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CASE REPORT

Perforation of the left atrium by a chest tube in a patient with cardiomegaly: Management of a rare, but life-threatening complication☆

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Summary Perforation of the heart is a rare, but life-threatening complication of chest tube thoracostomy. We report the very unusual case where right-sided insertion of a Matthys catheter (6 F) due to pleural effusion resulted in a left atrium perforation. Heart injury was immediately considered as a continuous flow of bright red blood emerging through the chest drain. Diagnosis was confirmed by computer-tomography also revealing a massive cardiomegaly due to pre-existing mitral valve regurgitation. In two consecutive thoracotomies, first the Mathys drain was removed and the heart defect closed and then the mitral valve was replaced by a bio prosthesis. The extent of the cardiomegaly and the position of the left atrium were not detected pre-operatively by chest X-ray or ultrasonic device. Despite a nosocomial pneumonia, the patient fully recovered. This case shows that extreme caution is necessary when inserting chest tubes in patients where thorax imaging by X-ray or ultrasonic device does not provide a clear anatomical site. In order to minimise complications, a blunt puncturing procedure or Seldinger technique should be used and assisted by a Doppler ultrasonic device. Also early imaging by CT and Doppler ultrasonic technique should be attempted. This may reduce incidence of severe complications as in this case.

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Introduction

Chest tube thoracostomy is a common procedure for treating pneumothorax and draining the pleural space after operation, trauma or in patients with pleural effusion or empyaema.[1–5]

The complication rate of this procedure may reach 30%, but severe incidents are rare in the hand of experienced physicians.[6–8] They include malpositioning of the chest tube with injury to the lung, liver, diaphragm, stomach, spleen and intercostal or intrathoracic blood vessels which may result in major bleeding. Phrenic nerve lesions, traumatic arteriovenous fistula and pulmonary infarction due to excessive suction have also been reported.[9–11]

A far more serious, but very rare complication is the perforation of the heart with consecutive pericardial tamponade or haemothorax. There are only few cases in the literature where this severe complication was reported.[12–16] The typical clinical background for this life-threatening incident is an emergency situation such as trauma, anatomical abnormalities or a massive pre-existing cardiomegaly.

Here we report the very rare case of a 72-year-old female patient where right-sided tube thoracostomy, performed to drain a pleural effusion, resulted in perforation of the left atrium. This complication occurred due to excessive cardiomegaly, the extent of which was not evident in chest X-ray and ultrasonic examination. The patient survived this severe complication after several therapeutic interventions, and we present and discuss the clinical course and draw conclusions for safe chest tube placement.

Case report

A 72-year-old female patient was admitted in the afternoon to the emergency room of our hospital with severe dyspnoea increasing over a period of 4 days. Mitral valve regurgitation with chronic heart failure (NYHA III), tachyarrhythmia over many years and a post-thrombotic syndrome were reported in her medical history. Medication consisted of furosemide, digoxin and phenprocoumon orally.

Clinical examination of the conscious patient revealed orthopnoea and attenuated breathing sounds over the right lung, but only light rales on both sides of the chest. Heart auscultation revealed an intense systolic murmer (4/6) over the whole left thorax with maximum intensity over the 2nd left intercostal space. Furthermore, there was a tachyarrhythmia of 110—120 beats/min. The liver was palpable 10 cm below the right rib arch and the jugular veins were distended.

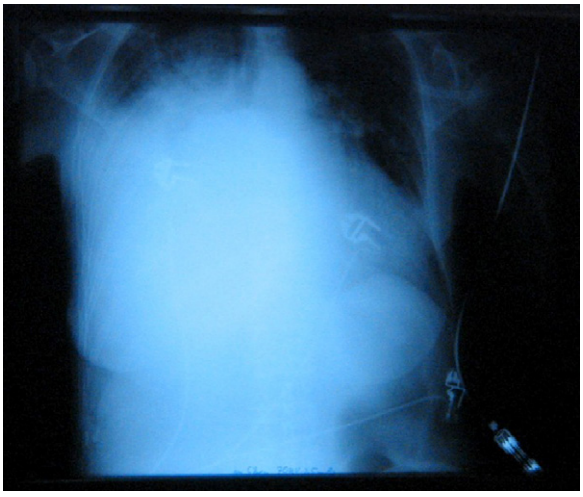

Figure 1 X-ray thorax examination prior to chest tube insertion. Massive pleural effusion appears to be on the right side. Despite pre-existing mitral valve regurgitation and cardiomegaly, the heart silhouette is not clearly visible, particularly, on the right side.

The patient was transferred immediately to the intensive care unit, where arterial blood gas analysis (ABGA) revealed: pCO_2 78.4 mmHg, pO_2 46.1 mmHg, pH 7.2 and SaO_2 85%. The patient was given an isotonic infusion (1000 ml NaCl) and continuous oxygen inhalation (10 l/min) via a face mask. Emergency chest radiography showed signs of a severe effusion in the right pleural space (Figure 1). The heart appeared to be enlarged significantly, however, the exact silhouette and borders could not be determined due to co-existing pleural effusion which was confirmed by ultrasonic examination. Thread-like structures were interpreted as pleural adhesions or septa. The right pleural space was punctured with a 16 G needle and 1200 ml of clear fluid were drained. Thereafter, the patient's respiratory condition improved and dyspnoea ceased; the blood pressure (BP) was 120/50 mmHg and heart rate 100—110 beats/min. Electrocardiography confirmed tachyarrhythmia with atrial fibrillation. Blood variables were normal except for haemoglobin 11.4 g/dl, haematocrit 33.4%, PTT 41 s and Quick 53%.

The next morning, the patient again developed severe dyspnoea and respiratory distress (respiratory rate 30—40 min^{-1}). Rales were now audible over the left lung, and there were no breathing sounds over the right lung. Heart rate was 140 beats/min. Despite 20 mg furosemide i.v., an inhaled bronchodilator (Berodual™) and continuous oxygen (10 l/min), the SaO_2 decreased to