

Chest Trauma

Dr. WASEEM HAJJAR, MD, FRCS.

Associate professor &

Consultant thoracic surgeon

Thoracic Surgery Division

KKUH

INTRODUCTION

- The chest contains vital organs.
- Damage to vital organs threatens life.
- Most common consequence is hypoxia.
- Chest injuries result in a significant number of deaths each year.
- One in every 4 cases of trauma death caused by chest injury.

■ Mechanism of injury :

1) Blunt chest trauma

- Most common cause of serious chest injuries.
- Post RTA, falls, direct blows, and crushing injuries.
- Many injuries are not immediately apparent in physical exam.

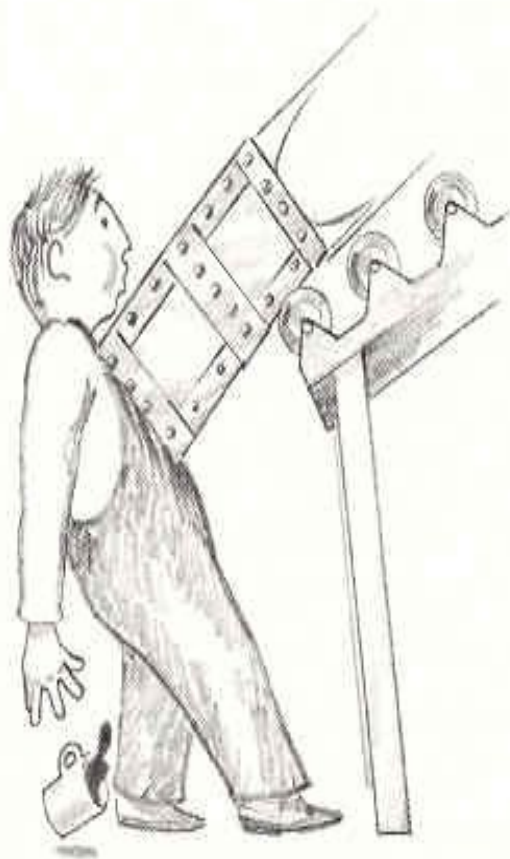
2) Penetrating trauma

- Immediate result can be severe bleeding or impaired breathing.
- Any chest wound can involve underlying organ injury.
- No matter how superficial it looks.
- Injuries to the heart, lungs, and great vessels can quickly lead to shock and cardiac arrest.

3) Iatrogenic







DIRECT



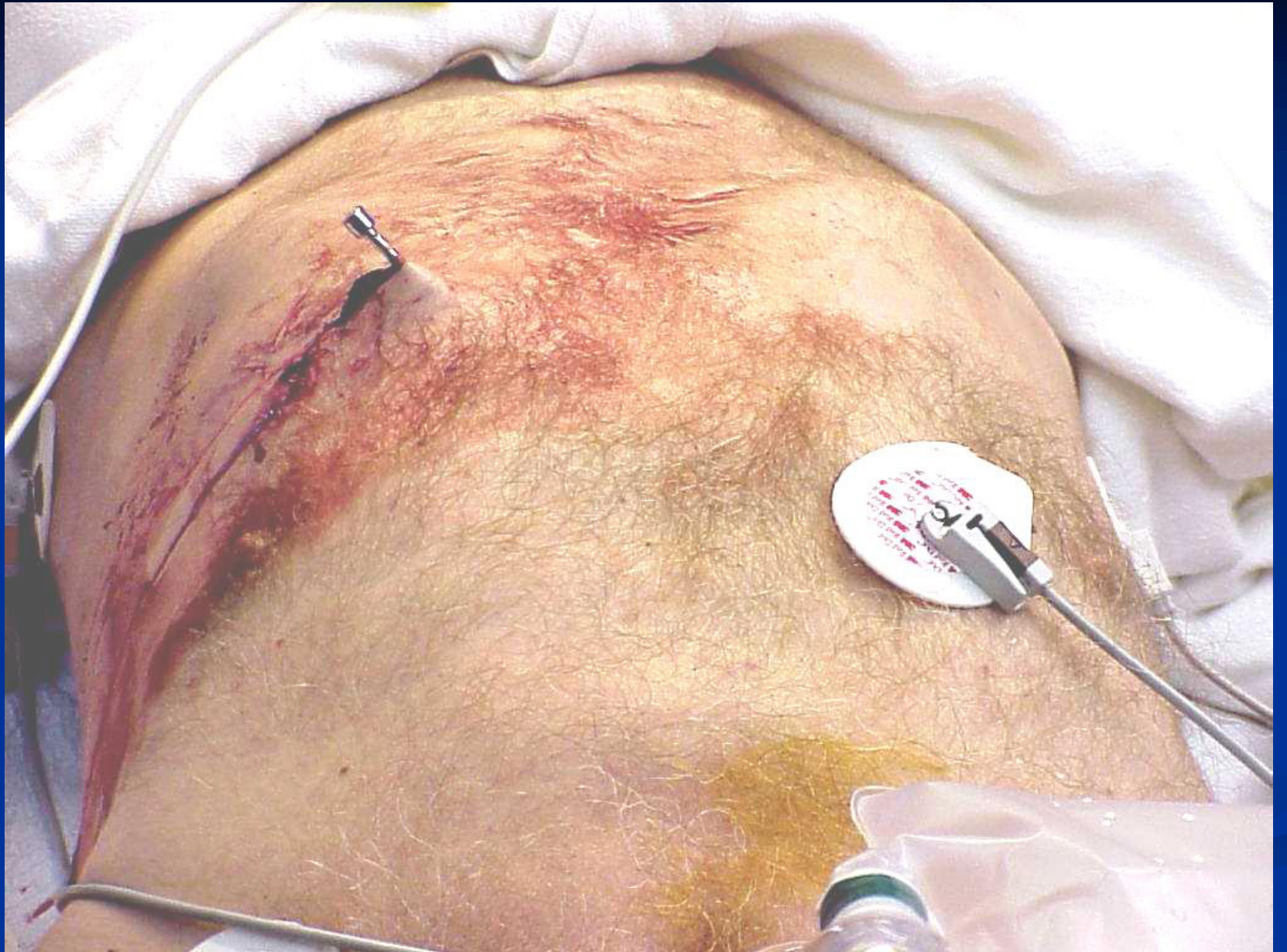
INDIRECT



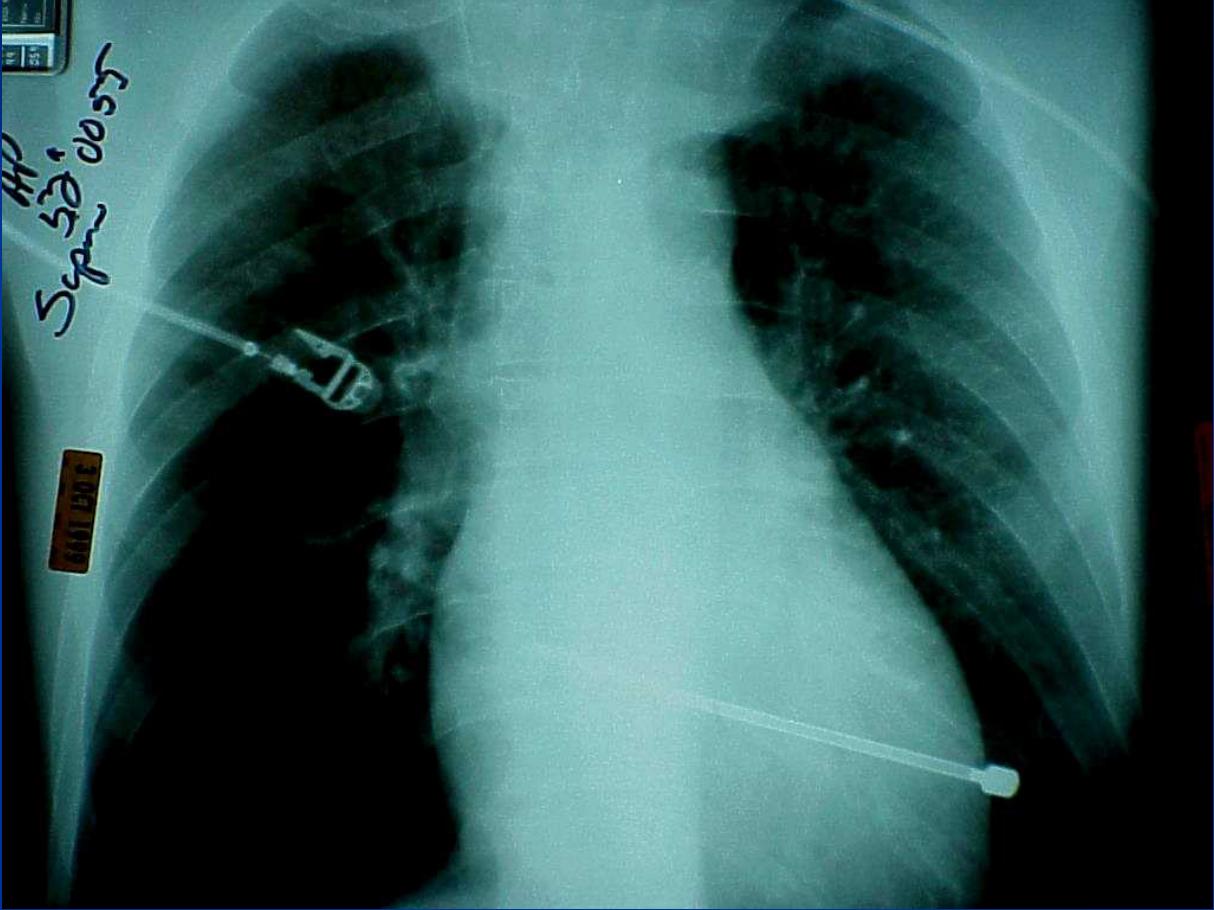
COMPRESSION

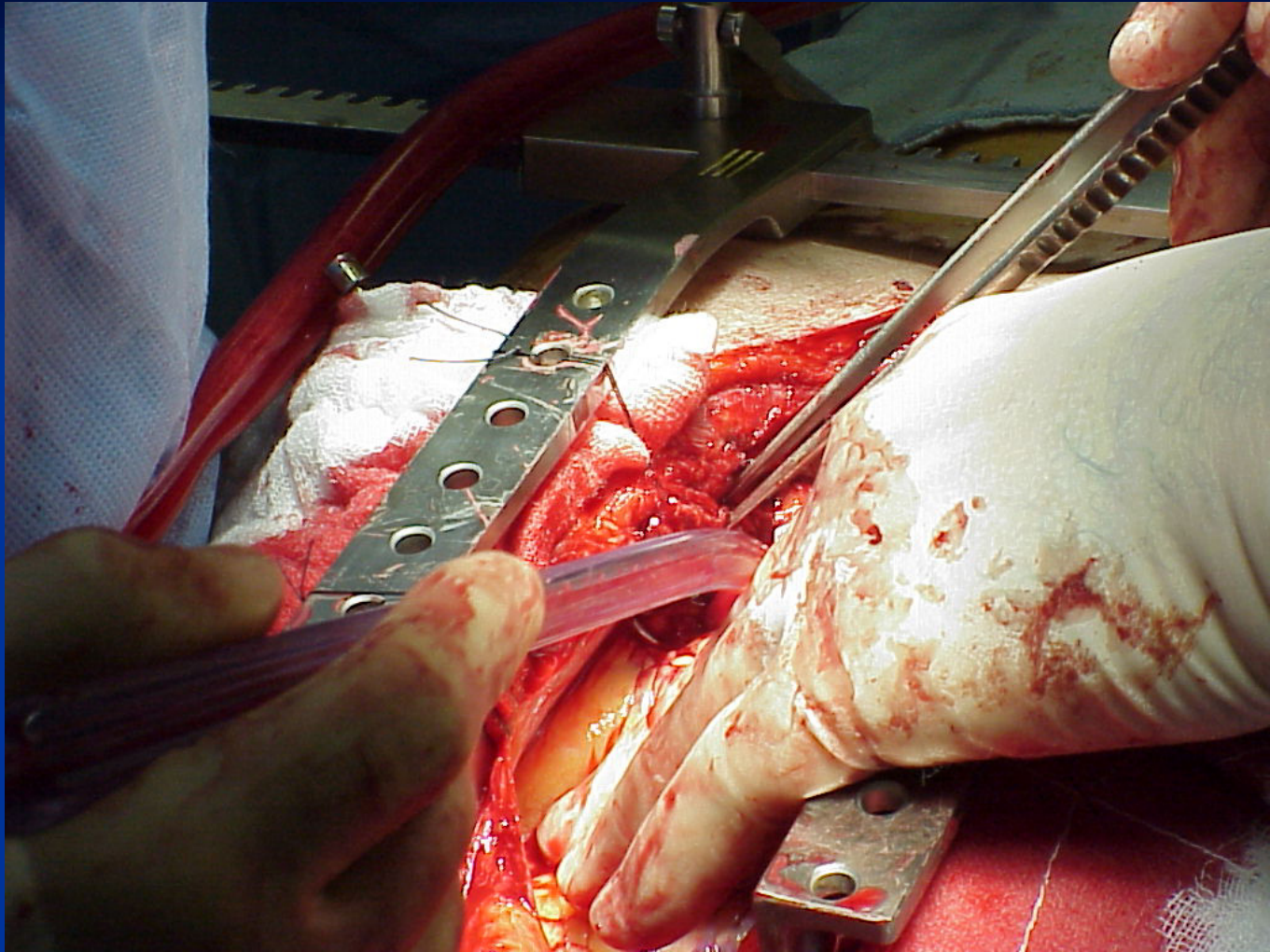












■ Signs and symptoms •

- Most common symptoms: pain and difficulty breathing.
- Signs are obvious injury to the chest wall (looking at both the front and back of the chest).
- Note any subcutaneous emphysema, or air present under the skin

■ Assessment

Follow all steps in the assessment of the trauma patient:

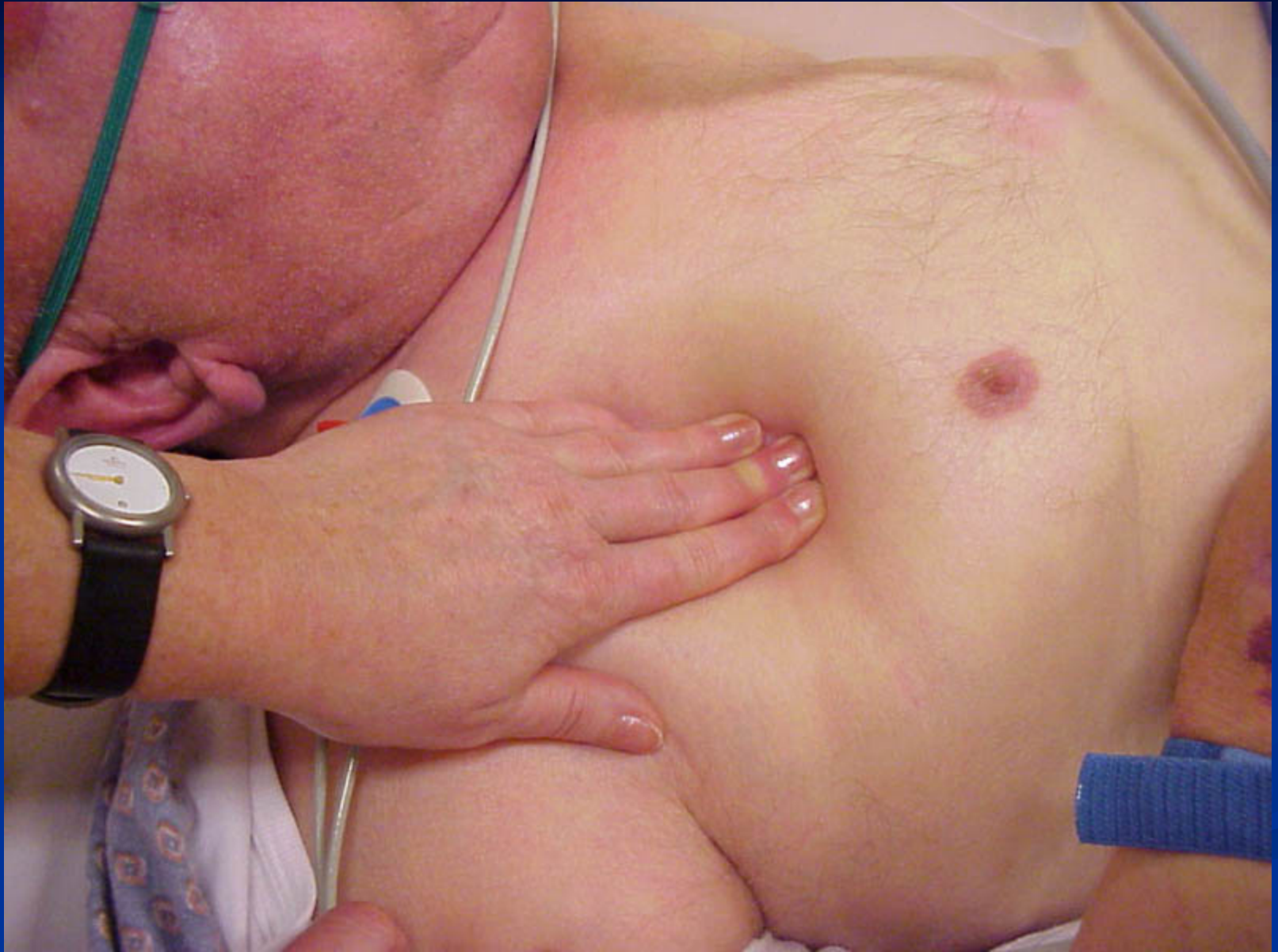
- Primary survey(A. Airway B. Breathing C. Circulation).
- Resuscitation.
- Detailed secondary survey (CXR , ABG ,ECG , CT Chest , Aortogram).



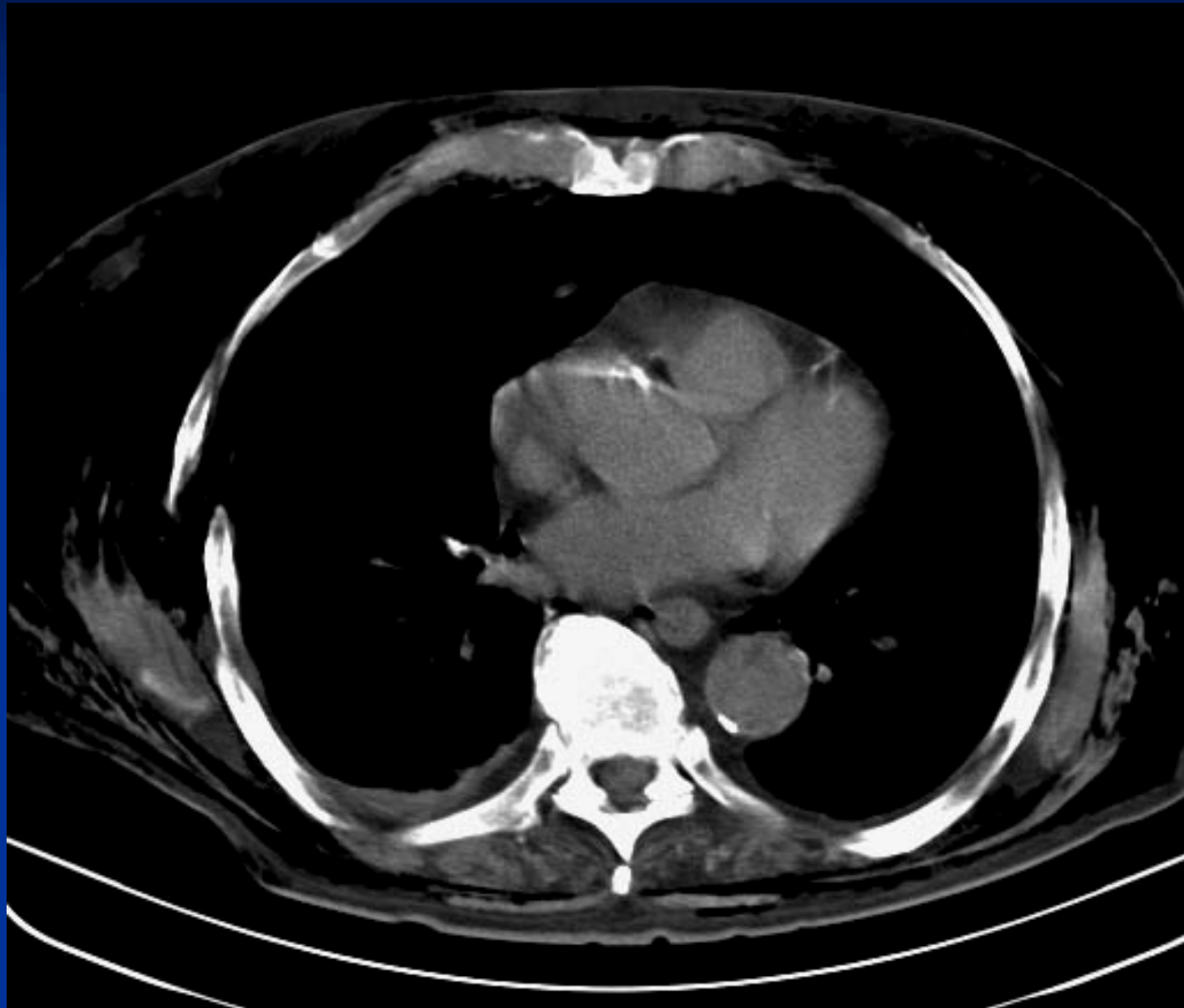












■ Management

- Ensure patient has adequate oxygenation and perfusion
- Provide high-flow oxygen, ventilating when necessary
- Halt any obvious bleeding
- Support circulation when needed
- Rapidly transport patient to definitive care

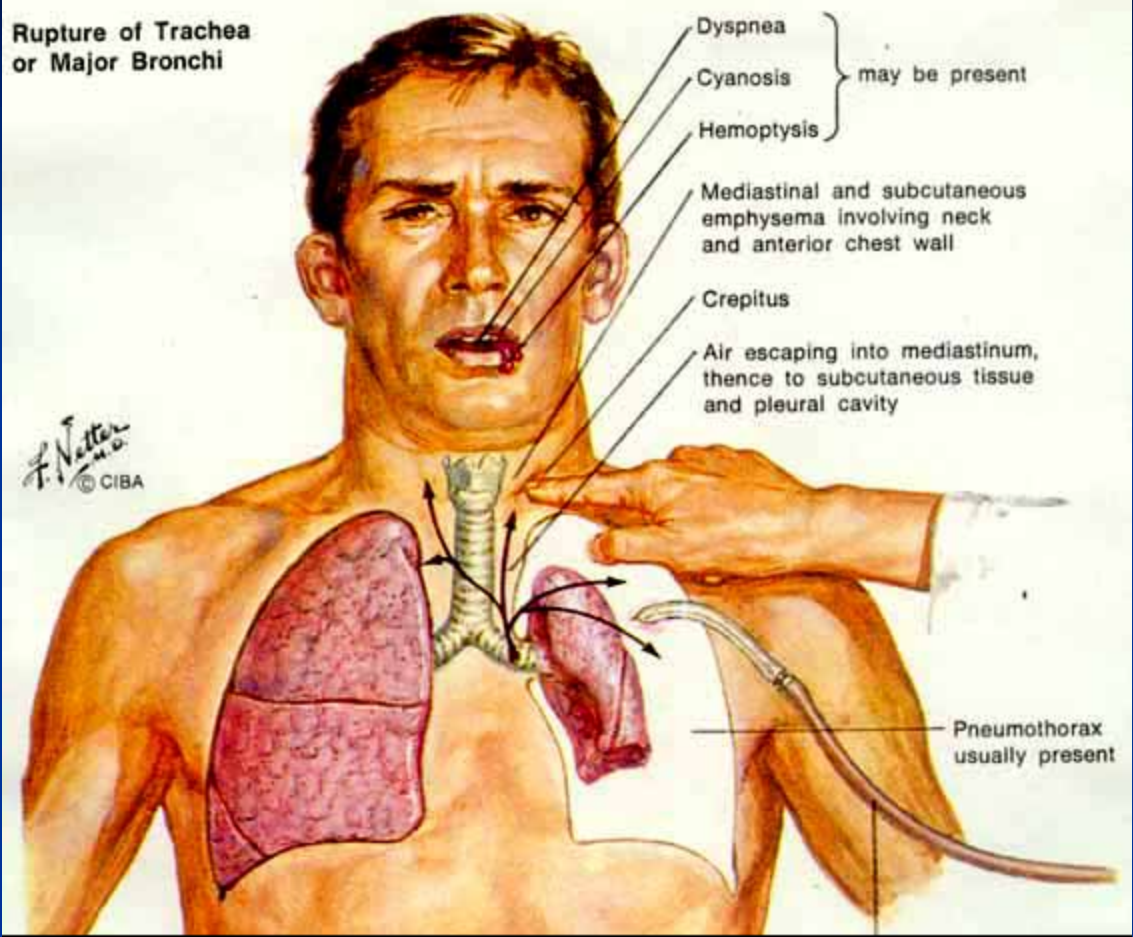
■ Life threatening chest injury
identified in the primary survey:

- 1) Airway obstruction.
- 2) Flial chest.
- 3) Tension pneumothorax.
- 4) Open pneumothorax.
- 5) Massive hemothorax.
- 6) Cardiac tamponade.

■ Potentially lethal chest injury:

- 1) Traumatic aortic rupture.
- 2) Myocardial contusion.
- 3) Tracheal bronchial injury.
- 4) Rupture diaphragm.
- 5) Esophageal trauma.
- 6) Pulmonary contusion.

**Rupture of Trachea
or Major Bronchi**



Dyspnea }
Cyanosis } may be present
Hemoptysis }

Mediastinal and subcutaneous
emphysema involving neck
and anterior chest wall

Crepitus

Air escaping into mediastinum,
thence to subcutaneous tissue
and pleural cavity

Pneumothorax
usually present

*F. Netter
M.D.*
© CIBA

Rib Fracture

- Most common chest injury.
- More common in adults than children.
- Especially common in elderly.
- Ribs form rings, Consider possibility of break in two places.

Rib Fracture

- Most commonly 5th to 9th ribs.
- Poor protection.

Rib Fracture

- Fractures of 8th to 12th ribs can damage underlying abdominal solid organs:
 - Liver.
 - Spleen.
 - Kidneys.

Rib Fracture

- Fractures of 1st, 2nd ribs require high force.
- Frequently have injury to aorta or bronchi.
- 30% will die.

Rib Fracture

- Local swelling and tenderness may be the only sign of a broken rib.
- Can be very painful.
- Patients often presents with guarding and shallow breathing.

