CASE FOR DIAGNOSIS

Opacity over the left hemithorax after abdominal aortic aneurysm repair

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Case history

A 77-yr-old male was admitted for aortic aneurysm repair. His history recorded hypertension, left carotid artery desobstruction, stroke and an anterior invocardial infarction. Aspirin was discontinued 1 day before surgery. For peri- and postoperative haemodynamic surveillance, a Swan-Ganz catheter (7.5 Fr thermodilution catheter; Criticath; Ohmeda, Bilthoven, the Netherlands) was introduced through the venae cubiti of the right arm 1 day before surgery. Initially the catheter was in overwedged position. After withdrawal of the catheter a correct wedge curve was obtained. As a result of congestive heart failure, there were elevated pulmonary artery and wedge pressures. For this reason, the patient was treated with diuretics and nitroglycerin intravenously.

The abdominal aortic repair was uncomplicated, with a blood loss of 1,900 mL. After surgery the chest radiograph showed a diffuse opacity over the left hemithorax (fig. 1).

Fig. 1. – Chest radiograph (supine position) after surgery.

BEFORE TURNING THE PAGE, INTERPRET THE RADIOGRAPH, AND SUGGEST DIAGNOSIS, ALTERNATIVE DIAGNOSIS AND TREATMENT.

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Interpretation of the chest radiograph

The chest radiograph shows a large amount of left-sided pleural fluid with an increase in opacity especially in the lower part of left hemithorax; a Swan-Ganz catheter is positioned in the pulmonary artery of the left lower lobe.

Treatment and clinical course

Diagnostic thoracentesis yielded haemorrhagic pleural fluid (haemoglobin (Hb) 24 g L\(^{-1}\), protein 38 g L\(^{-1}\)). Due to an increase of the pleural effusion and worsening of the arterial oxygen saturation, a chest tube was inserted. The production during the first 10 h was 1,500 mL. During the night after surgery the patient became haemodynamically unstable, with a pleural blood loss of 1,500 mL in 3 h.

Considering blood loss at the site of the aortic prosthesis, an emergency laparotomy was performed. This laparotomy, however, revealed no abnormalities.

A left thoracotomy was performed. A massive haemothorax was found originating from a large haematoma present in the left lower lobe. This haematoma was caused by a rupture of the pulmonary artery of the left lower lobe, as a result of overvending of the Swan-Ganz catheter.

DIAGNOSIS: "Rupture of the pulmonary artery of the left lower lobe".

A lobectomy of the lower lobe was performed. Massive transfusion (20 packed cells) was necessary to stabilize the haemodynamics.

The patient made an uncomplicated and complete recovery.

Discussion

Pleural effusions are often (up to 50%) seen after abdominal surgery, particularly in patients with free abdominal fluid present at the time of the operation [1]. However, these effusions are quantitatively small. Larger left-sided effusions occur especially after splenectomy. Postoperative pleural effusions are also observed as a result of pulmonary embolization, subphrenic abscess (both seldom within 72 h after surgery), atelectasis, parapneumonic effusion, congestive heart failure or an abnormal positioned central catheter. In the current patient the pleural effusion appeared to be blood, which was initially considered to be blood leakage from the abdominal cavity.

Since its introduction in 1970, various complications of Swan-Ganz catheterization have been reported [2–6]. Rupture of the pulmonary artery is an uncommon complication, with an estimated incidence of 0.03%, but it has a high mortality [7]. The severity varies from little parenchymal haemorrhage, to free rupture through the visceral pleura leading to haemothorax. Haemoptysis is the major presenting sign. Potential risk factors are older age, pulmonary hypertension, anticoagulation, cardiopulmonary bypass and difficulties during manipulations with the Swan-Ganz catheter (positioning, wedging, withdrawing) [3, 4, 7]. In the current patient two of these risk factors were present.

Mechanisms of importance in catheter-induced rupture are: perforation of the vessel with the catheter tip by a peripherally advanced catheter or by eccentric balloon inflation, damage of the vessel by withdrawal of a firmly wedged catheter or overdistention of the vessel [2, 4, 8, 9]. If pulmonary artery rupture is diagnosed both surgical and nonsurgical procedures, such as bronchoscopy with tamponade of the bleeding site using a Fogarty catheter, double lumen endotracheal intubation and 20 cmH\(_2\)O positive end-expiratory pressure (PEEP) ventilation are tested forms of treatment, with comparable results. It is also possible to administer an autologous blood clot through the catheter to seal the tear. However, in the case of a haemothorax an immediate thoracotomy offers the greatest chance of survival [2, 3, 5, 7].

Recommendations to minimize the risk of pulmonary rupture include inflation of the balloon in a large artery before advancing the balloon, minimizing time of wedging, using no more than 1.5 mL air for inflating the balloon, withholding high pressure flush devices when the catheter is in wedge position, deflating the balloon before withdrawal, frequently monitoring pulse tracings and carefully observing the position of the catheter tip on chest radiographs. A wedge position obtained with less than the recommended volume, is a warning sign that the catheter may have been migrated too far.

Finally, when a change in haemodynamics, respiratory failure or haemoptysis occurs in a patient with a Swan-Ganz catheter, the possibility of a rupture of the pulmonary artery should be considered [2, 5–7, 10].

Keywords: Haematothorax, pulmonary artery rupture, Swan-Ganz catheterization

References