

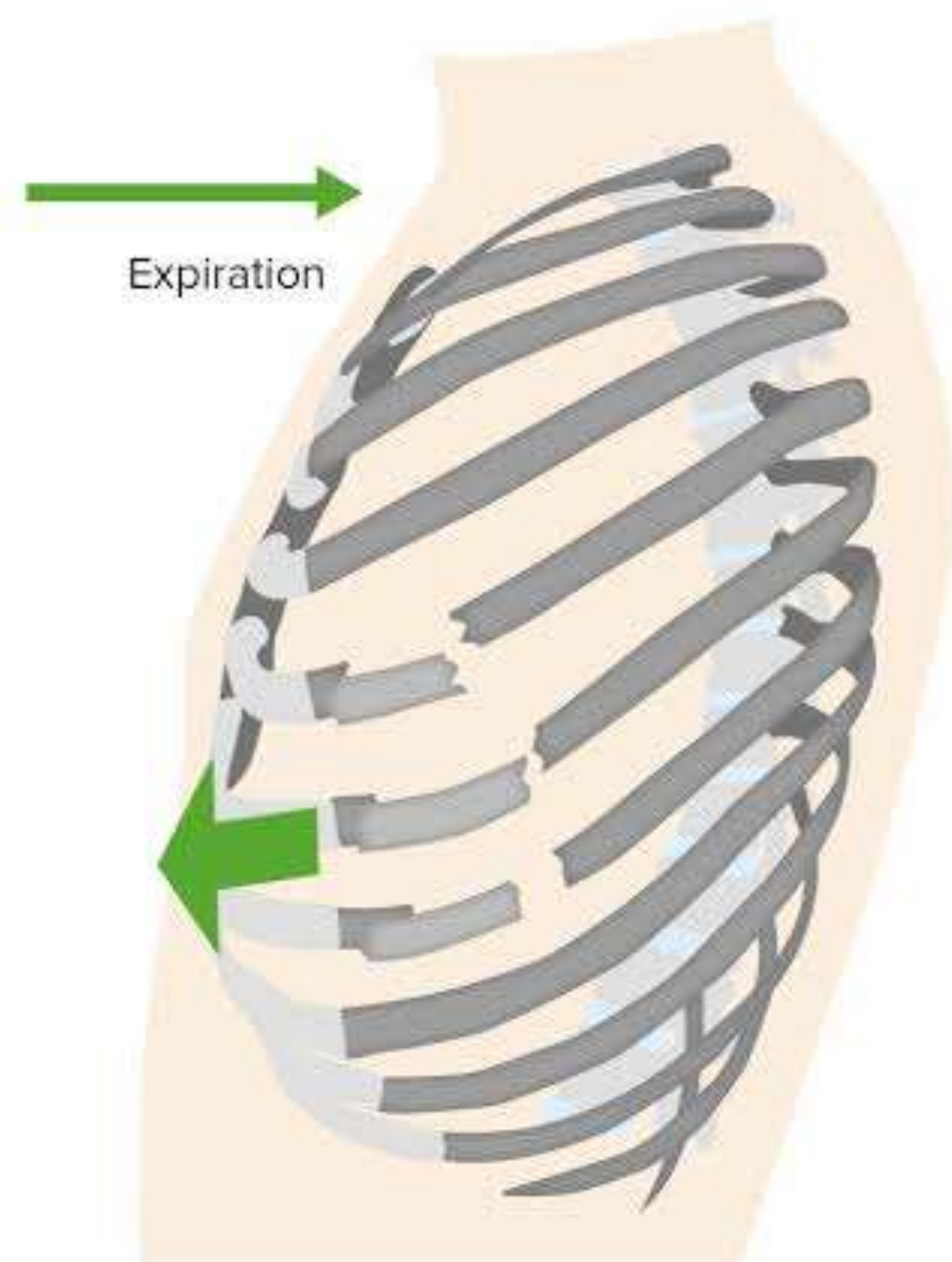
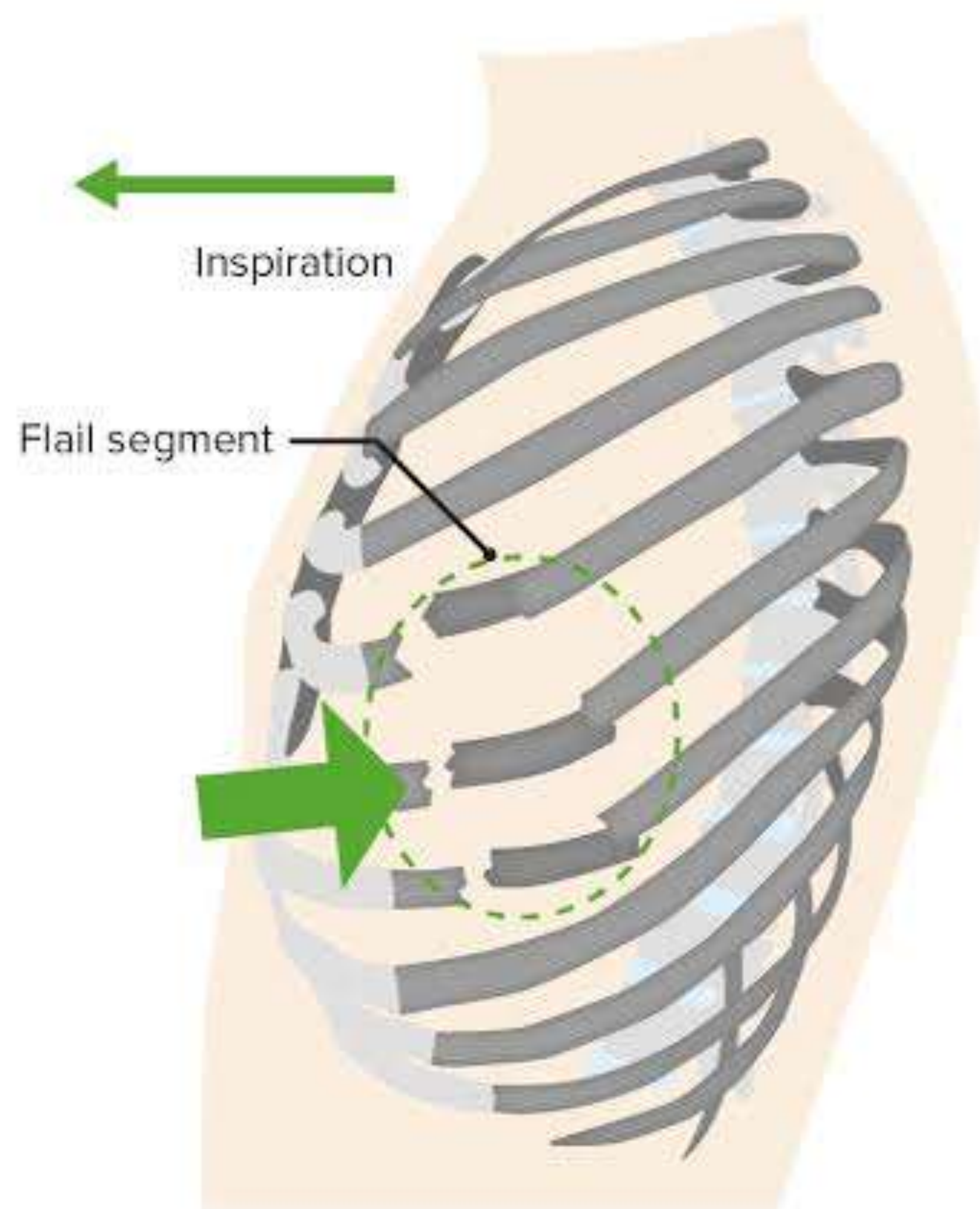
TRAUMA AND THORAX

OUTLINE

- Rib fracture
- Splenic trauma
- Cardiac tamponade
- Lethal triad
- Damage control surgery
- Head injury - EDH
- Thoracic outlet syndrome
- Pancoast Tumor