➤ *Management*

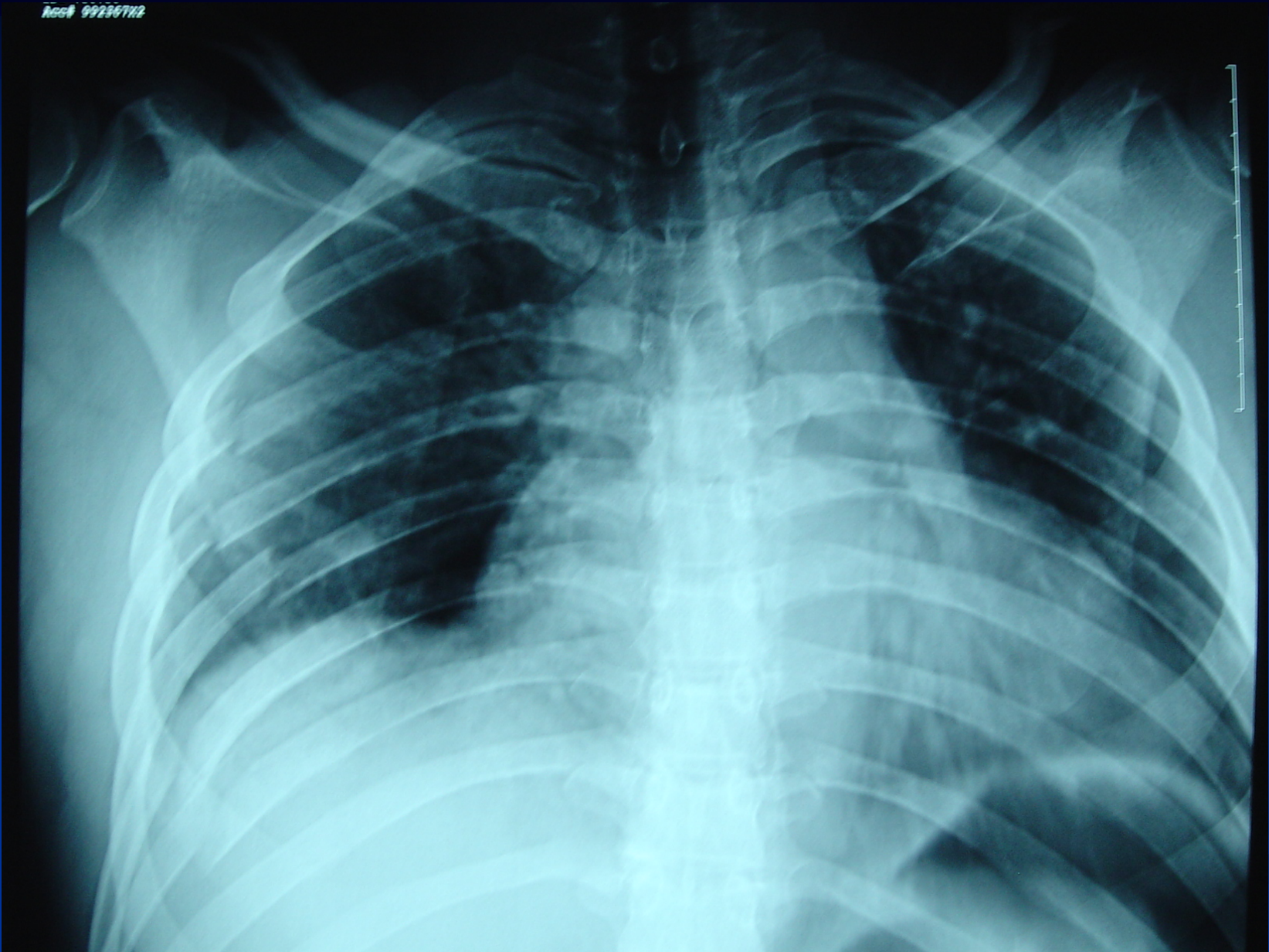
- Move the patient carefully to prevent the bone ends from puncturing the lung.
- Administer O₂.
- Allow patient to self-splint by assuming the most comfortable position possible.
- Encourage patient to limit movement.
- Analgesia like Morphine, PCA, Epidural.

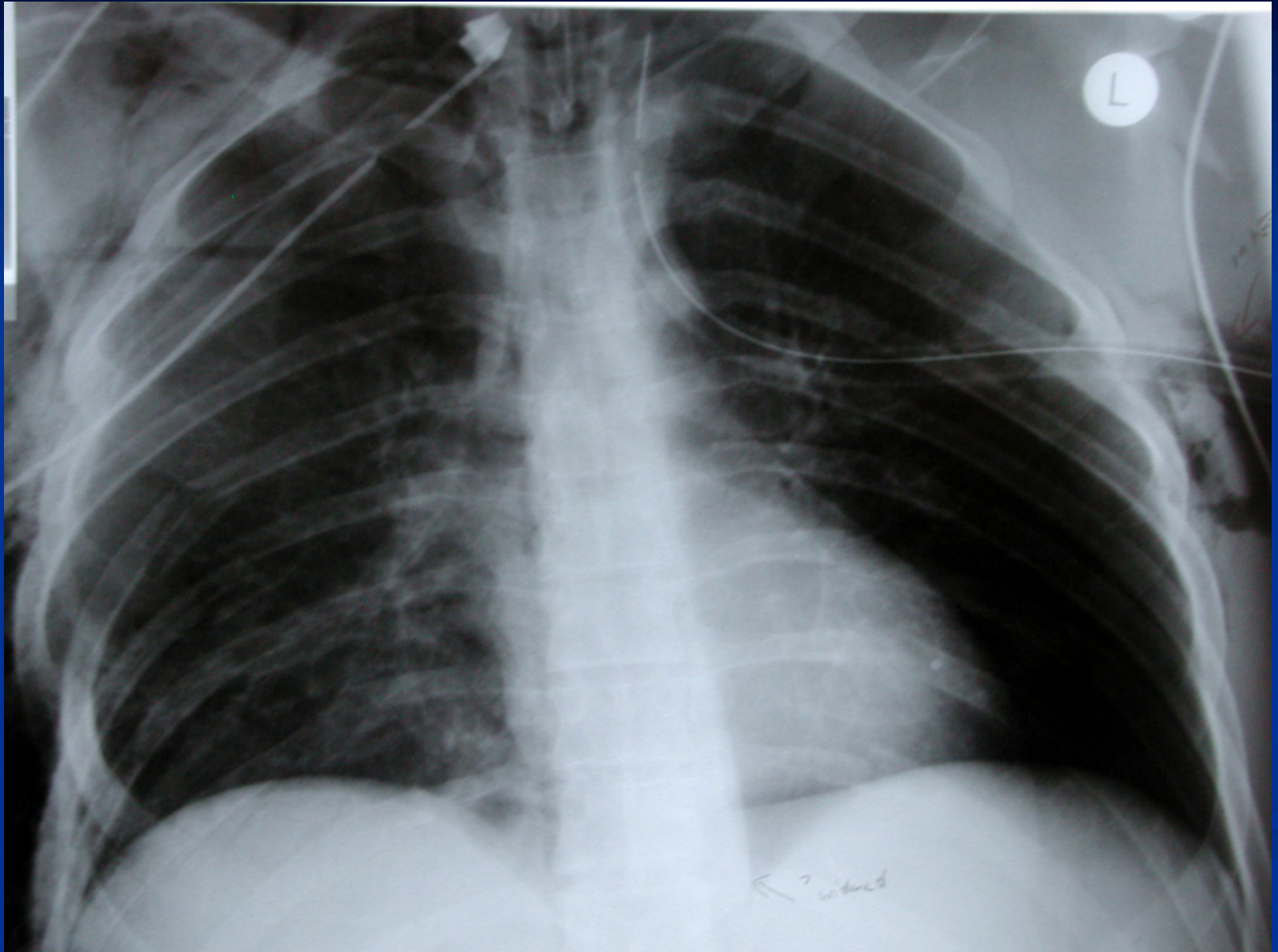
Rib Fracture

Signs and Symptoms

- Localized pain, tenderness
- Increases when patient:
 - Coughs
 - Moves
 - Breathes deeply
- Chest wall instability
- Deformity, discoloration
- Associated pneumo or hemothorax

Rect# 99286712



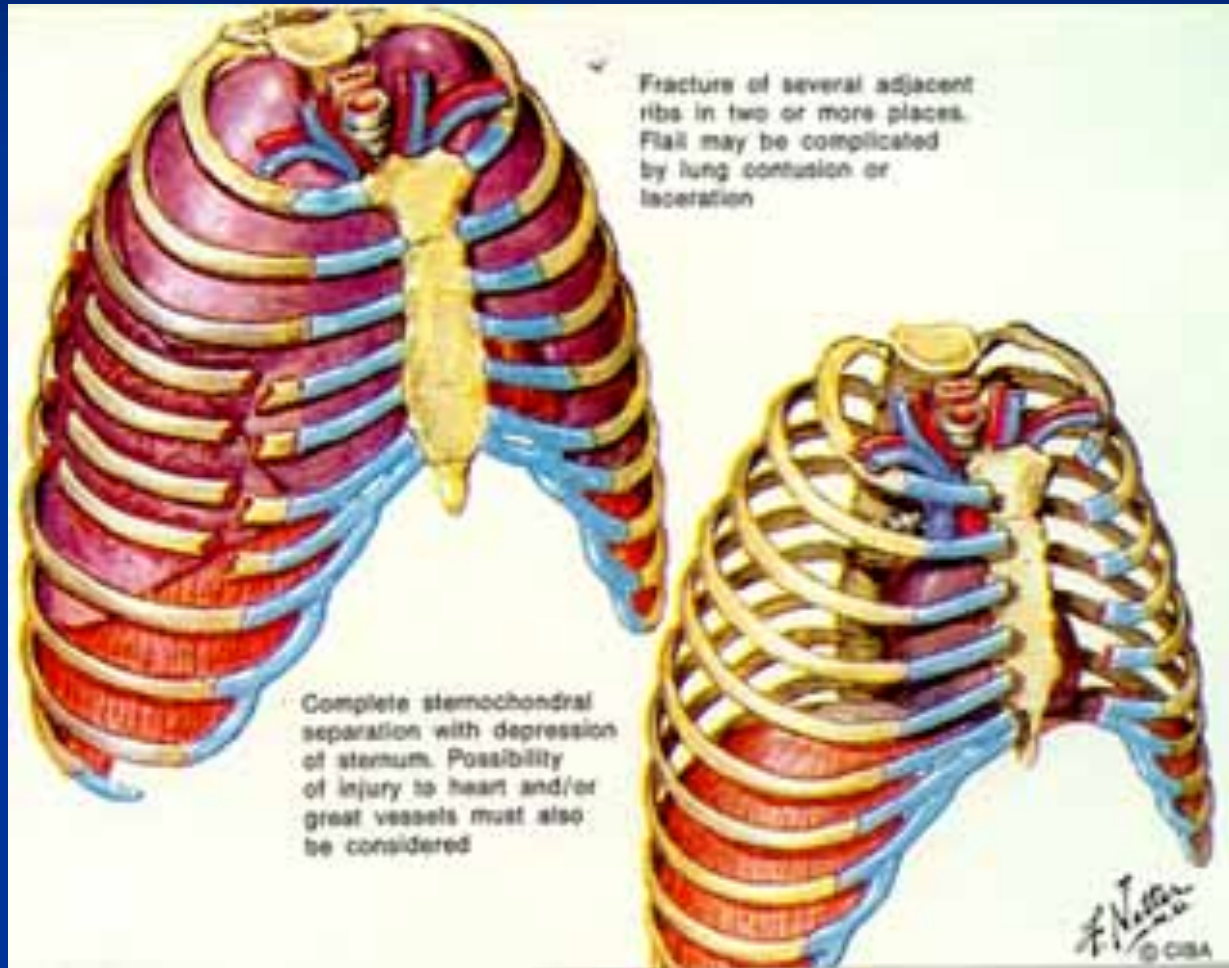


Flail Chest

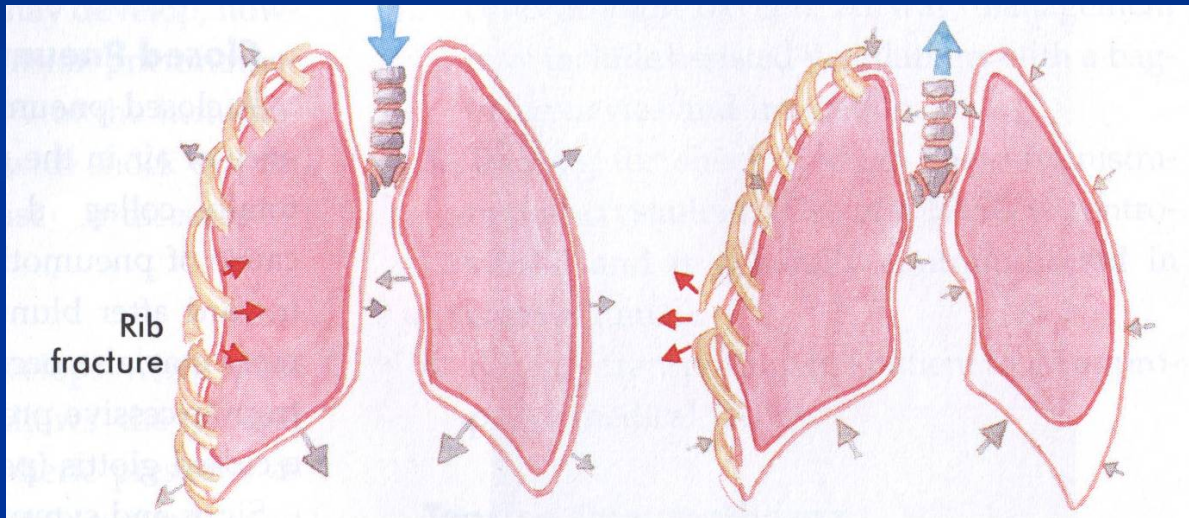
■ Flail segment

- When three or more ribs are broken in two or more places, a rib-cage segment may detach from the rest.
- Flail segment is free floating.
- Paradoxical movement: movement of flail segment in opposite direction of the rest of the chest wall .
- Paradoxical movement can significantly impair breathing and cause injury to the underlying lung.

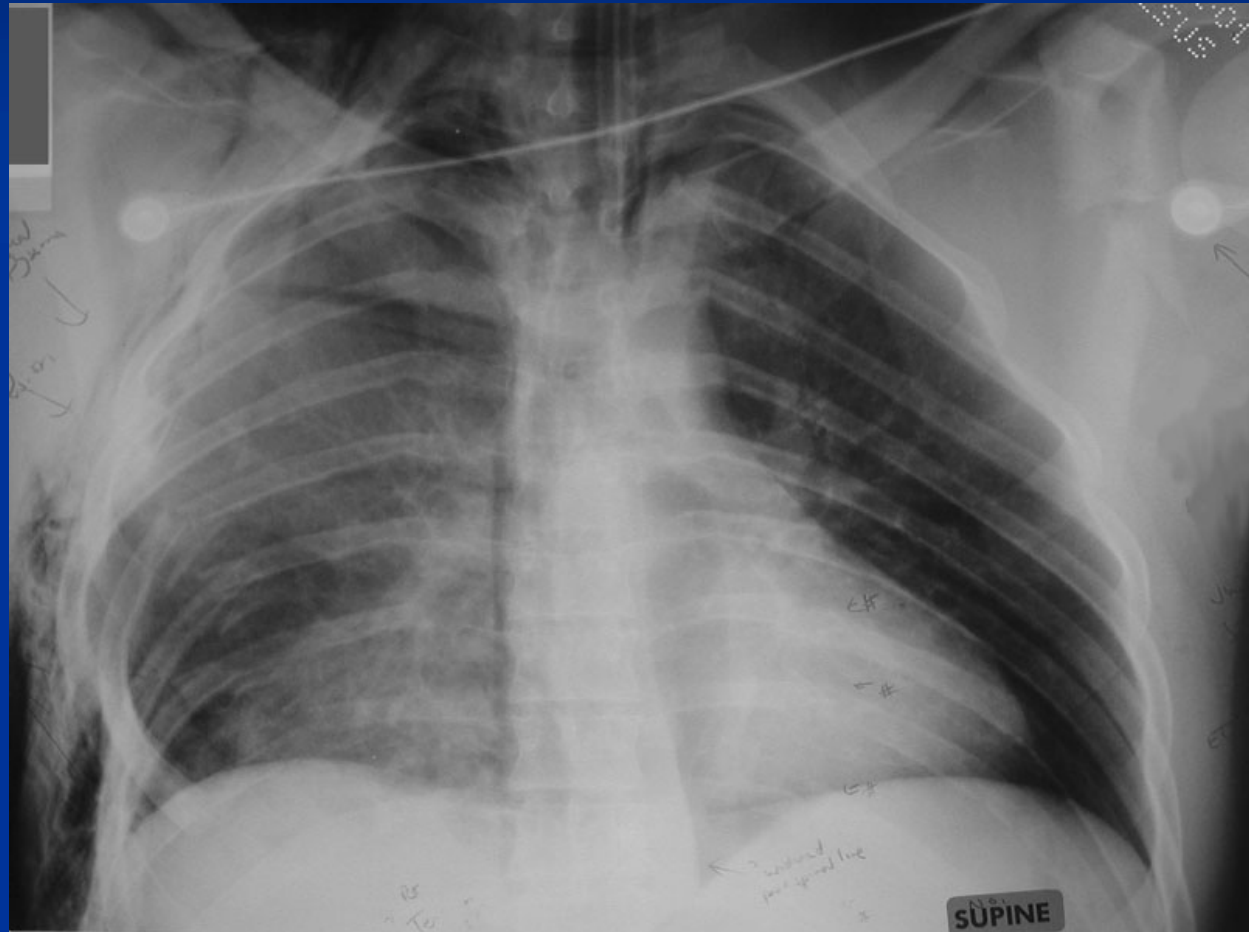
Flail Chest

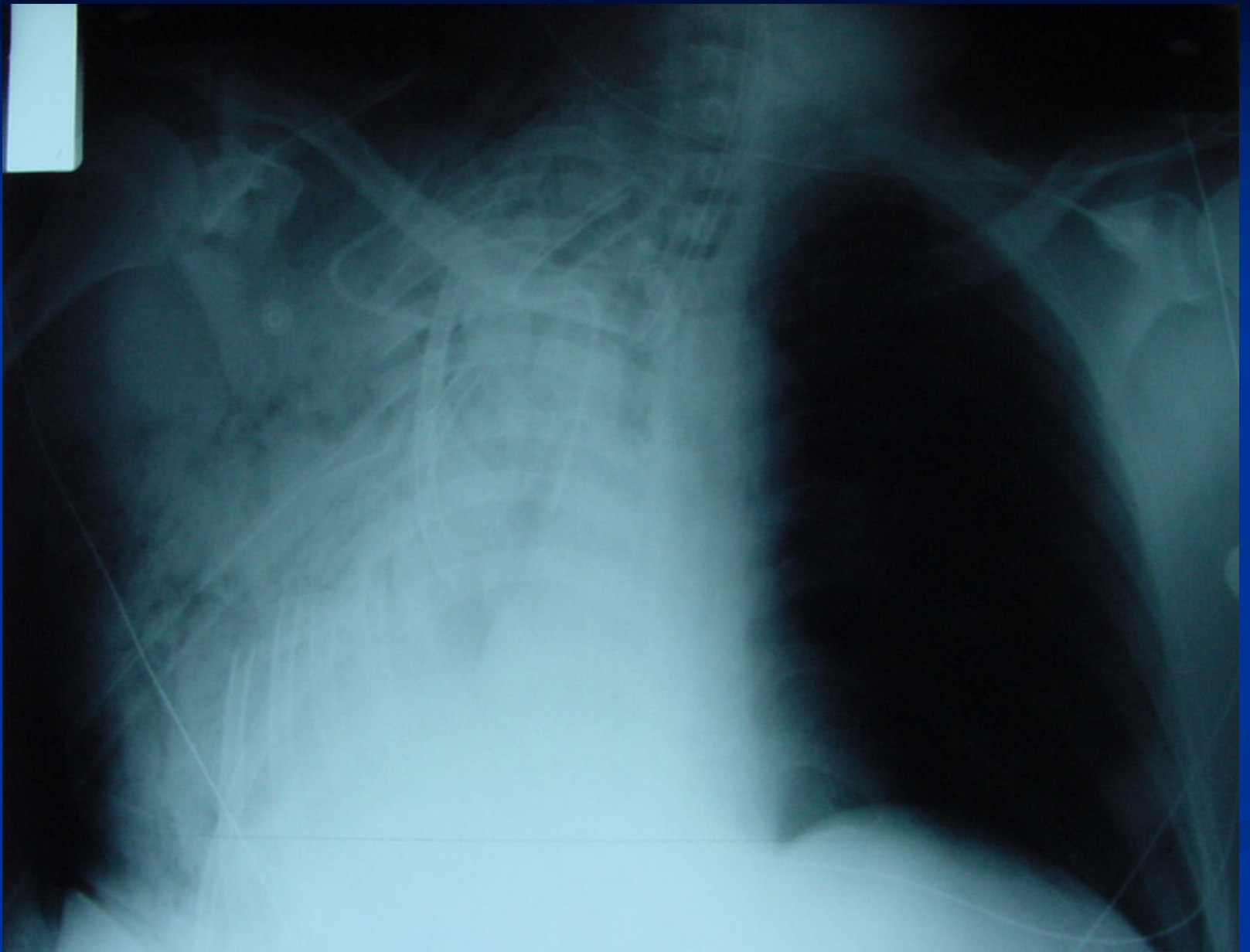


Flail Chest



Flial Chest

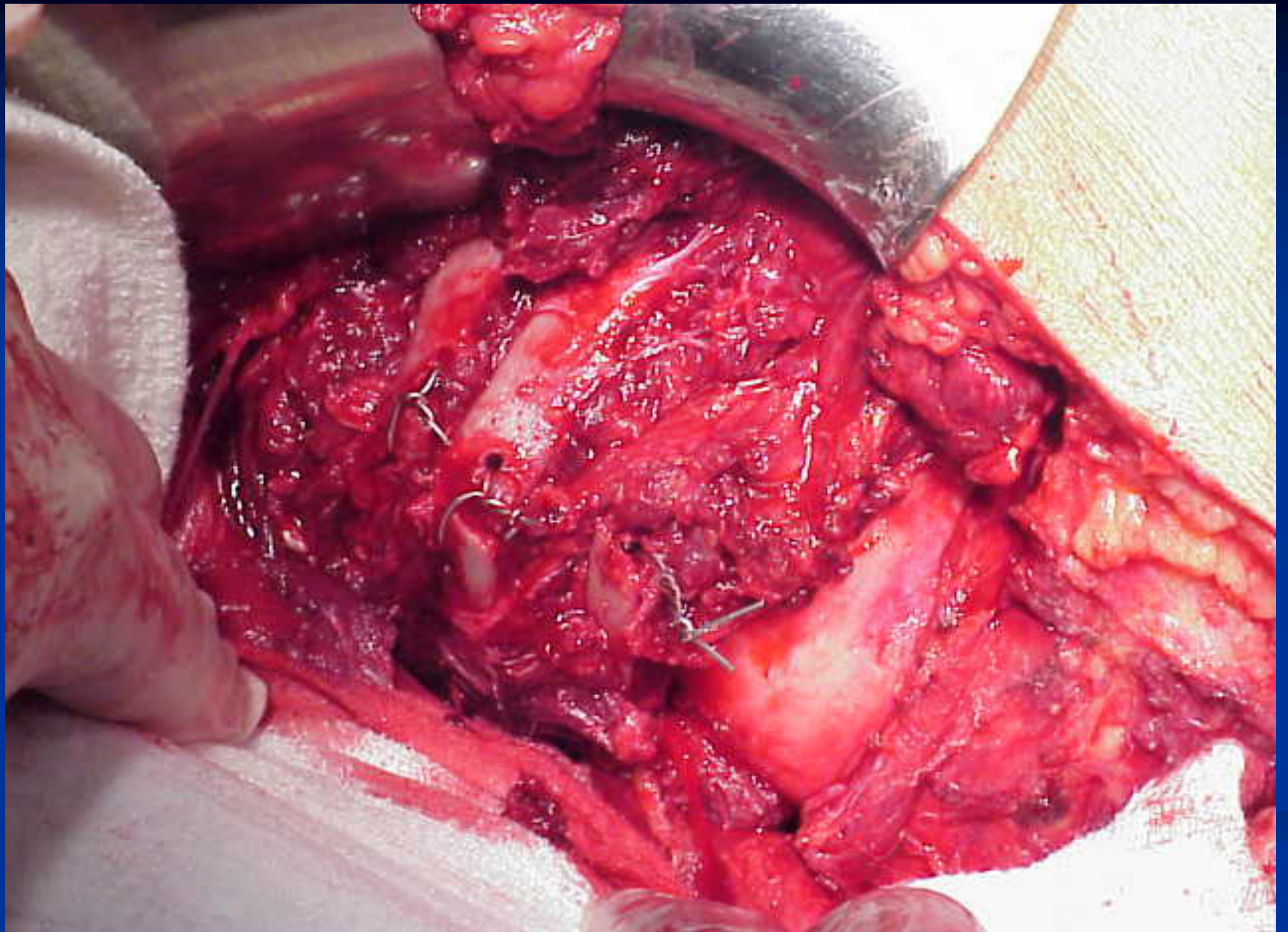




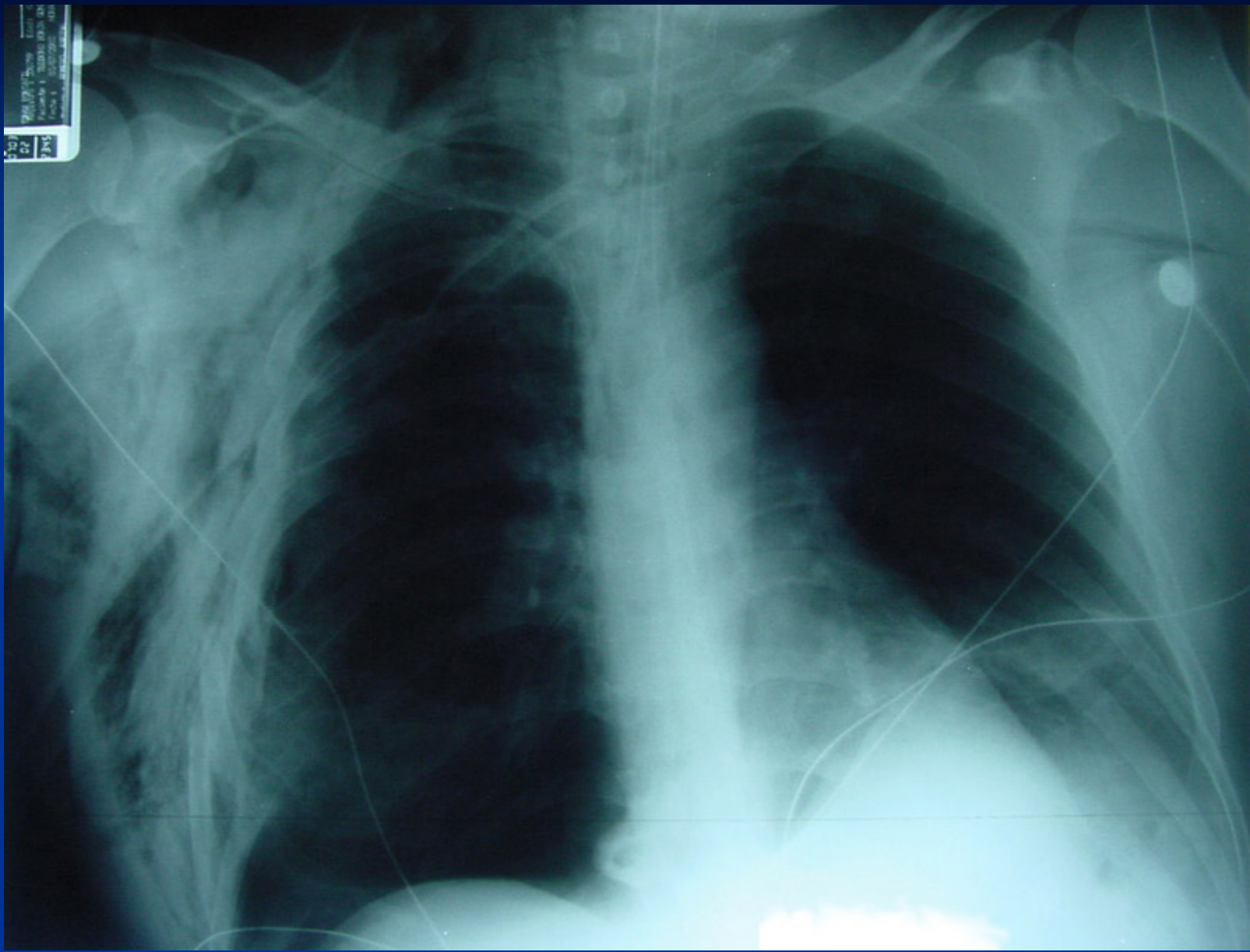
Flail Chest

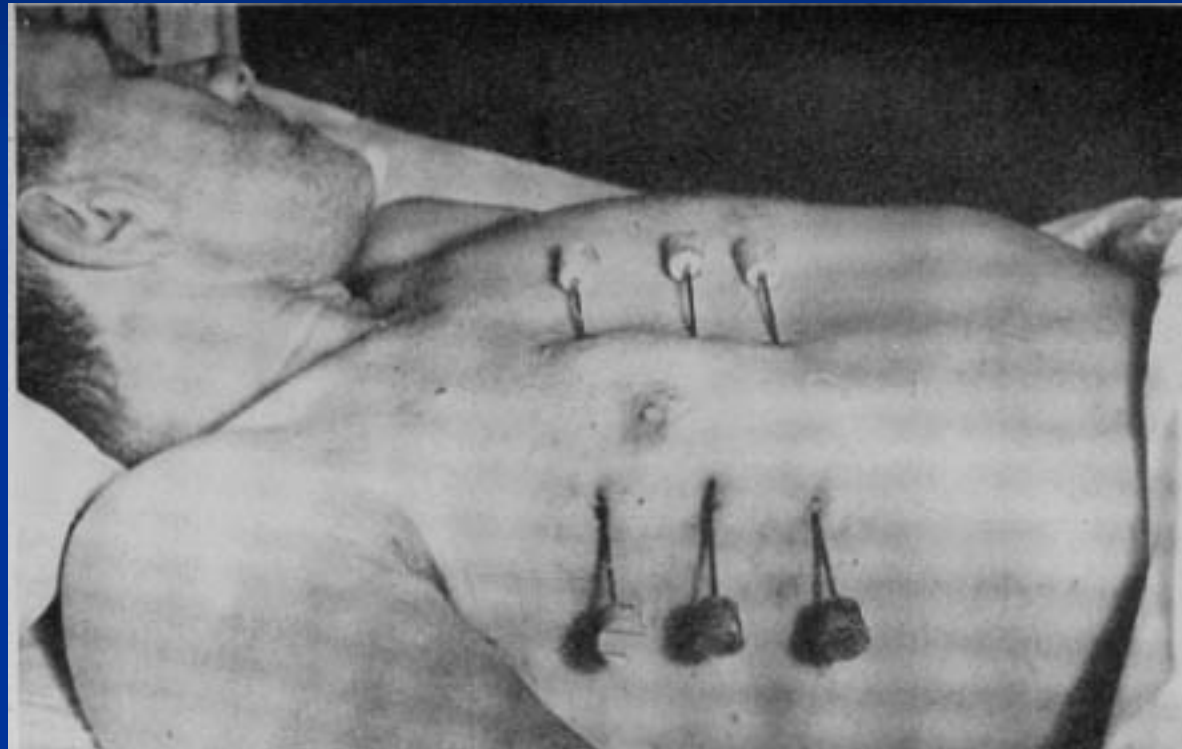
➤ *Management*

- Quickly stabilize flail segment by placing gloved hand over injured area.
- After manual stabilization, place folded universal dressing over segment and tape securely.
- Fixation (External, Internal).



