



# Chest trauma

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# Thoracic injury

Thoracic injury account for **25%** of all injuries. Chest injuries are often life threatening, either by itself or in conjunction with other system injuries.

About **80%** of patients with chest injury can be managed non operatively, and the key is early physiological resuscitation followed by diagnosis.

# Investigation

Good clinical examination, and chest radiography are the investigations of choice, provided that it does not interfere with the patient resuscitation.

Ultrasound can be used to differentiate between contusion and the actual presence of blood.

A chest tube can be diagnostic procedure as well as therapeutic one, and the benefit of insertion outweigh the risks.

# Investigation

CT scan, especially using the newer multislice scanning technology, has become the principal and most reliable examination for major injury in thoracic trauma.

# Management

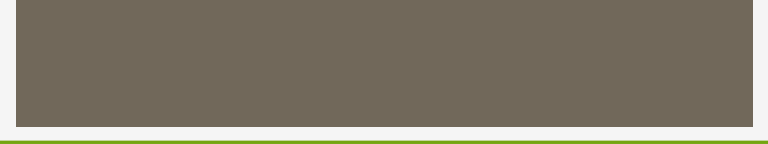
Most patient who suffered penetrating injury to the chest can be managed with appropriate **resuscitation** and **drainage of haematoma**.

If sucking chest wound is present, this should not be fully closed but should be covered by piece of plastic, closed on **three sides**, to form one-way valve, and then under water drain should be placed.

# Management

In blunt chest injury most bleeding occurs from the intercostal or internal mammary vessels, and it can be treated by non-operative ways in most of the time.

If bleeding does not stop spontaneously the vessels can be tied off or encircled.



Life threatening injuries can be remembered as the **deadly dozen**. Six are immediately life-threatening and should be sought during the primary survey

and six are potentially life-threatening and should be detected during the secondary survey.

# The deadly dozen threats of life from chest injury

Immediately life threatening	Airway obstruction Tension pneumothorax Pericardial tamponade Open pneumothorax Massive haemothorax Flail chest
Potentially life threatening	Aortic injury Tracheobronchial injuries Myocardial contusion Rupture of diaphragm Oesophageal injury Pulmonary contusion



Efficient initial assessment should be focus on identifying and correcting the **immediate threats of life.**

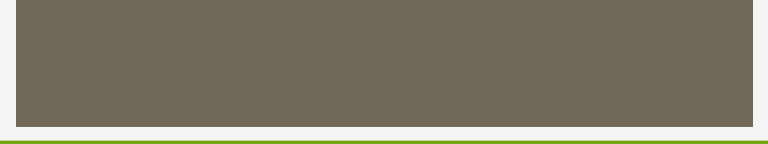
# Immediate life threatening injuries

## Airway obstruction

Early preventable trauma deaths are often due to lack of or delay in airway control.

Dentures, teeth, secretions and blood can be contribute to airway obstruction in trauma.

Bilateral mandibular fracture, expanding neck haematoma producing deviation of the pharynx and mechanical compression of the trachea,



laryngeal trauma such as thyroid or cricoid fractures and tracheal injury other cause of airway obstruction.

Early intubation is very important and life saving measure for those patient as delayed intubation more difficult if not impossible.

# Tension pneumothorax

A tension pneumothorax develops when a one-way valve air leak occurs either from the lung or through the chest wall.

Air forced through the pleural cavity without any means of escape, completely collapsing the affected lung.

The mediastinum is displaced to the opposite side, decreasing venous return to the heart and compressing the opposite lung.

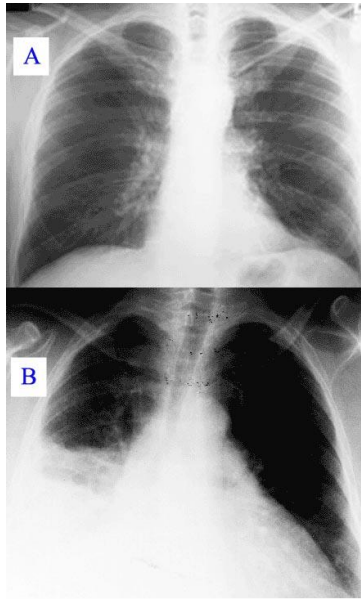


The clinical presentation is dramatic.

