis major, a line superior to the horizontal level of the nipple and the apex below the axilla.
- ▶ Indications
 - ▶ **Large bore chest drains:**
 - ▶ Tension pneumothorax
 - ▶ Haemothorax drainage
 - ▶ **Smaller diameter chest drains:**
 - ▶ Pneumothorax
 - ▶ Pleural effusion drainage



Chest drains

Terminology

- ▶ **Swinging:** the fluid in the chest drain tubing should rise with inspiration and fall with expiration due to changes in thoracic pressure - 'swinging' - if this is not occurring it may indicate a blockage
- ▶ **Bubbling:** bubbles coming from drainage tube into drainage bottle is normal in pneumothorax, abnormal in effusion
- ▶ **Clamping:** a (bubbling) chest drain for a pneumothorax should never be clamped without consulting a senior doctor as it can lead to a tension pneumothorax

Chest drains

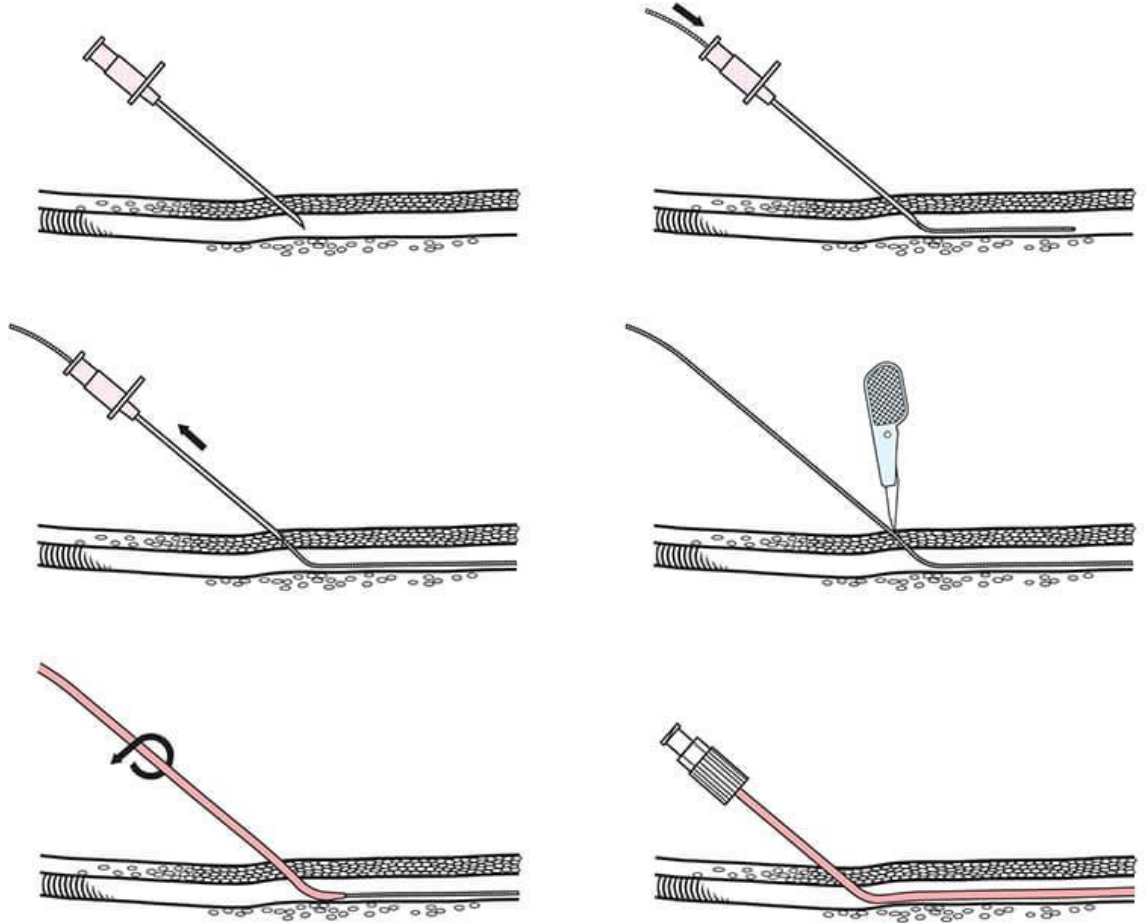
▶ Relative contraindications

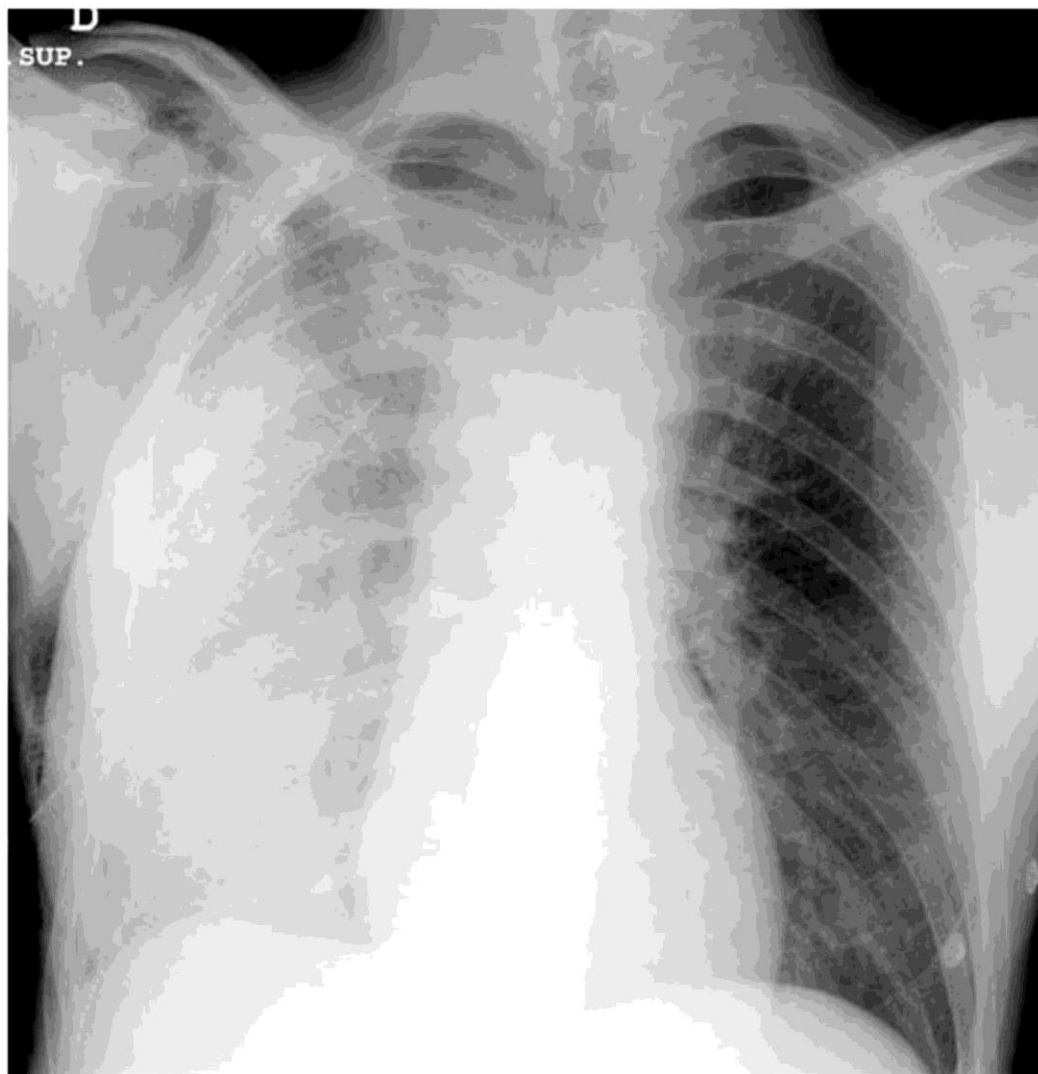
- ▶ INR >1.3
- ▶ Platelet count <75
- ▶ Pulmonary bullae
- ▶ Pleural adhesions