H01 00232707
H01 00232707
H01 00232707
H01 00232707
H01 00232707
SM 6
20
12/21/19

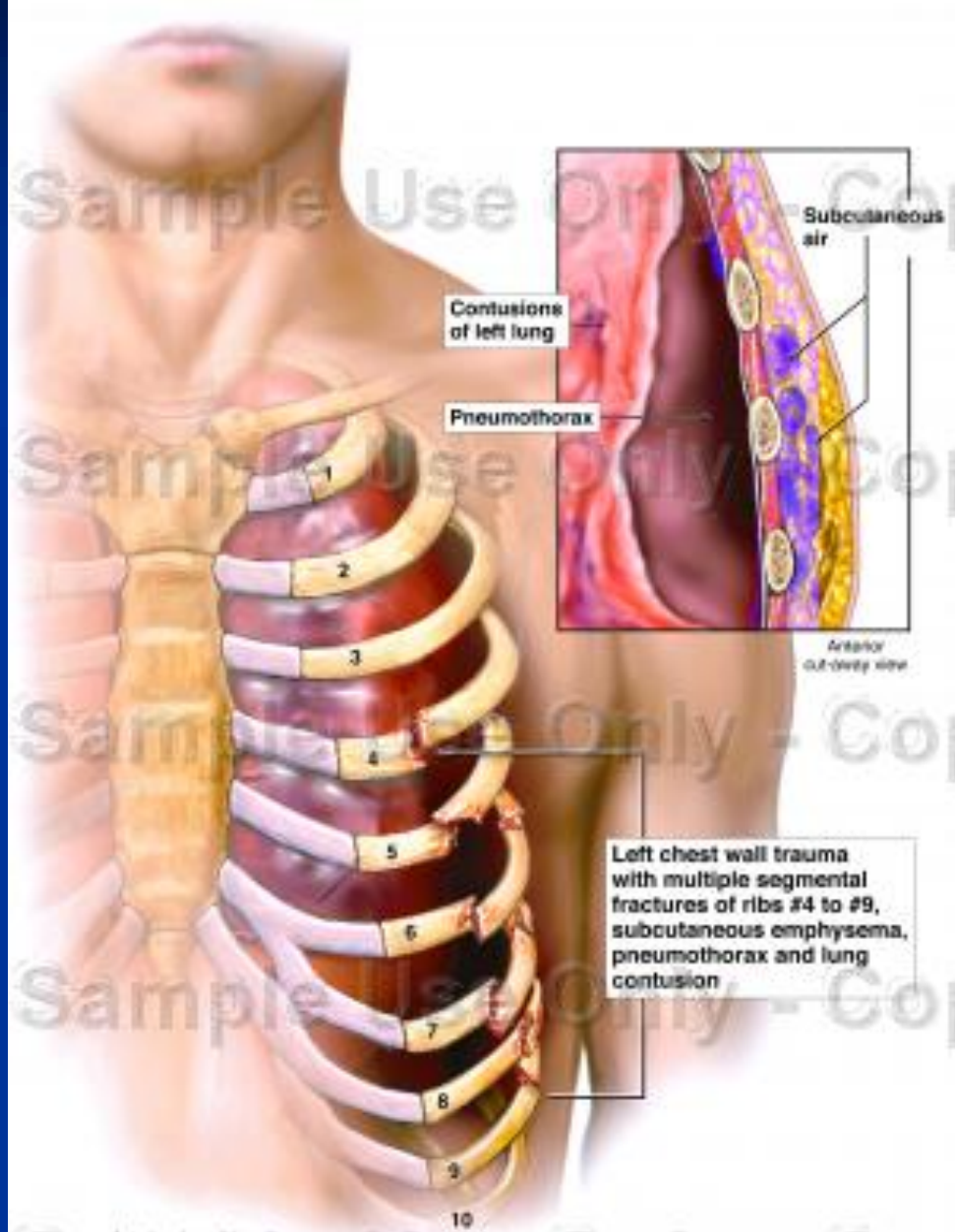






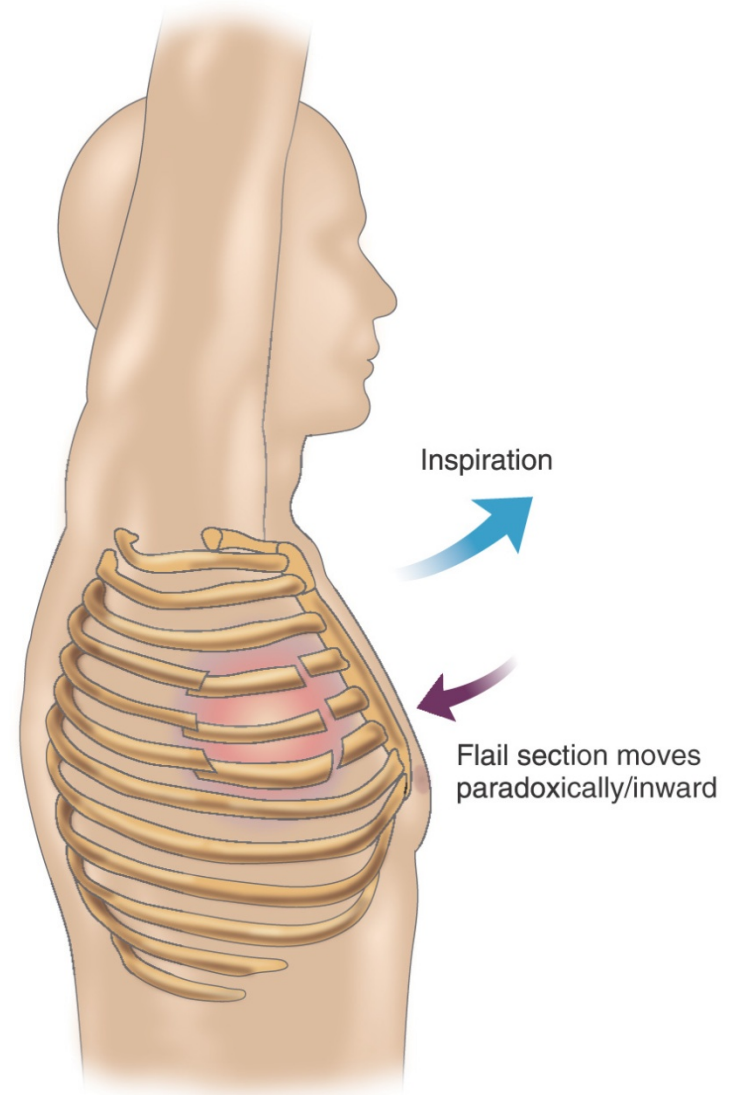
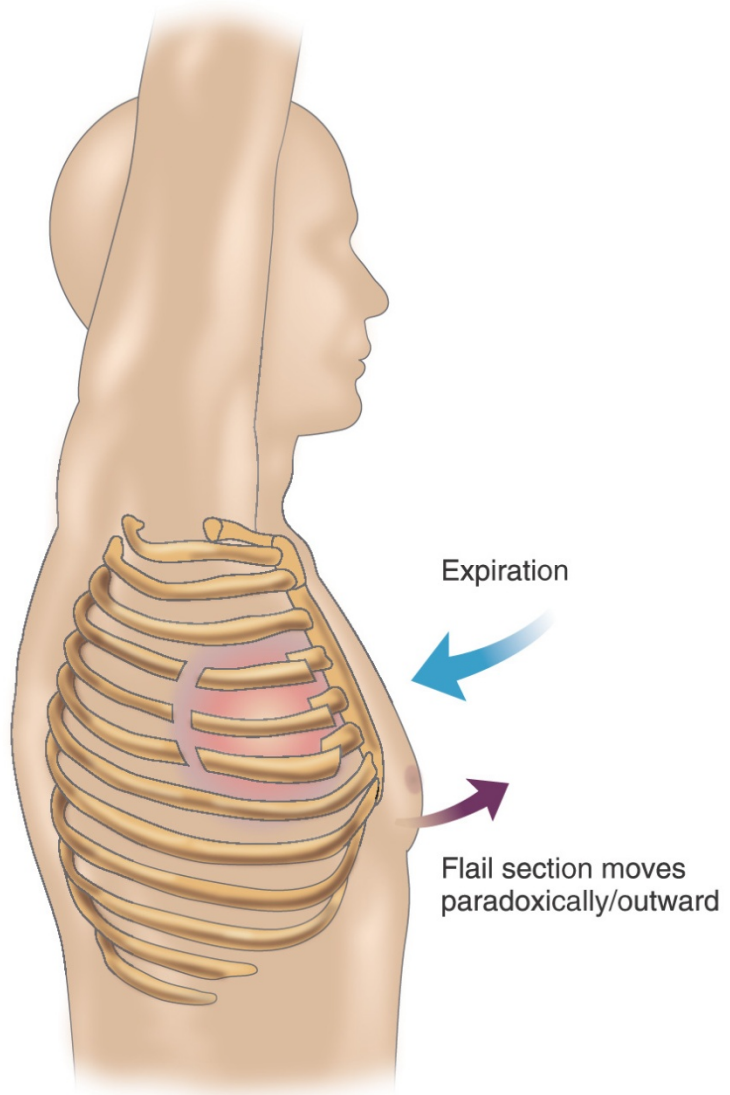
Left Chest Wall Trauma

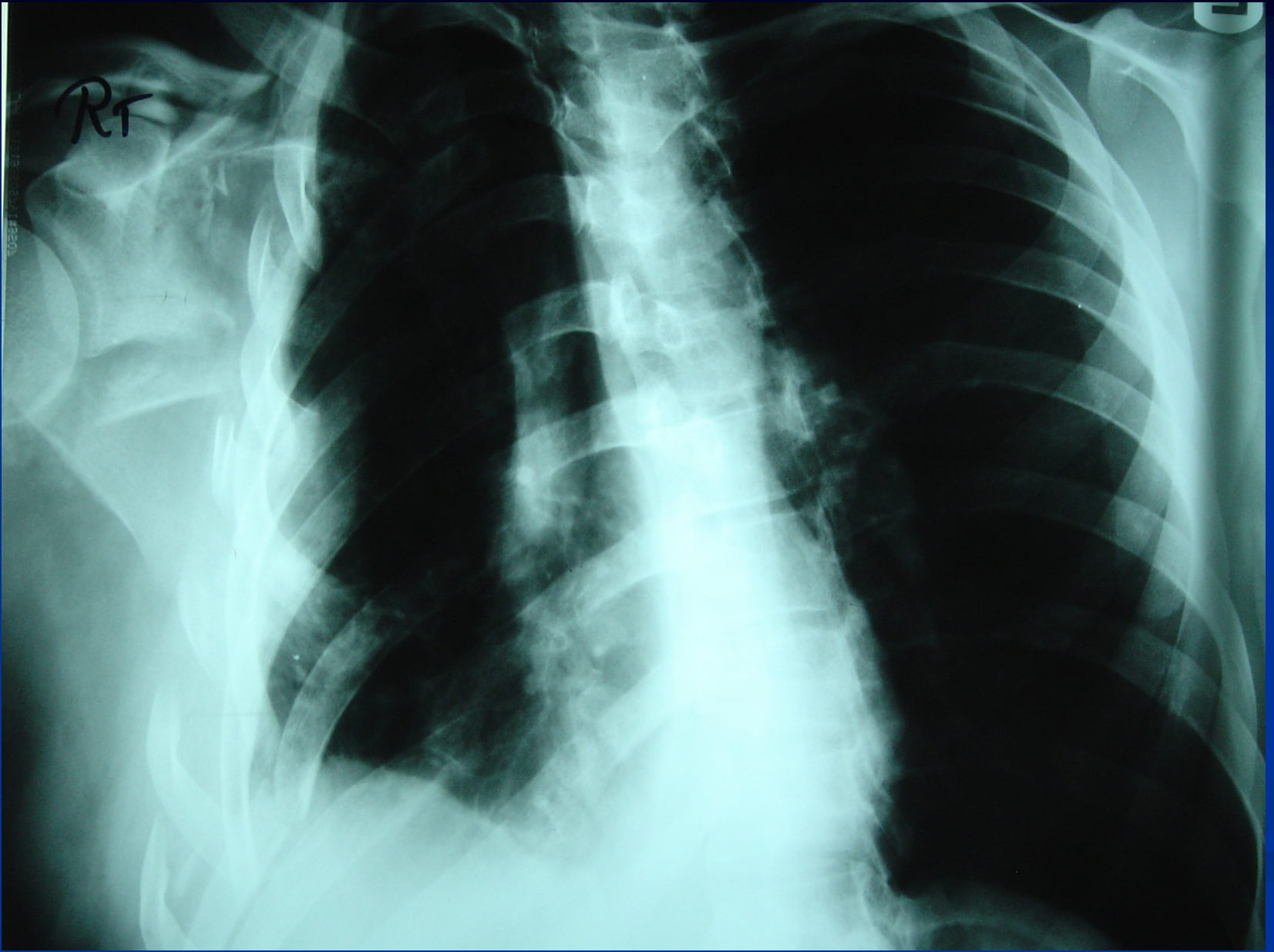
Sample Use Only - Copy

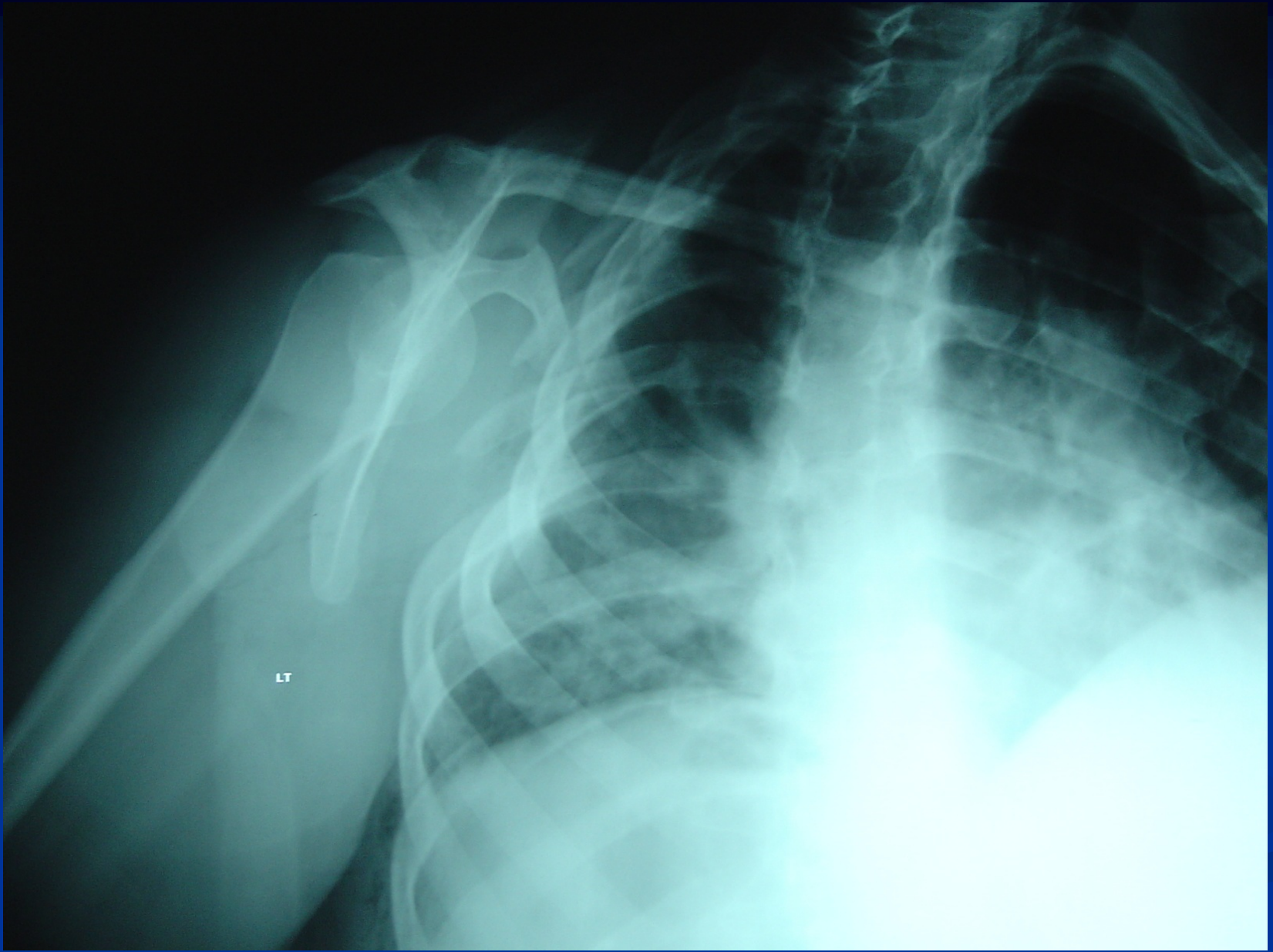


Left chest wall trauma with multiple segmental fractures of ribs #4 to #9, subcutaneous emphysema, pneumothorax and lung contusion

Sample Use Only - Copy







■ Post Traumatic Pneumothorax

Types:

- 1) Opened pneumothorax.
- 2) Close pneumothorax.



Sr 3542

Im 2

[P]

A.MESFER., FAHAD., MESFER
Study Date 3/22/2010
Study Time 10:40:21 PM
MRN

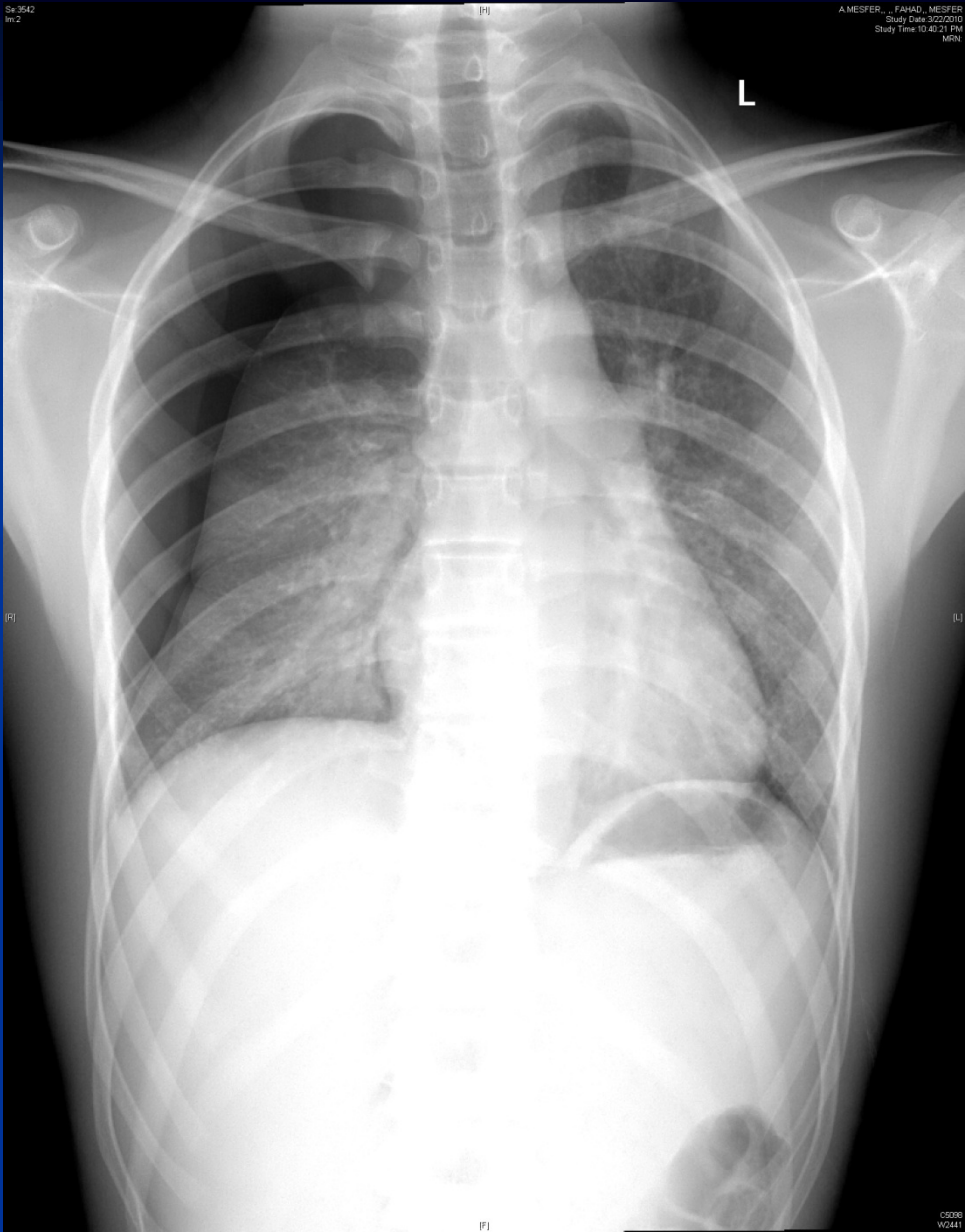
L

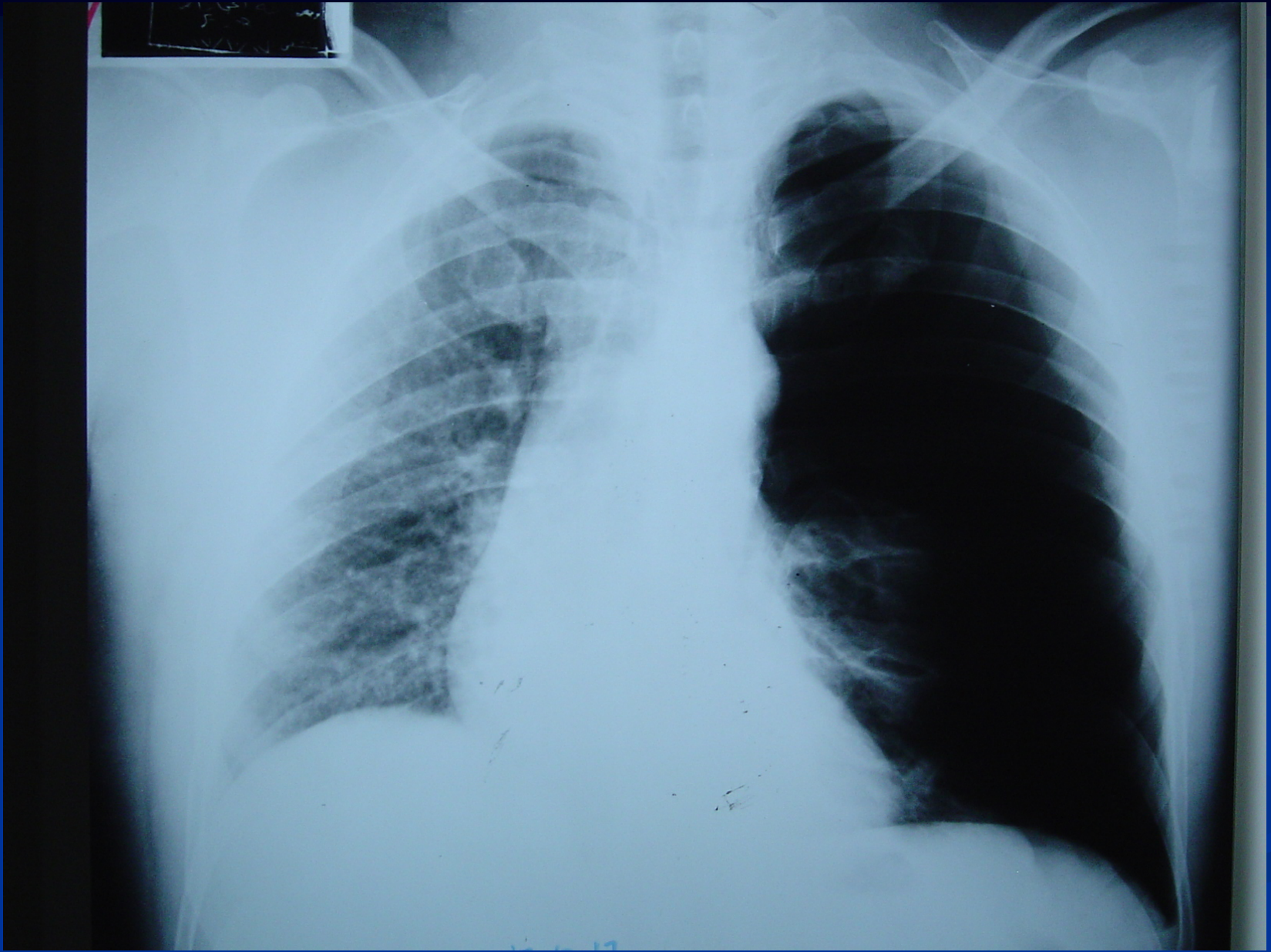
[P]

