

Re-expansion Pulmonary Syndrome after Hemothorax: A Case Report of Contralateral Pulmonary Edema

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Abstract

Re-expansion pulmonary syndrome is a rare complication that occurs after re-expansion of a collapsing lung. Most occurrences of re-expansion pulmonary syndrome follow drainage of a pleural effusion or pneumothorax. We present a case of contralateral re-expansion pulmonary syndrome in a 38-year-old man who fell from the back of an elephant, then presented with right maxilla fracture and 8th and 9th rib fractures. Left re-expansion pulmonary syndrome occurred after catheter drainage of right-sided pneumohemothorax. We present our interpretation of the case and reviewed the literature on the treatment of re-expansion pulmonary syndrome.

Keywords: Thoracic injuries, pulmonary edema, re-expansion pulmonary syndrome

INTRODUCTION

Re-expansion pulmonary edema (RPE) is a rare complication that occurs after re-expansion of a collapsing lung especially after the release of pleural effusion and pneumothorax. The incidence was reported as 1.2%-6%¹. The mortality rate was 20% of the cases².

Mahfood et al. reported that 94% of RPE occurred in the re-expanded lung³. There are also reports of contralateral pulmonary edema. Three cases were caused by drainage of the pneumothorax, and one case by a large volume of thoracocentesis drainage⁴.

We report the case of a patient who had contralateral RPE after the hemothorax was released.

We also reviewed the pathophysiology, treatment of RPE and the recommendation for thoracocentesis.

CASE PRESENTATION

A 38-year-old man fell from the back of an elephant. The patient presented at the ER with an opened fracture of the right maxilla and blunt injury chest. On examination in the ER, the patient was conscious and his vital signs were stable. He had mild respiratory distress and needed 6 l/min of oxygen to maintain the oxygen saturation. The initial radiograph of the chest showed fractures at the head of clavicle right 8th and 9th rib fractures, and widened mediastinum.

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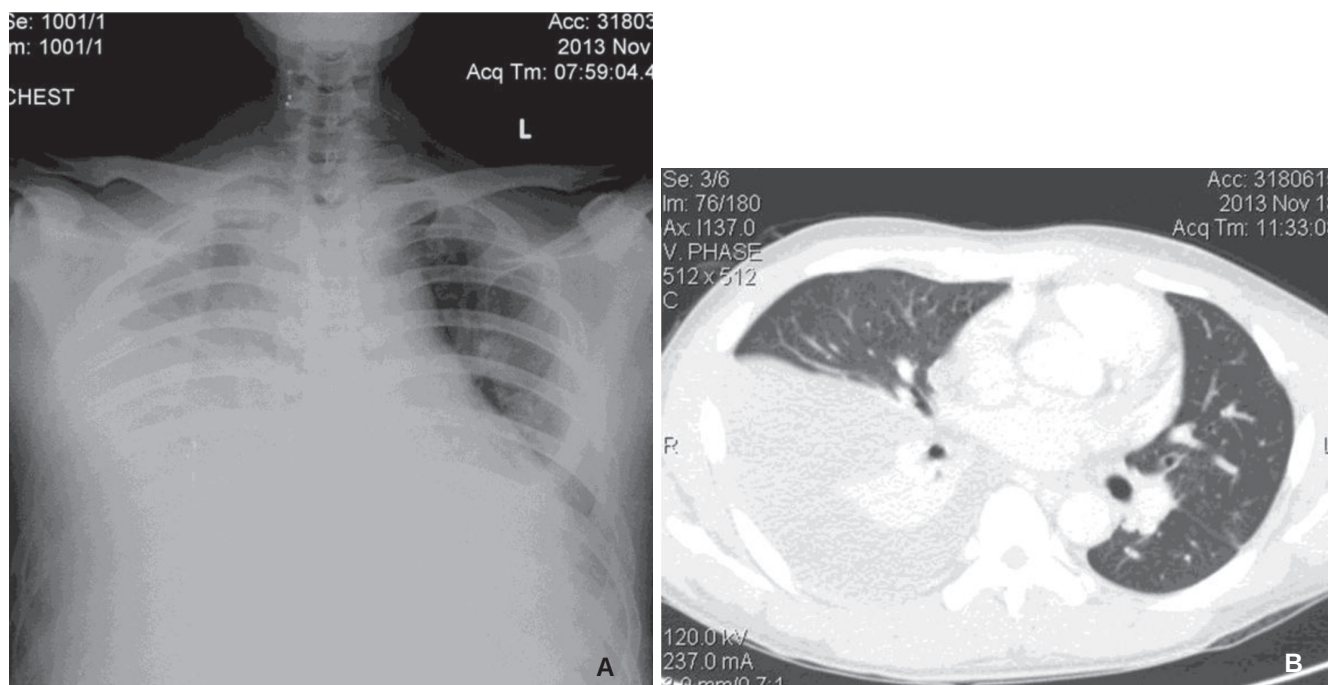