▶ Complications

- ▶ Failure of insertion: should be removed and re-sited
- ▶ Bleeding
- ▶ Infection
- ▶ Penetration of lung
- ▶ Re-expansion pulmonary oedema

Seldinger technique





Re-expansion pulmonary oedema

- ▶ Non-cardiogenic pulmonary oedema. Occurs following rapid expansion of a collapsed lung. May be onset of cough and/or SOB.
- ▶ Chest drain should be clamped and an urgent CXR obtained.
- ▶ To avoid this drain tubing should be clamped regularly in the event of rapid fluid output.



Open pneumothorax aka 'sucking chest wound'

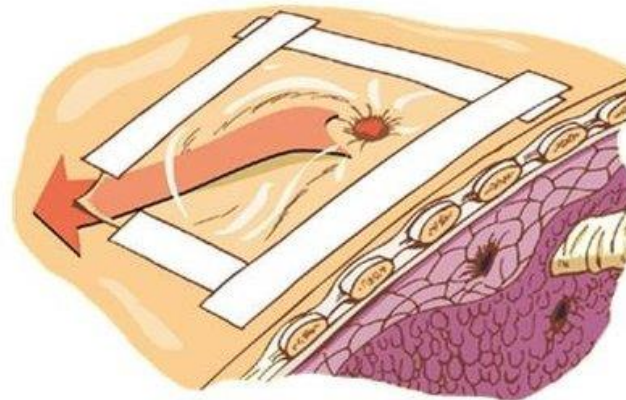
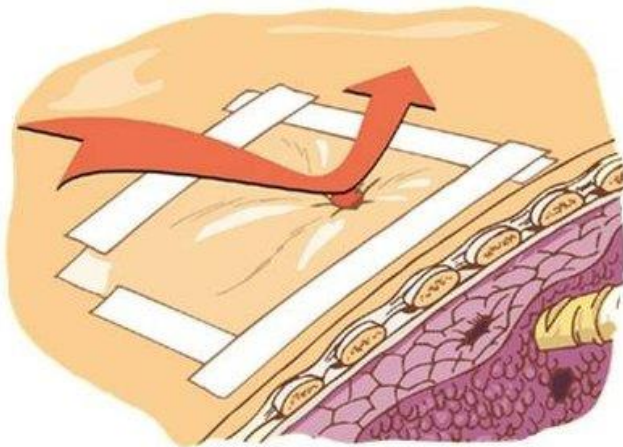
- ▶ Caused by large defect of chest wall that allows air to enter pleural space from outside causing ineffective ventilation.
- ▶ Signs:
 - ▶ A sucking sound on inhalation
 - ▶ Tachycardia and tachypnoea
 - ▶ Subcutaneous emphysema



Open pneumothorax aka 'sucking chest wound'

▶ Management:

- ▶ Cover defect with sterile dressing secured on 3 sides, producing flutter-valve effect.
- ▶ Insert formal closed chest suction tube on same side remote from wound.
- ▶ Never mechanically ventilate until a chest drain is inserted



