Chapter 3

Chest Trauma

Case 27

Fig. 27.1a

Case 27: A 43-year-old male patient brought to the ER after history of falling from a height. He was fully conscious with severe dyspnea and chest pain. Fig. 27.1 shows his initial CXR.

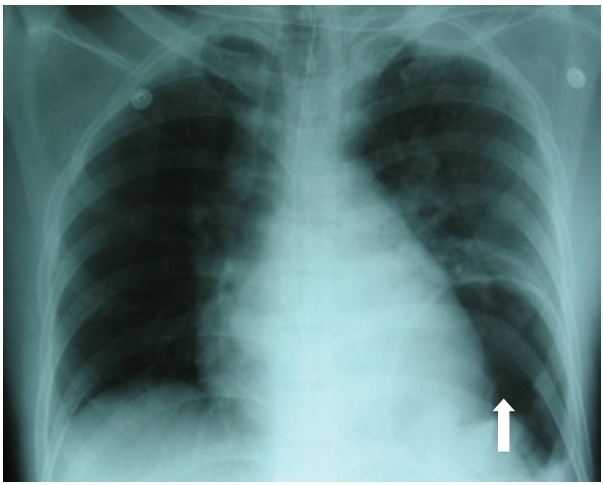

Fig. 27.1b

CXR in Fig. 27.1 shows: gas bubble of the stomach is seen intrathoracically (white arrow) there is associated mild mediastinal shift.

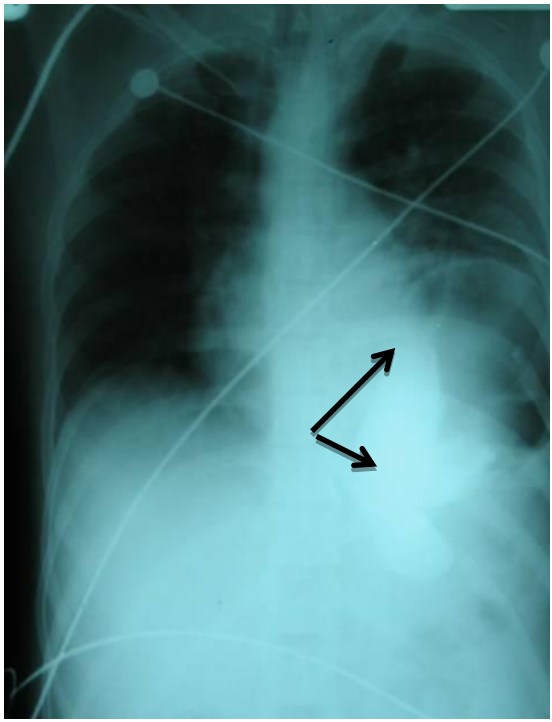

Fig. 27.2 *CXR was taken after injection of gastrograffin through the NGT in the Trendlenburg position. The dye is passing and outlining the herniated stomach.*

CXR after passage of NGT & instillation of contrast material are the most valuable studies used to diagnose traumatic diaphragmatic ruptures (TDR). Nevertheless, the reported sensitivity of CXR varies from 30-60% for left sided TDR & approximately 17% for right sided TDR.

Other tools for diagnosis includes CT & US:

CT sensitivity in diagnosing TDR ranges from 33-83%. US has the advantage of being a bedside procedure but its sensitivity varies with the experience of the operator.

Reports of conventional CT diagnosis of blunt diaphragmatic ruptures yield sensitivity of 14% to 82% and specificity of 87%. Subsequent studies of helical CT detection of BDR (blunt diaphragmatic rupture) reveal improved sensitivity of 71% to 100% and specificity of 75% to 100%. Sensitivity for left-sided injuries is greater (78-100%) than for right-sided injuries (50-79%). The diagnostic accuracy of MDCT, when used to detect diaphragm injury, remains unexplored; however, MDCT's advantages over helical CT, including the ability to obtain thinner images with improved z-axis resolution and less respiratory motion, suggest that detection of injury will continue to improve.

Q: What is the surgical approach?

Repair of left sided diaphragmatic hernias could be approached either via laparotomy or low left sided thoracotomy, but laparotomy is the preferred route for repair. VATS and laparoscopy could also be used to repair diaphragmatic hernias. In patients who undergo surgery a week or more after the injury, thoracotomy is the preferred approach because of the development of intrathoracic adhesions.

