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A Case Report of Delayed Hemothorax Complicated by Fibrothorax

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Abstract

Delayed hemothorax is a potentially life-threatening complication of thoracic trauma that should be carefully considered in all patients presenting with thoracic injury. We report a case of delayed hemothorax in a 77-year-old male presenting eleven days' status post multiple right mid- to high-rib fractures. His case was complicated by retained hemothorax after CT-guided chest-tube with subsequent video-assisted tube thoracostomy (VATS) revealing fibrothorax necessitating conversion to open thoracotomy. Known risk factors for development of delayed hemothorax include older patient age, three or more rib fractures, and presence of mid- to high-rib fractures, and should be used in risk stratification of thoracic trauma. Tube thoracostomy is often sufficient in management of delayed hemothorax. In rare cases, hemothoraces can be complicated by retained hemothorax or fibrothorax, which require more invasive therapy and carry greater morbidity and mortality.

Keywords

Delayed Hemothorax, Chest Wall Trauma, Rib Fractures, Fibrothorax, Open Thoracotomy

Introduction

Delayed hemothorax is a life-threatening complication of thoracic trauma, commonly including rib fractures, that carries significant morbidity [1,2]. Delayed hemothorax has been reported to develop 2 hours up until 44 days after initial injury and is therefore an easily missed sequelae of chest trauma [3]. Treatments vary from non-surgical management with tube thoracostomy and thoracentesis to operative intervention, often including video-assisted thoracoscopic surgery [4].

Management is rarely complicated by retained hemothorax, which is defined as retained clots measuring at least 500mL or an amount of residual blood that is greater than onethird of the initial blood in the pleural space [5]. Retained blood can irritate the pleura and cause diffuse pleural scarring or pleural adhesions that can encase the lung [6]. This complication known as fibrothorax typically requires more invasive surgical management of thoracotomy [4]. We present a case of delayed large hemothorax 11 days after blunt chest trauma complicated by retained hemothorax with fibrothorax requiring open thoracotomy.

Case Report

A 77-year-old male with past medical history of lumbar disc disease, prostate adenocarcinoma status post radical prostatectomy, and thyroid cancer status post thyroidectomy, was brought in by ambulance to the emergency department after sustaining a fall from his bicycle. He reported head injury with brief loss of consciousness. Patient had a blood pressure of 131/70 on arrival. Vital signs were otherwise stable, with temperature of 36.5°C, heart rate of 91 bpm, respiratory rate of 16 breaths/minute, blood pressure of 131/70 mmHg, and pulse oximetry of 98% on room air. Serial neurologic exams and noncontrast CT scans of head and neck were benign. An x-ray of the right shoulder demonstrates a comminuted, slightly displaced and overriding fracture of the right mid-clavicle with mild subcutaneous emphysema in the right lower neck region, and multiple right rib fractures (**Fig-1**).

Further investigation via contrast CT chest demonstrated mildly displaced fractures of the lateral right 3^{rd}-8^{th} ribs with small rightsided apical pneumothorax. Patient's laboratory studies revealed a mild anemia with hemoglobin value of 10.7 (12.0) gm/dL and hematocrit of 32.0% (35.3%). CBC and metabolic panel were otherwise benign. He had considerable pain with respiration. Normal oxygen

Fig-1:

Initial chest x-ray, demonstrating multiple right rib fractures, fracture of the right clavicle, and 10% right pneumothorax with subcutaneous emphysema.

saturation was maintained via nasal cannula oxygen therapy. He was admitted to hospitalist service for pain control and orthopaedic consultation. His medications included aspirin 81mg daily, which was halted throughout hospital stay. He tolerated incentive spirometry and oxygen saturation was 98% on room air at discharge three days later. The patient was discharged with 2L home oxygen via nasal cannula (**Fig-2**). He was instructed to resume daily aspirin therapy and take acetaminophen-hydrocodone 325 mg-10 mg as needed for pain.