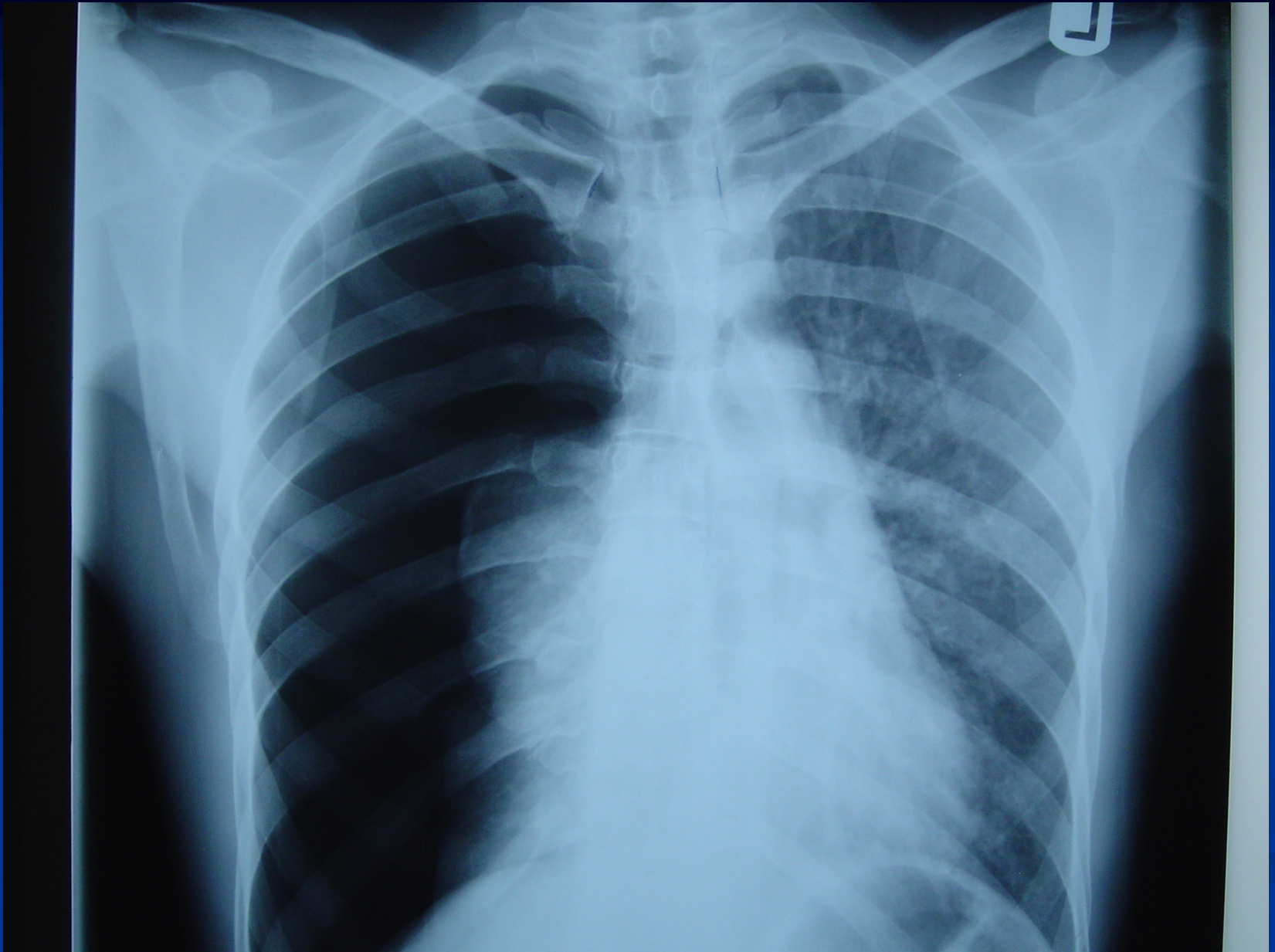
[L]

[P]

C5208
V2441





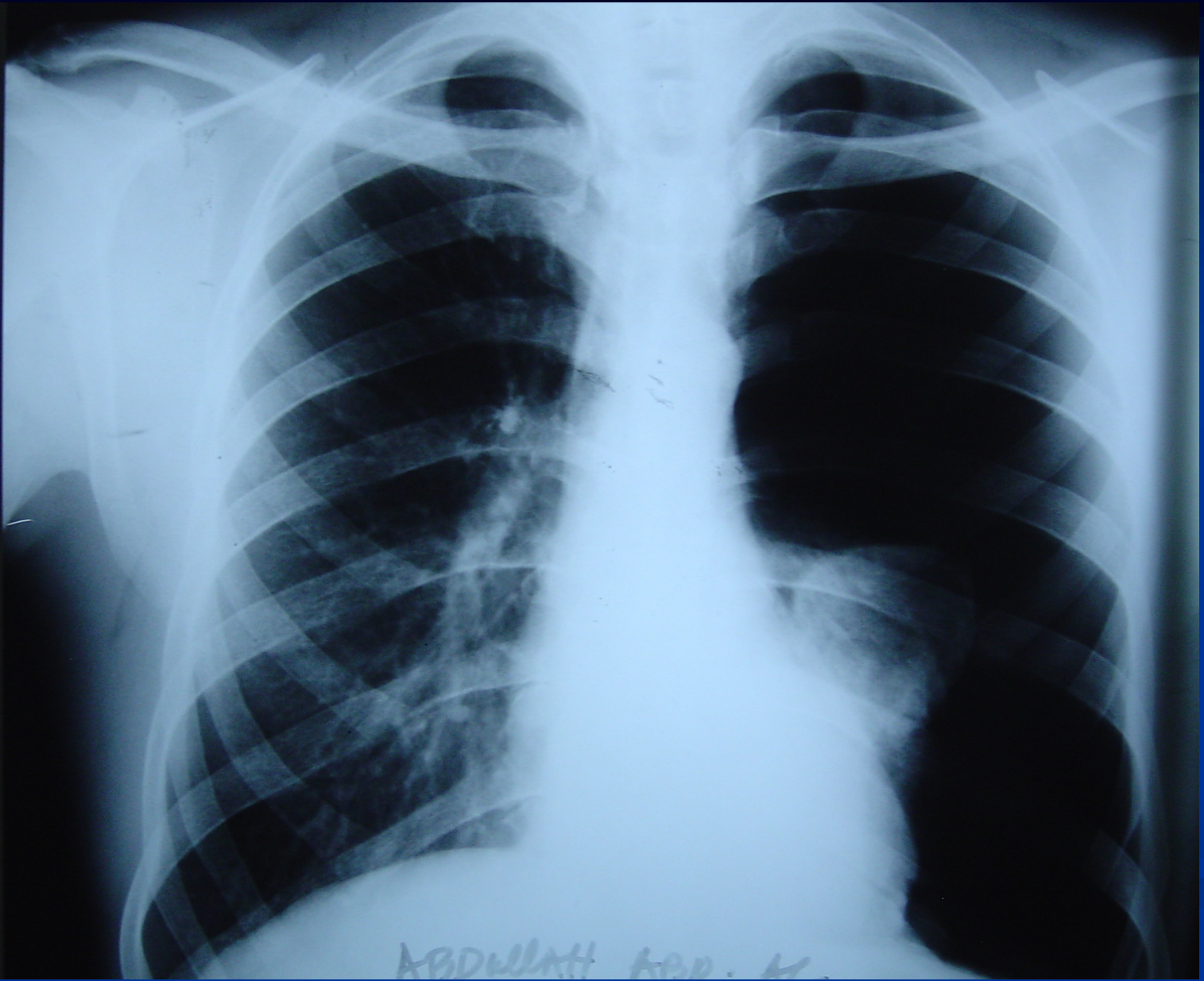


1 27



KV 120
mA 170
TI 0.75
GT 0.0
SI 8.0/12.0
364 -277-49
A850 L0 AWM
1011360 I.V. Contrast 30SEC

W 1900
C -700





■ Open pneumothorax

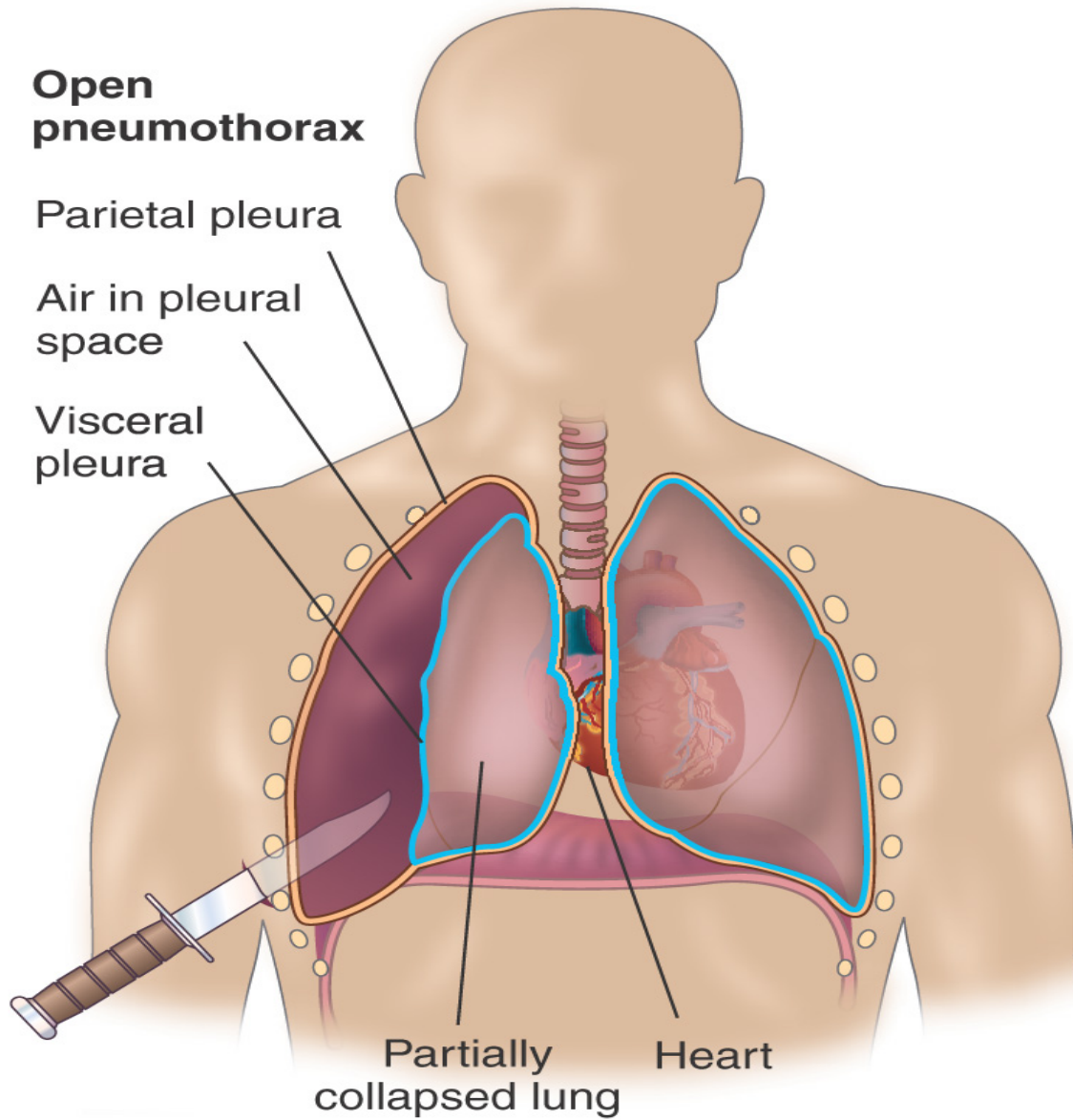
- A sharp object penetrates the skin on the chest wall.
- If penetrating object has pierced pleura, outside air can enter the thoracic cavity.
- As the volume of air in the thoracic cavity expands, the lung starts to collapse .
- Air within the pleural space is called a pneumothorax
- As air passes in and out of an open wound, it can create a sucking-type sound.
- Sucking chest wound means possibility of pneumothorax.
- Signs of pneumothorax: difficulty breathing, cyanosis, diminished breath sounds on the affected side.

Open pneumothorax

Parietal pleura

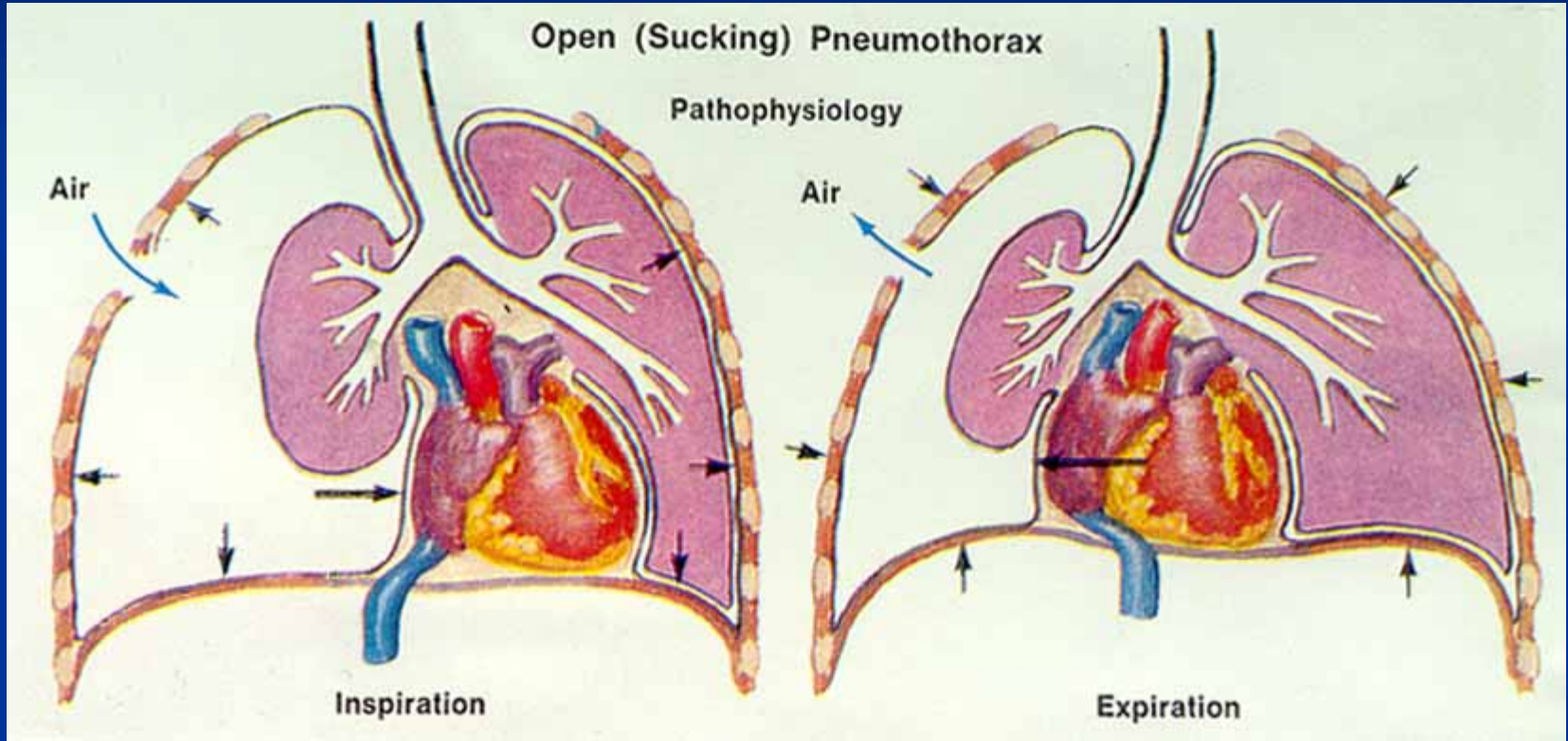
Air in pleural space

Visceral pleura

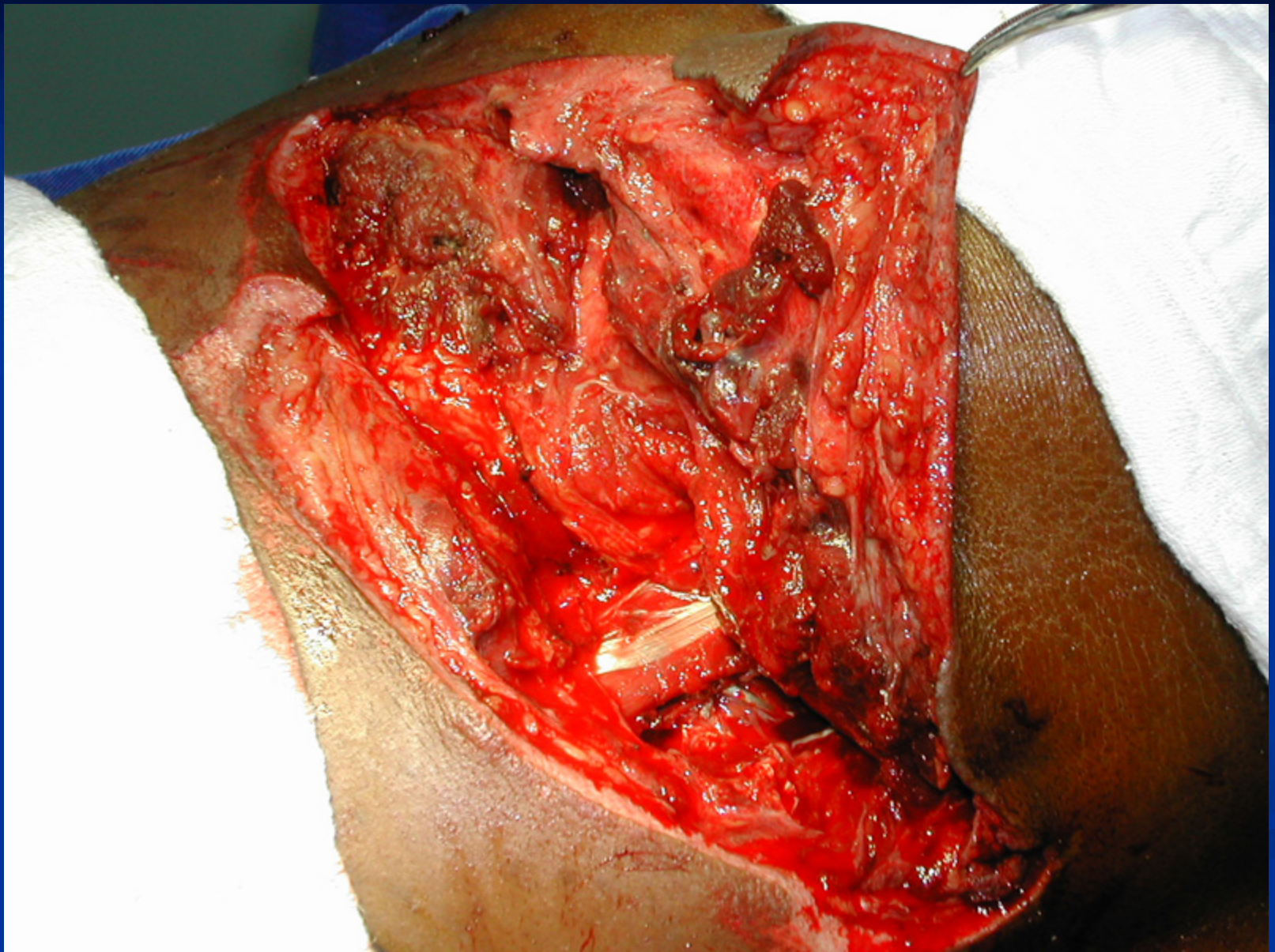


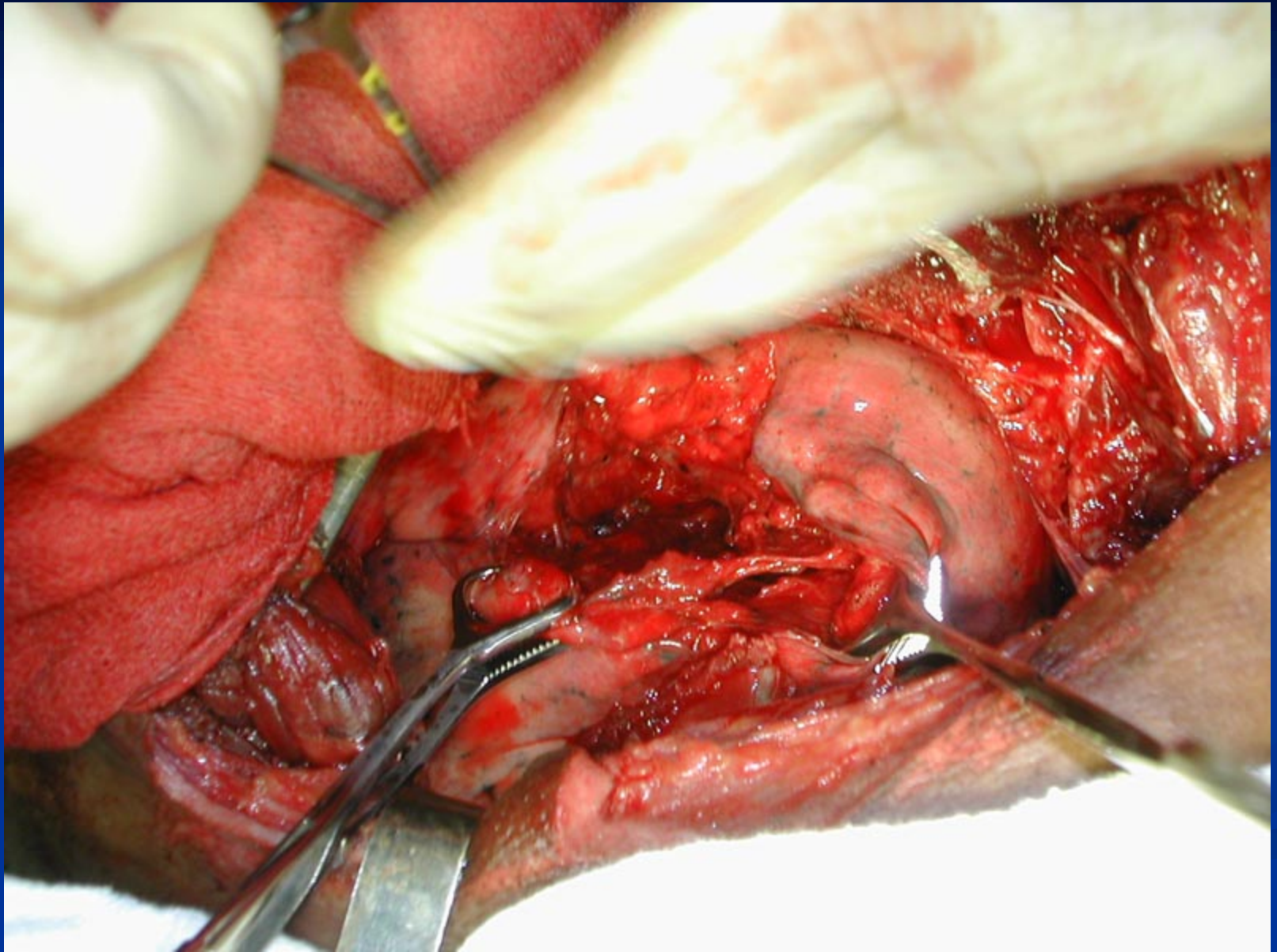
- Chest wall defect
- Collapsed lung
- Ball valve effect

Open pneumothorax

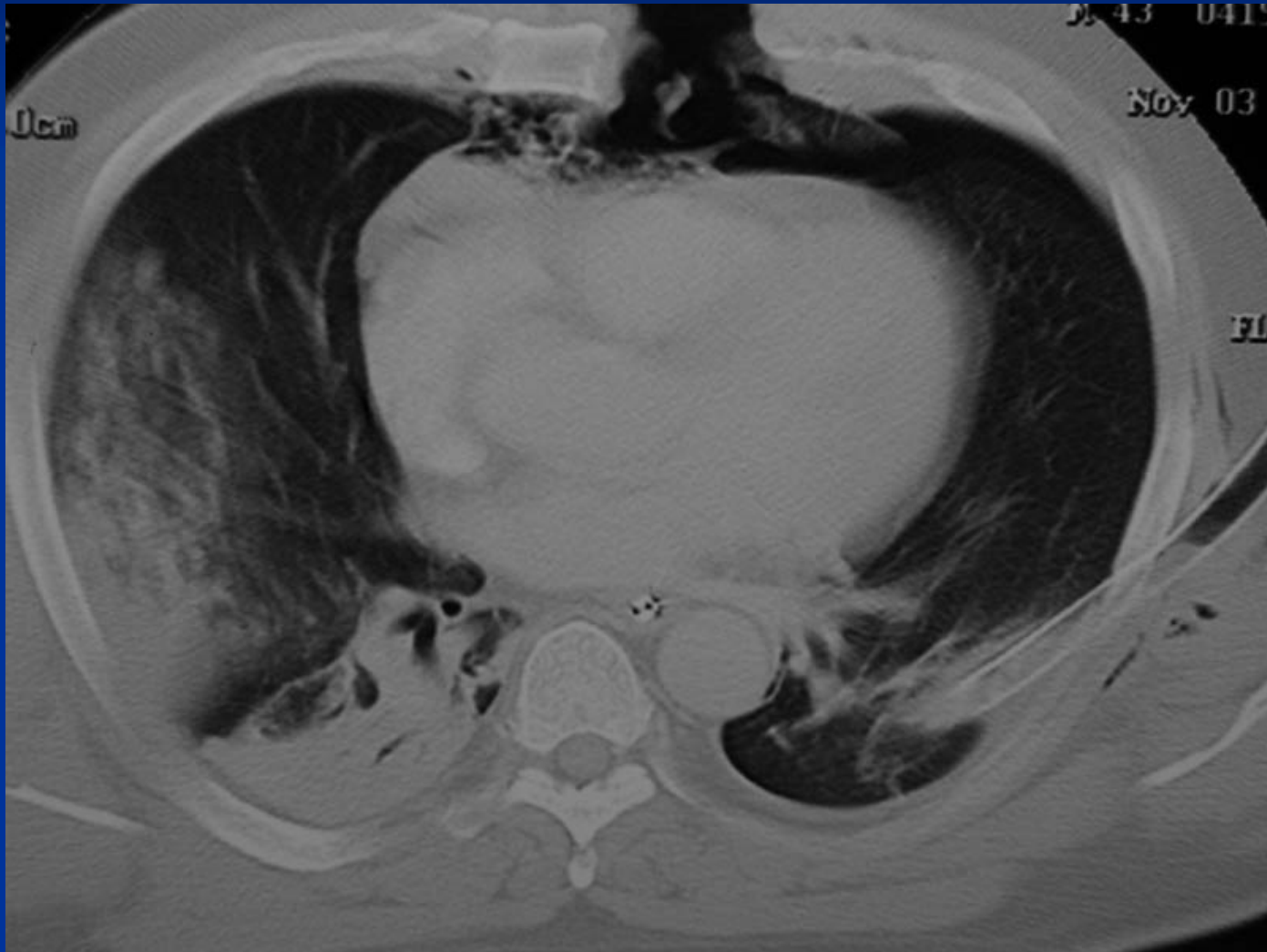








Open pneumothorax



Open pneumothorax

■ Management

- Cover open chest wounds with occlusive dressing
- Gloved hand is an effective temporary occlusive dressing
- Secure dressing on three sides
- High-flow oxygen
- Transport with unaffected side slightly elevated

■ Tension pneumothorax

- Build up of pressure in pleural space resulting in decrease in blood pressure.
- Potentially life-threatening condition that must be treated immediately.
- Can occur in blunt or penetrating chest trauma.