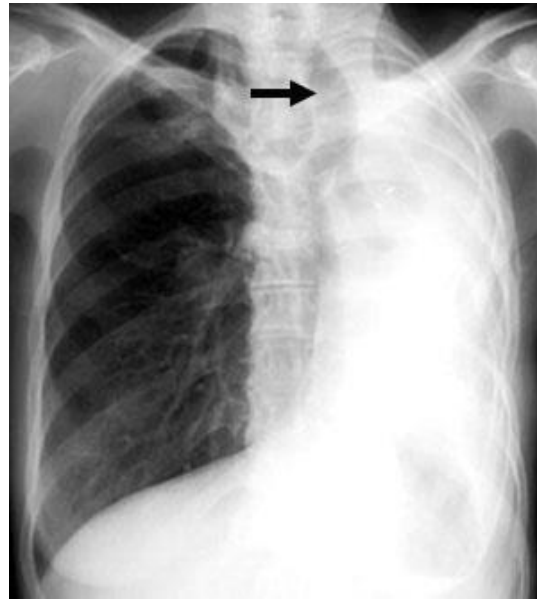
The patient is panicky with tachypnea, dyspnea and distended neck veins.

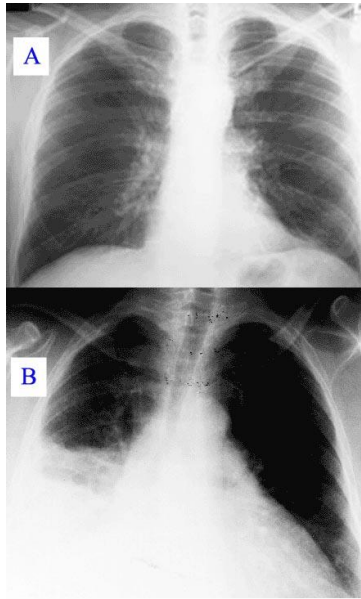
Clinical examination can revealed tracheal deviation, hyperresonance and absent breath sounds over the affected hemithorax.

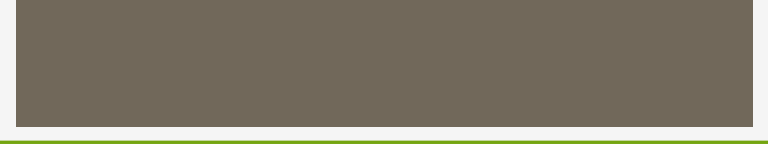
## Normal cxr



## Tension pneumothorax





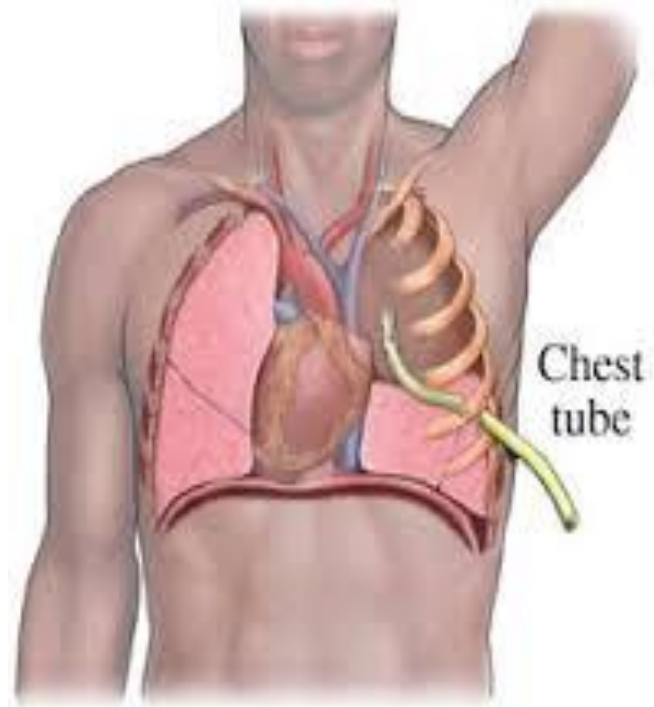
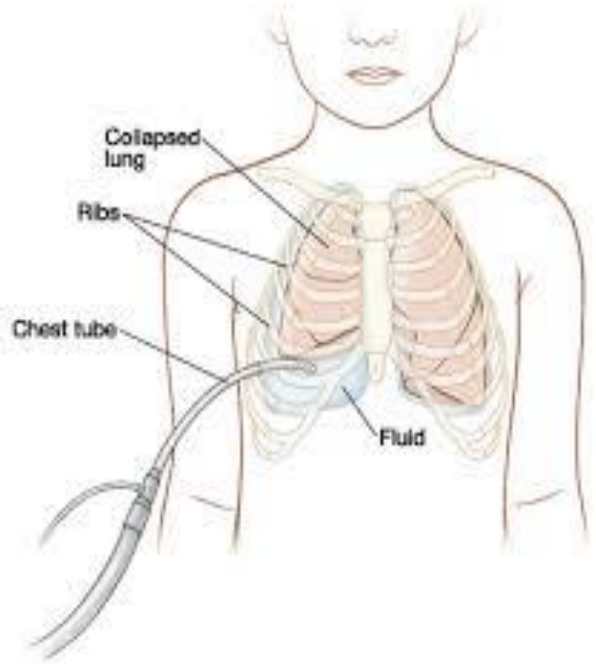


