Case 10906

Cardiac volvulus (ECR 2012 Case of the Day)

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Section: Chest imaging
Area of Interest: Cardiac
Procedure: Complications
Imaging Technique: Conventional radiography
Special Focus: Volvulus Case Type: Clinical Cases
Authors: Murphy BD, Colleran GC, Shelly MJ, O'Sullivan PJ
Patient: 57 years, male

Clinical History:

This 57-year-old man developed acute haemodynamic compromise one day following major cardiothoracic surgery for a right-sided pleural based mesothelioma.

Imaging Findings:

Fig. 1a: AP chest radiograph in the immediate post-operative period. This demonstrates the air-filled right pleural cavity with central venous catheter in situ.

Fig 1b: AP chest radiograph on post-operative day 1 immediately following the patient's clinical deterioration.

Discussion:

Cardiac herniation and volvulus are rare complications following pneumonectomy and are even less common following lobectomy. The majority of cases result from a pericardial defect created at the time of surgery, most frequently following intrapericardial pneumonectomy, resulting in a large dead space with negative pressure that predisposes to cardiac herniation and volvulus. Cardiac herniation can occur irrespective of the size of the surgically created pericardial defect and shows no side predilection [1].

Clinical perspective: Cardiac herniation typically presents in the early post-operative period and is a catastrophic complication requiring immediate treatment. The clinical presentation relates to the location of the pericardial defect. On the right side kinking or torsion of both the SVC and the IVC may impair cardiac venous return resulting in haemodynamic shock due to impaired filling. SVC obstruction syndrome may also occur in this setting. On the left side cardiac herniation produces dysrhythmias and acute myocardial ischaemia due to strangulation of the ventricular wall by the pericardial edges [2]. Important clinical signs include loss of the normal cardiac apex beat and bizarre ECG patterns.

Imaging perspective: The plain chest radiograph in the setting of partial or impending herniation may show a slight bulge at the site of the pericardial defect (snow cone sign) with the heart shifting toward the operative side [3]. Right sided cardiac herniation is usually unmistakable; the shadow of the herniated heart can easily be seen in the vacant right pleural cavity at chest radiography and is easily recognisable and pathognomonic. The residual pericardial sac is then empty and may be outlined by air. Left-sided herniation is less easily recognised; there may be mediastinal shift to the left and abnormal cardiac contour with bulging of the left heart border [4]. Bedside echocardiography may
be helpful in cases of diagnostic uncertainty. The acuity of the clinical scenario typically precludes CT evaluation
where findings are similar to those seen on the plain radiograph [5].

Outcome: The diagnosis of cardiac volvulus in our patient was made on the chest radiograph findings. The patient
returned immediately to the operating theatre for repeat thoracotomy with repositioning of the heart and patch repair
of the pericardial defect. The patient recovered well with no further complications.

Take home message: Clinical awareness and a high index of suspicion are essential for the prompt diagnosis and
treatment of this rare but well recognised and potentially catastrophic post-pneumonectomy complication.

**Differential Diagnosis List:** Cardiac volvulus - following intrapericardial pneumonectomy and partial
pericardiectomy for mesothelioma, Pericardial mass, Intrathoracic haemorrhage, Bronchial stump dehiscence,
Cardiac tamponade

**Final Diagnosis:** Cardiac volvulus - following intrapericardial pneumonectomy and partial pericardiectomy for
mesothelioma

**References:**

22:67-86 (PMID: 11796900)


(PMID: 3786712)

3786713)

Radiol Med 105:230-3 (PMID: 12835646)
Description: AP chest radiograph in the immediate post-operative period. This demonstrates the air-filled right pleural cavity with central venous catheter in situ. Origin: O'Sullivan P.J., Mater Misericordiae Hospital, Dublin, Ireland.
**Description:** AP chest radiograph on post-operative day 1 immediately following the patient’s clinical deterioration. **Origin:** O’Sullivan P.J., Mater Misericordiae Hospital, Dublin, Ireland.