RIB FRACTURE

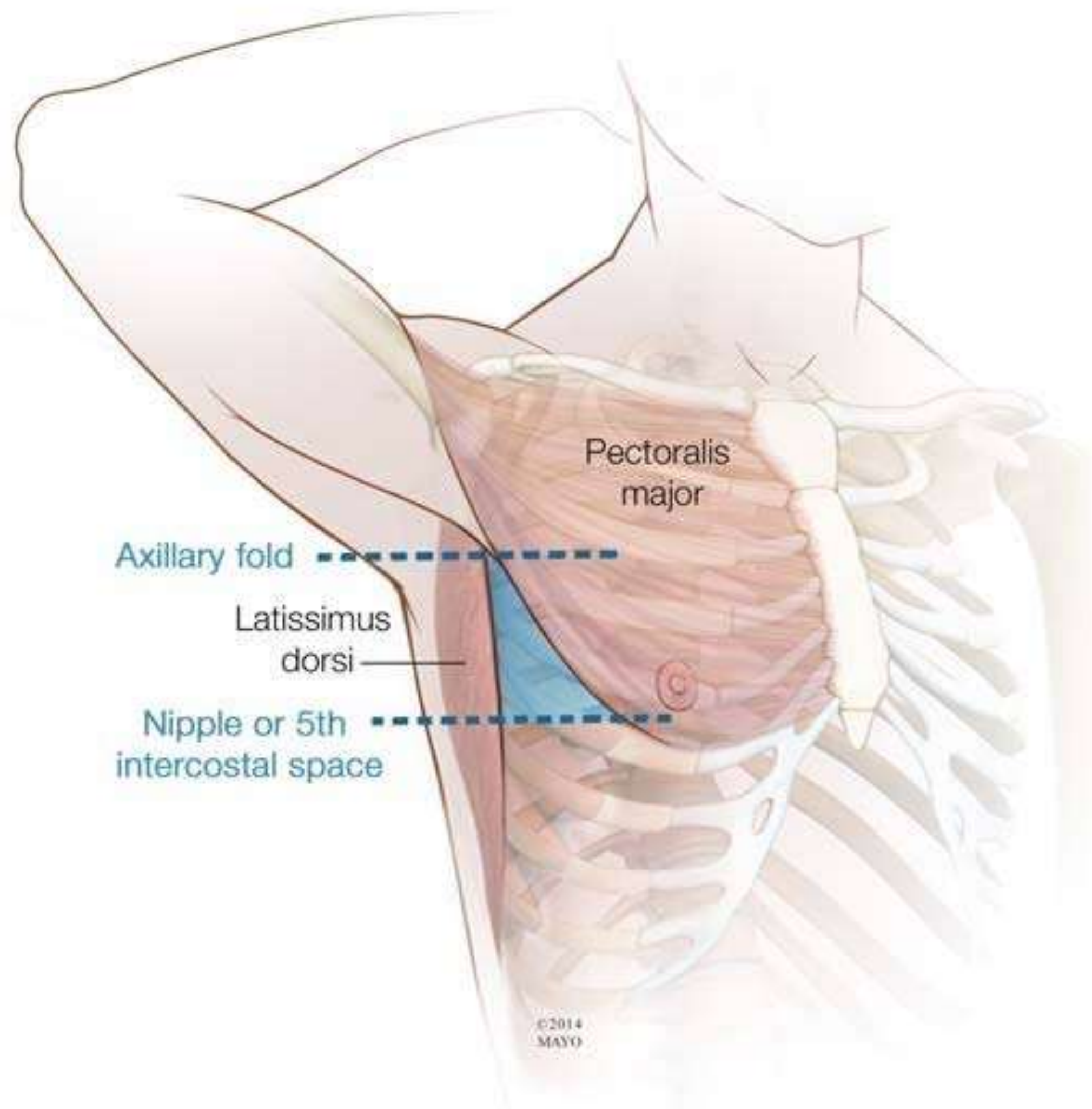
- Flail chest - part of deadly dozen
 - Immediately life threatening
 - 3 or more ribs fractured at two or more places
 - Underlying lung contusion
 - Paradoxically respiration
 - Hypoxia - voluntary splinting of chest wall due to pain- impaired expansion
 - lung contusion
 - Main aim of treatment- ventilation



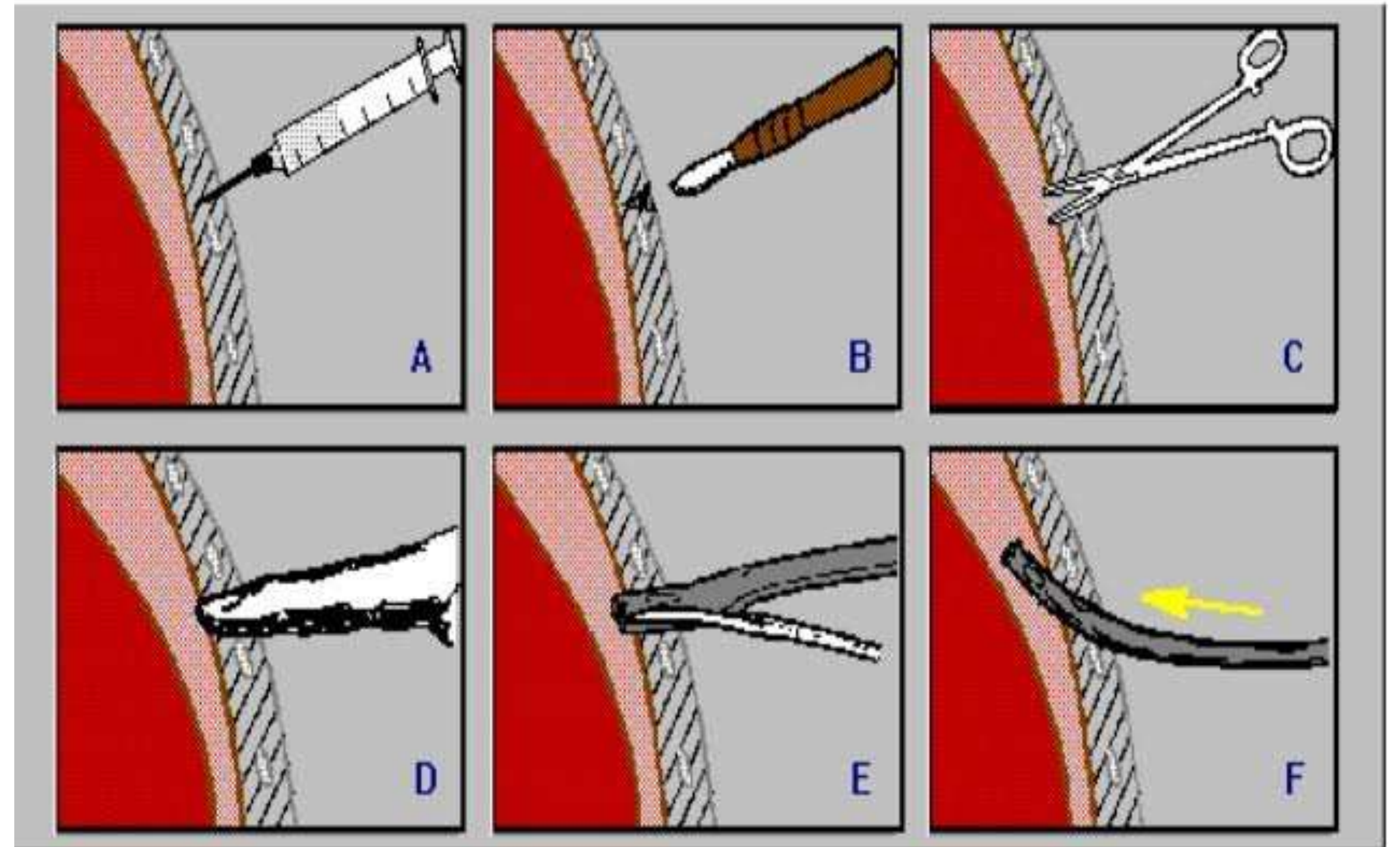
- Treatment - oxygen administration
 - adequate analgesia
 - physio therapy
 - ? ICD
 - ventilation- in respiratory failure
 - surgery - internal fixation of ribs

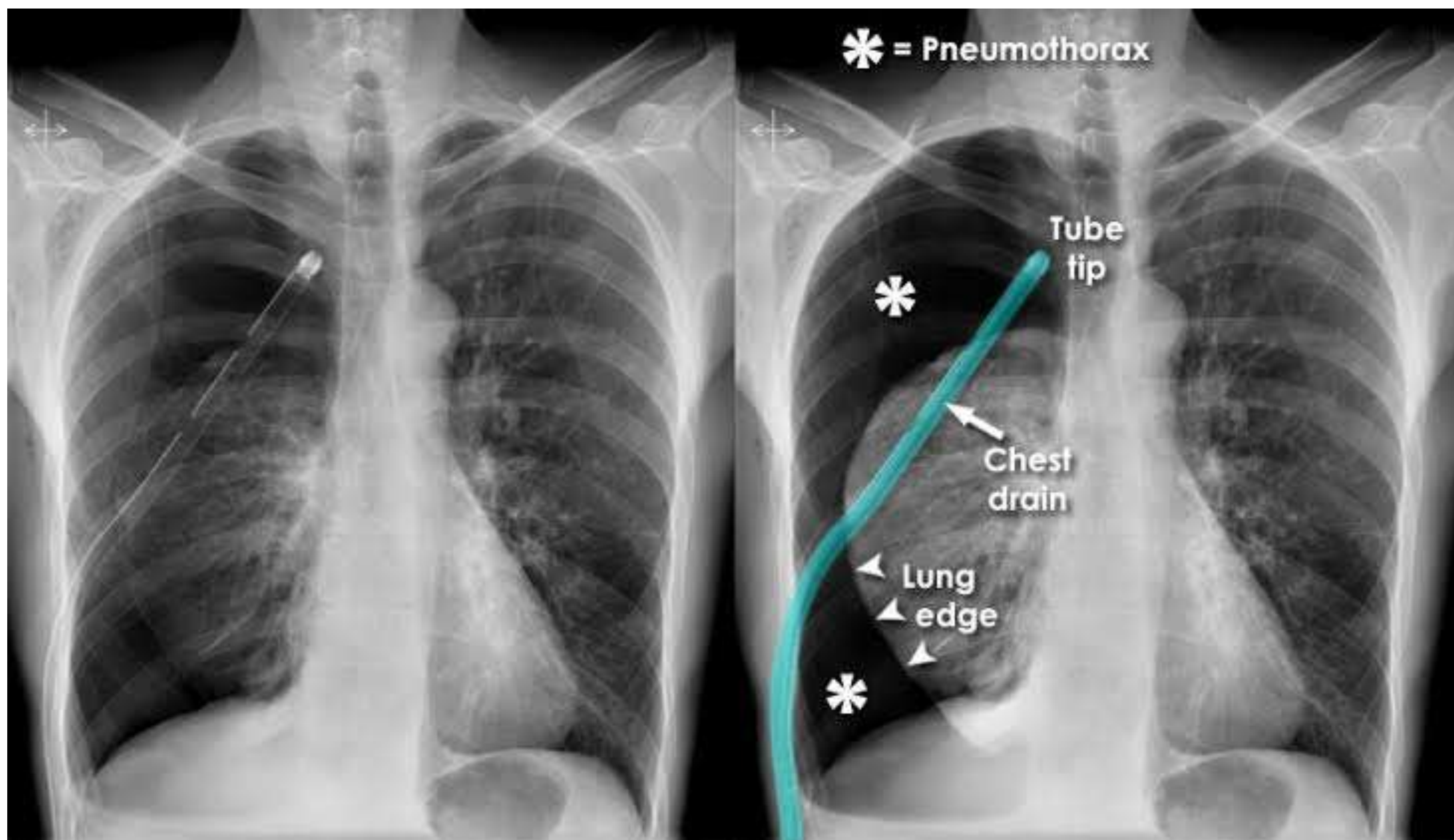
TUBE THORACOSTOMY

- ICD insertion
- Where to put? - triangle of safety
- TRIANGLE OF SAFETY - ant- lateral border of pec major
 - post- mid axillary line
 - inf - infamammry / level of nipple (5th ICS)



Insertion of chest tube





THORACOTOMY

- ED thoracotomy indications
 - >1500ml of blood drained
 - 150-200ml /hr for 2-4 consecutive hours
 - Persistent hemodynamic instability in setting of transfusion
- Done for control of Haemorrhage, cardiac tamponade or internal cardiac massage
- Planned thoracotomy for definitive correction

AIMS OF EDT

- Internal cardiac massage
- Control bleeding
- Control massive air leak
- Clamping thoracic aorta

TABLE 29.5 Different approaches to the contents of the chest cavity.