Figure 1 (A) Supine chest radiograph shows homogeneously increased density in right lower hemithorax. (b) Axial CT at the level of subcarinal level in lung window and passive atelectatic right lower lung in a moderate right effusion

No hemothorax or pneumothorax was seen. The computed tomography angiography of the chest revealed occult left pneumothorax, minimal lung contusion and effusion with suspected hemothorax at both sides, and a small subcapsular hematoma of the liver. He was admitted for open reduction and irrigation of his right maxilla. His clinical signs of dyspnea and abdominal signs were closely observed. After the operation, we weaned him off the ventilator.

On the 6th day of the admission, the patient developed dyspnea. He had shortness of breath, suprasternal notch and intercostal muscle retraction. The physical examination revealed dullness on percussion involving the right lung. A radiograph of the chest showed a large right-sided homogeneous opacity (Figure 1). Right-sided hemothorax or clotted hemothorax was the presumed diagnosis. Computed tomography of the chest was requested since a clotted hemothorax was suspected and it revealed moderate right-sided pleural effusion with passive atelectasis. A therapeutic thoracocentesis was done by an interventionist. A 12Fr pigtail catheter was inserted and 1,100 ml of serosanguinous fluid from the right thorax were drained and the percutaneous catheter drainage (PCD) tube was clamped due to the awareness of re-expansion syndrome. Five hours after the initial

release, the patient complained of right chest tightness. Further drainage of the pleural fluid was done and the content output was 650 ml in 2 hours. After that, the patient complained of progressive dyspnea. On examination, the patient was conscious and the dyspnea was better in the upright position. Auscultation found fine crepitation that involved only the left lung. The vital signs were: temperature, 37 celsius, blood pressure, 152/105 mmHg, pulse, 125 beats per minute, respiratory rate, 25 times per minute, and the oxygen saturation was 92% while low flow oxygen of 3 LPM was delivered. A repeated chest radiograph revealed good expansion of the right lung with a smaller amount of effusion, but the left lung had new patchy infiltration which was compatible with unilateral pulmonary edema (Figure 2). The arterial blood gas results revealed acute respiratory alkalosis with mild hypoxemia. Lung re-expansion syndrome and volume overload were in the differential diagnosis. Oxygen and 20 mg of intravenous furosemide were administered. Six hours later, the clinical condition improved. An examination revealed no crepts at the left side. A repeated chest radiograph showed that the left-sided patchy infiltration had disappeared. The patient was able to be weaned from oxygen within a day. The right PCD was taken off after three days. The patient was discharged to his

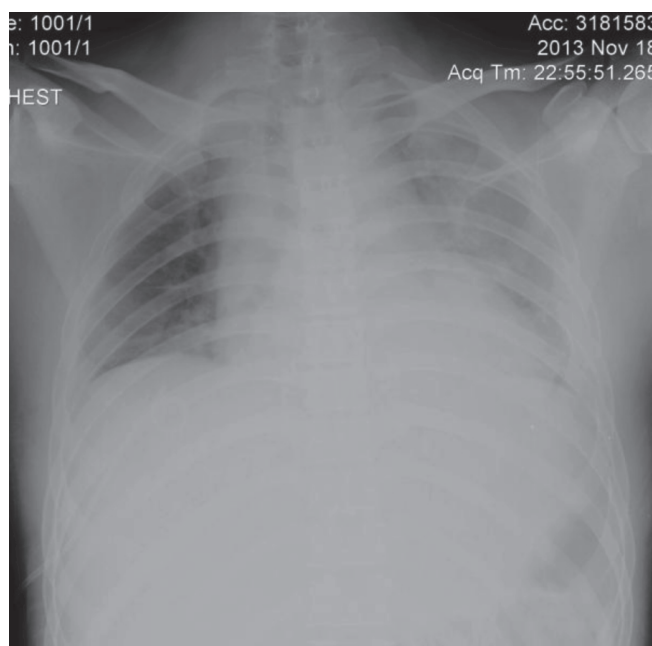


Figure 2 Supine chest radiograph immediately after releasing large amount of right effusion shows unilateral pulmonary edema at left lung and a lower amount of right effusion

home after 11 days of admission.

DISCUSSION

Re-expansion pulmonary edema (RPE) is an uncommon complication. The pathophysiology of RPE includes reperfusion injury of the hypoxic lung, increased capillary permeability and local production of neutrophil chemotactic factors⁵. The patients who appear to be at high risk are those who have had large lung pneumothoraces, patients whose lung has collapsed for more than 7 days, and have >3 liters of pleural effusion¹. RPE is less likely to occur in patients who had a collapsed lung for less than 3 days⁵.