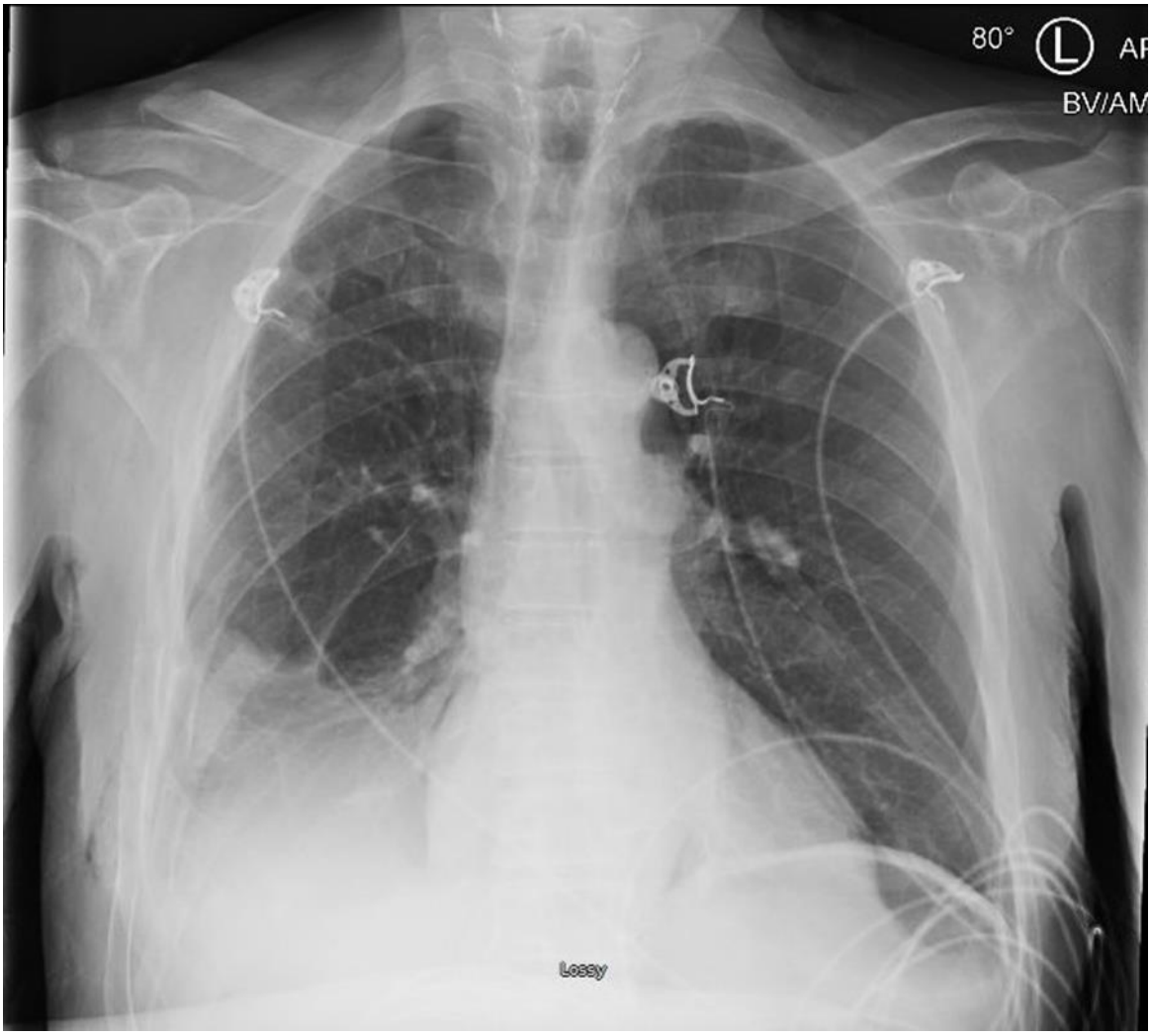

Fig-2:

Follow up chest x-ray upon discharge, showing decreased size of pneumothorax, decreasing right pleural effusion, and decreasing subcutaneous emphysema.

Eleven days following initial trauma, the patient was brought in by ambulance with acute onset dyspnea that woke him from his sleep one hour prior to arrival (**Fig-3**). He had generalized weakness and light headedness throughout the day, and as a result was unable to ambulate by late evening. Patient's oxygen saturation was noted to be 83% on his home pulse oximeter and called EMS. He also reported having slept upright since discharge from hospital. There were no new falls or trauma. Initial vital signs in ED showed blood pressure 87/53 mmHg, heart rate of 72 beats per minute, respiratory rate 18 breaths per minute, oxygen saturation 99% of 2L nasal cannula. The patient's physical exam revealed severely diminished breath sounds at the right lung base. His initial laboratory studies showed significant anemia with hemoglobin of 8.8 gm/dL and hematocrit of 23.4%. He also had elevated d-dimer 2,270 DDU ng/mL and lactate 2.44 mmol/L. Troponin I, BNP, as well as the remainder of the metabolic panel and CBC were unremarkable. CT

angiography of chest demonstrated a large, loculated, right hemothorax. His repeat CBC showed a hemoglobin of 7.8 gm/dL and a hematocrit of 23.4%. Patient was stabilized with intravenous fluids and transfusion with 2 units of PRBCs, and was admitted to the intensive care unit.