Case 28

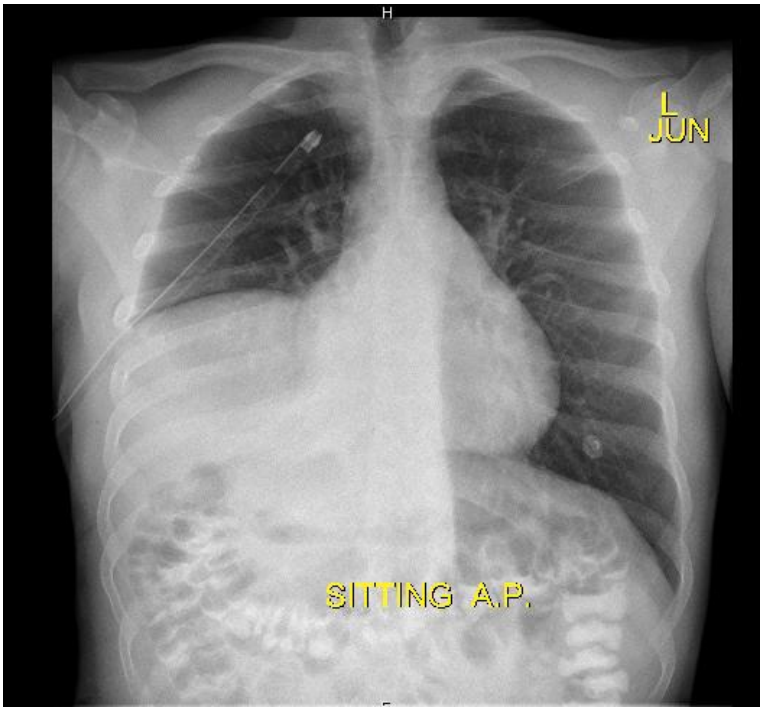

Fig. 28.1a

Case 28: This is a 20-year-old male patient a victim of RTA, he was admitted in another hospital and presented with dyspnea and right sided chest pain. Right sided ICT was inserted and it was found that it is associated with minimal drainage and no improvement of his CXR. Fig. 28.1 showed his CXR at the time of referral to our hospital.

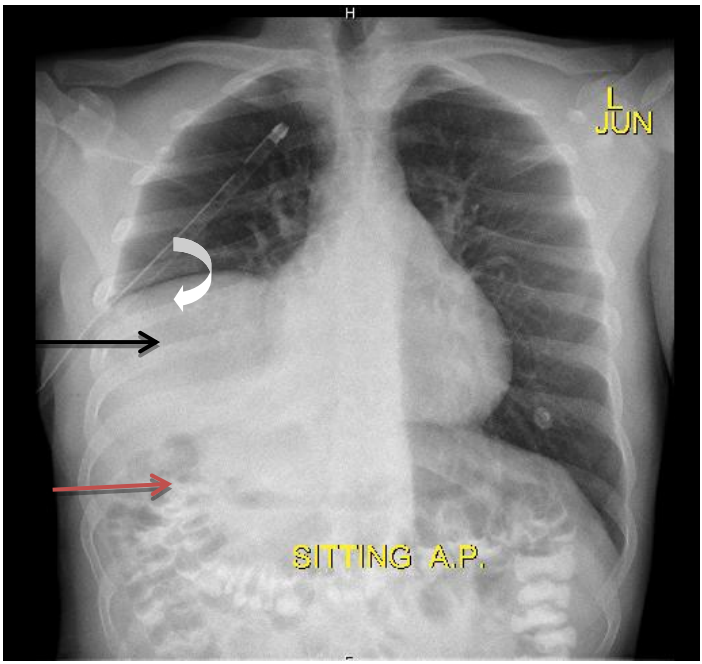

Fig. 28.1b

CXR shows:

- An opacity occupying the right lower lung zone (black arrow).
- Absent hepatic shadow from the abdomen (orange arrow).
- The upper border of the opacity is convex upward (curved white arrow).
- This was a case of right side diaphragmatic hernia with hepatothorax.
- ICT insertion was not indicated as this was not a case of hemothorax.

Q: What is against the diagnosis of hemothorax in the CXR?

The upper convex border of the opacity is against hemothorax, as free fluid in the thoracic cavity has an upper concave border raising towards the axilla or transverse border when then there is an air-fluid level.

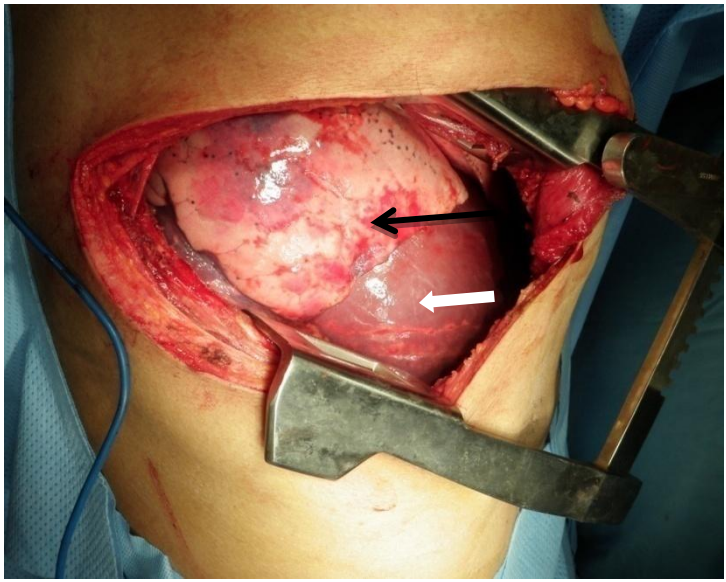

Fig. 28.2 *An intra-operative view via right lower thoracotomy incision. The black arrow is pointing on the right lower lung lobe and the white arrow is pointing on the herniated liver.*

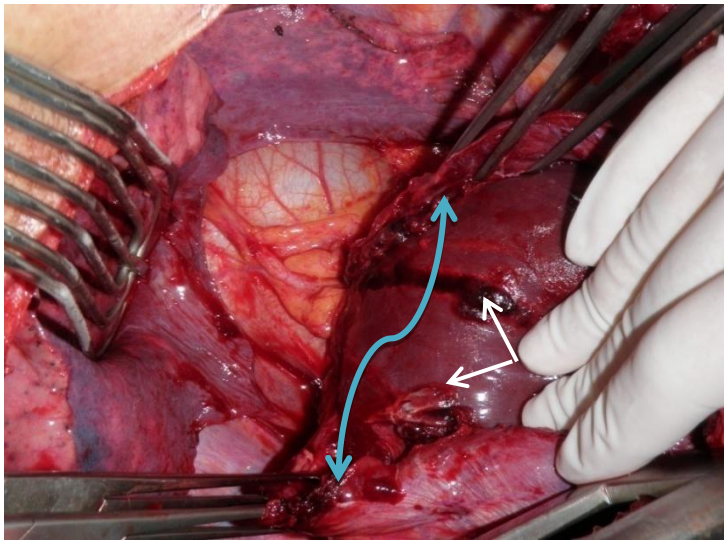

Fig. 28.3 *The curved blue line points on the edges of the torn diaphragmatic copula while the white arrow points on the liver lacerations caused by the non indicated insertion of right ICT.*

The diaphragm is repaired by heavy non absorbable sutures in a continuous or interrupted fashion. If there is a defect, a mesh could be used.