➤ *Signs*

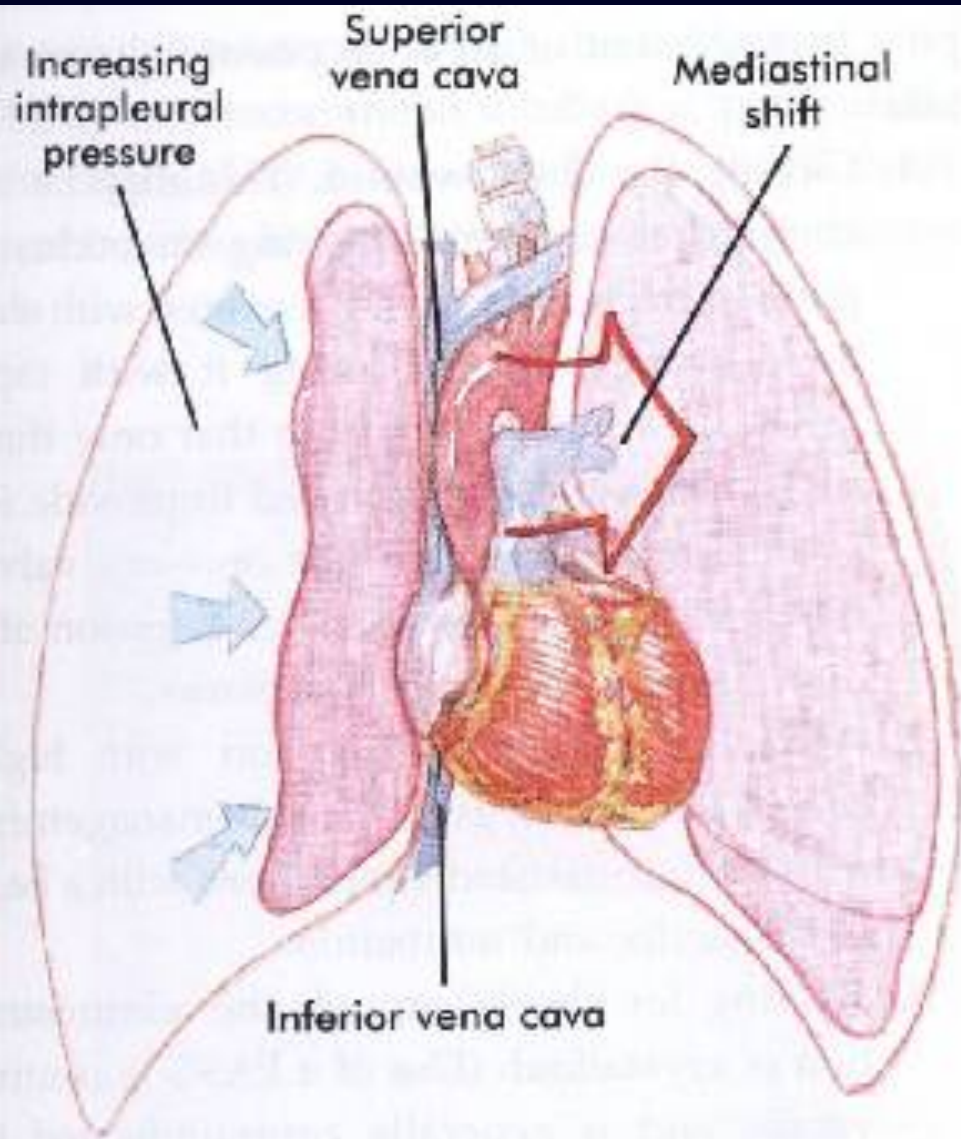
- Include all those of a pneumothorax.
- Jugular venous distension (JVD).
- If ventilating becomes more difficult, significant lung compression is indicated.

Tension Pneumothorax

- One-way valve forms in lung or chest wall
- Air enters pleural space; cannot leave
- Air is trapped in pleural space
- Pressure rises
- Pressure collapses lung

Tension Pneumothorax

- Trapped air pushes heart, lungs away from injured side
- **Both** Vena cavae become kinked
- Blood cannot return to heart
- Cardiac output falls



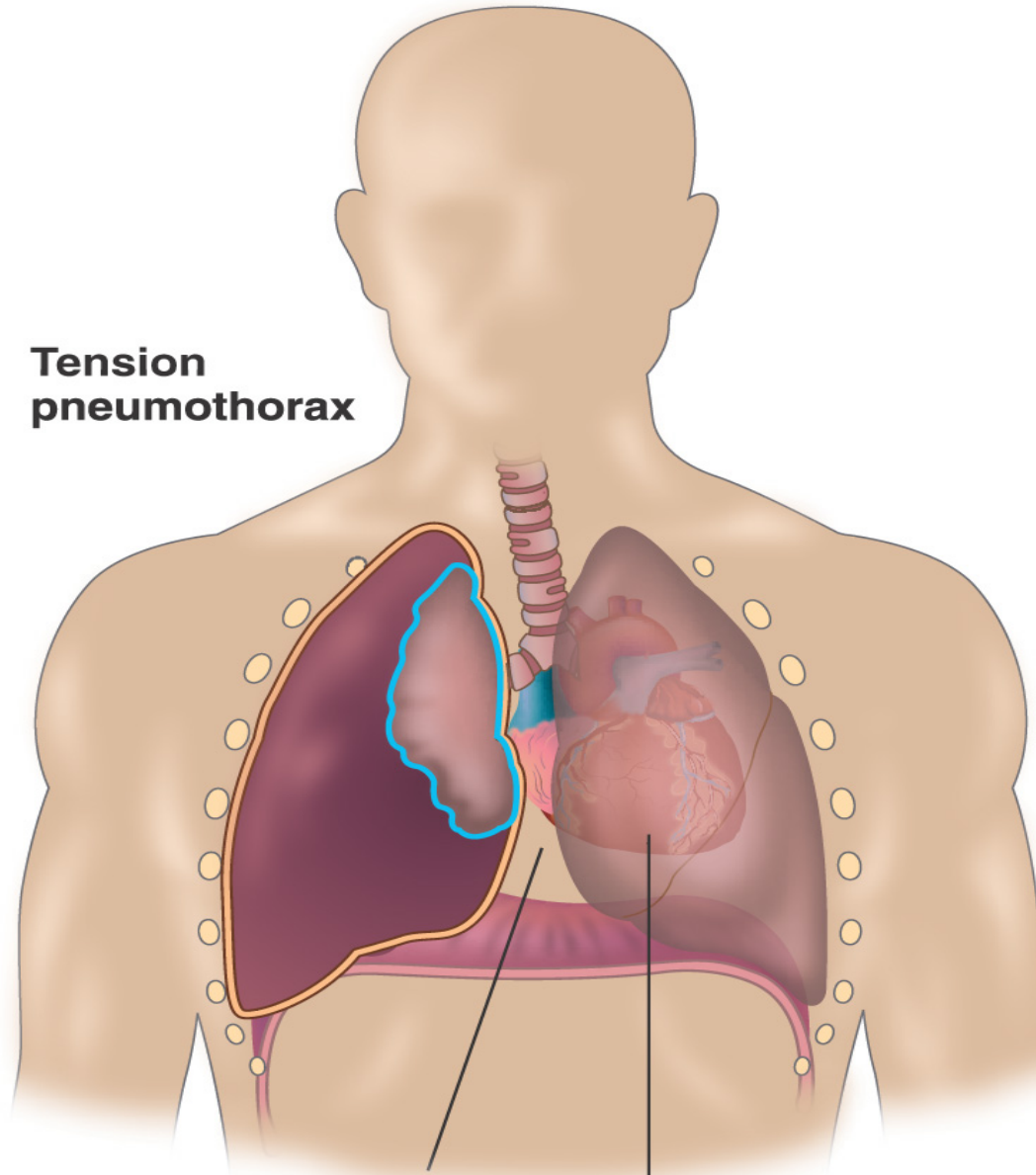
Tension pneumothorax.

Tension Pneumothorax

■ Signs and Symptoms

- Extreme dyspnea
- Restlessness, anxiety, agitation
- Decreased breath sounds
- Hyperresonance to percussion
- Cyanosis
- Subcutaneous emphysema
- Rapid, weak pulse
- Decreased BP
- Tracheal shift away from injured side
- Jugular vein distension
- Early dyspnea/hypoxia - Late shock

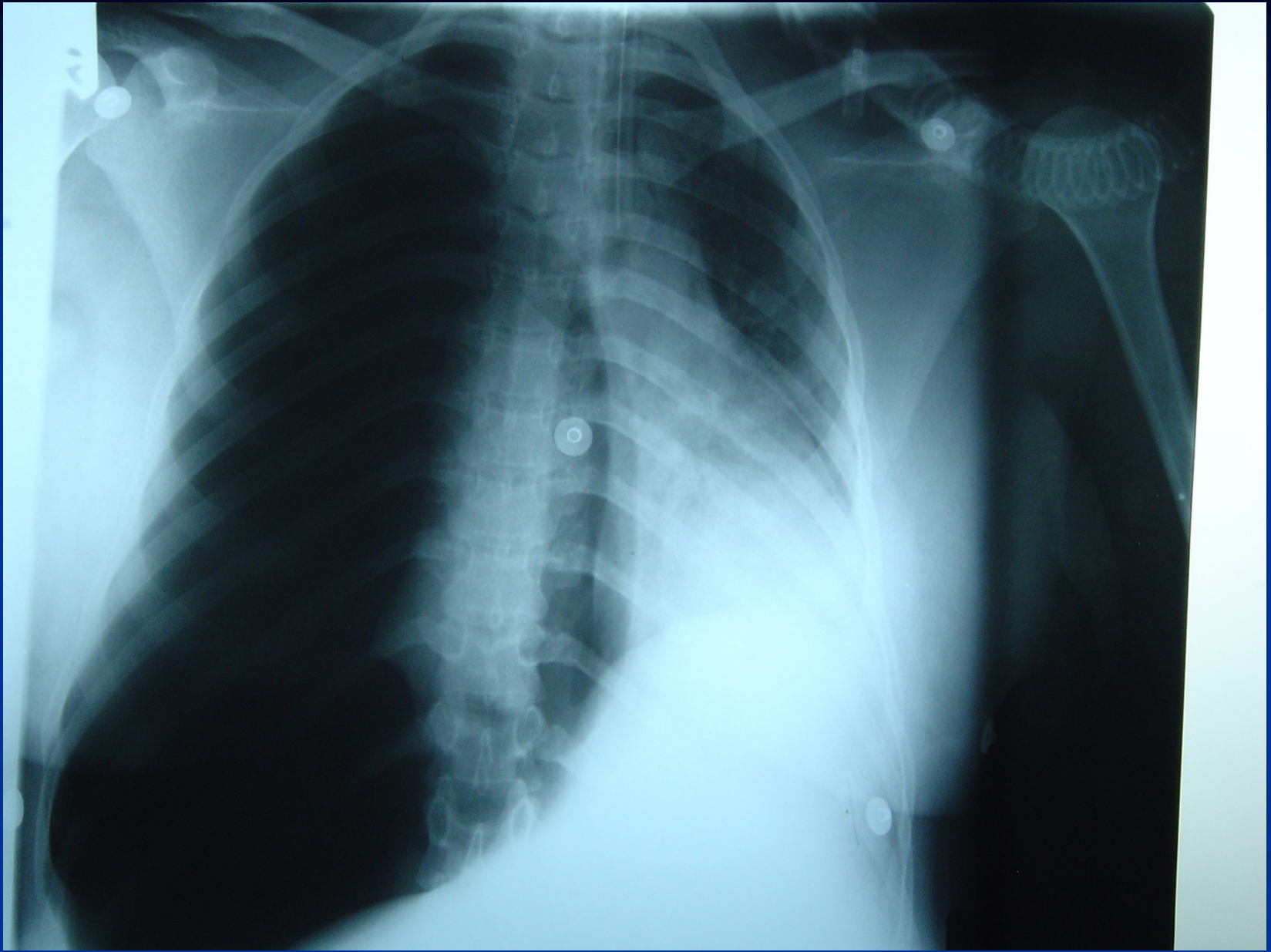
**Tension
pneumothorax**



Mediastinal
shift

Heart





Tension Pneumothorax



■ Tension Pneumothorax



Haemothorax

- Blood in pleura space
- Most common result of major chest wall trauma
- Present in 70 to 80% of penetrating, major non-penetrating chest trauma



Accumulation
of blood in
pleural space

Hemothorax.

Haemothorax

- Signs and Symptoms
 - Rapid, weak pulse
 - Cool, clammy skin
 - Restlessness, anxiety
 - Thirst
 - Chills
 - Hypotension
 - Collapsed neck veins

Haemothorax

- **Source of bleeding**
 - Intercostal vessels
 - Internal mammary vessels
 - Lung parenchyma
 - Broncheal arteries
 - Major pulmonary vessels
 - Heart and great vessels

Hemothorax

- Management
 - Secure airway
 - Assist breathing with high concentration O₂
 - Rapid transport

Hemothorax

Indications for Thoracotomy:

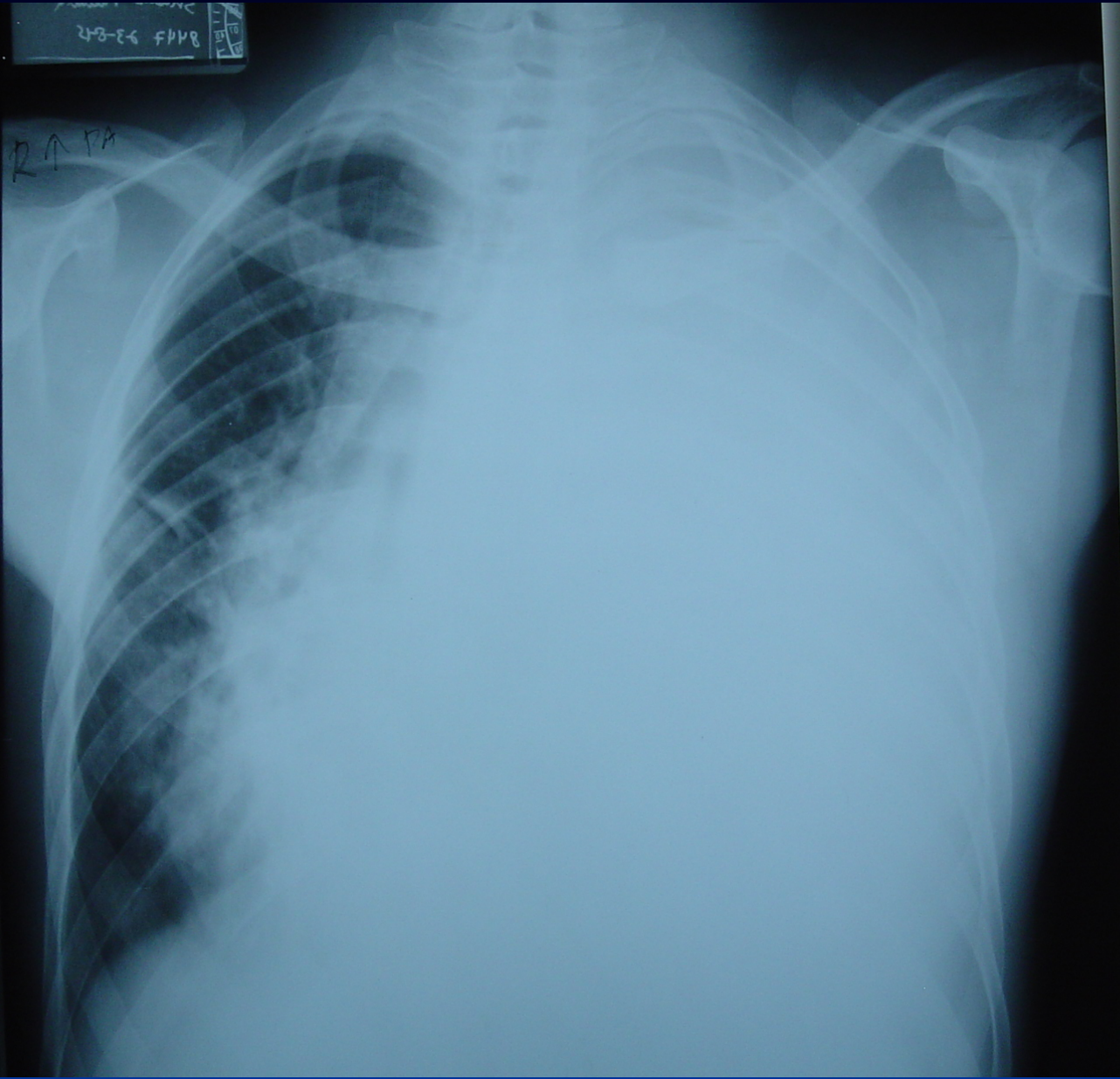
- Initial output is > 1250 ml
- Initial output is > 1000 ml with hypotension
- Output > 250 ml/h for 3 hours



2.67



10
C
M



16:39:15.00
TP -608.5
IMA 22
SPI 2



Chest tube

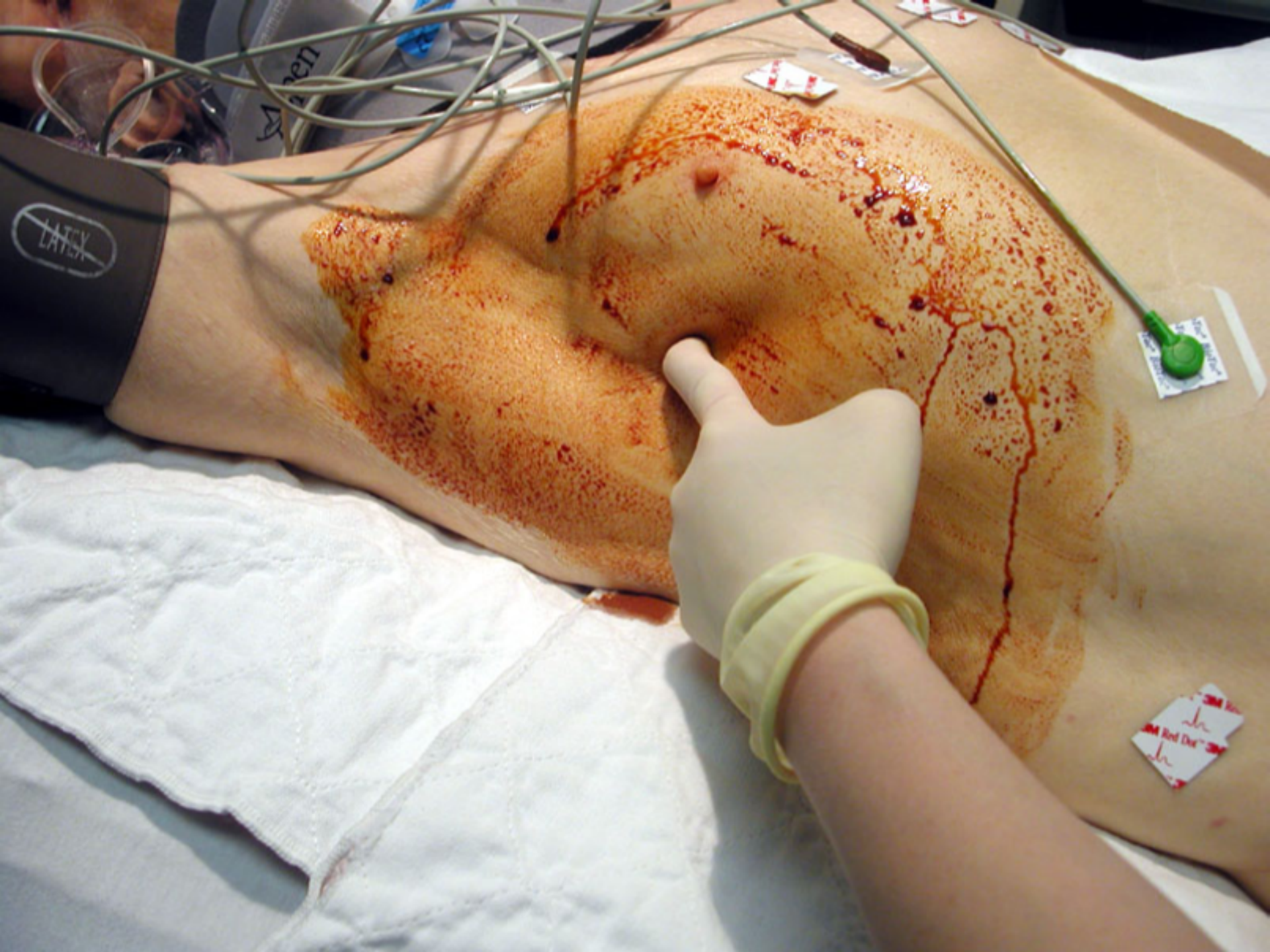
indicated to drain the contents of the pleural space. Usually this will be air or blood, but may include other fluids such as chyle or gastric/oesophageal contents.

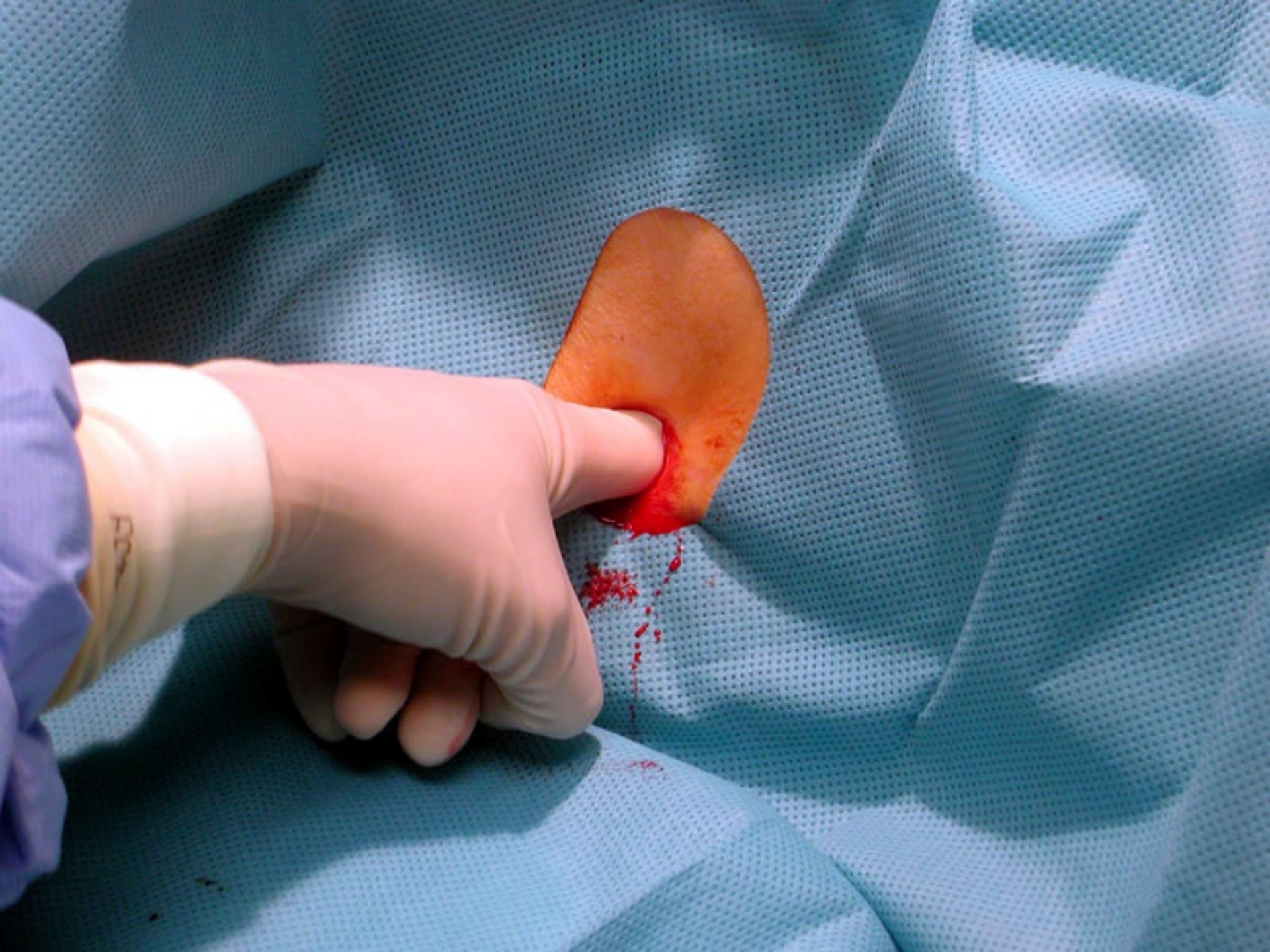
Absolute Indications

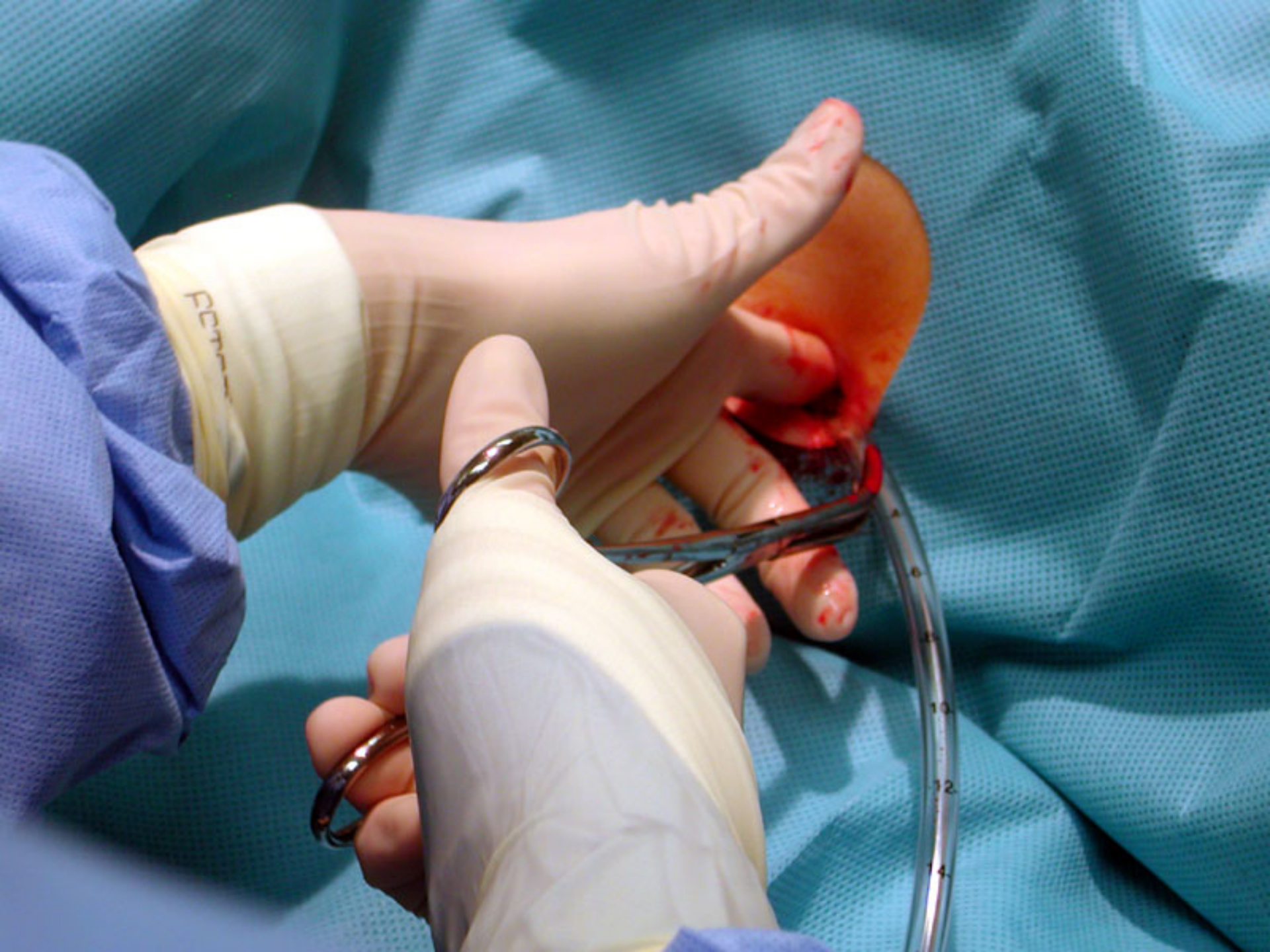
- Pneumothorax (tension, open or simple)
- Haemothorax
- Traumatic Arrest (bilateral)