There are no definitive guidelines on the prevention or treatment of RPE. The British Thoracic Society Pleural Disease Guideline 2010 recommends that < 1.5 liters of plural fluid should be drained at a time for the management of malignant pleural effusion⁶. The treatment of RPE is mostly supportive care with supplemental oxygen or positive pressure ventilation and endotracheal intubation⁴. Pulmonary edema can be relieved by diuretics. Steroids are also possibly effective⁵. However, if there is radiographic evidence of RPE but the patient is asymptomatic, no

treatment is necessary³.

Our patient had a rare presentation of contralateral RPE since most cases of RPE occur at the ipsilateral expanded lung. The amount of drainage fluid in this patient was 1,750 ml. Fortunately, the patient had mild respiratory distress and responded to 6l/min of oxygen and 20mg of intravenous furosemide.

CONCLUSION

Re-expansion pulmonary syndrome is a rare complication but it can be prevented by a slow release of the effusion and allowing the lungs to re-expand slowly. The volume of released fluid that leads to RPE may be less than the previous reports from the literature. The definitive treatment of this condition is still not clear.

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Authors' contributions

Kraipop Wongwaiyut recognized the patient, reviewed the literature and was the main writer of the case.

Osaree Akaraborworn read and approved the content of the case and was the secondary writer.

Wiwatana Tanomkiat provided additional radiographic interpretation, read and proved the content of the case.

Financial disclosure

The authors declare that they have no financial conflict of interests.

Editorial note: Our referee noted that this case could simply be a left-sided pulmonary edema following large volumes of fluid administration in a patient with pre-existing left sided pulmonary contusion, since the details of fluid intake and output was not provided. The referee feels that a stronger evidence for contralateral re-expansion pulmonary edema would be the presence of mediastinal shift to the left prior to right-sided drainage, since a sudden shift back to normal could result in a re-expansion, inducing

pulmonary edema. There was no clear evidence of mediastinal shift in this case report.

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บทคัดย่อ รายงานผู้ป่วยที่มีอาการปอดด้านตรงข้ามบวมน้ำจากกลุ่มอาการการขยายตัวของปอดภายหลังเลือดออกในโพรงเยื่อหุ้มปอด

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ภูมิหลัง: กลุ่มอาการการขยายตัวของปอดเป็นภาวะแทรกซ้อนที่เกิดขึ้นภายหลังจากการขยายตัวของปอดภายหลังปอดแฟบ ซึ่งส่วนใหญ่จะพบภายหลังจากการระบายน้ำหรือลมในเยื่อหุ้มปอด

การนำเสนอรายงานผู้ป่วย: ผู้ป่วยชายอายุ 38 ปีได้รับอุบัติเหตุตกจากหลังช้าง มีการบาดเจ็บของกระดูกใบหน้าและกระดูกซี่โครงหัก การถ่ายภาพรังสีคอมพิวเตอร์แรกพบพบปอดซ้ายและมีลมและเลือดในโพรงเยื่อหุ้มปอดเพียงเล็กน้อย ในวันที่หกหลังจากนอนโรงพยาบาล ผู้ป่วยมีน้ำในเยื่อหุ้มปอดด้านขวาและปอดแฟบ จึงได้รับการรักษาด้วยการใส่สายระบายทางผิวหนัง หลังจากได้ระบายน้ำในเยื่อหุ้มปอดปริมาณ 1.7 ลิตรในระยะเวลาใส่สายระบาย 5 ชั่วโมง ผู้ป่วยมีอาการเหนื่อยมากขึ้น การตรวจร่างกายพบเสียงกรอบแกรบที่ปอดด้านซ้าย ภาพรังสีทรวงอกพบรอยแทรกซึมเป็นปื้นที่ปอดซ้าย ส่วนปอดขวาขยายตัวได้ดี ภาพรังสีทรวงอกเข้ากันได้ดีกับภาวะปอดบวมน้ำด้านเดียว ผู้ป่วยได้รับการรักษาด้วยออกซิเจนและยาขับปัสสาวะ ภาพถ่ายรังสีที่ถ่ายซ้ำในอีก 8 ชั่วโมงรอยที่ปอดได้หายไป

สรุป: ถึงแม้ว่าการเกิดอาการปอดด้านตรงข้ามบวมน้ำจากกลุ่มอาการการขยายตัวของปอด โดยเฉพาะเกิดภายหลังเลือดออกในเยื่อหุ้มปอดเป็นภาวะที่พบได้น้อย แต่ก็เกิดได้หากระบายน้ำในเยื่อหุ้มปอดในปริมาณมาก