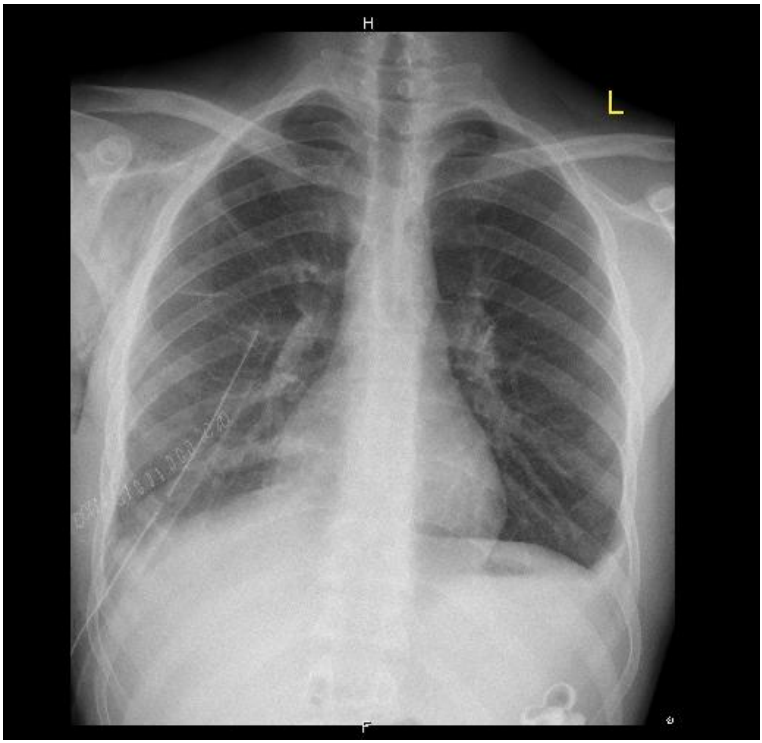

Fig. 28.4 *CXR Post operative CXR, showing intact right diaphragm with liver opacity back into the abdomen.*

Case 29

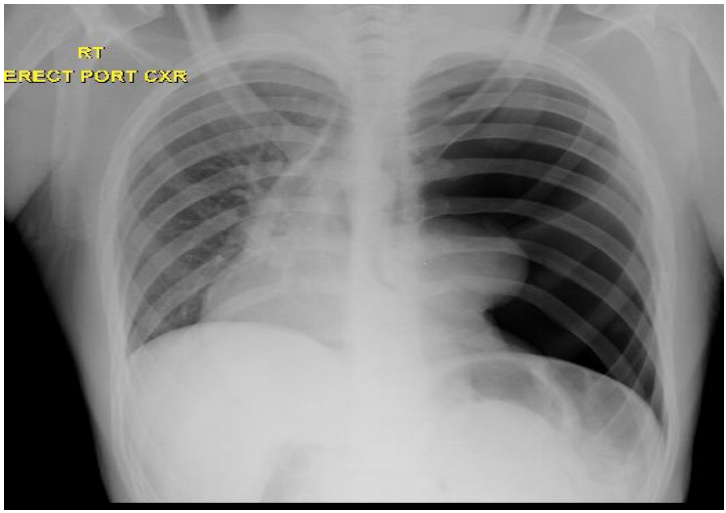

Fig. 29.1a

This is a CXR of a young patient brought to the ER after being involved in RTA. He was severely distressed. *What is the CXR finding?*

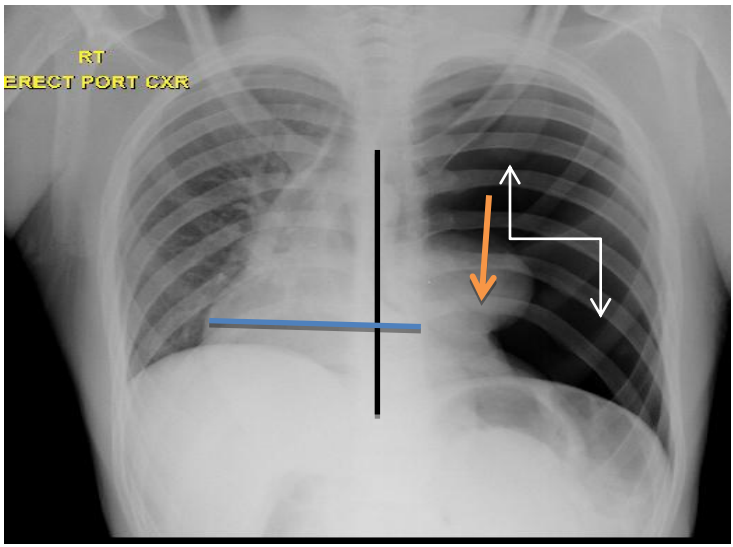

Fig. 29.1b *CXR of a case of left side traumatic pneumothorax.*

There is a significant mediastinal shift to the right (most of the cardiac shadow (blue line) is located to the right of the midline).