Approach	Best for
Left anterolateral thoracotomy	• Left lung and lung hilum • Thoracic aorta • Origin of left subclavian artery • Left side of heart • Lower oesophagus
Right anterolateral thoracotomy	• Right lung and lung hilum • Azygos veins • Superior vena cava • Infracardiac inferior vena cava • Upper oesophagus • Thoracic trachea
Median sternotomy	• Anterior aspect of heart • Anterior mediastinum • Ascending aorta and arch of aorta • Pulmonary arteries • Carina of the trachea

CARDIAC TAMPONADE

- Blood in pericardial sac causing compression of heart
- BECKS TRIAD- hypotension
 - Distended neck veins
 - Muffled heart sounds
- Dx - USG (eFAST)
- Pericardiocentesis and pericardial drain placement (stable patients)
- Unstable patients - left anterolateral thoracotomy

SPLENIC TRAUMA

- M/c injured intraabdominal organ
- In blunt trauma abdomen (direct compression/ rapid deceleration)
- Stab injuries
- C/F - shock, abdominal pain and contusion
 - Left lower rib fractures
- Dx- eFAST
 - CECT abdomen (hemodynamically stable patient)

TABLE 70.1 Criteria for grading of splenic injury based on computed tomography.

Grade 1	Subcapsular haematoma <10% of surface area Parenchymal laceration <1 cm depth Capsular tear
Grade 2	Subcapsular haematoma 10–50% of surface area; intraparenchymal haematoma <5 cm Parenchymal laceration 1–3 cm
Grade 3	Subcapsular haematoma >50% surface area; ruptured subcapsular or intraparenchymal haematoma ≥5 cm Parenchymal laceration >3 cm depth
Grade 4	Any injury in the presence of a splenic vascular injury or active bleeding confined within the splenic capsule Parenchymal laceration involving segmental or hilar vessels producing >25% devascularisation
Grade 5	Any injury in the presence of splenic vascular injury ^a with active bleeding extending beyond the spleen into the peritoneum – shattered spleen

^aVascular injury is defined as a pseudoaneurysm or arteriovenous fistula and appears as a focal collection of vascular contrast that decreases in attenuation with delayed imaging. Active bleeding from a vascular injury presents as vascular contrast, focal or diffuse, that increases in size or attenuation in the delayed phase.

Management

- NON OPERATIVE MANAGEMENT
 - Stable patients
 - Grade I and II
 - Grade III stable patients
- OPERATIVE MANAGEMENT
 - Unstable patients
 - Failure of non operative management
 - High grade injury (Grade III- V)

Non operative management

- Monitor vitals and u/o
- Abdominal girth monitoring
- Hb and HCV monitoring
- Blood transfusion
- Angioembolisation

Operative management

- Splenectomy
- Post splenectomy vaccination
 - Streptococcus pneumoniae
 - Neisseria meningitidis
 - Hemophilus influenzae

HAEMORRHAGE

- Acute loss of circulating blood
- 7% BW- blood
- 70kg - 5L of blood
- Classification- 4 classes based on % of blood loss
 - CLASS I - <15%
 - CLASS II- 15-30%
 - CLASS III- 31-40%
 - CLASS IV- >40%

TABLE 3-1 SIGNS AND SYMPTOMS OF HEMORRHAGE BY CLASS

PARAMETER	CLASS I	CLASS II (MILD)	CLASS III (MODERATE)	CLASS IV (SEVERE)
Approximate blood loss	<15%	15–30%	31–40%	>40%
Heart rate	↔	↔/↑	↑	↑/↑↑
Blood pressure	↔	↔	↔/↓	↓
Pulse pressure	↔	↓	↓	↓
Respiratory rate	↔	↔	↔/↑	↑
Urine output	↔	↔	↓	↓↓
Glasgow Coma Scale score	↔	↔	↓	↓
Base deficit ^a	0 to -2 mEq/L	-2 to -6 mEq/L	-6 to -10 mEq/L	-10 mEq/L or less
Need for blood products	Monitor	Possible	Yes	Massive Transfusion Protocol

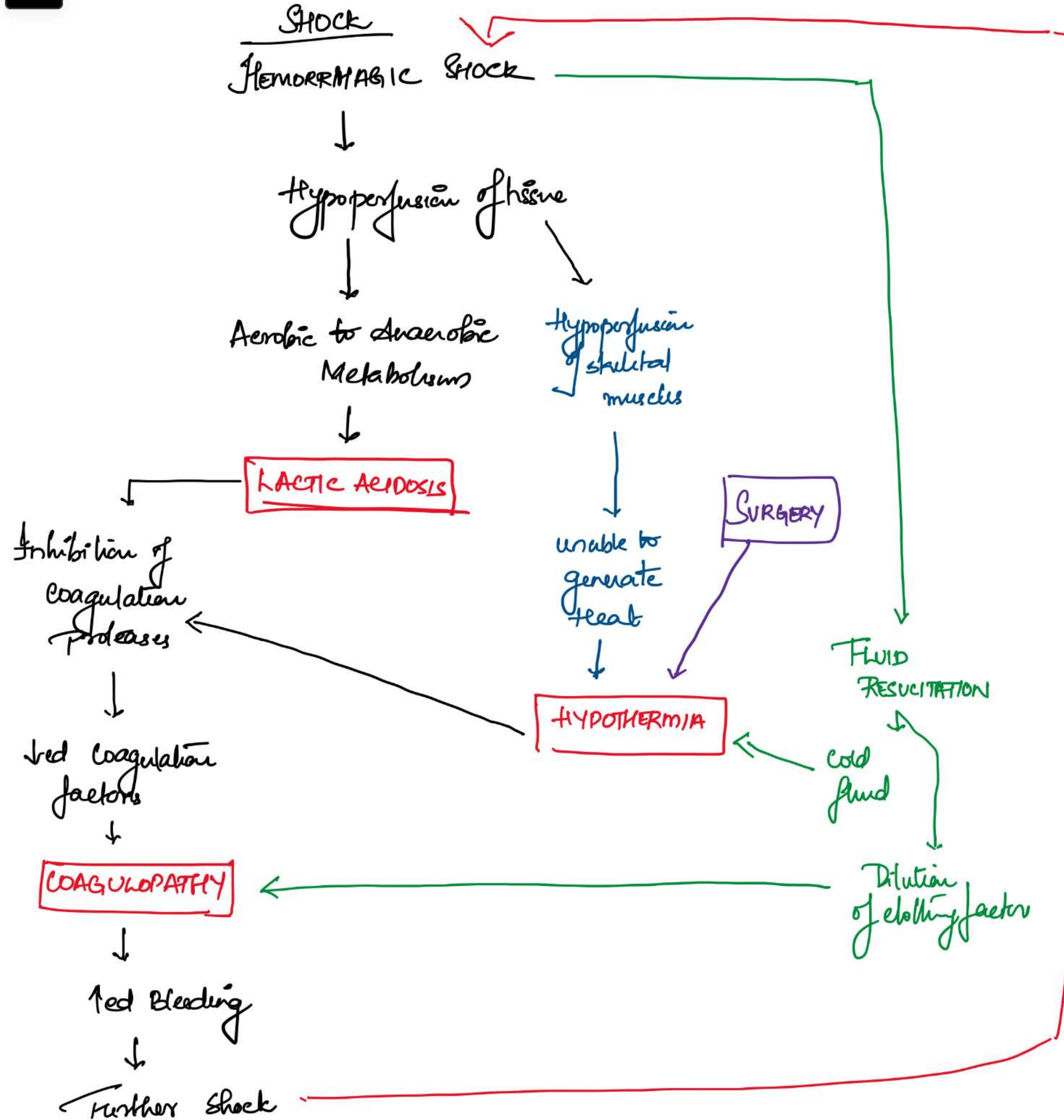
^a Base excess is the quantity of base (HCO_3^- , in mEq/L) that is above or below the normal range in the body. A negative number is called a base deficit and indicates metabolic acidosis.