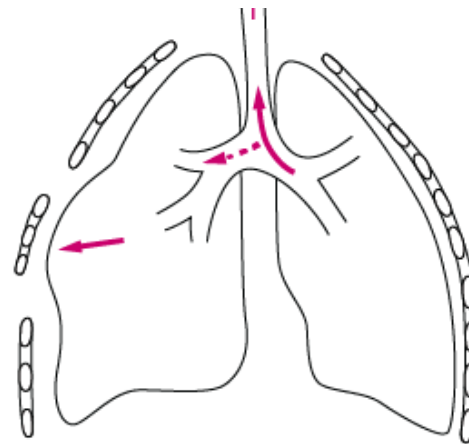
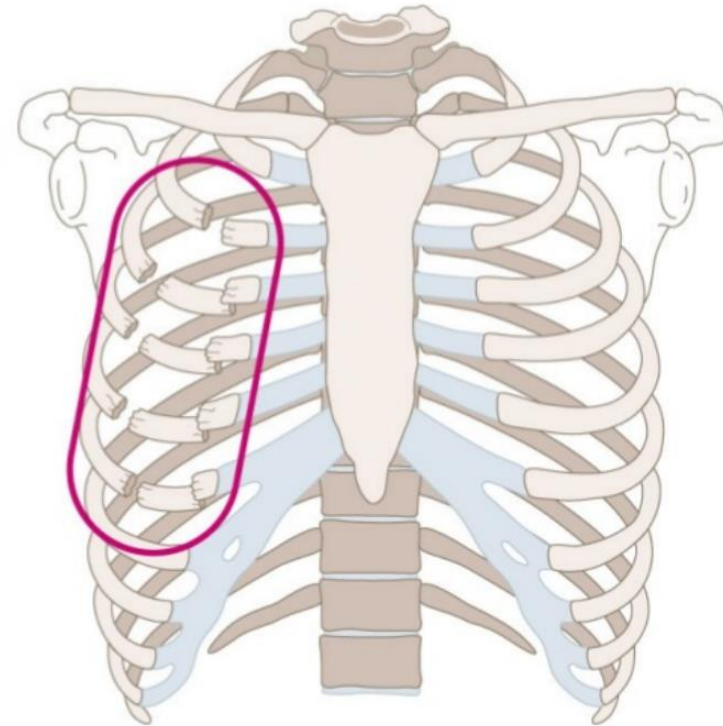
Haemothorax



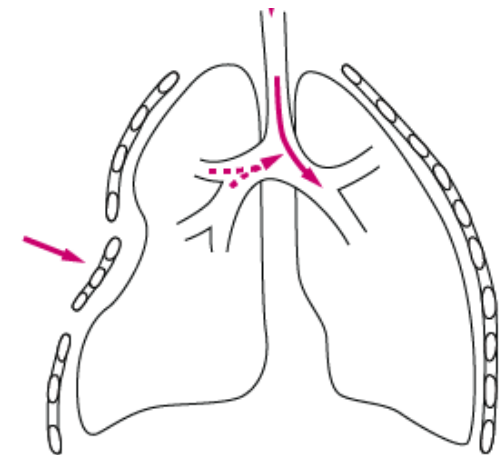
- ▶ Traumatic injury may cause bleeding into pleural cavity. This causes respiratory impairment and haemodynamic shock. Usually see whiteout on CXR.
- ▶ Management:
 - ▶ Rapid crystalloid/ blood infusion through 2 large bore cannulae
 - ▶ Decompress chest via closed chest suction tube
 - ▶ If $\geq 1500\text{ml}$ drained immediately or continued blood loss $>200\text{ml/hr}$, thoracotomy is indicated.