Completely collapsed left lung that retracted toward the hilum (orange arrow).

Jet black density of the left hemithorax with absent bronchovascular markings (white arrows).

Q: What is the degree of pneumothorax?

This is a complete pneumothorax.

Case 30

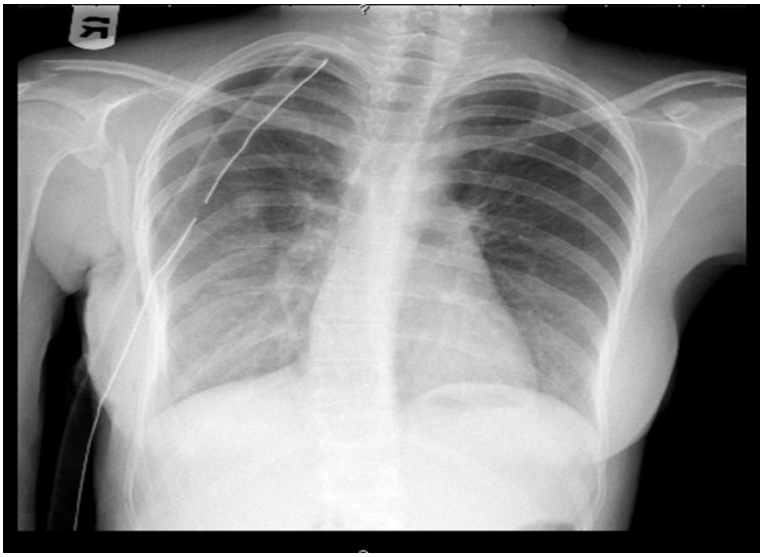

Fig. 30.1a

Case 12: A young female patient involved in RTA and presented with right side traumatic pneumothorax and ICT was inserted in the ER. Fig. 30.1 shows her CXR post insertion of ICT.

What are the other CXR findings?

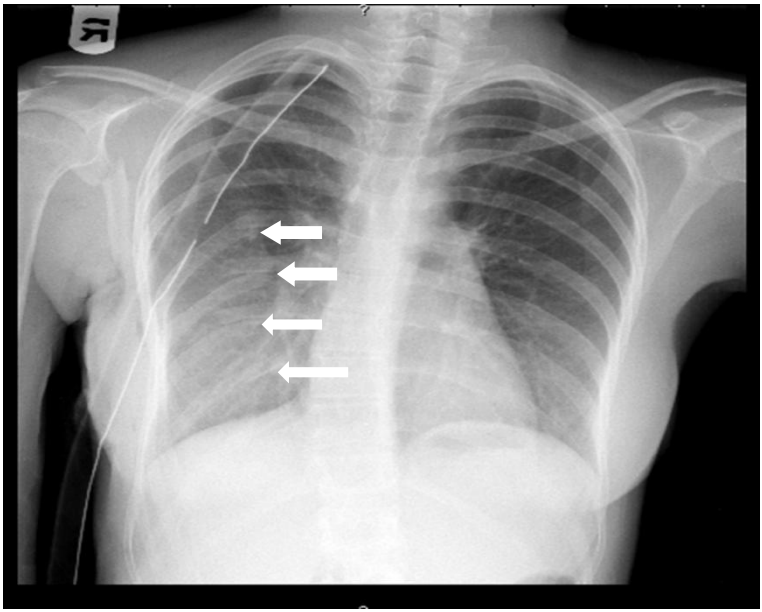

Fig. 30.1b

Fig. 30.1b shows the evidence of multiple simple fracture ribs on the right side.

There is simple fracture of the posterior aspects of the right 7^{th}, 8^{th} 9^{th} and 10^{th} ribs.

There is bilateral veiling of both lung bases suggesting bilateral basal contusion.

Case 31

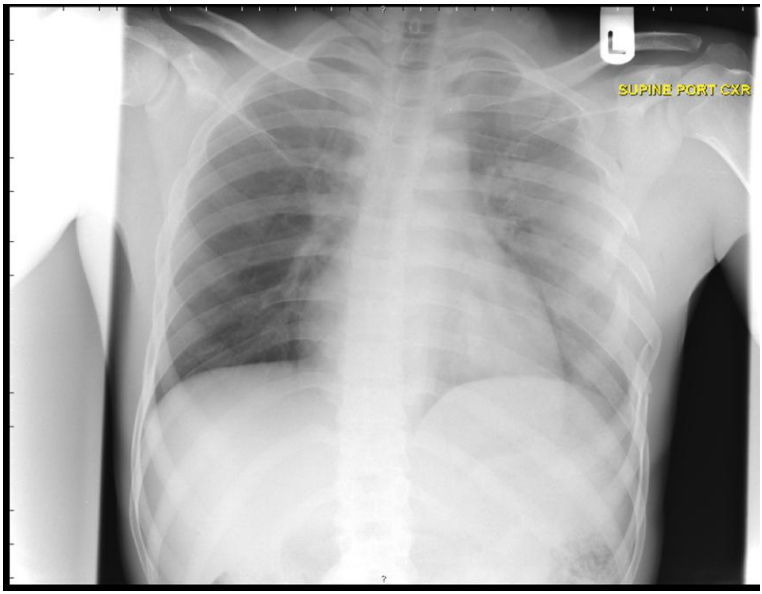

Fig. 31.1a

Case 31: A 30-year-old male patient had severe chest trauma. Fig. 31.1 shows his initial CXR in the ER.