Types of hemorrhage

- Revealed and concealed
- Primary, reactionary and secondary
 - Primary - immediately as a result of injury
 - Reactionary- within 24hrs, due to clot dislodgement, normalisation of BP and vasodilatation or slippage of ligatures
 - Secondary- 7-14 days, sloughing of wall of vessel (infection, malignancy)
- Surgical and non surgical

LETHAL TRIAD

- HYPOTHERMIA
- ACIDOSIS
- COAGULOPATHY



DAMAGE CONTROL

- Includes initial care and resuscitation (DAMAGE CONTROL RESUSCITATION)
 - and surgical correction of injury (DAMAGE CONTROL SURGERY)
- DAMAGE CONTROL SURGERY
 - Control hemorrhage
 - Control and limit contamination
 - Secondary surgery for definitive repair

INDICATION OF DCS

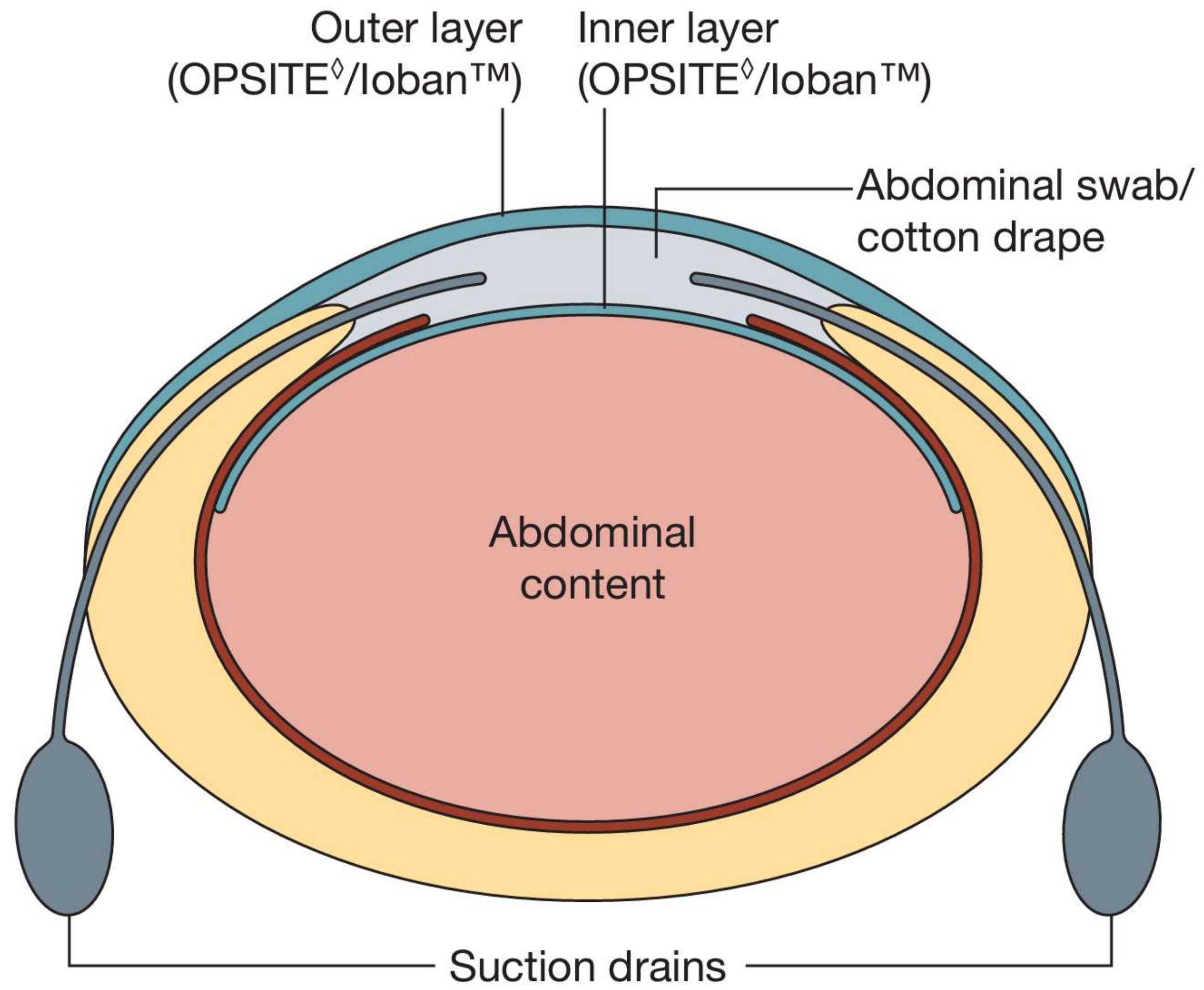
- ANATOMICAL - inability to achieve haemostasis
 - Complex abdominal injury
 - Combined vascular, solid and hollow organ injury
 - Time consuming procedure
- PHYSIOLOGICAL - temp <34 degree Celsius
 - pH- < 7.2
 - S. Lactate - >5mmol/L
 - PT- >16s
 - APTT>60s
 - > 10 unit blood transfused
 - SBP <90mm Hg for >60min

- ENVIRONMENTAL

- Operating time >60min
- Relook surgery needed
- Inability to approximate the abdominal incision

What do we do

- Simple ligation of bleeding vessels
- Shunt major arteries and veins
- Temporary stapling of bowel
- Drainage
- Packing of abdomen
- Temporary closure of abdomen





STAGES OF DCS

TABLE 29.6 The stages of damage control surgery.

Stage	Intervention
I	Patient selection
II	Control of haemorrhage and control of contamination
III	Resuscitation continued in the intensive care unit
IV	Definitive surgery
V	Abdominal closure

HEAD INJURY

- GCS
 - Total score -15
 - Minimum- 3
 - Minor- GCS 15 with no LOC
 - Mild injury -GCS 14 or 15 with LOC
 - Moderate - 9-13
 - Severe- less than 8

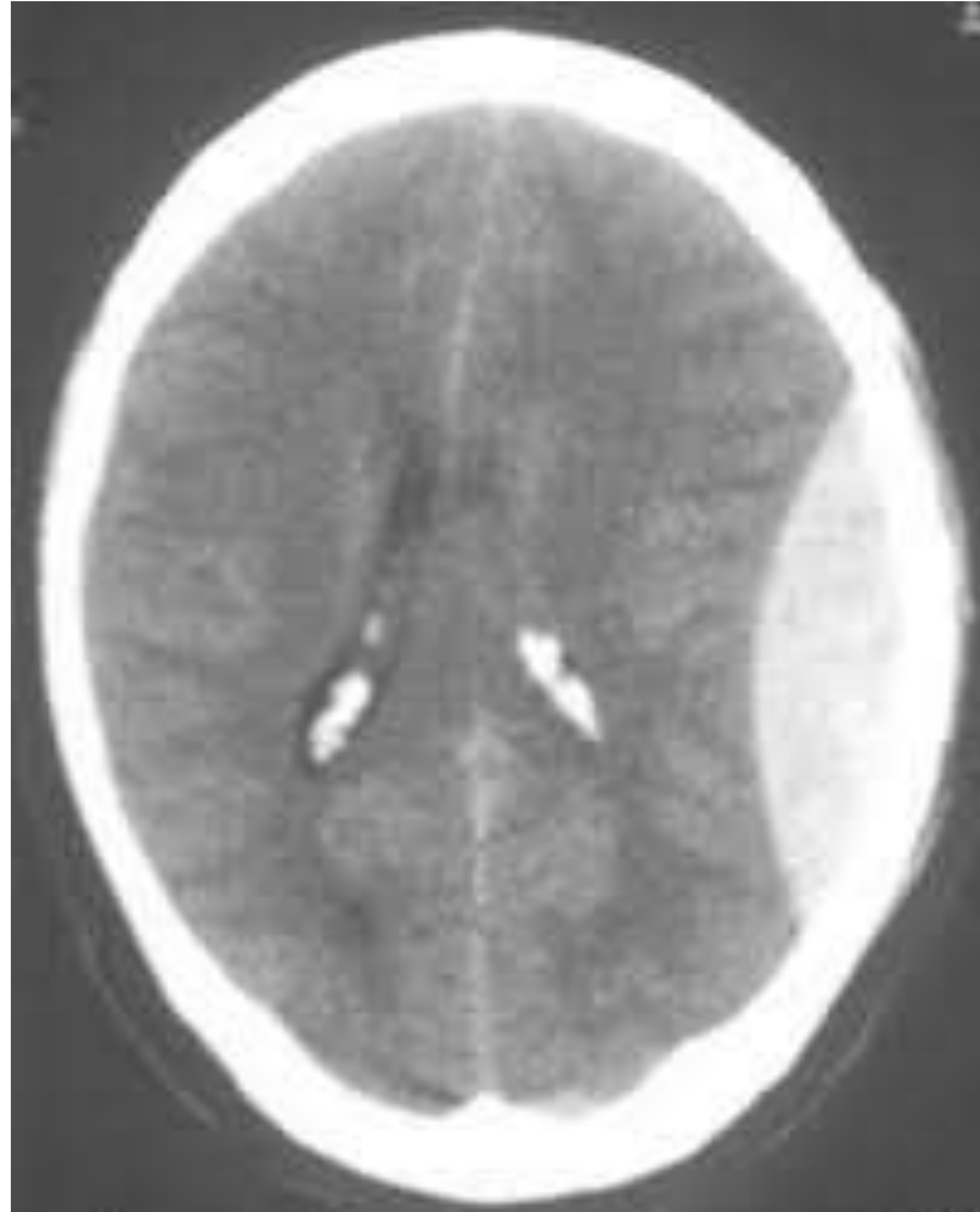
TABLE 28.4 Glasgow Coma Scale score for head injury.