Flail chest

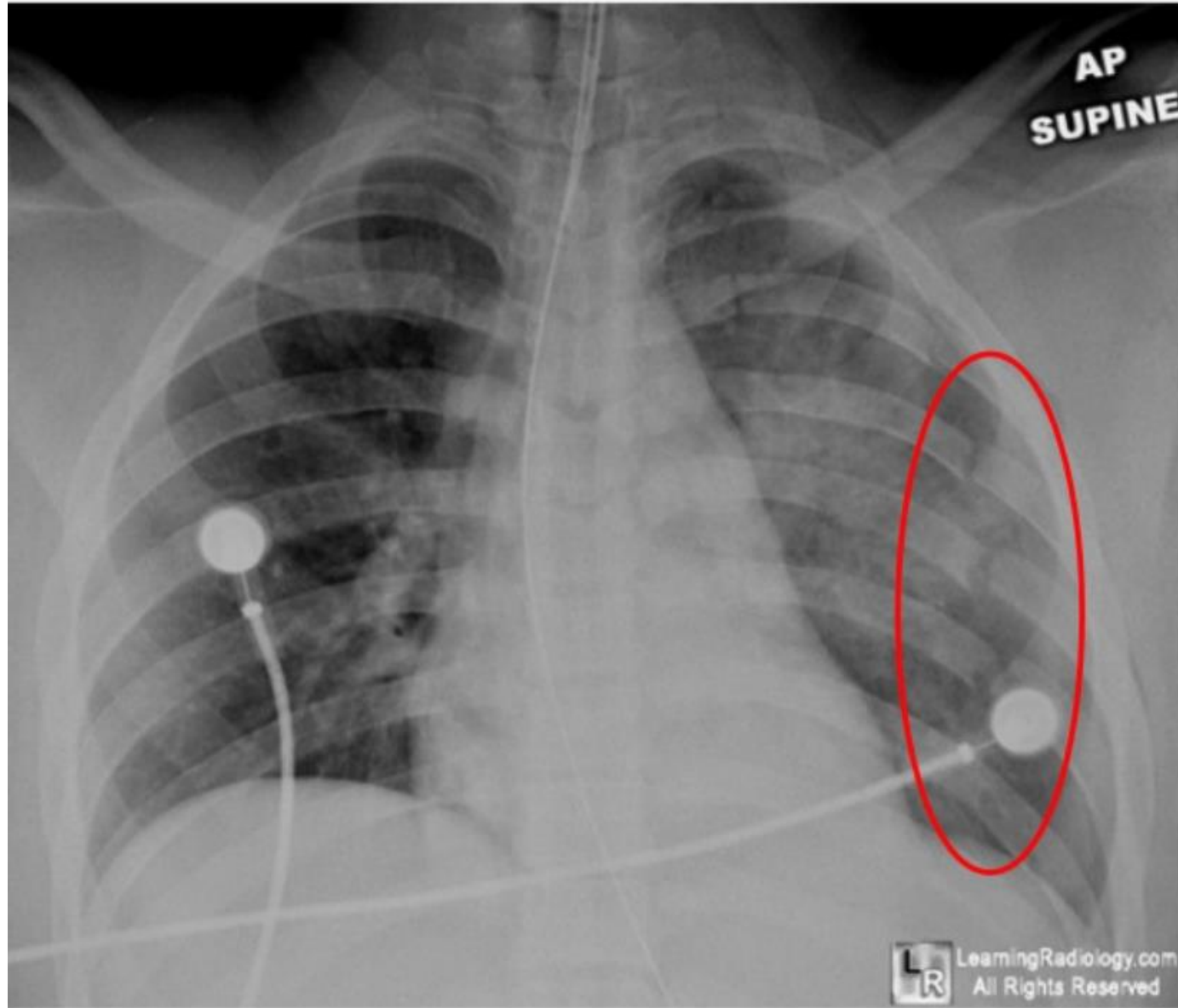
- ▶ Occurs when ≥ 3 ribs broken in ≥ 2 places causing segment of chest wall to move independently. This causes respiratory compromise exacerbated by pain +/- underlying pulmonary contusions.
- ▶ Management: Mainly conservative
 - ▶ May require intubation and ventilation
 - ▶ Avoid over hydration and fluid overload in absence of systemic hypotension
 - ▶ Analgesia !!!!
- ▶ Surgical intervention- if fragments are severely displaced and there's risk of non-union. Plates + bolts.