What is the type of fracture ribs he has?

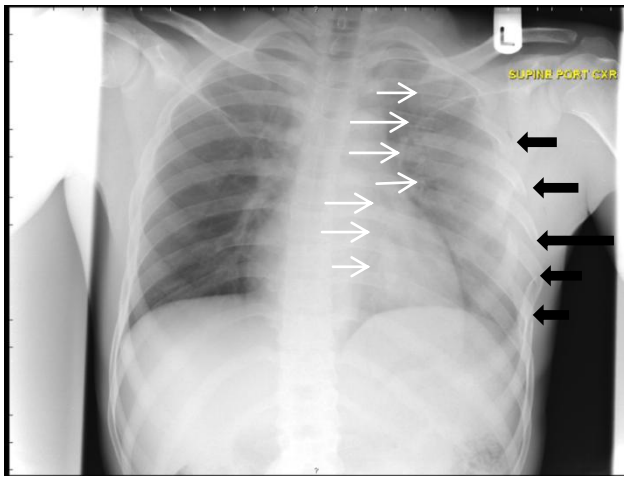

Fig. 31.1b

Fig. 31.1b CXR shows fracture left 3rd, 4th, 5th, 6th and 7th ribs in two sites, posterior (white arrows) and lateral (black arrows) and fracture left 8th and 9th ribs posteriorly only.

This is a flail chest with underlying left lung contusion.

Flail Chest:

Is caused by 4 consecutive ribs being fractured in at least two sites, which leads to paradoxic motion of the chest wall during respiration.

Pulmonary contusion is commonly associated with flail chest and is a major factor in determining the degree of respiratory compromise.

Management:

- Good pain control, pulmonary toilet & external fixation.
- Intubation and mechanical ventilation (Internal fixation).
- Surgical fixation.

Case 32

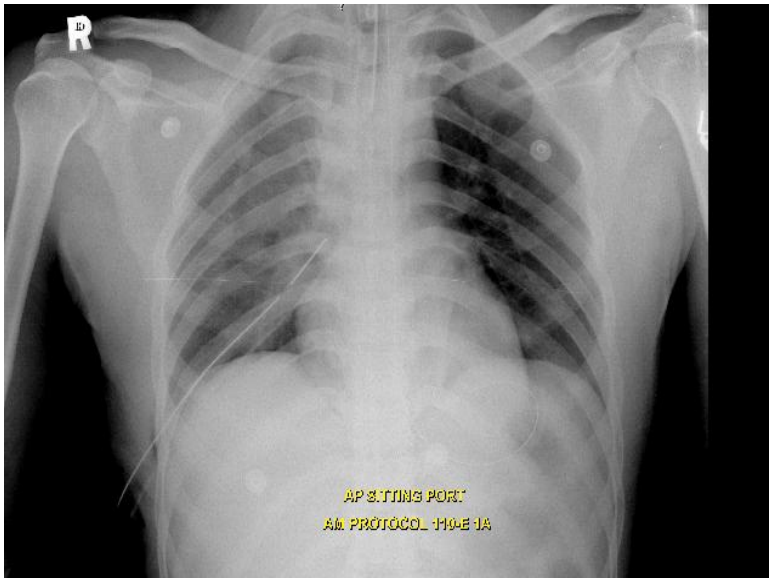

Fig. 32.1a

Case 32: A young male patient was shot by multiple pellets, he was transferred from another hospital intubated and ventilated. He had right sided pneumothorax and ICT was inserted. Clinically air entry is decreased over the left lung, *what is the CXR finding?*

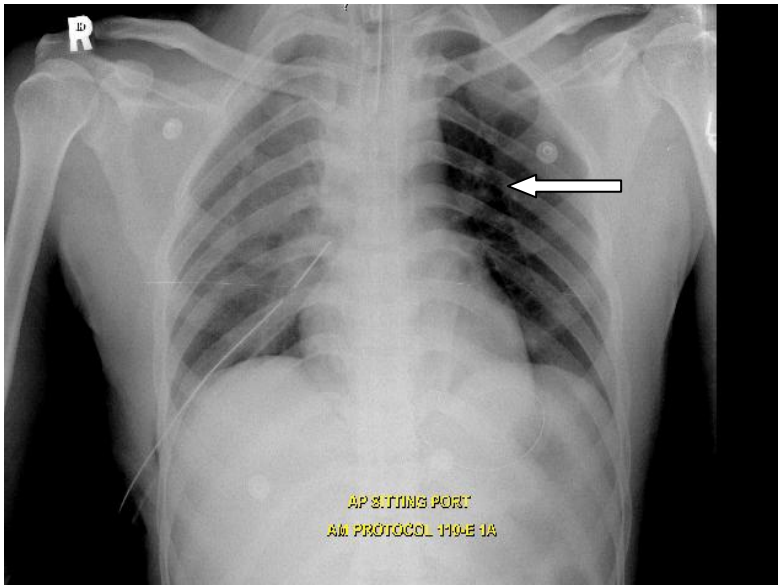

Fig. 32.1b

CXR in Fig. 32.1 shows difference in density between the right and left lung fields, the left is more translucent.

What is the white arrow pointing at?

The white arrow is pointing at the medial border of the left scapula.