Eyes open	Spontaneously	4
	To verbal command	3
	To painful stimulus	2
	Do not open	1
Verbal	Normal	5
	Confused	4
	Inappropriate/words only	3
	Sounds only	2
	No sounds	1
Motor	Intubated patient	T
	Obeys commands	6
	Localises to pain	5
	Withdrawal/flexion	4
	Abnormal flexion	3
	Extension	2
	No motor response	1

EDH

- Blood in extradural space between skull and dura
- M/c site- temporoparietal region
- M/c vessel - middle meningeal artery
- C/F - LUCID INTERVAL
 - Transient loss of consciousness following injury
 - Regains consciousness
 - Again deteriorates
- Anisocoria

- Features of raised ICP - , hypertension , vomiting , seizures, bradycardia
- Laceration or wound over scalp
- Cushing triad
- Dx- CT head - biconvex hematoma
- Rx- craniotomy and evacuation
- Antibiotics and antiepileptics given post op
- Post op complication - post traumatic seizures, meningitis, post traumatic amnesia



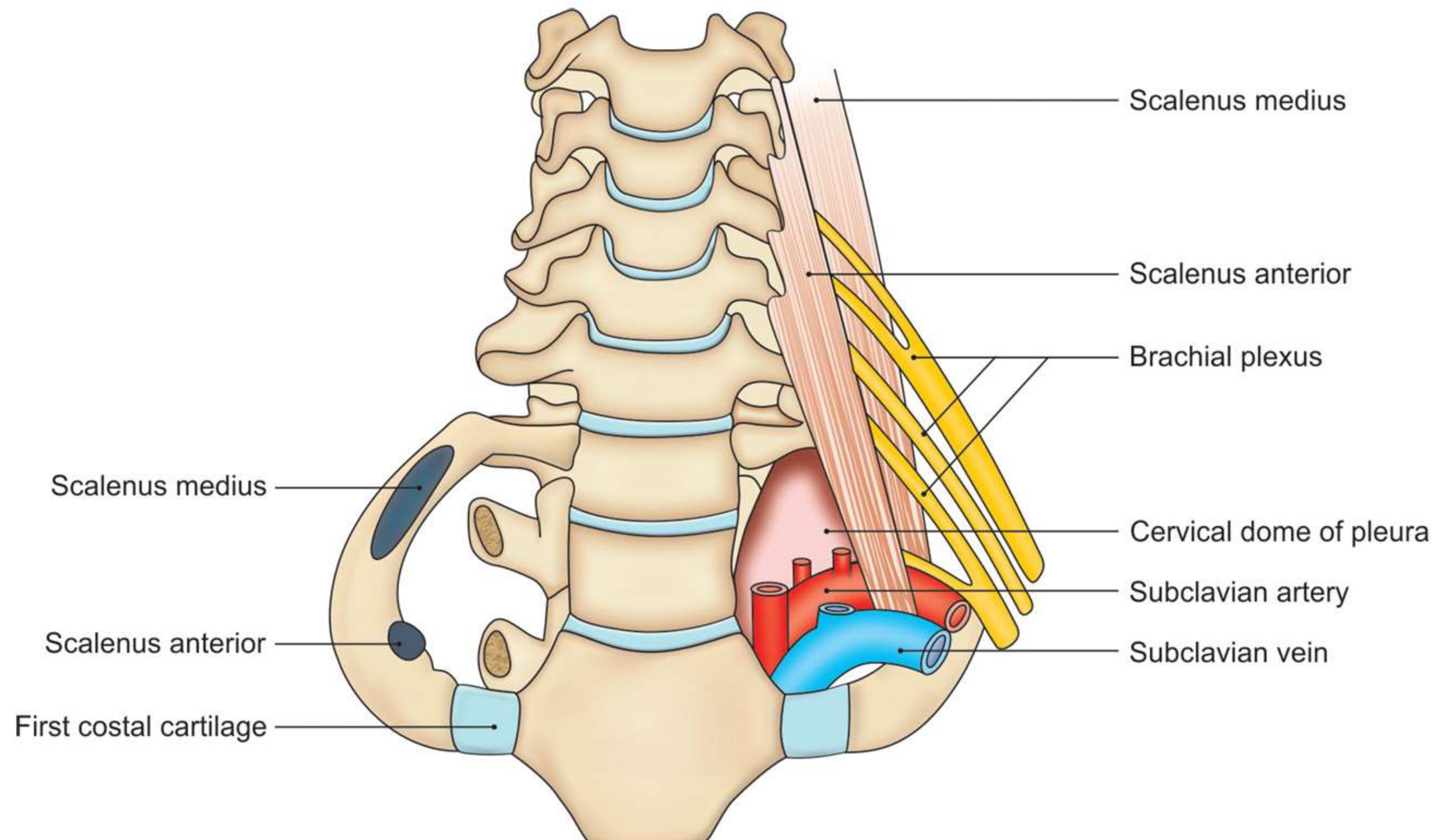


- SAH



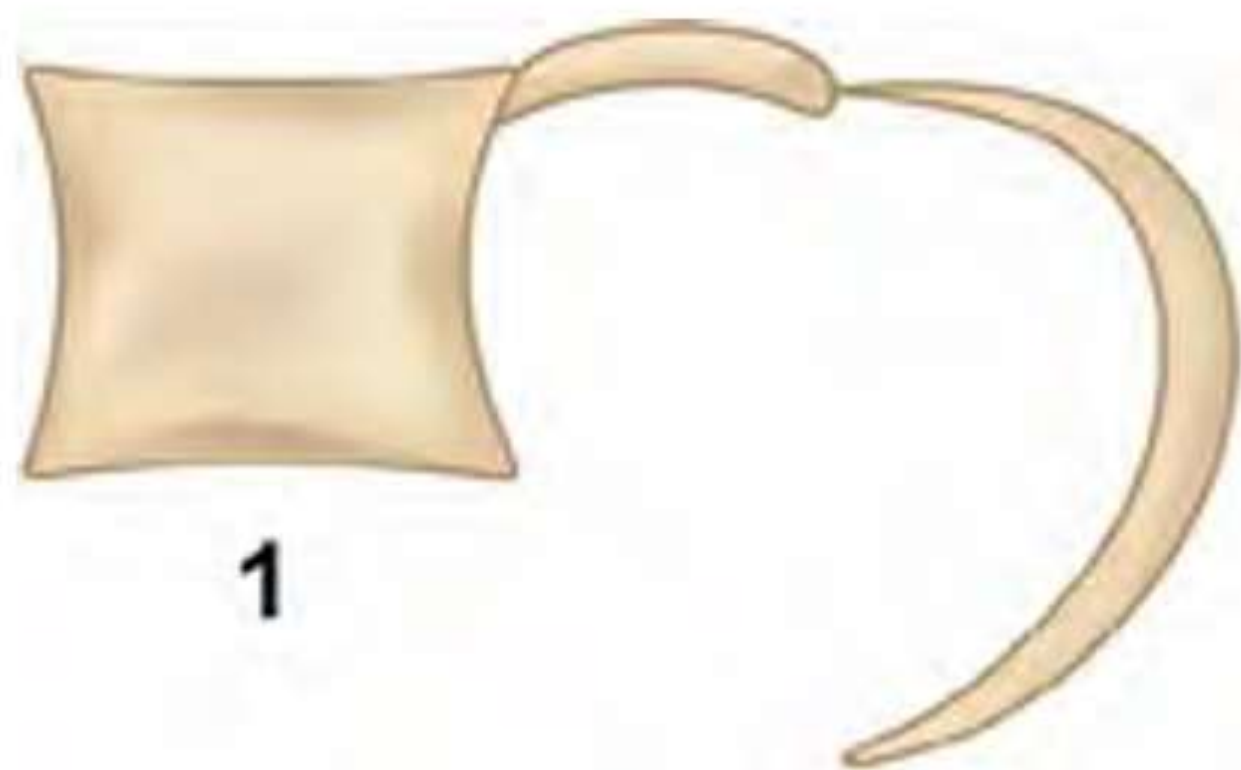
CERVICAL RIB

- Extension of costal element of transverse process of C7 vertebrae
- AKA thoracic outlet syndrome, thoracic inlet syndrome, scalene syndrome
- Common in female
- U/I or b/I