Expiration



Inspiration



Cardiac tamponade

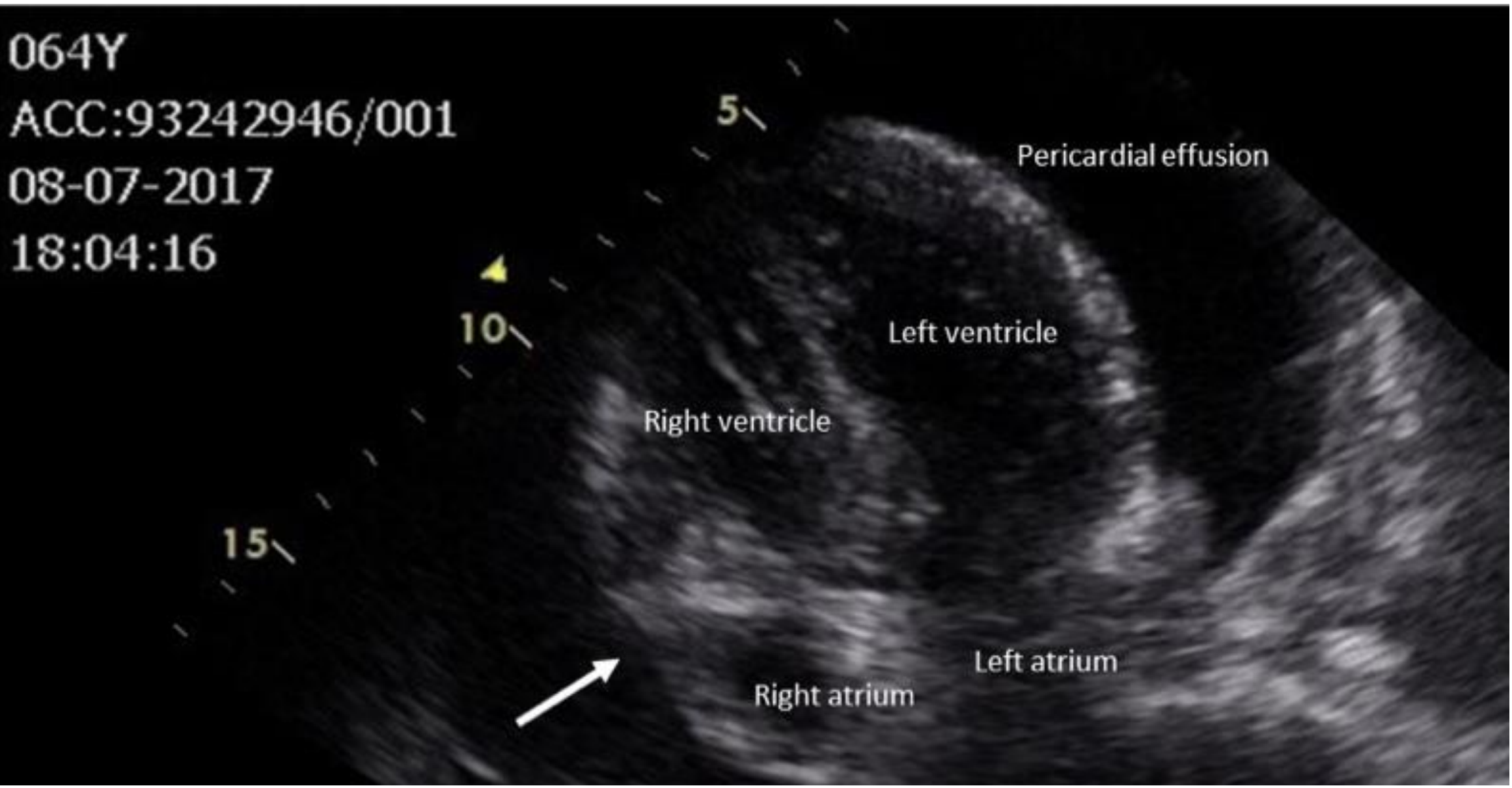
- ▶ Bleeding between fibrous pericardium and myocardium, impairing cardiac output.
- ▶ Becks triad:
 - ▶ Shock
 - ▶ Muffled heart sounds
 - ▶ Raised JVP
 - ▶ Pulsus paradoxus
- ▶ Management:
 - ▶ Definitive: Needle pericardiocentesis
 - ▶ Do not take out penetrating object