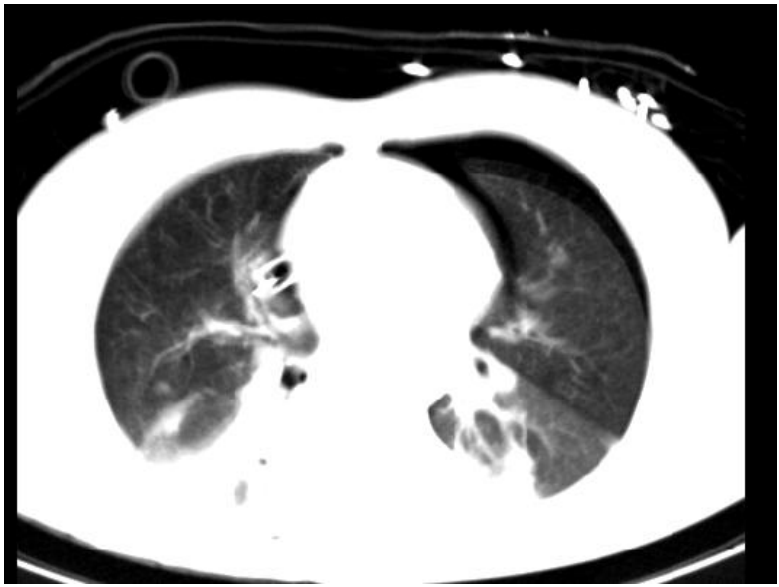

Fig. 32.2

CT chest (lung window) of the same patient shows a mild left sided pneumothorax. The subcutaneous tissue overlaying the anterior chest wall shows fragments of the pellets.

CXR is preferred to be taken in PA in the erect position. Supine CXR could not detect minimal pneumothorax or minimal pleural collection.

Case 33

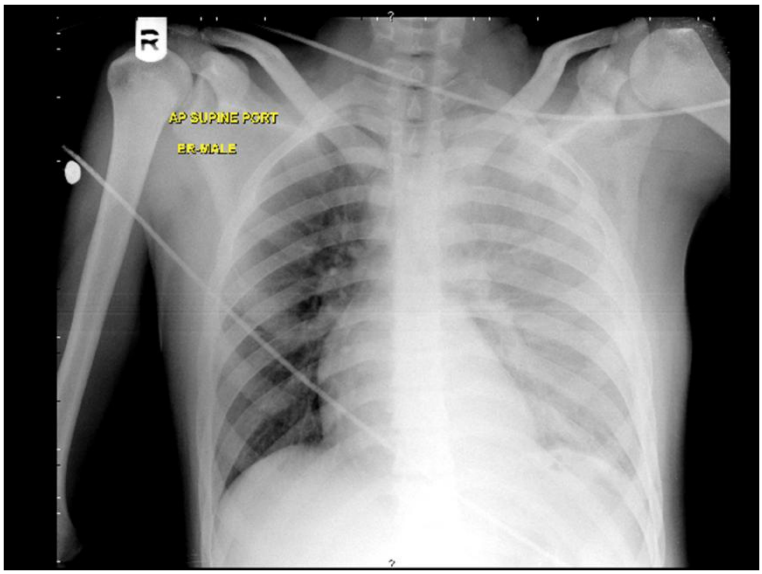

Fig. 33

Case 33: A 20-year-old male patient presented to the ER after being involved by a stab in the left infraclavicular area. This was his initial CXR.

The CXR showed a diffuse opacity of the left hemithorax, which indicates fluid collection. The cardiac shadow is shifted to the right.

This CXR was taken in the supine position so the fluid causes opacity of the whole affected chest side, if the CXR is taken in the erect position we would have seen an upper border of the fluid raising to the axilla or air fluid level.

This was a case of traumatic hemothorax.

Case 34

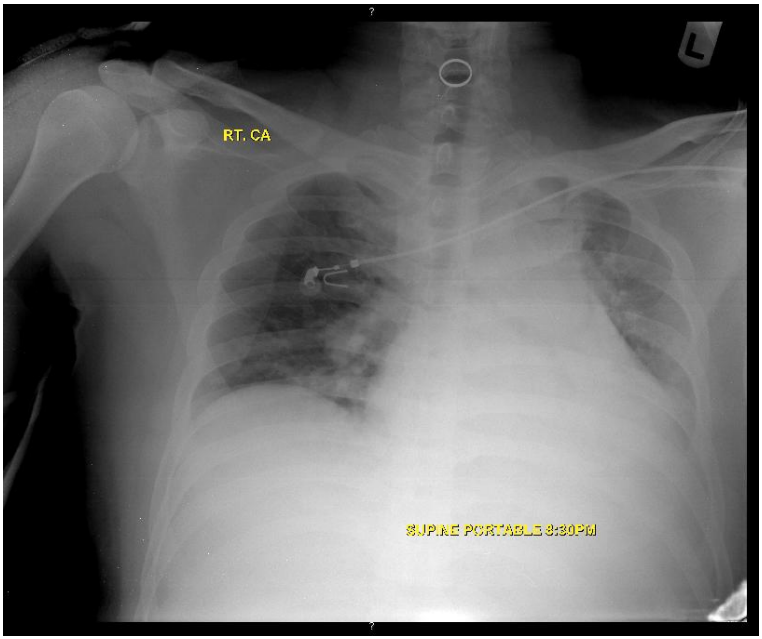

Fig. 34.1a

Case 34: A young male patient a victim of road traffic accident (RTA), brought to the ER complaining of severe chest pain. He was irritable but fully conscious and his blood pressure was 100/60 mmHg on presentation. His femoral and dorsalis pedis pulses were very weak bilaterally. Fig. 34.1 shows his initial CXR.