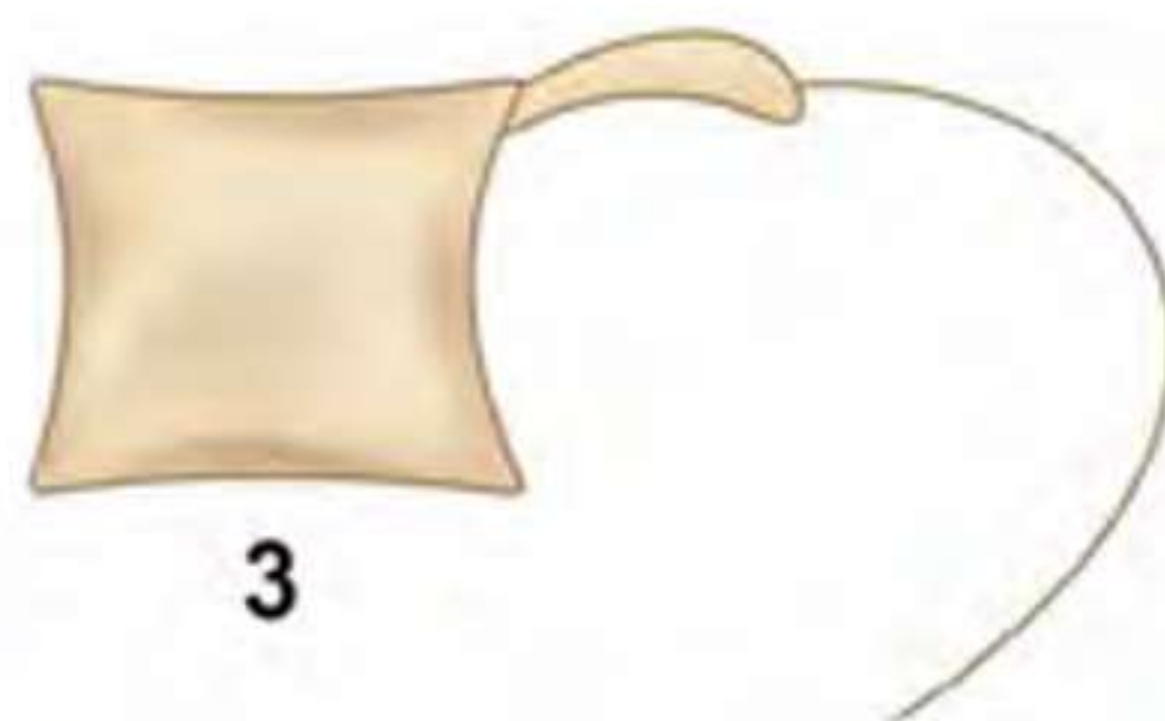


TYPES

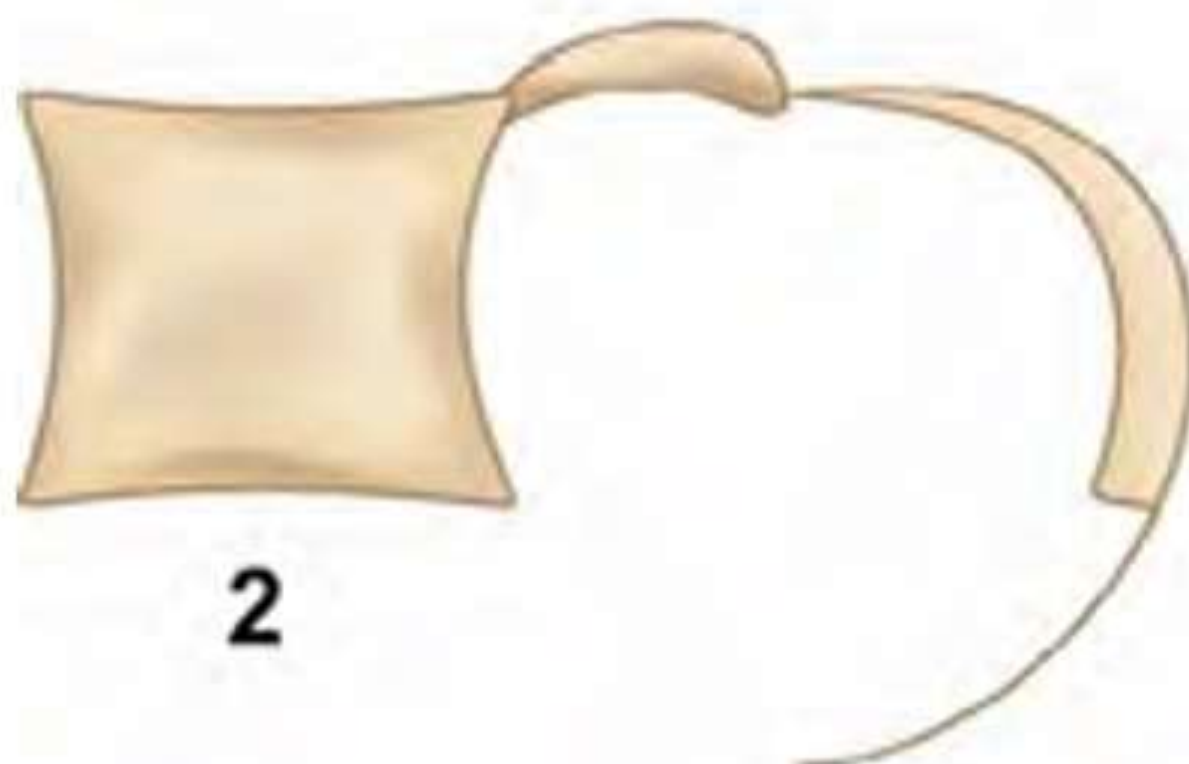
- Complete bony
- Combined
- Complete fibrous
- Partial bony - free end expanding as bony mass (felt in neck)



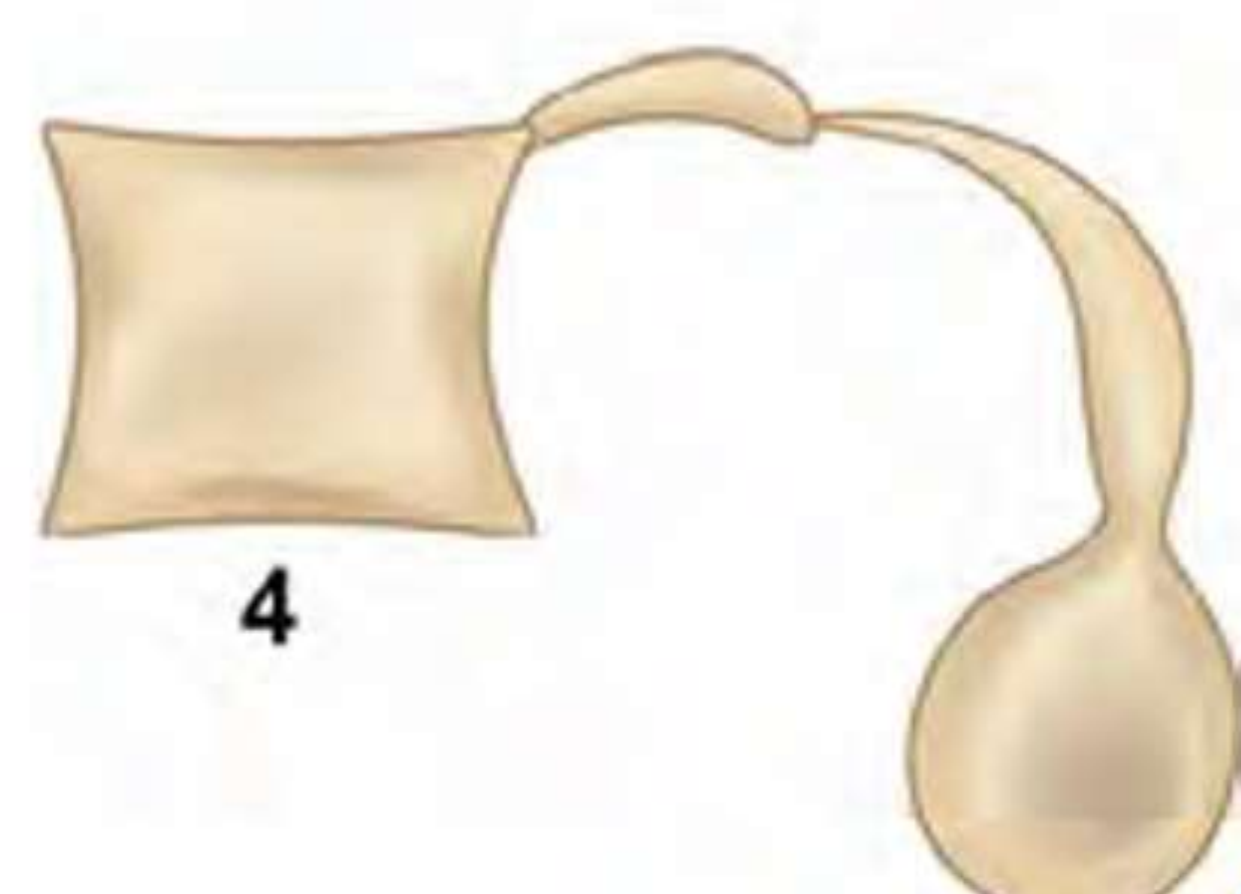
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3