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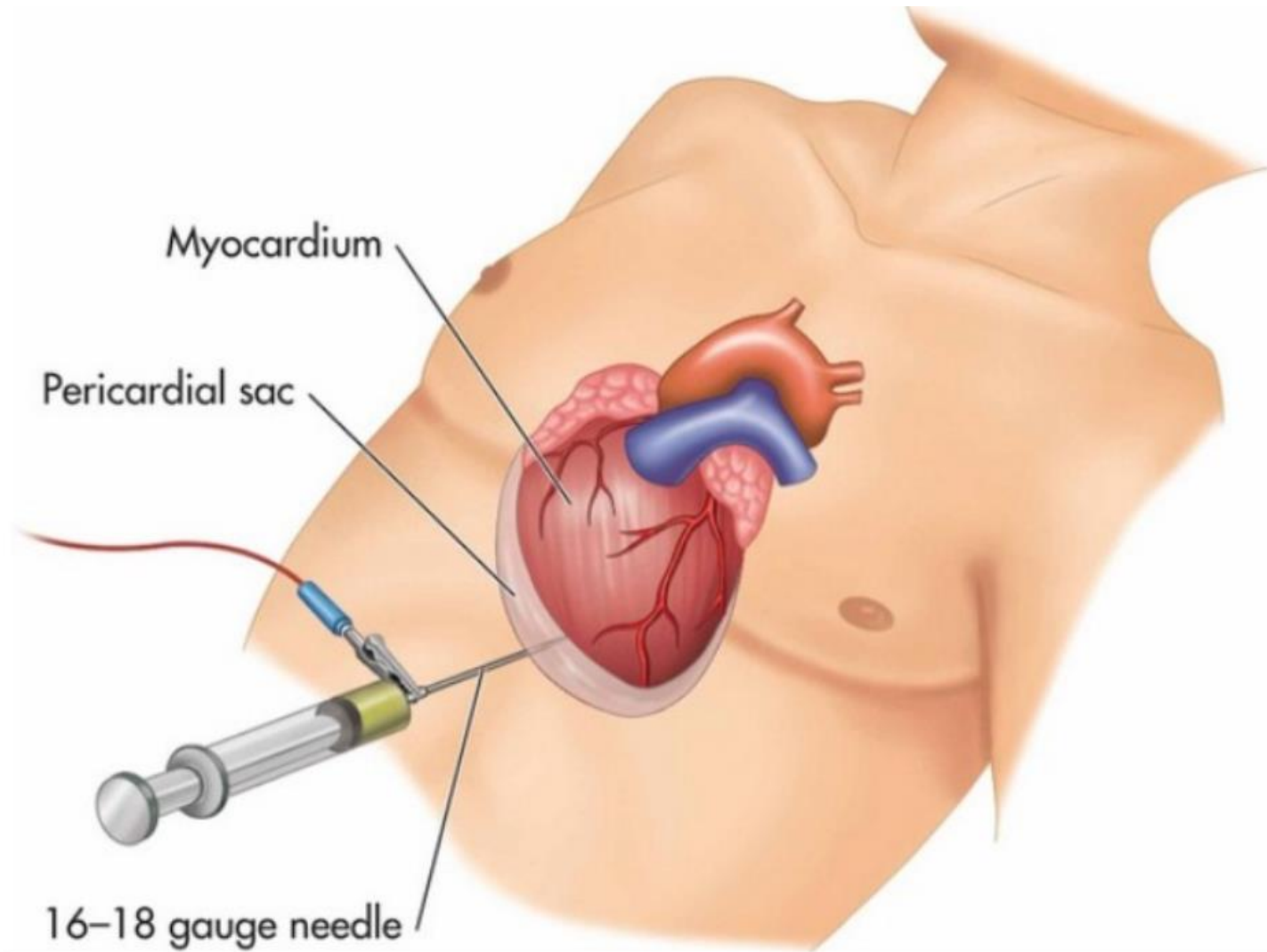
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Pericardiocentesis



Thank-you!

The background features a series of overlapping, semi-transparent triangles in various shades of blue and orange. The triangles are arranged in a way that creates a sense of depth and movement, with some appearing to be in the foreground and others receding into the background. The colors range from light, airy blues to deep, rich oranges and dark blues.