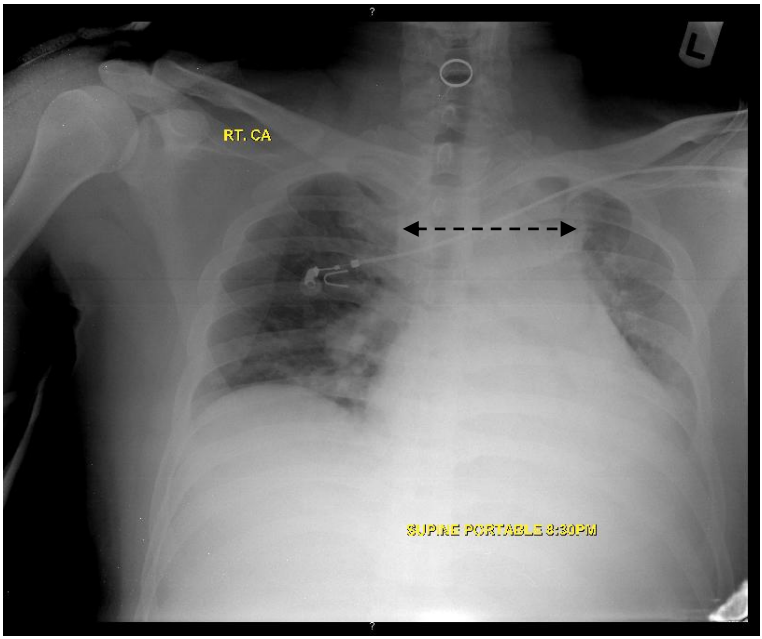

Fig. 34.1b

Fig. 34.1 This CXR shows broad superior mediastinum, there is an increased opacity around the trachea from both sides. In addition there is loss of the aortic knob contour. These findings after chest trauma are alarming and raises the possibility of aortic trans-section. There is also obliteration of the left costophrenic angle.

To confirm the diagnosis CT angiography is recommended immediately.

Fig. 34.2 *CT with IV contrast at the level of the arch vessels which shows a significant mediastinal hematoma surrounding the aortic arch vessels (white arrows). There is evidence of tracheal shift to the right of the midline by the mediastinal hematoma.*

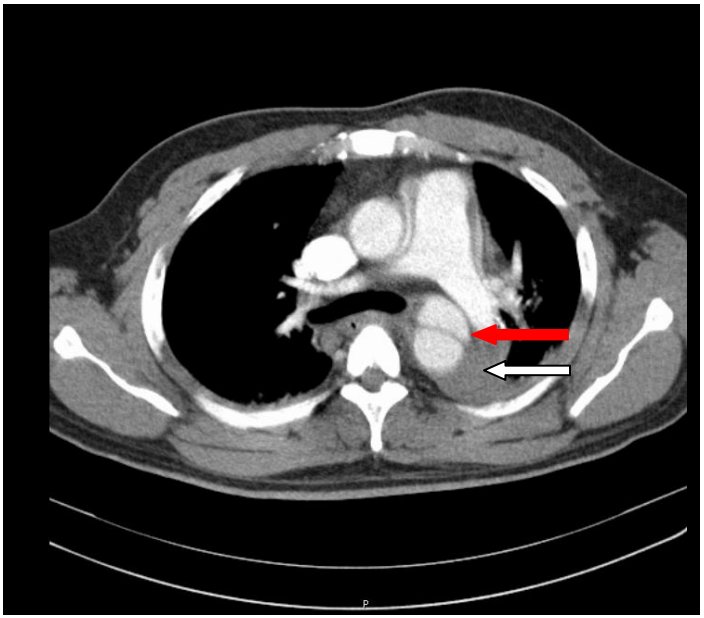

Fig. 34.3

The CT at the level of the main pulmonary artery shows an intimal flap at the descending thoracic aorta (red arrow) with the lumen dissected into true and false lumen. There is a surrounding hematoma (white arrow).

Fig. 34.4

The coronal CT shows the site of the tear at the beginning of the descending thoracic aorta (white arrow) at the site of the aortic isthmus.

Case 35

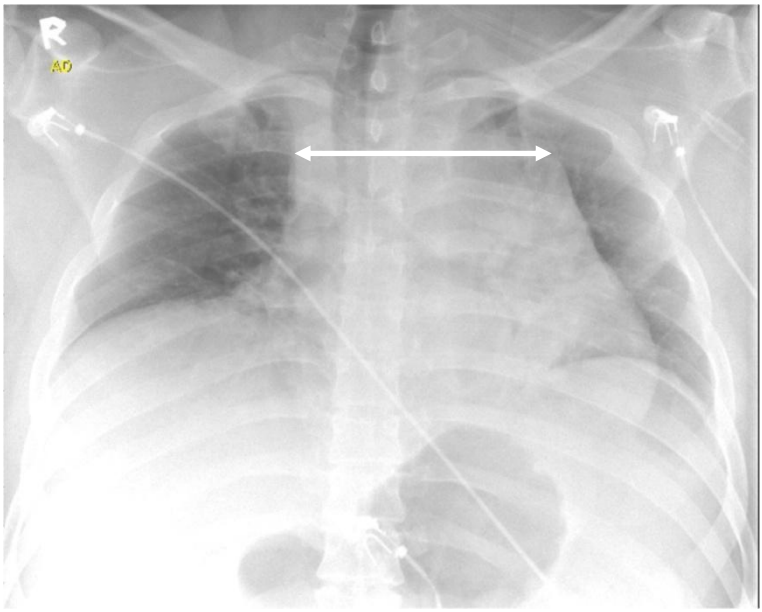

Fig. 35.1

Case 35: This is another case of RTA with severe decelerating injury. Fig. 35.1 shows his initial CXR. There is a significant broad mediastinum (white arrow) and marked kinking and shifting of the trachea to the right. The left main bronchus is depressed from above by the hematoma.