Tension pneumothorax is a clinical diagnosis and treatment should not be delayed by waiting for radiological confirmation.

Treatment consist of immediate decompression and is managed by rapid insertion of a large – bore needle into the second intercostal space in the mid-clavicular line of the affected hemithorax.

This is immediately followed by insertion of a chest tube through the fifth intercostal space in the anterior axillary line.



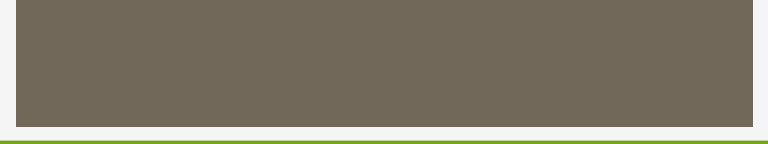


# Pericardial tamponade

Accumulation of relatively small amount of blood into the non-distensible pericardium which produce physiological obstruction of the heart.

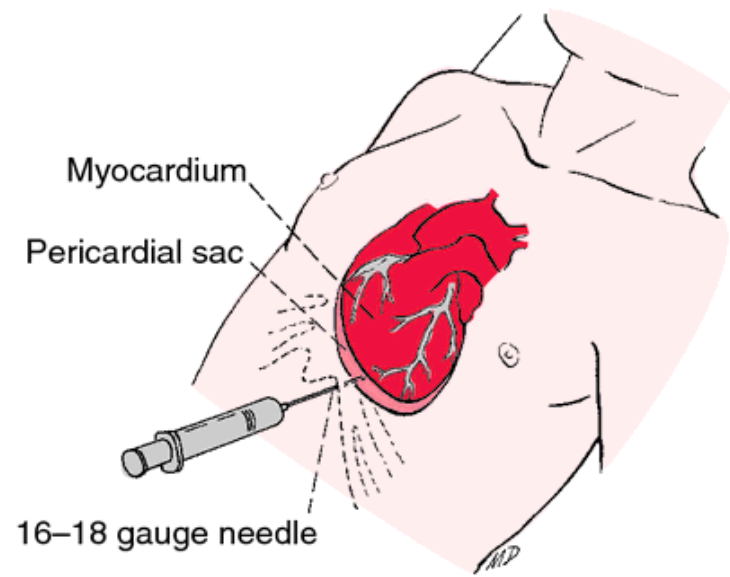
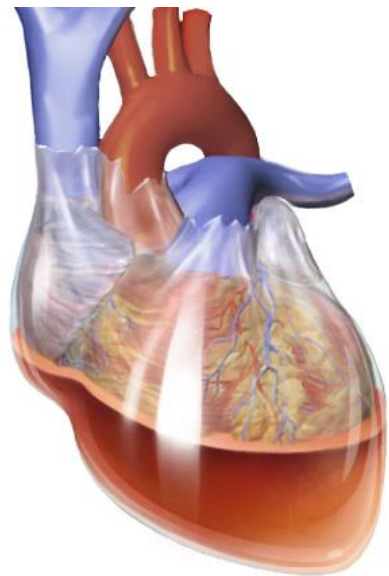
Cardiac tamponade must be differentiated from tension pneumothorax in the shocked patient with distended neck veins.