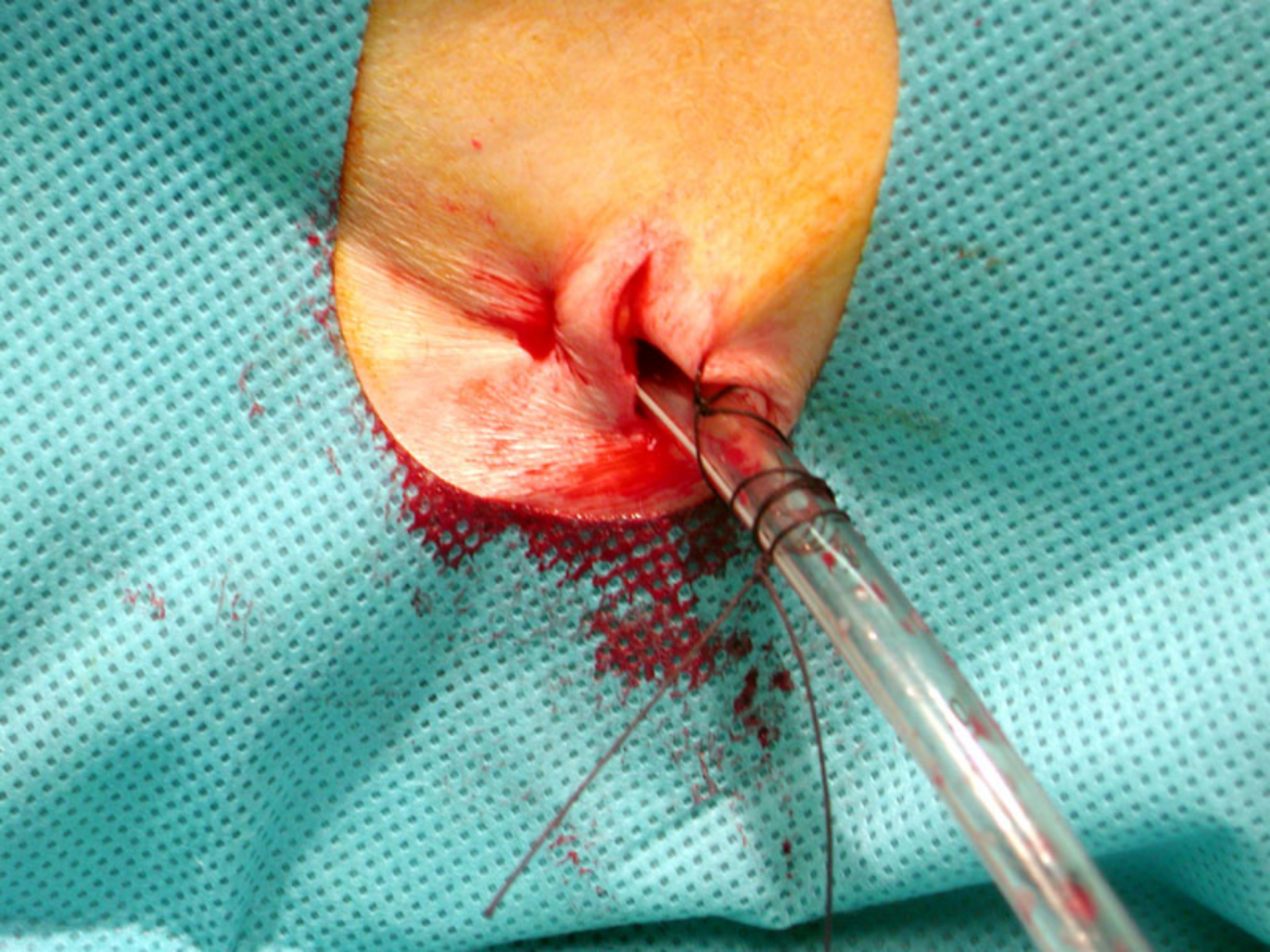
Relative Indications

- Rib fractures & Positive pressure ventilation
- Profound hypoxia / hypotension & penetrating chest injury
- Profound hypoxia / hypotension and unilateral signs of hemithorax





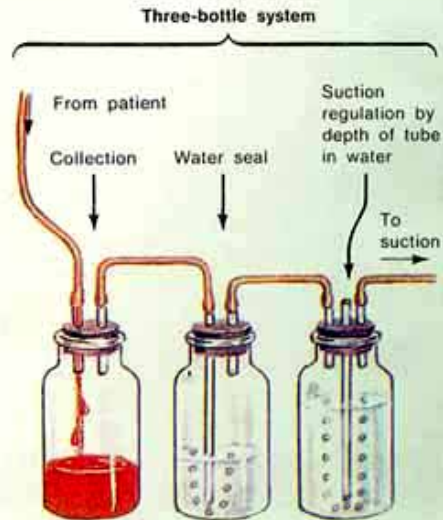
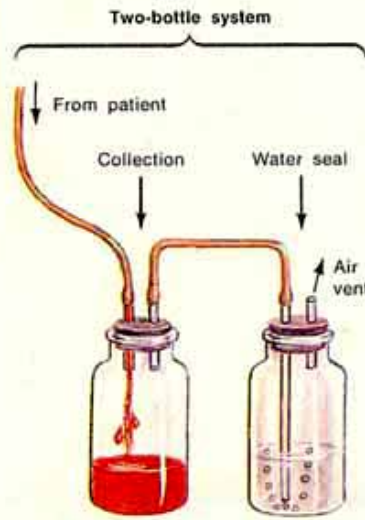
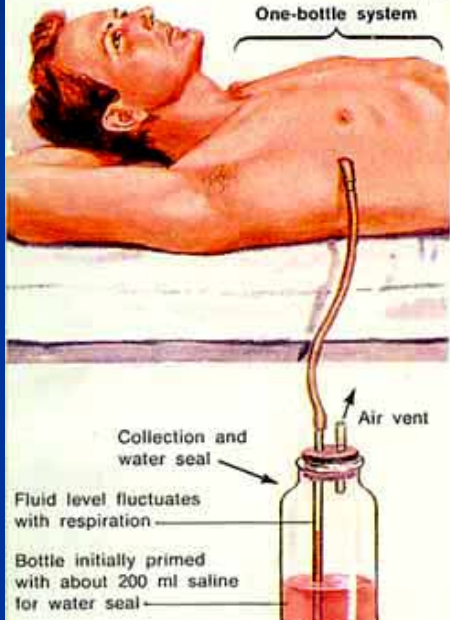








Underwater-Seal Drainage of Chest

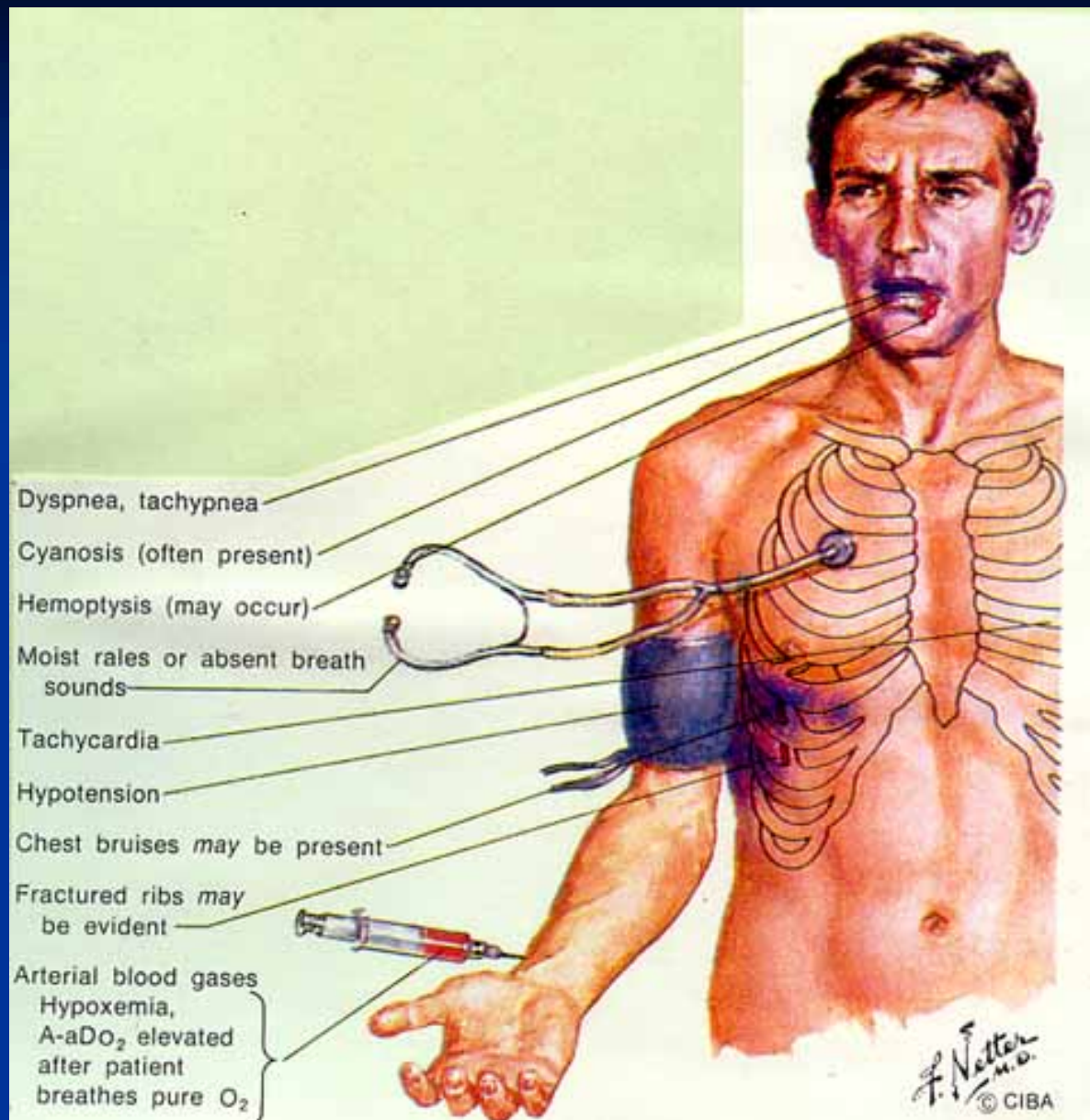


■ Pulmonary contusion

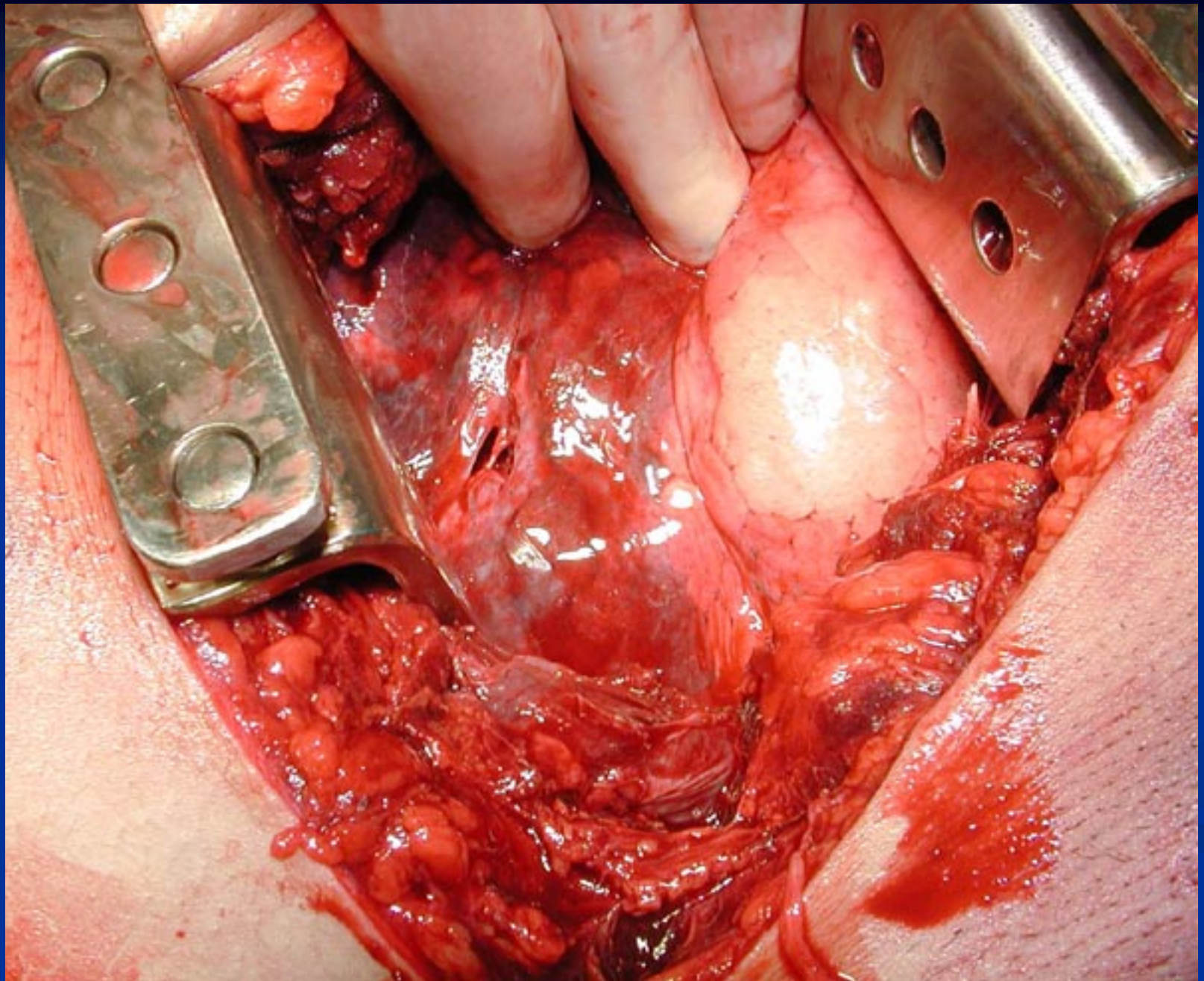
- Bleeding into the lung itself is a pulmonary contusion
- Bleeding and edema can impair gas exchange, causing hypoxia and respiratory failure.
- Soft crackles may be heard over injury site
- Chest pain, point tenderness, and localized swelling over area of impact

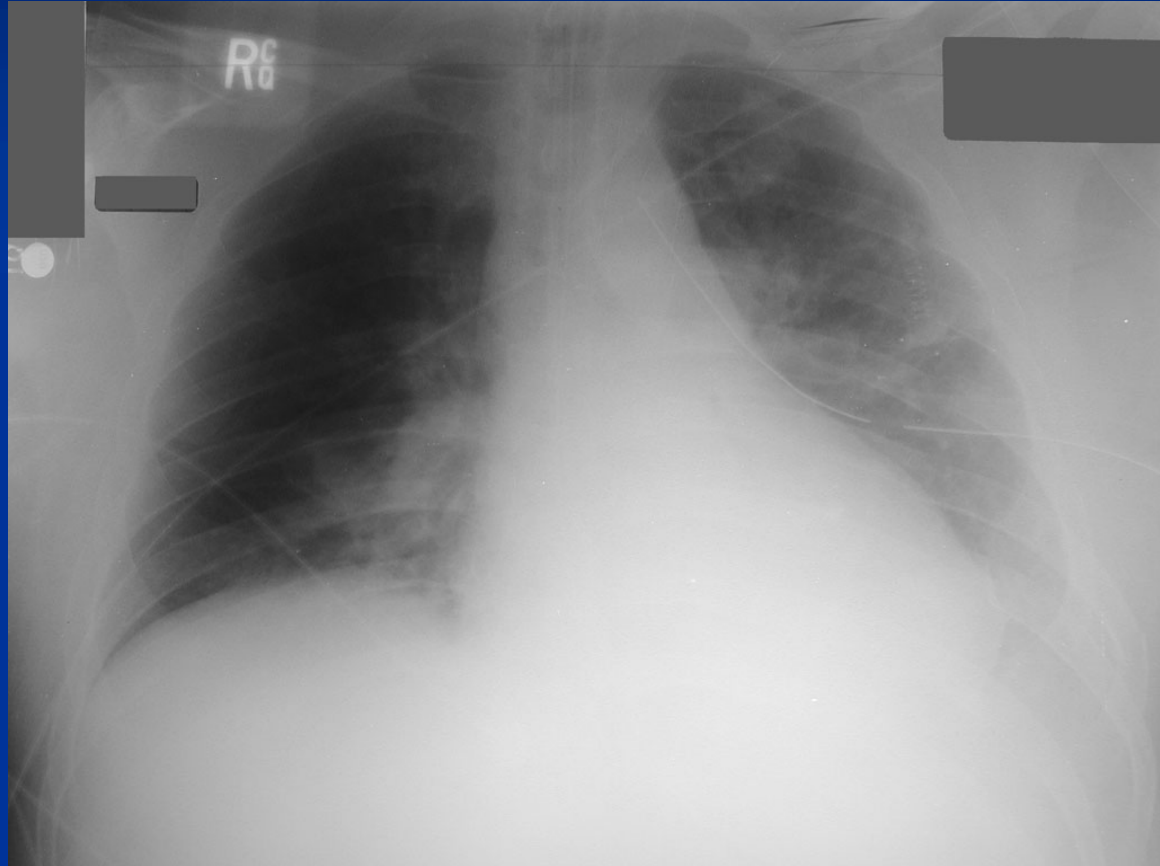
➤ *Management*

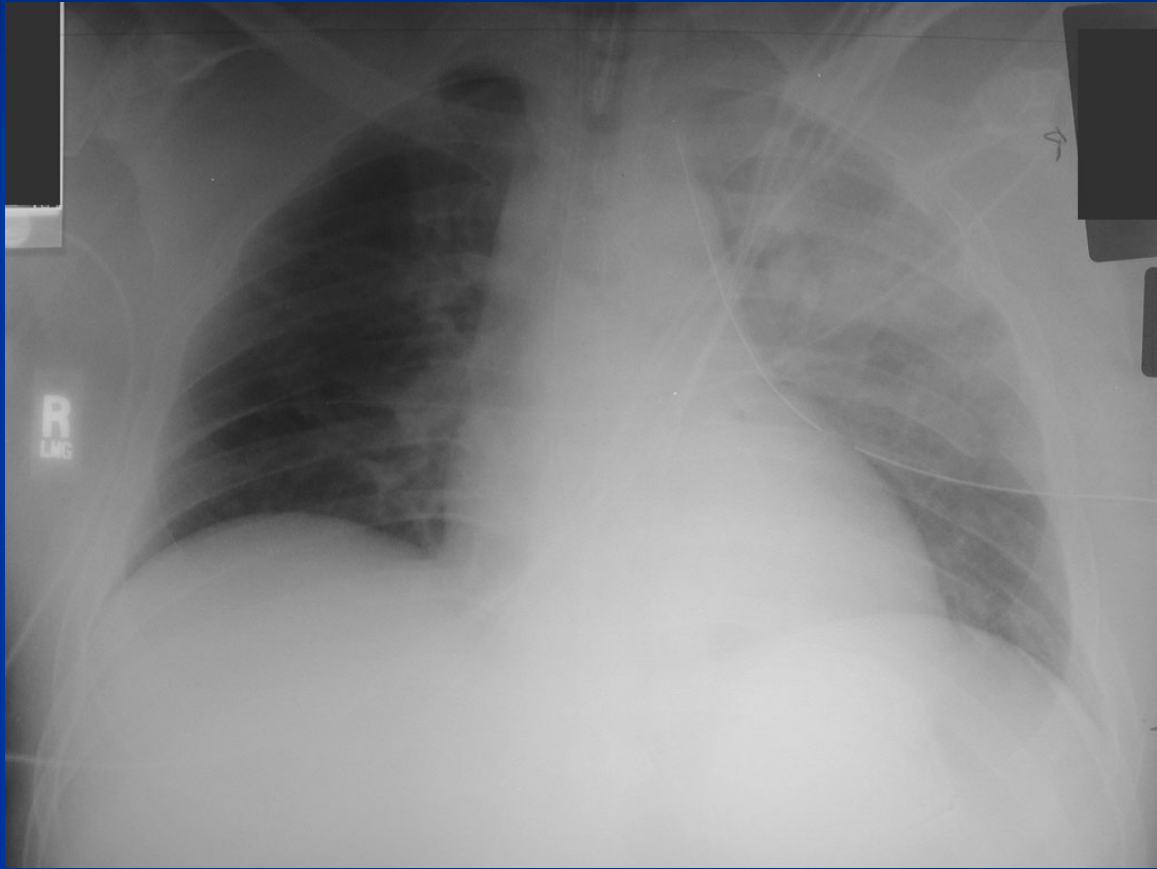
- Support ventilation as needed
- Supply high-flow supplemental oxygen
- Transport to hospital--- ventilation