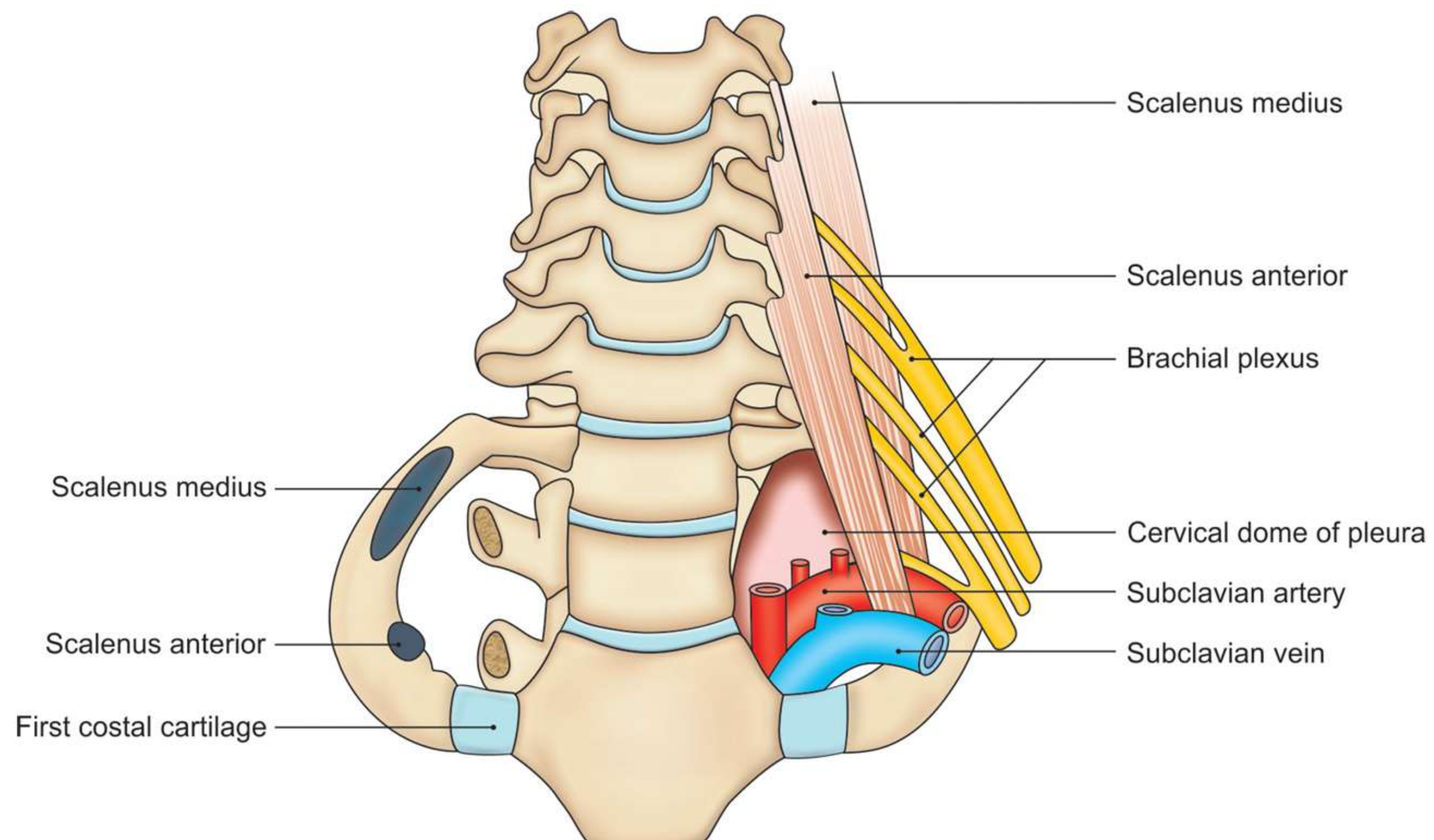


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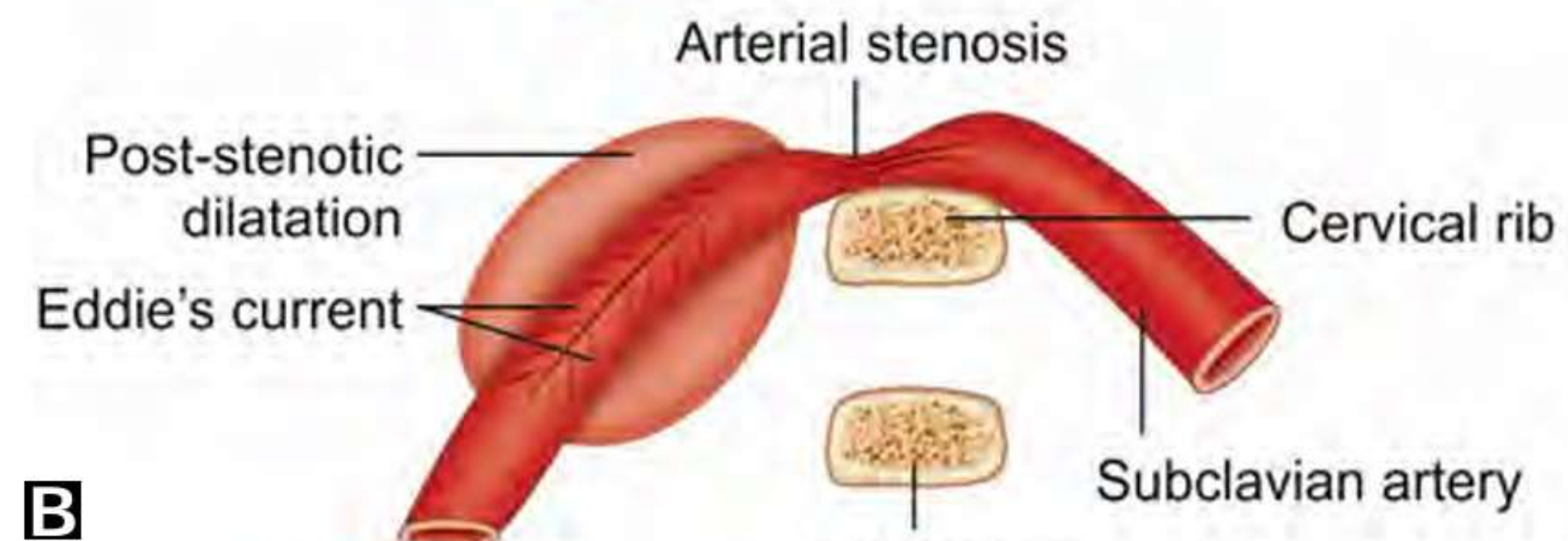
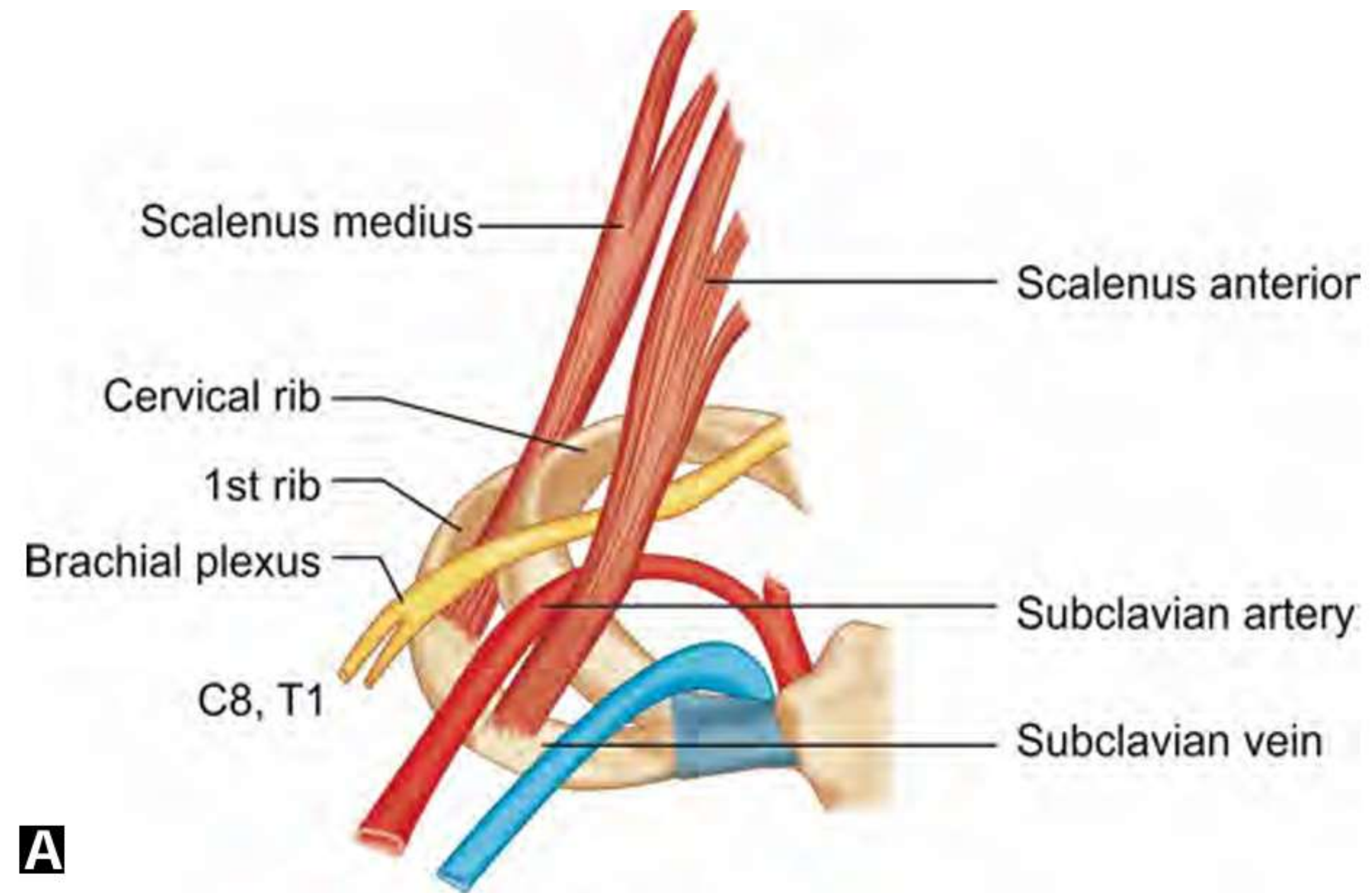
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C/F

- Neurological - pain, numbness and tingling
- Vascular manifestation- pain
 - Upper limb claudication
 - Adson's test - feeble pulse
 - Roos test
 - Elevated arm stress test
 - Wright's test
 - Allen's test
 - Gangrene
 - Muscle wasting



INVESTIGATIONS

- Chest X-ray
- Arterial Doppler
- CT neck and thorax
- Nerve conduction studies



Treatmebt

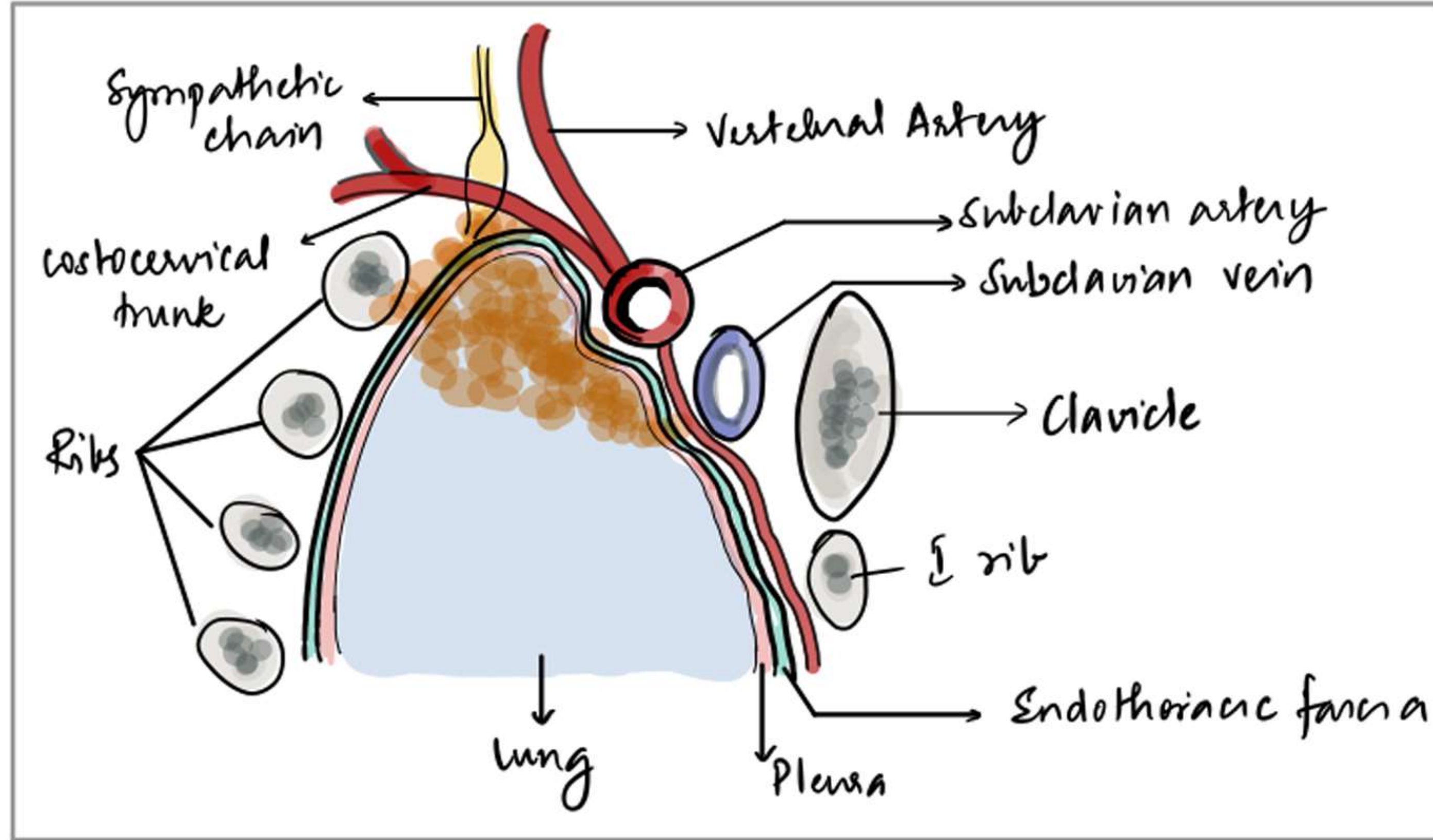
- Conservative- proper posturing
- NSAIDS
- Muscle relaxants
- Surgical -
 - Indication - failure of conservative management beyond 2 months
 - Arterial compression
 - Progressive neurological deficit
 - NCV <60m/s