Its most commonly the result of penetrating trauma.



Chest radiography may show enlarged heart shadow, cardiac eccho showing fluid in the pericardial sac. Insertion of a central line show rising venous pressure.

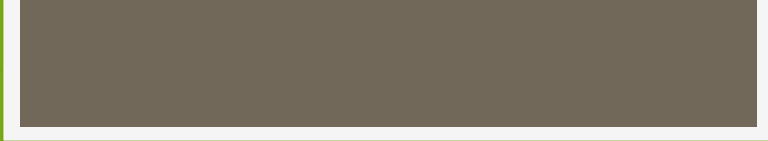
Needle pericardiocentesis under electrocardiac control may improve the condition temporarily before operative repair.

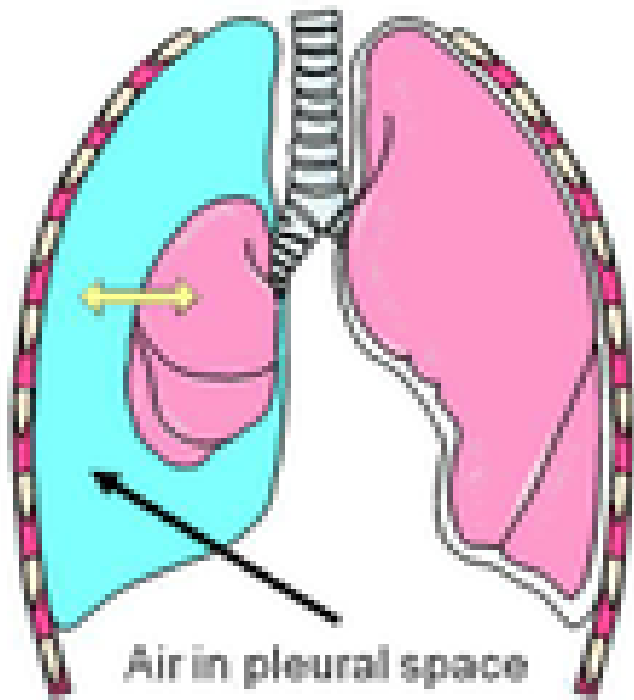


# Open pneumothorax(sucking chest wound)

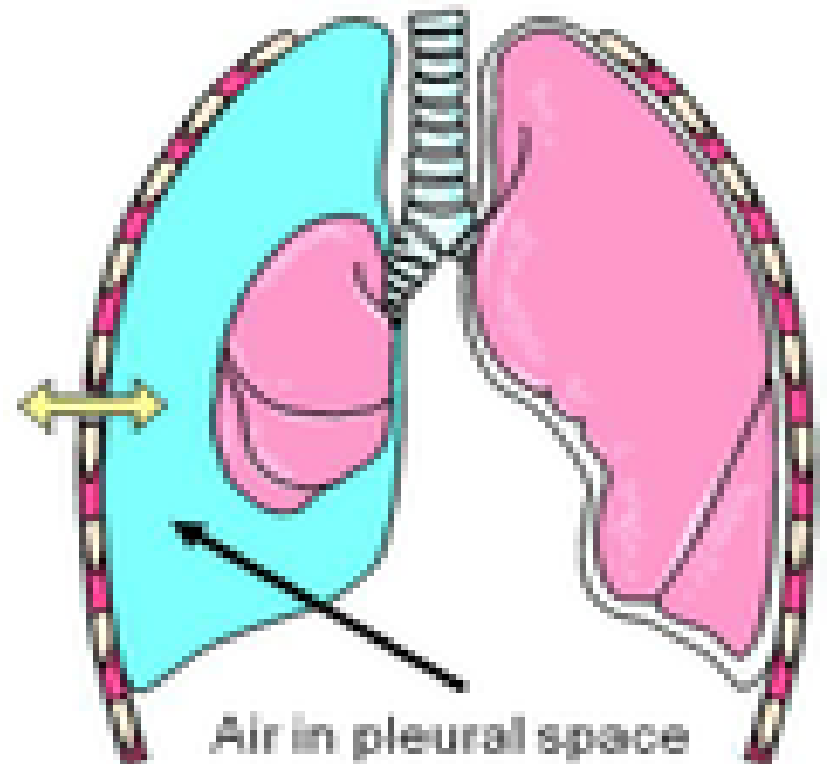
This is due to large open defect in the chest (more than 3 cm), leading to equilibration between intrathoracic and atmospheric pressure.