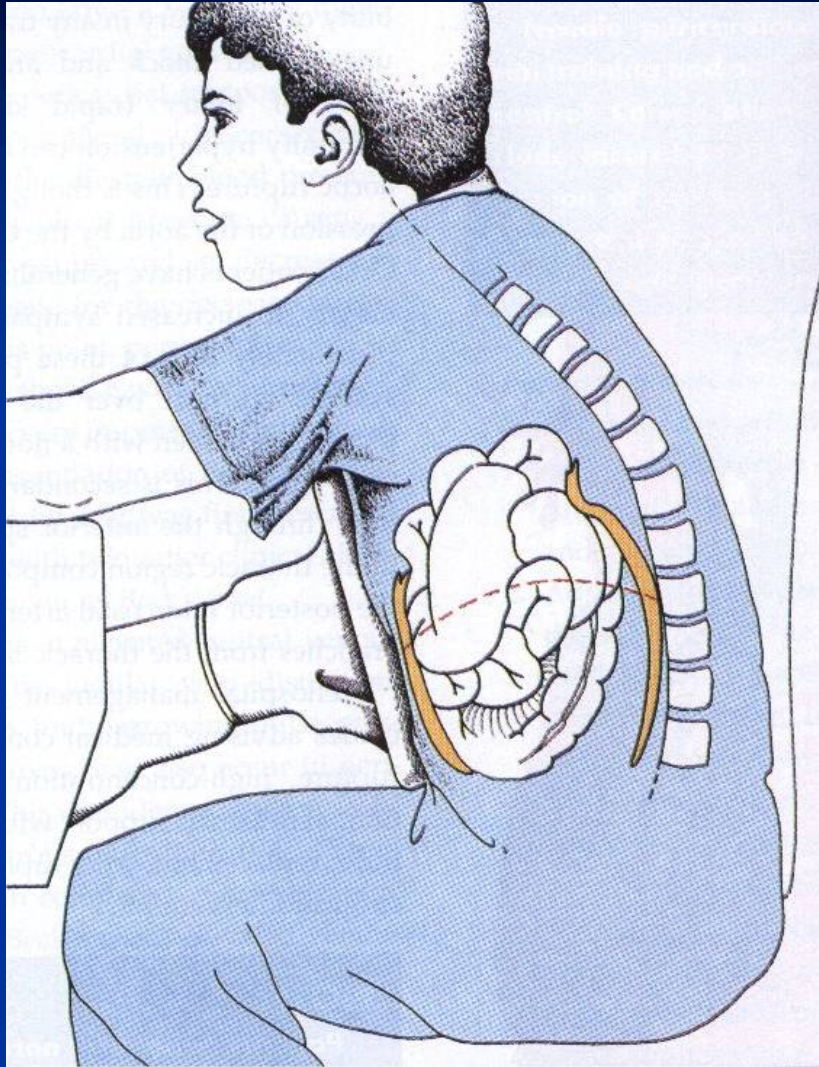


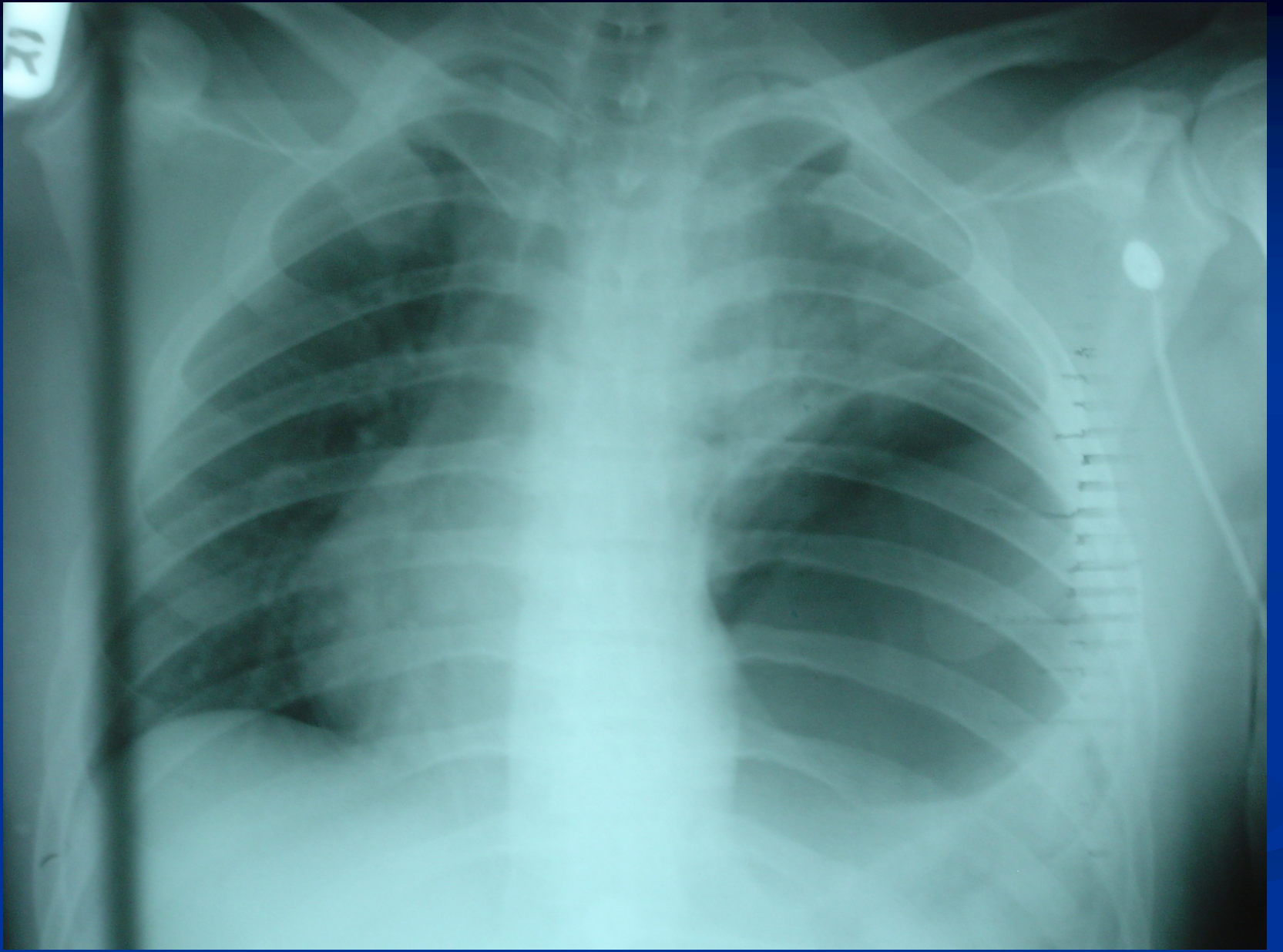


■ Diaphragmatic injury

➤ *Types*

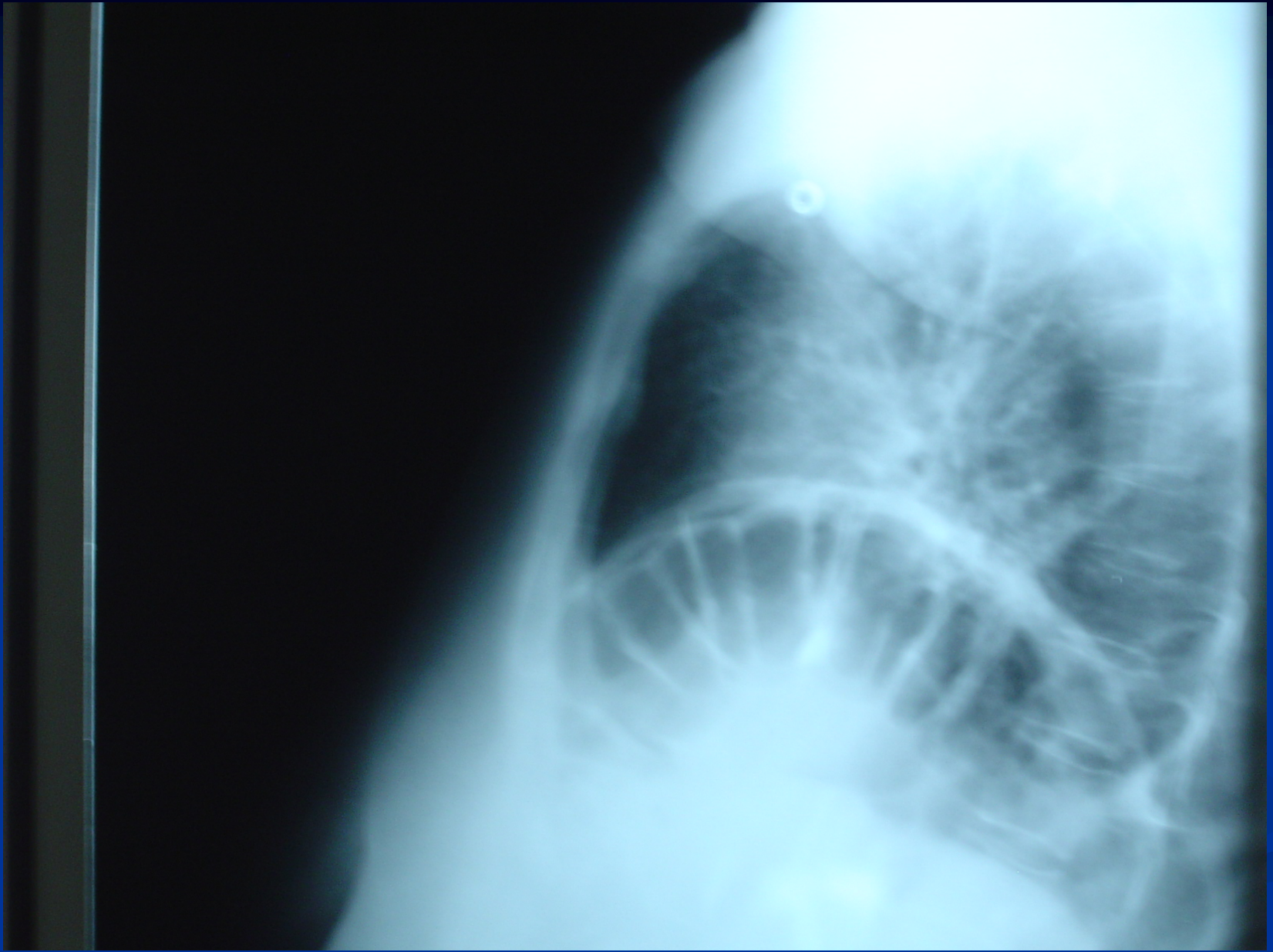
- 1) Acute blunt injury
- 2) Acute penetrating injury
- 3) Chronic diaphragmatic hernia

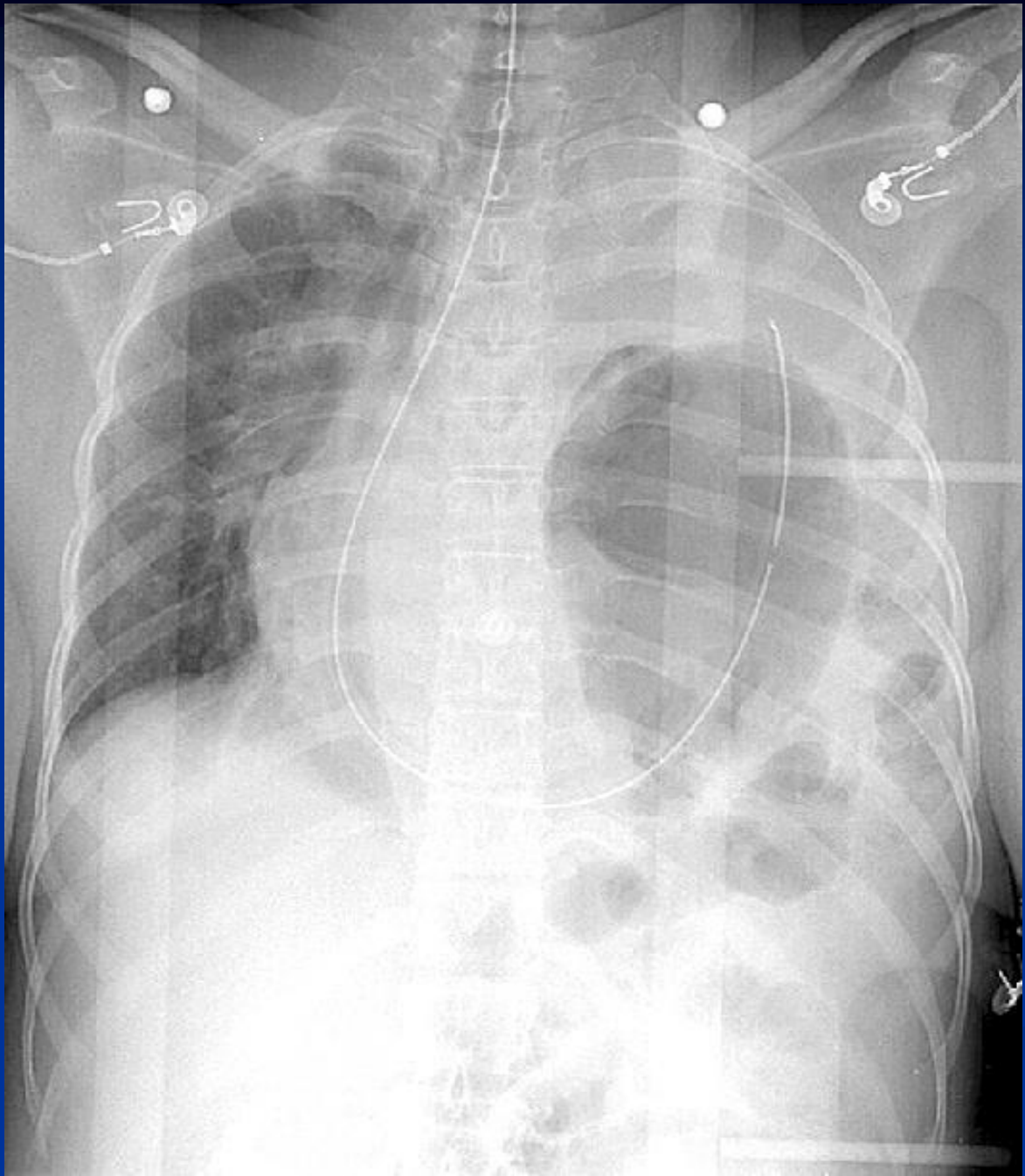














SPI 2

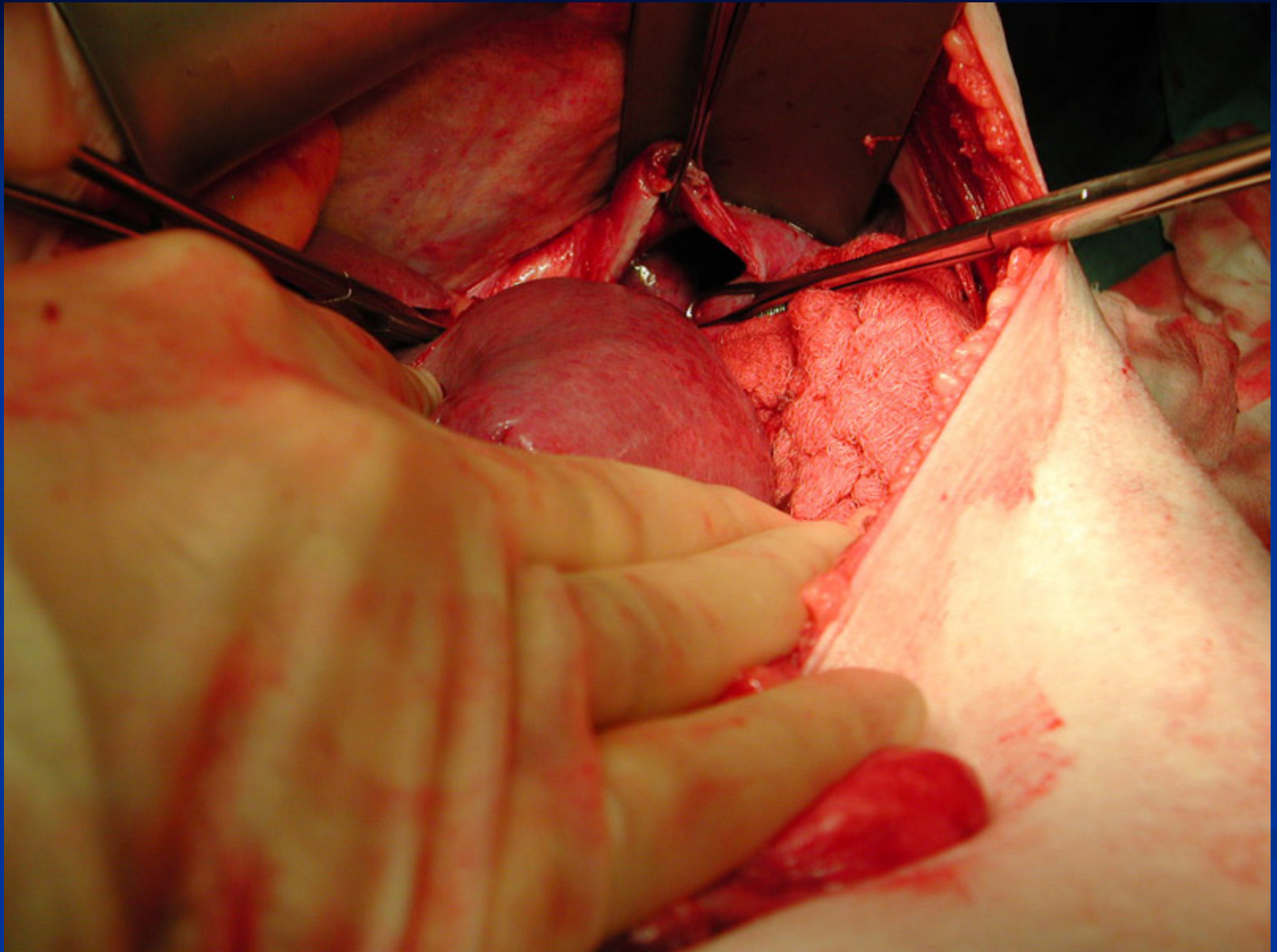


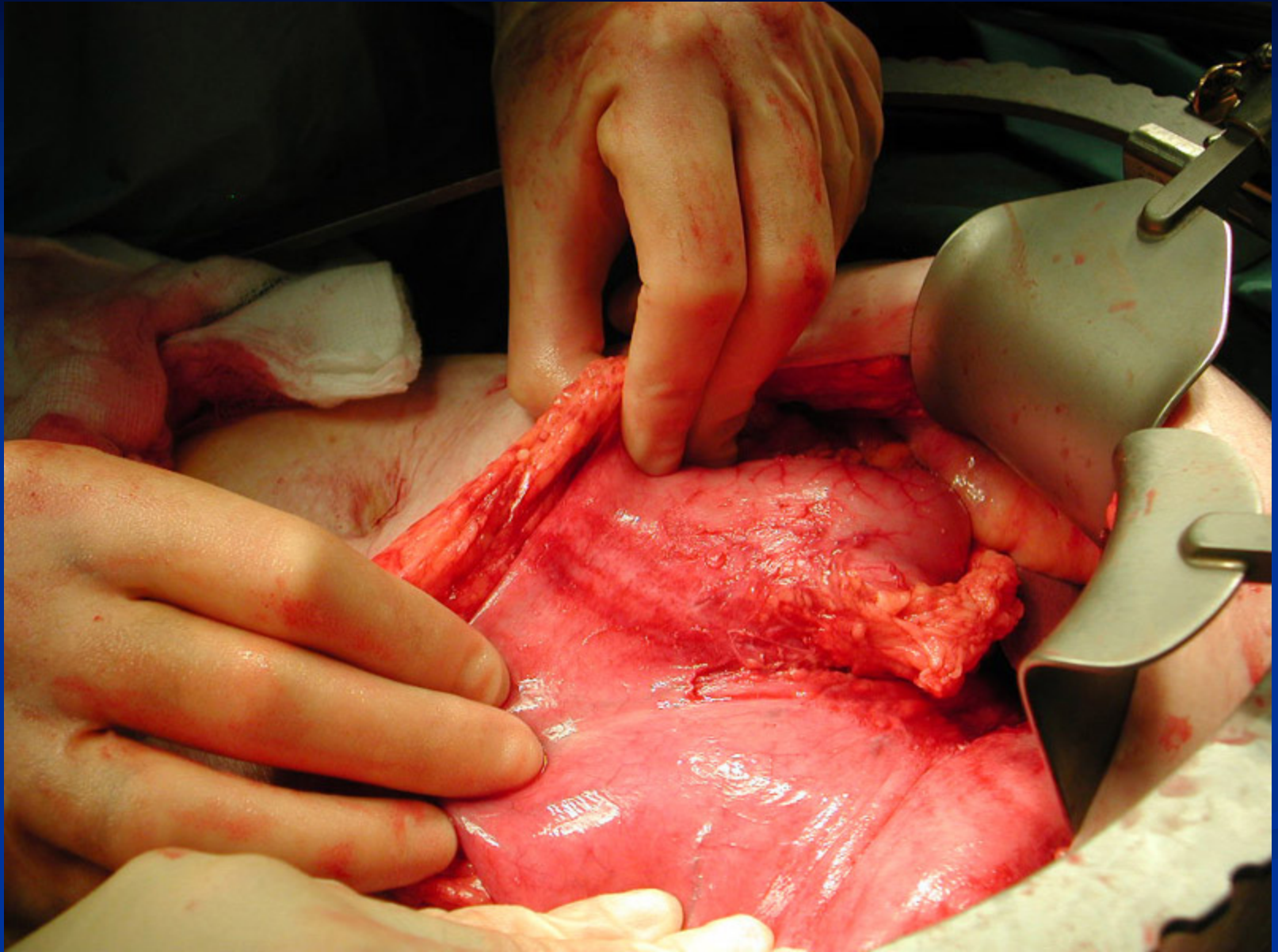
R

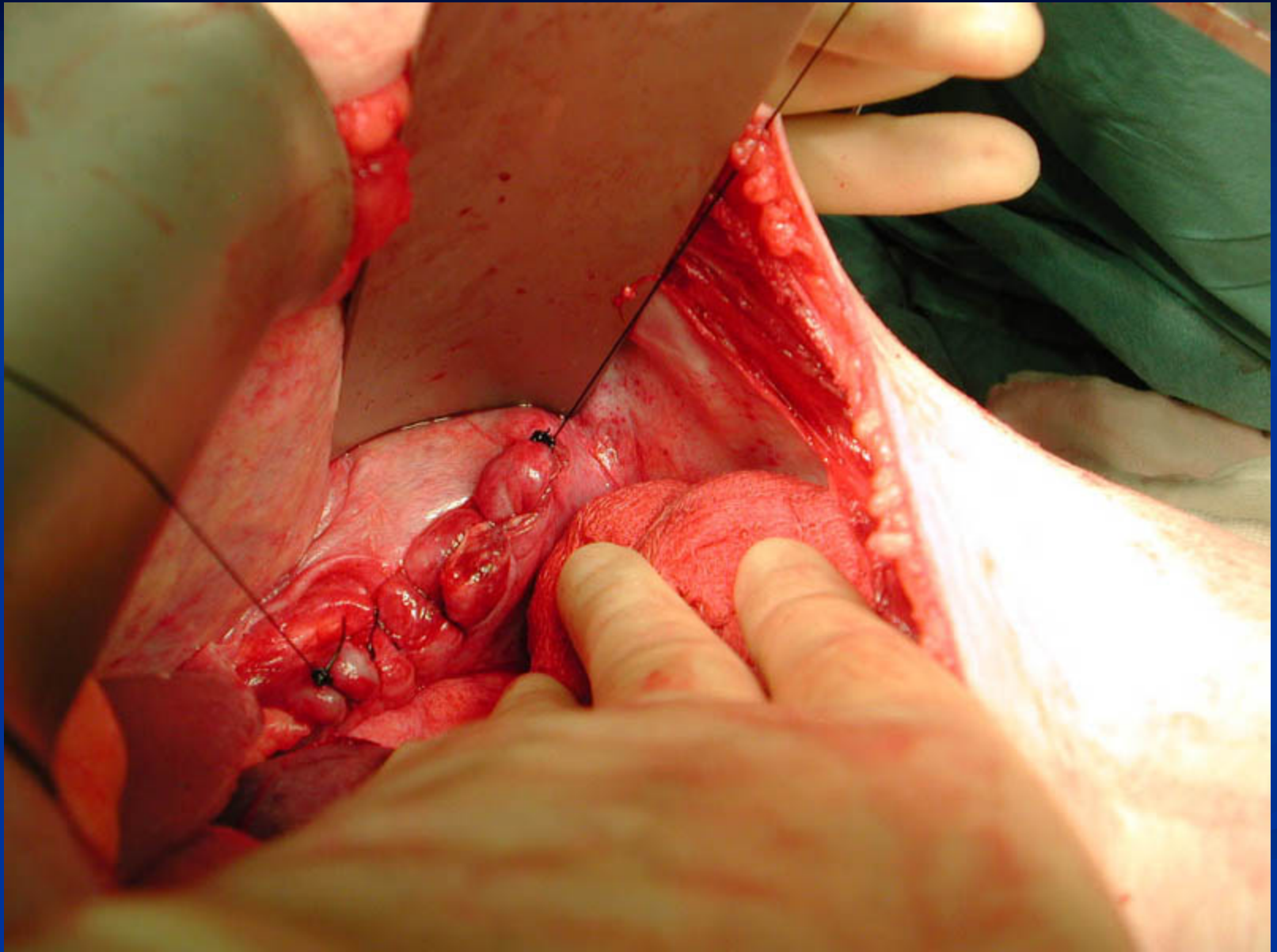
+C

kV 140
mA 111
TI 0.75
ST 0.0
SL 8.3/12.0
345 -11/-35
7882UL0
0011960 70 mls Niopan

W 2000
C -700







■ Cardiac contusion

- Can impair heart's ability to pump
- Bleeding into heart tissue can cause heart to beat irregularly
- Irregular pulse should alert to possibility of a cardiac contusion

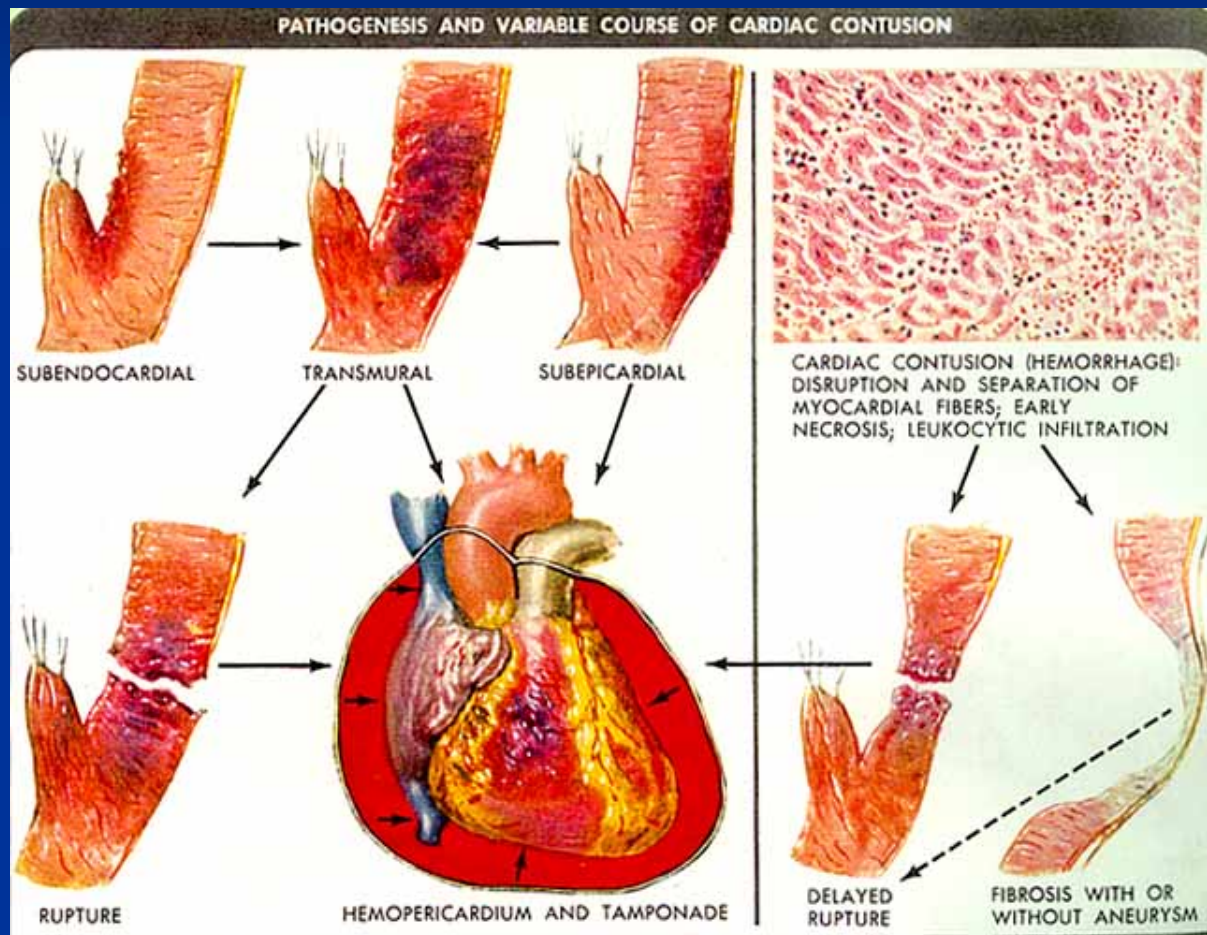
➤ *Diagnosis*

- Fracture sternum
- ECG----- ST& T abnormality + Dysrhythmias
- CPK-MB

➤ *Management*

- High-flow oxygen
- Ventilation support as needed
- Support of circulation if appropriate
- Prompt transport
- Request ALS backup

Cardiac contusion



■ Pericardial tamponade

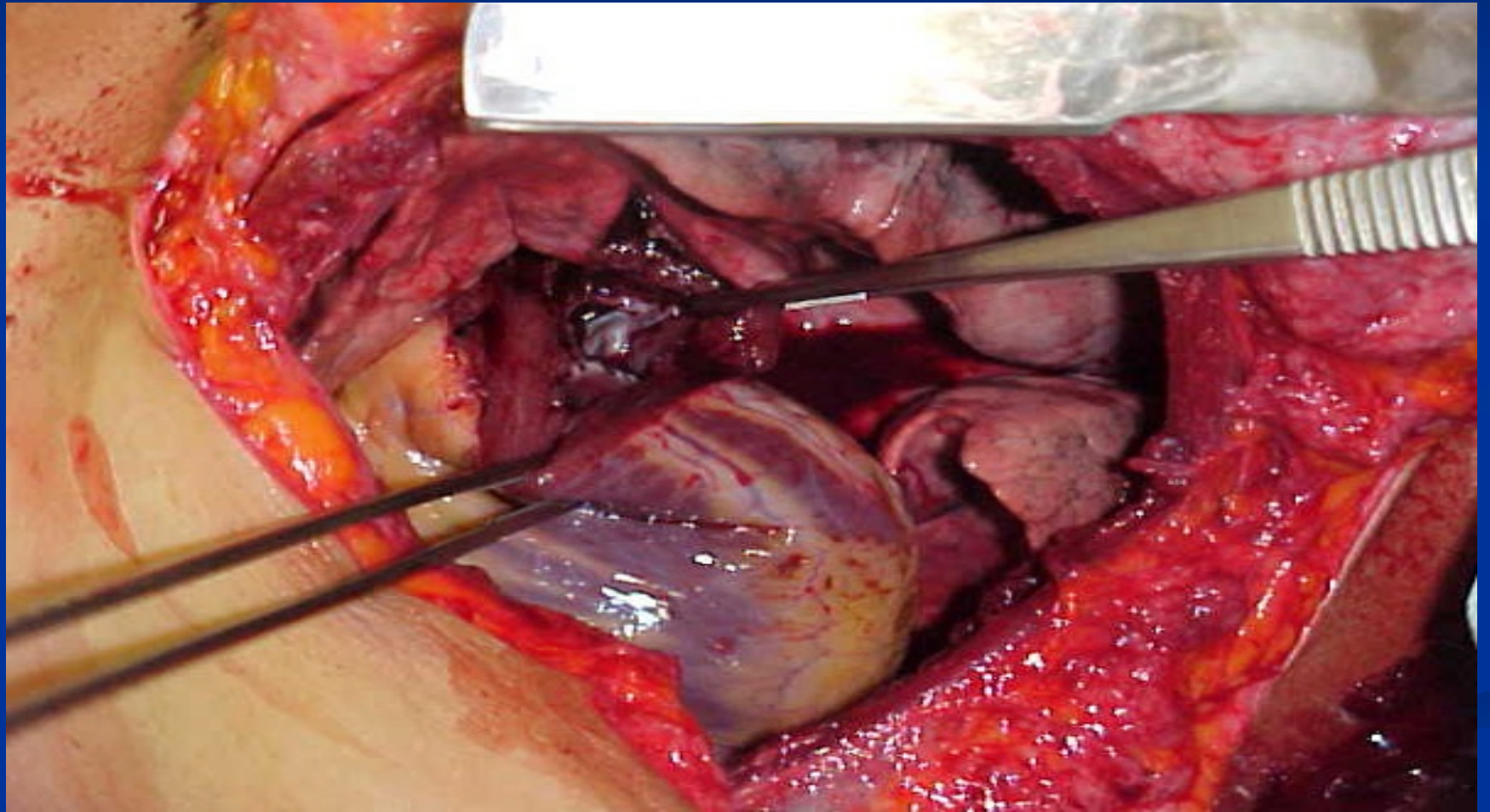
- Bleeding around heart and into pericardial sac that encloses the heart can cause pericardial tamponade
- Usually results from a penetrating chest trauma with laceration to the heart itself
- Blood filling the pericardial sac compresses heart, causing blood to back up
- JVD is a telltale sign of pericardial tamponade
- Narrowed pulse pressures