- No arterial compression- extraperiosteal resection of cervical rib
- Arterial compression- resection plus arterial reconstruction
- Gangrene- amputation
- COMPLICATIONS OF SURGERY
 - Pleural injury- pneumo or hemothorax
 - Nerve injury- phrenic, brachial plexus, long thoracic nerve
 - Vascular injury - subclavian vessels

PANCOAST TUMOR

- Pulmonary neoplasm present in superior sulcus (apical pleuropulmonary groove)
- Extend into thoracic inlet
- C/F -
 - Horner's syndrome- d/t invasion of stellate sympathetic ganglion
 - Ptosis
 - Miosis
 - Anhidrosis
 - Unilateral enophthalmos
 - Loss of ciliospinal reflex

- Apical chest wall/ shoulder pain - d/t parietal pleura, intercostal nerves of 1st rib involvement
- Radicular upper limb pain
- Edema



Pulmonary embolism

CRITERIA FOR PREDICTING PULMONARY EMBOLISM

TABLE 62.5 Modified Wells criteria for predicting pulmonary embolism (PE).

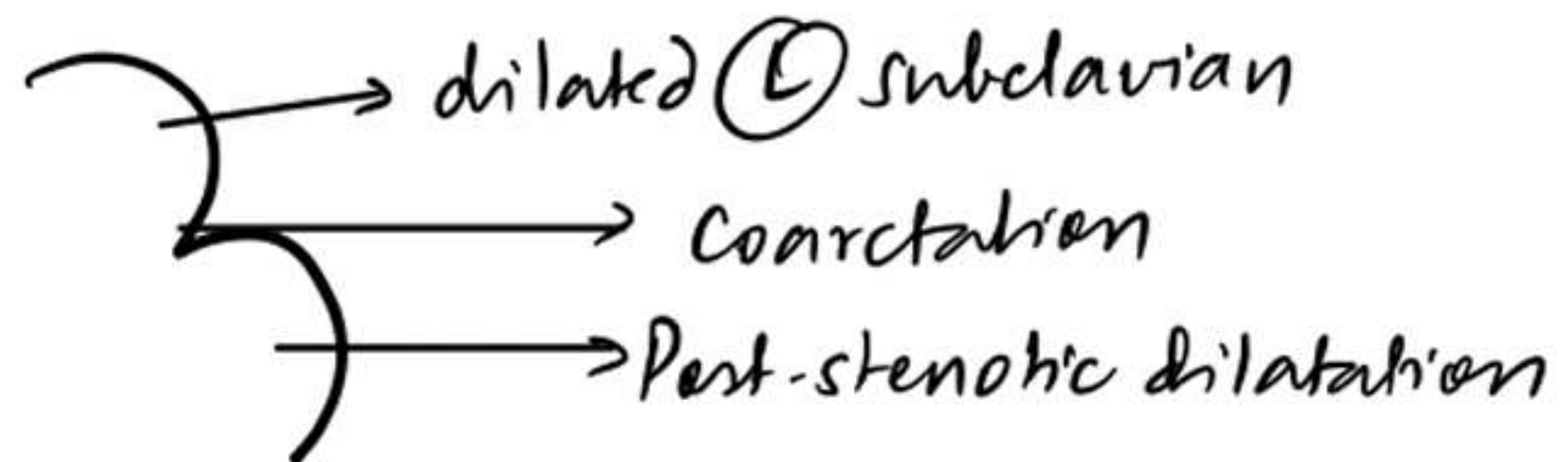
Variable	Score
Clinical signs and symptoms of DVT (minimum of leg swelling and pain on palpation of deep veins)	3
Alternative diagnosis less likely than PE	3
Heart rate >100 bpm	1.5
Immobilisation >3 days or surgery within past 4 weeks	1.5
Previous DVT or PE	1.5
Haemoptysis	1
Malignancy (treatment or palliation within past 6 months)	1

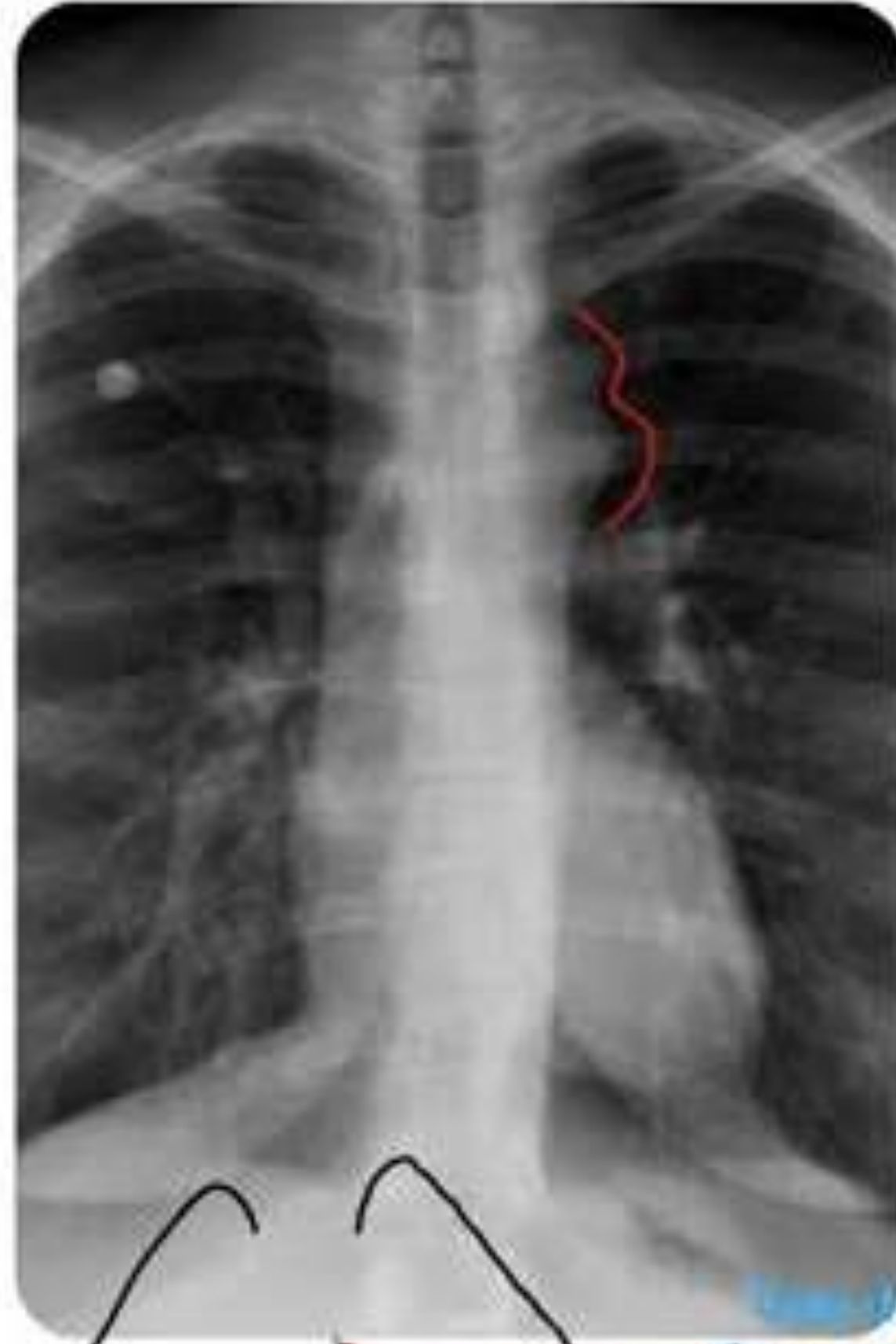
A score of <4 means PE is unlikely (12.4%); >4 is suggestive of PE (37.1%).

bpm, beats per minute; DVT, deep vein thrombosis.

COARCTATION OF AORTA

- Luminal narrowing in aorta causing obstruction to blood flow
- Usually distal to left subclavian artery
- CXR - reverse 3 sign





Dissection shows
Figure of 3 sign
Normal shadows of
aorta

- A 50 yr old man brought to emergency after road accident. He is short of breath with a pulse rate 110bpm and SBP 90 mm hg. Outline early assessment and management.

THANK YOU