Air accumulates in the hemithorax(rather than in the lung) with each inspiration, leading to hypoventilation on the affected side and hypoxia.

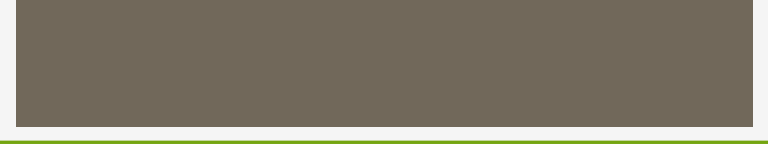




Air in pleural space



Air in pleural space



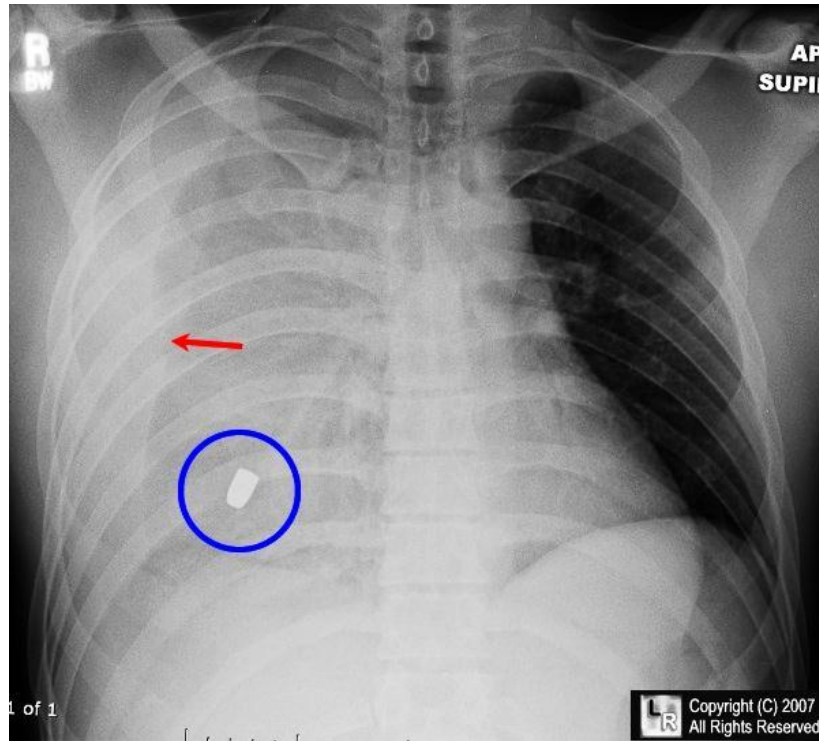
Initial management consist of promptly closing the defect with a sterile plastic dressing taped on three sides, then a chest tube is inserted as soon as possible before the definitive operative treatment.