Pericardial tamponade

■ Management

- High-flow oxygen
- Treat patient for shock
- Transport rapidly to ER
- Request ALS intercept
- Notify hospital so staff can properly prepare





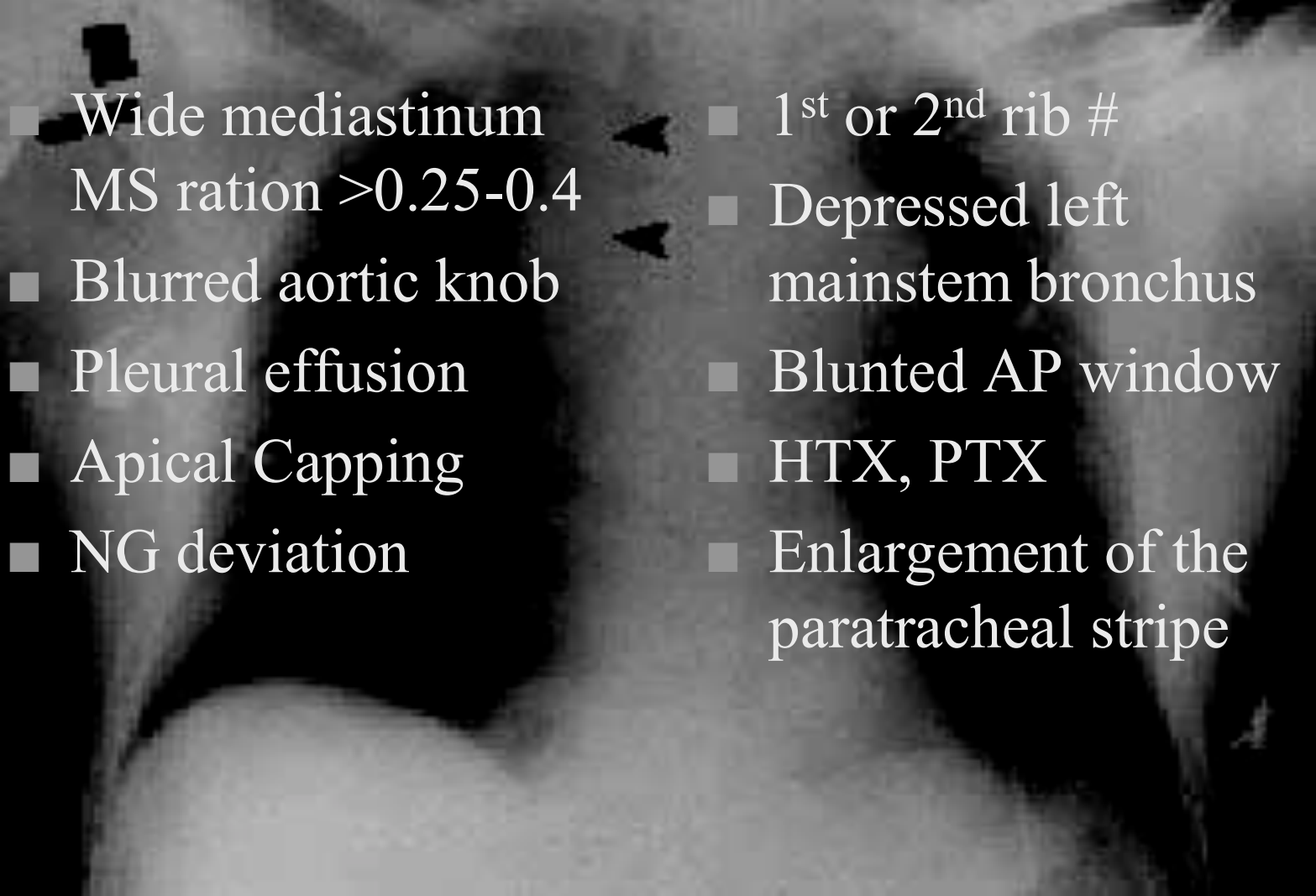
■ Aortic injury

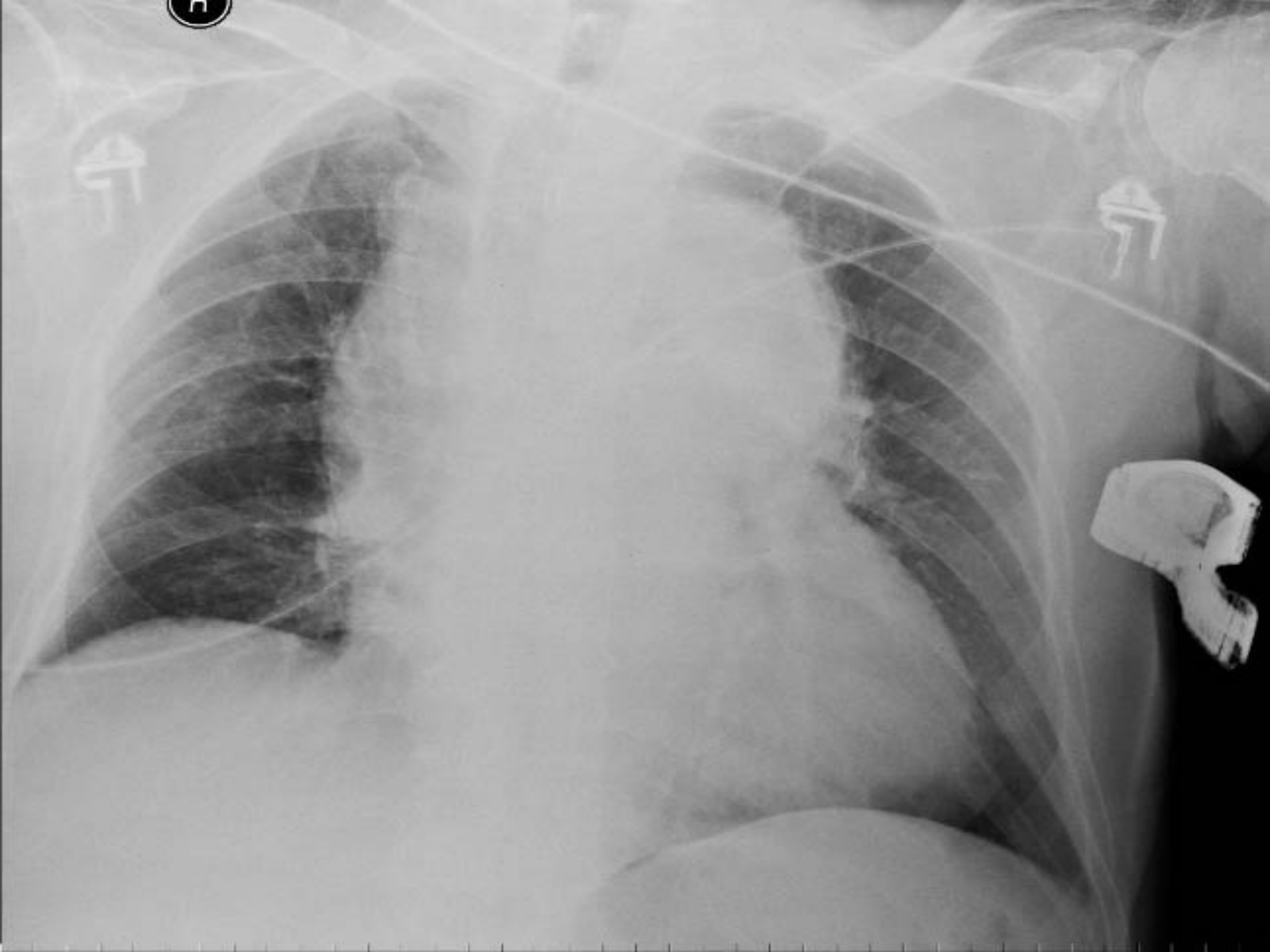
- In sudden decelerations such as high-speed head-on MVCs, body organs are thrown forcefully against the front of the body
- Most significant tear: aorta
- If tear is complete, patient will die in minute

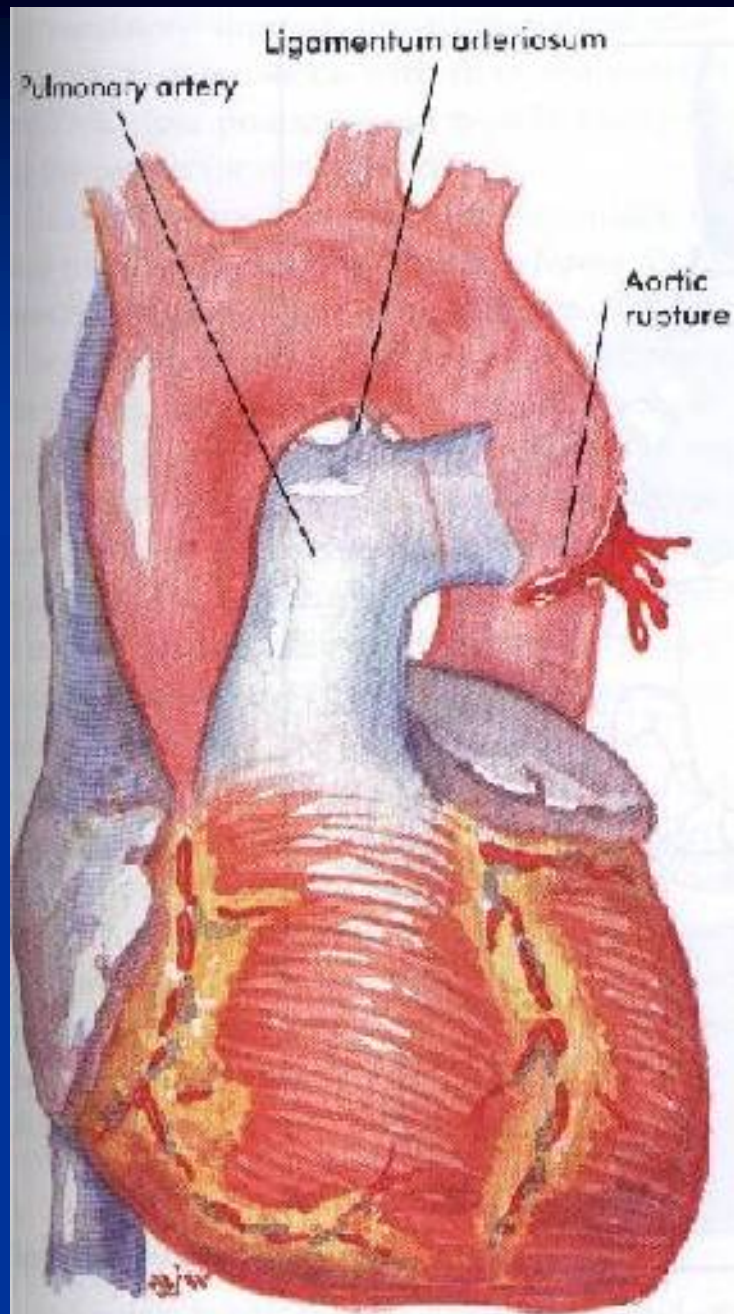
➤ *Management*

- High-flow oxygen
- Treat patient for shock
- Transport rapidly to ED
- Notify hospital so staff can properly prepare

BAL: investigations - CXR

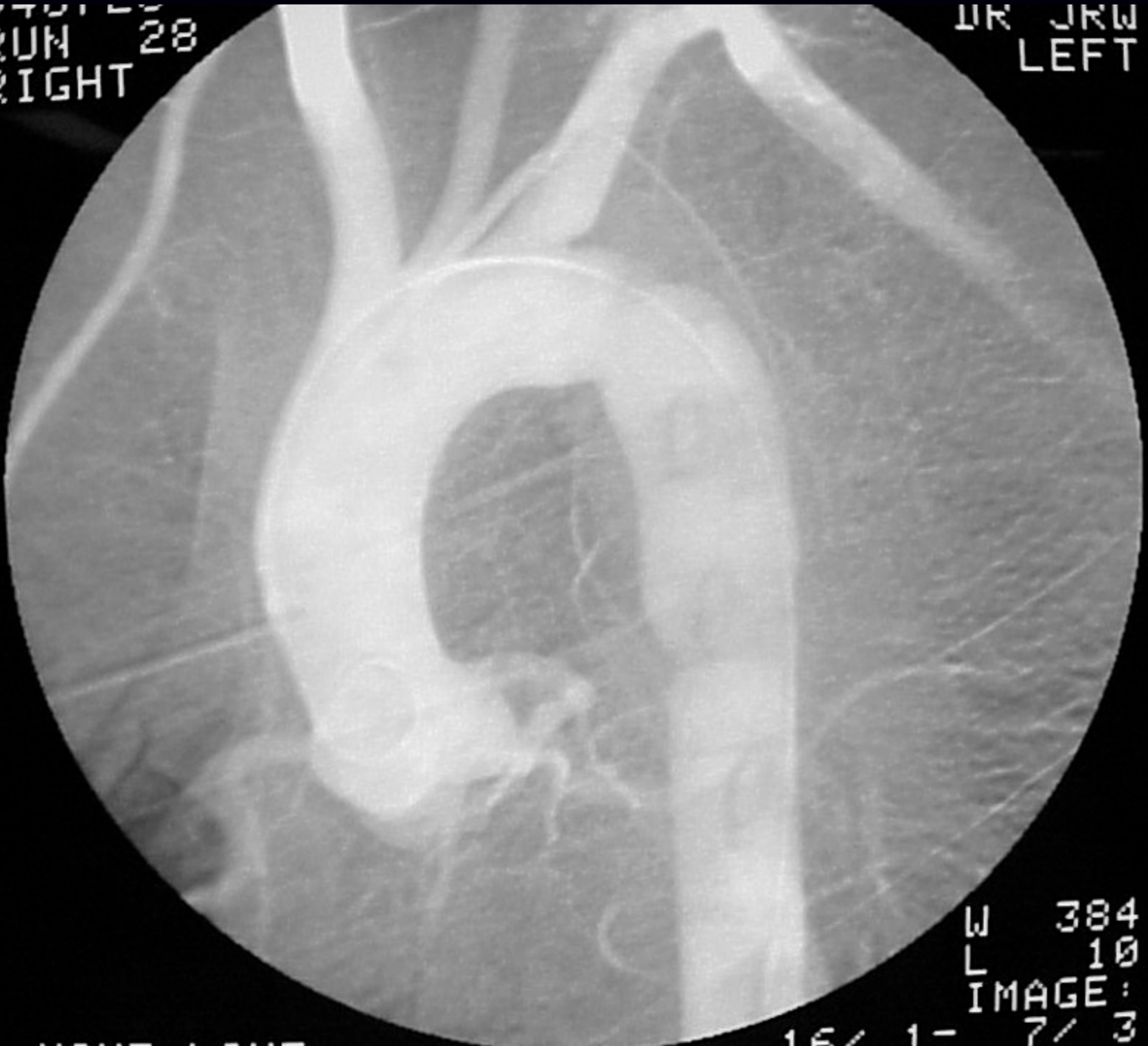
- 
- Wide mediastinum
MS ratio $>0.25-0.4$
 - Blurred aortic knob
 - Pleural effusion
 - Apical Capping
 - NG deviation
 - 1st or 2nd rib #
 - Depressed left mainstem bronchus
 - Blunted AP window
 - HTX, PTX
 - Enlargement of the paratracheal stripe





2701 28
RUN 28
RIGHT

UR URW
LEFT

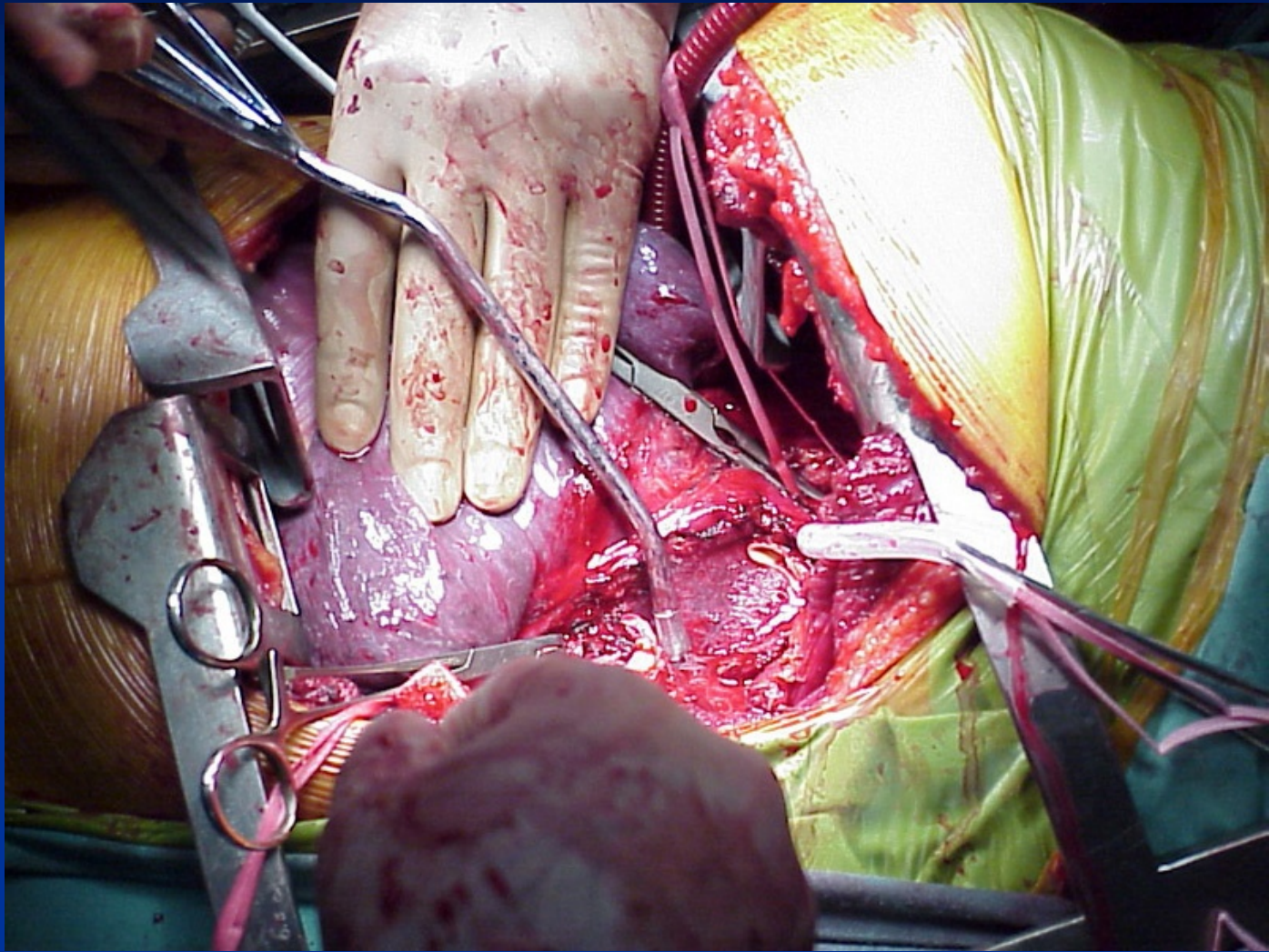


W 384
L 10
IMAGE:

16/ 1- 7/ 3

MOIE 1 THE

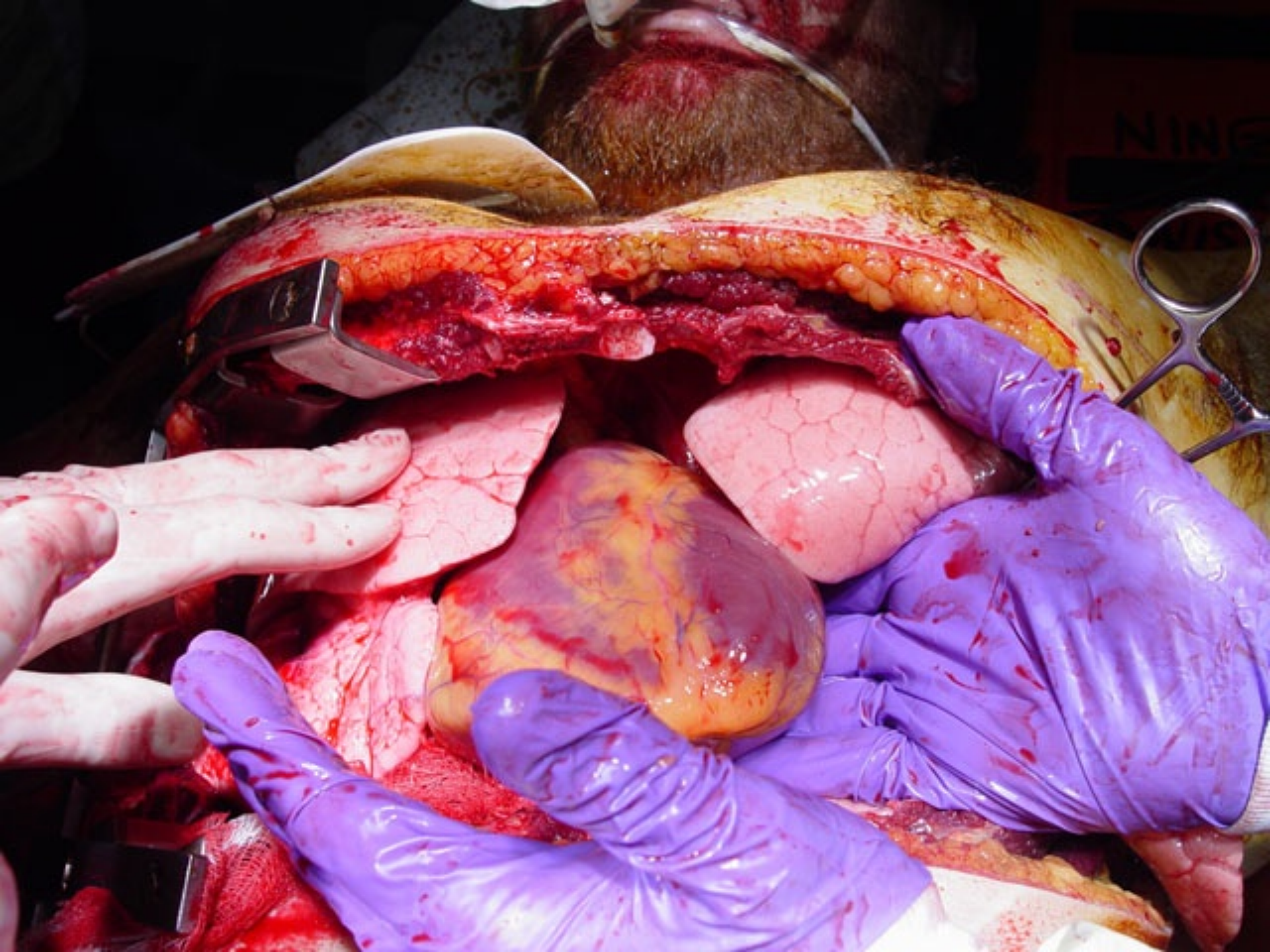




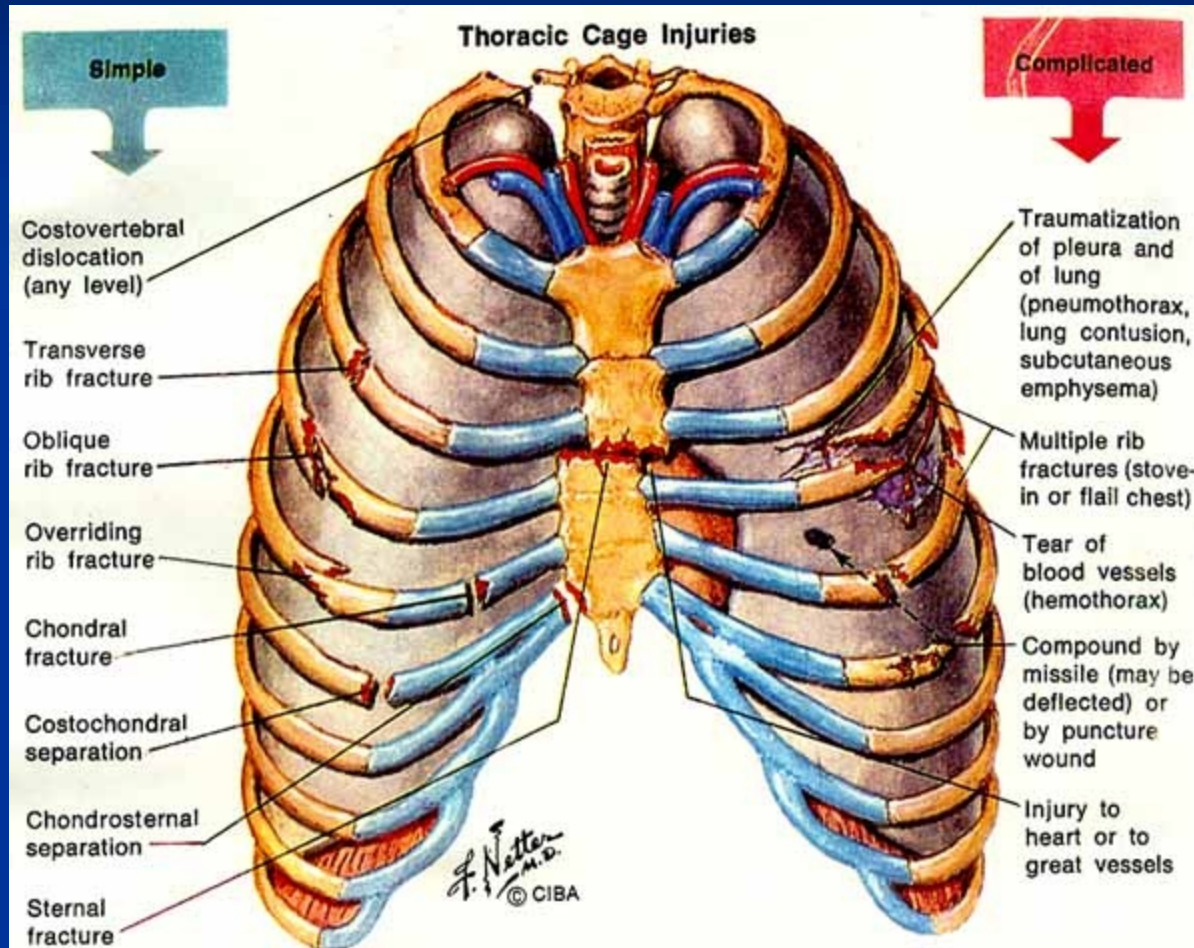


SIKON
Surgical Instruments





Conclusion



Conclusion

