The haemothorax that should not be drained

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Introduction

Haemothorax commonly follows blunt chest trauma, usually as a consequence of rib fractures. Insertion of a chest drain for evacuation of the haemothorax is generally all that is required. Less commonly, haemothorax can be the result of rupture of the lung, diaphragm, thoracic aorta or pulmonary hilar structures. Free bleeding from a ruptured thoracic aorta into the pleural cavity is a non-survivable injury, but where bleeding comes from a ruptured pulmonary vein the patient may reach hospital alive. It is important in such cases to know the diagnostic radiological features and to avoid chest drainage if optimal outcomes are to be obtained.

Case report

An 18-year-old man was found 36 hours after he had been reported missing lying at the base of a 25-metre cliff. The admission chest X-ray showed a large left pneumothorax which was drained, and a right haemothorax. The patient was relatively stable but complained of back pain. All other observations and examination findings were unremarkable. A computed tomography scan confirmed a large right haemothorax with the only other injuries being T10 and T11 stable vertebral crush fractures. Attention was also drawn to non-visualisation of the right inferior pulmonary vein with a filling defect in the left atrium (Figure 1) at the site where the right inferior pulmonary vein ought to have been connected to the left atrium. The radiologist reported that these computed tomography features are highly suggestive of an avulsed right inferior pulmonary vein and consequently advised against draining the right haemothorax. The patient was transferred to the regional cardiothoracic surgery unit for definitive repair of the cardiac injury. On arrival, he was conscious and relatively stable.

The patient was taken to theatre where the chest was explored via median sternotomy. Re-implantation of the pulmonary vein was accomplished on cardiopulmonary bypass. Figure 2 shows the postoperative computed tomography scan, highlighting the widely patent right inferior pulmonary vein. He made an uncomplicated recovery from surgery and was discharged home on postoperative day 6.

Figure 1. Admission computed tomography scan showing non-filling of the right inferior pulmonary vein with a left atrial filling defect where it should have joined the heart.

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Figure 2. Postoperative computed tomography scan showing a normal configuration of the right inferior pulmonary vein.

Discussion

Traumatic pulmonary vein avulsion is an uncommon cardiac injury. The right inferior pulmonary vein is the most commonly reported vein affected but any of the pulmonary veins can be involved. While chest drain insertion is usually the correct thing to do in traumatic haemothorax, this injury is an exception because of the potential for exsanguination. Massive ongoing bleeding from the chest drain has been reported in this injury, which made operative repair much more difficult (Nwaejike et al, 2015). While some authors have successfully repaired the defect via a lateral thoracotomy approach (Varghese et al, 2000), others recommend the median sternotomy approach (Ouda et al, 2011). One advantage of sternotomy is that it allows rapid institution of cardiopulmonary bypass which, once established, allows isolation of the heart from the systemic circulation. This removes the risk of systemic arterial air embolism that might otherwise occur in a hypotensive patient being explored via lateral thoracotomy.

Significant head injury is a contraindication to cardiopulmonary bypass since it requires systemic anticoagulation with heparin. In such patients, lateral thoracotomy would still be the best approach. Pre-mortem diagnosis of this injury depends on admission computed tomography scans being carried out. As these are now readily available, this injury will be encountered more frequently at a time when appropriate intervention may be lifesaving.

Learning points

- In the context of blunt chest trauma, computed tomography appearances of a non-filling pulmonary vein and a corresponding left atrial filling defect at the normal site of attachment of the vein to the left atrium are highly suggestive of a pulmonary vein avulsion, particularly when associated with a haemothorax.
- Haemothorax associated with a suspected pulmonary vein avulsion should not be drained.
- In the absence of a significant head injury, pulmonary vein avulsion is best approached surgically via a median sternotomy with the patient on cardiopulmonary bypass.

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