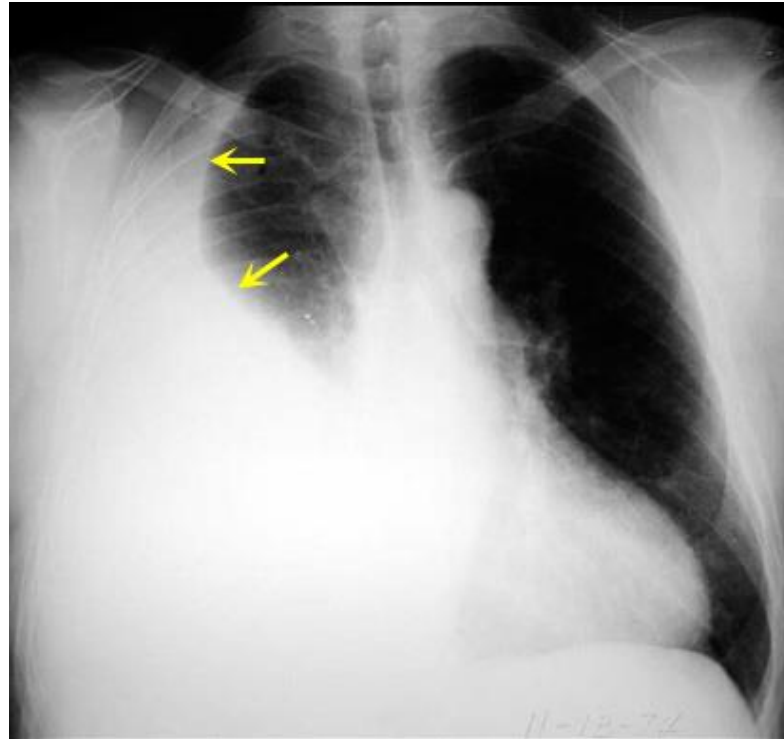


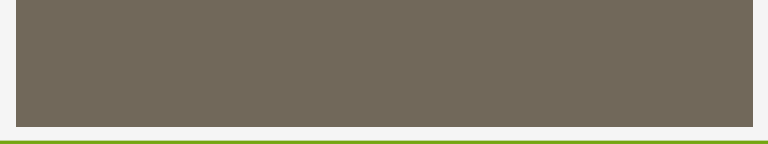
# Massive haemothorax

Accumulation of blood in the hemithorax which compromise the respiratory effort compressing the lung and prevent adequate ventilation.

The most common cause of massive haemothorax in blunt injury is continuing bleeding from torn intercostal vessels or occasionally the internal mammary vessels.







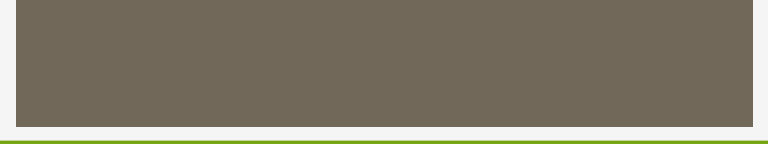
Such massive accumulation of blood presents as haemorrhagic shock with flat neck veins, unilateral absence of breath sounds and dullness to percussion.

The treatment consist of correcting the hypovolemic shock and insertion of chest tube.

# Flail chest

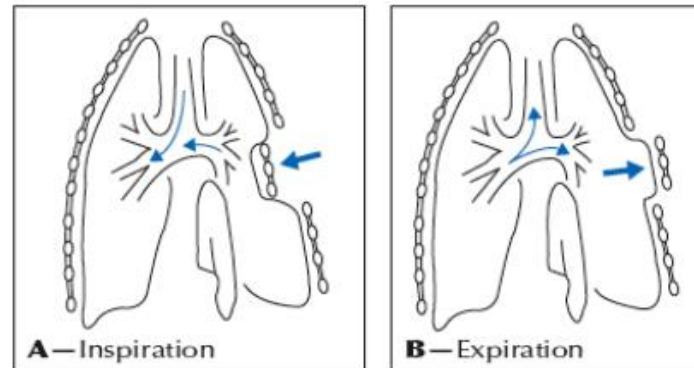
A flail chest occur when a segment of chest wall does not have bony continuity with the rest of thoracic cage.

This condition usually result from blunt trauma associated with multiple rib fracture, i.e., three or more ribs fractured in two or more places.

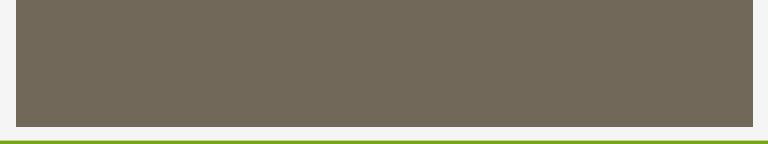


The blunt force required to disrupt the integrity of the thoracic cage typically produces an underlying pulmonary contusion as well.