Fig. 35.2 *The CT of the same patient shows the intimal tear at the typical site just at the aortic isthmus. Significant mediastinal hematoma is surrounding the aortic arch.*

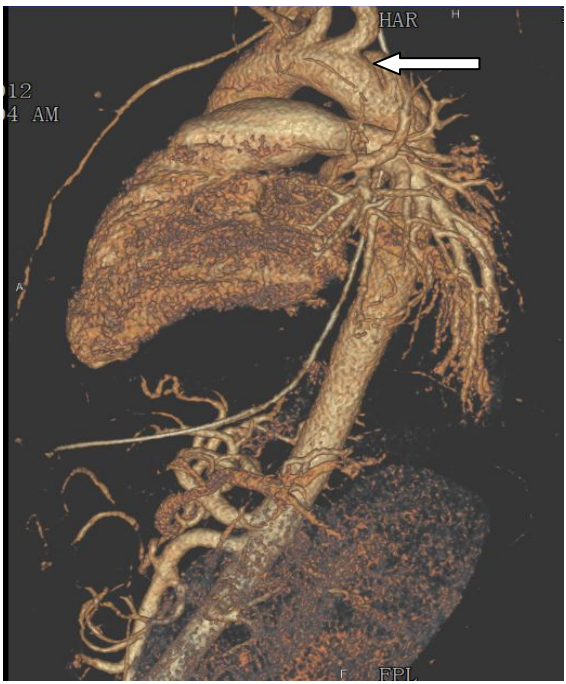

Fig. 35.3 *A reconstruction CT of another similar case of traumatic aortic transaction showing the site of tear at the aortic isthmus (white arrow).*

Traumatic aortic trans-section: Blunt injury of the descending thoracic aorta, in the isthmus, is relatively common due to deceleration accidents. According to the literature the preferential site for aortic injuries is the aortic isthmus. After the aortic isthmus, the second most common location of aortic injuries is supravalvular part of the ascending aorta.

Although spinal cord injury has been a well documented complication of the surgical management, the use of the direct clamp and sew technique with preservation of the intercostals reduces the risk against spinal cord injury.

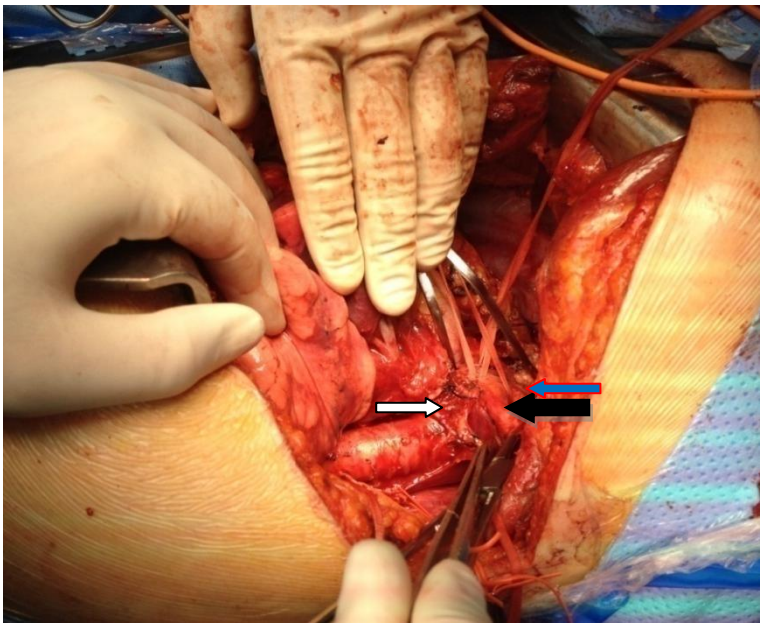

Fig. 35.4 *An intra-operative view through a left posterolateral thoracotomy. The black arrow points on the left subclavian artery and the blue arrow points on the common carotids artery. The site of aortic injury located at the isthmus (white arrow).*

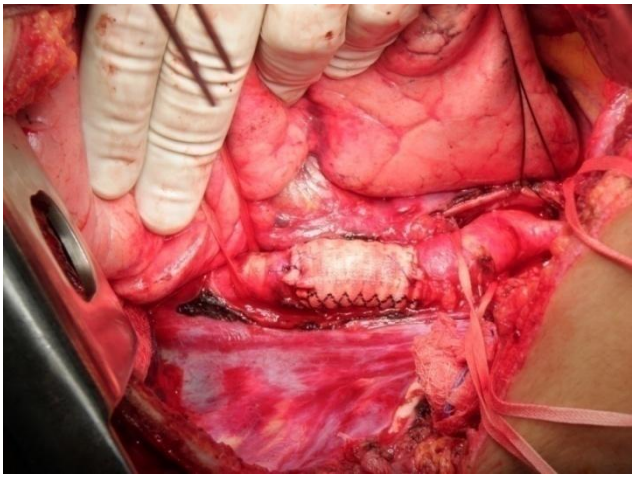

Fig. 35.5 *An operative view in another patient with aortic transaction after aortic debridement, excision of the injured segment and interposition of aortic graft.*

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