The diagnosis is made clinically, not by radiography. On inspiration the loose segment of the chest wall is displaced inwards and less air therefore moves into the lungs.



**Figure 1.** In patients with flail chest, the negative pressure within the pleural cavity causes the flail segment to collapse inward during inspiration. This illustration also shows the movement of air associated with flail chest as air is shunted from the lung under the flail segment to the opposite hemithorax (A). Conversely, the flail segment moves outward during expiration, and air from the unaffected hemithorax is shunted to the lungs under the flail segment (B).



Traditionally, treatment consisted of mechanical ventilation to internally splint the chest until fibrous union of the broken ribs occurred.

Surgery to stabilise the flail chest is currently in use again



# Potentially life threatening injuries

## Thoracic aortic disruption

Traumatic aortic rupture is a common cause of sudden death after an automobile collision or fall from a great height.

It should be clinically suspected in patients with asymmetry of upper or upper and lower extremity blood pressure, widened pulse pressure and thoracic wall contusion.



The most common radiological finding is widened mediastinum.

The diagnosis is confirmed by aortography or contrast CT scan of the mediastinum.



Initially, management consists of control of systolic arterial blood pressure to less than 100mmHg.

Thereafter aortic stent or operative repair of the tear taken place.

# Tracheobronchial injury

Severe subcutaneous emphysema with respiratory compromise can suggest tracheobronchial disruption.

A chest drain placed on the affected side will reveal a large air leak and the collapsed lung fail to expand.



Bronchoscopy is diagnostic.

Treatment involve intubation of the unaffected bronchus followed by operative repair.

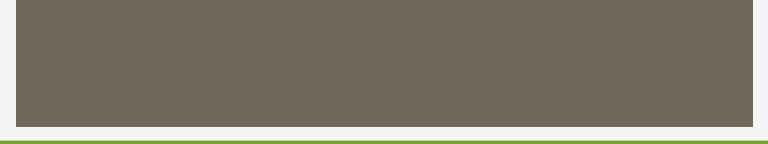
# Blunt myocardial injury

Significant blunt cardiac injury is rare, and often presented with ECG or conductive abnormalities and dysrhythmias.

# Diaphragmatic injuries

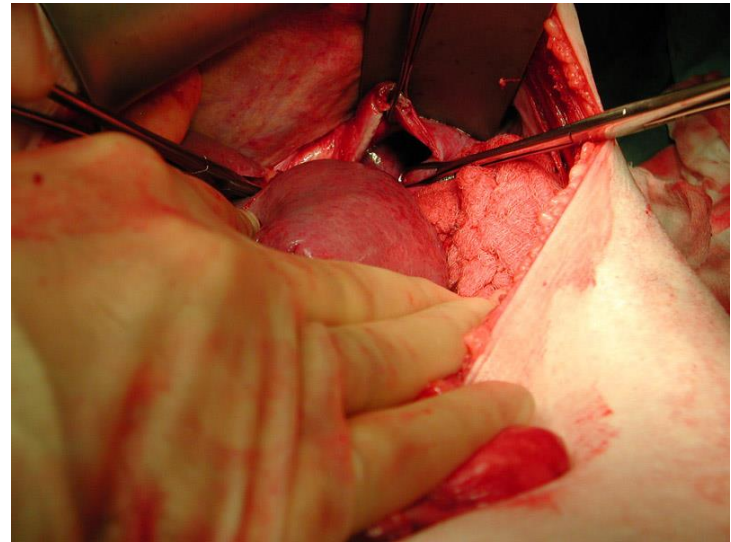
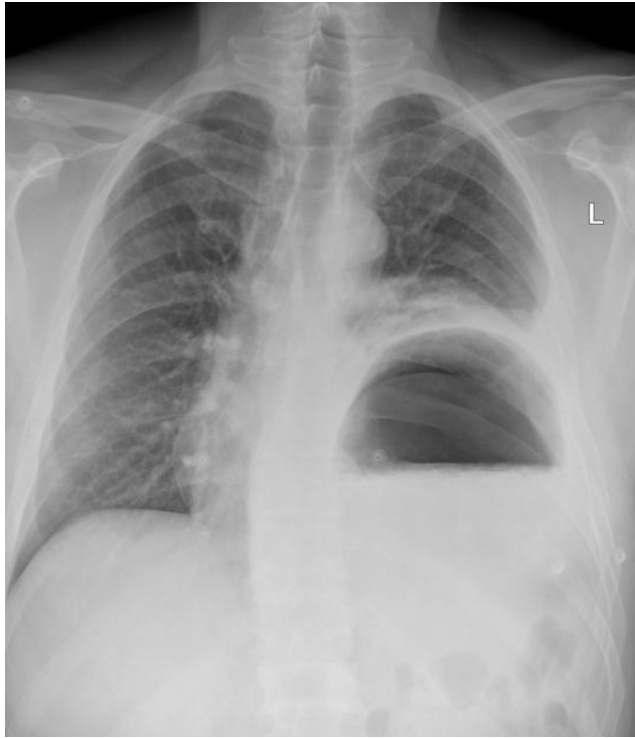
Any penetrating injury below the 5th intercostal space should raise the suspicion of diaphragmatic injury.

Blunt injury to the diaphragm is usually caused by a compressive force applied to the abdomen



Clinical suspicion, chest x ray, CT scan of the upper abdomen and lower chest all aid in the diagnosis. Operative repair recommended in all cases.

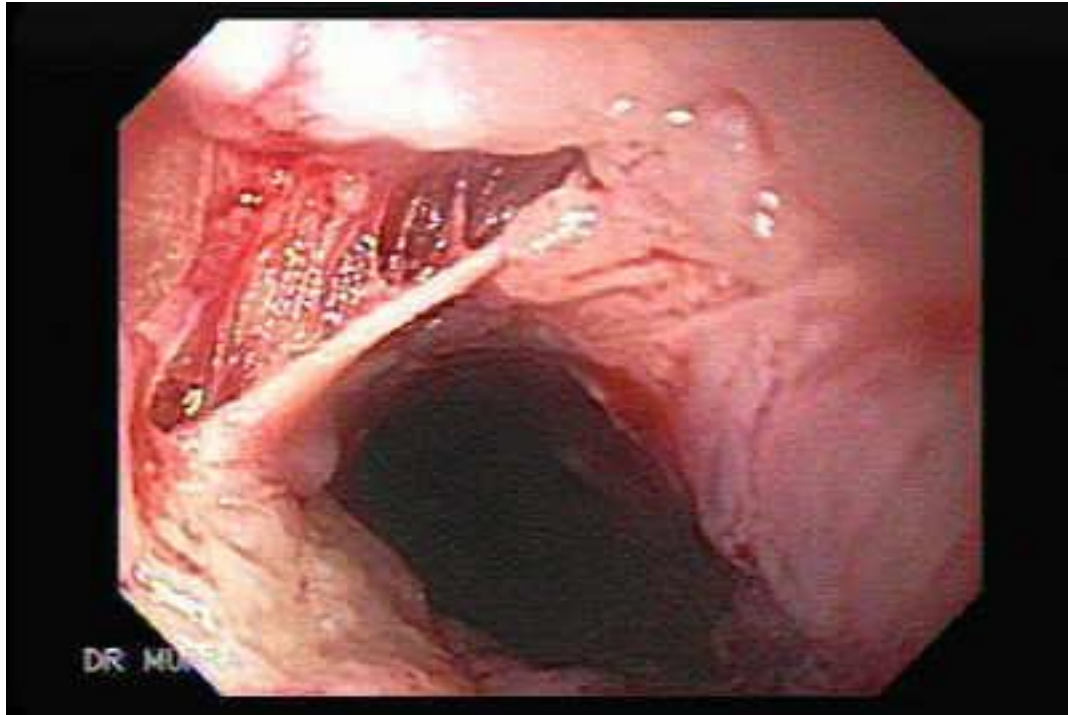




# Oesophageal injury

Most injuries to the oesophagus result from penetrating injuries ; blunt injury is rare.

Treated by operative repair and drainage.



# Pulmonary contusion

Pulmonary contusion is caused by haemorrhage into the lung parenchyma, usually underneath a flail segment.

In mild contusion the treatment is oxygen administration, aggressive pulmonary toilet and adequate analgesia.

In more severe cases mechanical ventilation is necessary.

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**Thanks**