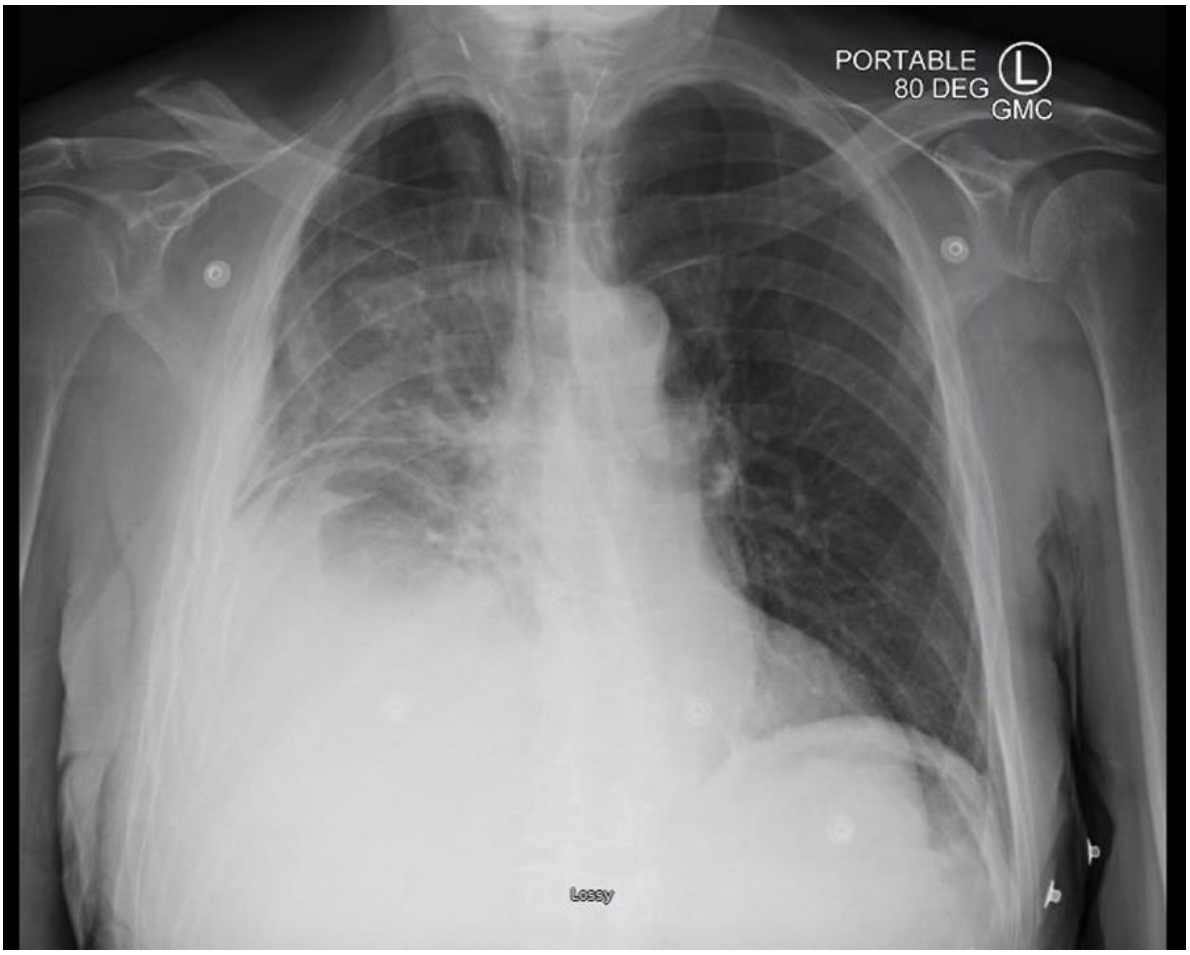

Fig-3:

Chest x-ray performed in emergency department eleven days following initial trauma, demonstrating moderate to large volume right-sided effusion with consolidation pneumonitis atelectasis. Interval worsening compared to prior study.

A right-sided CT-guided chest-tube was placed draining 3L of serosanguinous fluid. Follow-up CT chest demonstrated retained right loculated hemothorax and videoassisted thoracoscopic surgery (VATS) was performed on the third day of admission. VATS showed adhesions with fibrothorax of right middle and lower lobes, and hemothorax in right pleural space. Procedure was converted to an open thoracotomy for evacuation of the hemothorax, decortication, repair of rib fractures and placement of two chest tubes (**Fig-4**). The patient remained hemodynamically stable without recurrence of pneumothorax or hemothorax, and was discharged six days following procedure.

Discussion

Delayed hemothorax should be carefully considered and anticipated in all patients presenting with thoracic injuries. Detection of delayed hemothorax in these patients is hindered by conflicting literature regarding the necessity of follow-up imaging studies [7,8] and perception of its rarity. The incidence of delayed hemothorax in patients with thoracic trauma has been reported between 7.4 - 11.8% in prior prospective studies [9,10]. This is considerably greater than the incidence of delayed pneumonia (4%), an often considered sequelae of rib fracture [11,12], arguing for greater consideration of delayed hemothorax in thoracic trauma.

Case Report

Fig-4:

Postoperative chest x-ray, showing interval placement of right apical and right basilar chest tubes. There is a notable decrease in size of the left-sided pleural effusion and re-expansion of the right lung. Left hemithorax is clear.

Clinical decision rules and consideration of patient-specific factors should guide patient management in the setting of thoracic trauma with rib fracture. In particular, elderly patients and patients with multiple or displaced rib fractures [13] are at significantly higher risk for development of delayed hemothorax. Émond et al. highlighted the importance of risk factor identification within chest trauma patients [9]. This 2017 prospective study derived and validated the Quebec clinical decision tool to risk stratify emergency department patients for development of delayed hemothorax based upon consideration of patient age (> 70 yr, 2 points; 45-70 yr, 1 point), presence of a high- to mid-rib fracture (ribs 3-9, 2 points), and presence of 3 or more rib fractures (1 point). Our patient scored high-risk (≥ 4) for delayed hemothorax upon initial ED visit. A greater suspicion for delayed hemothorax in our patient may have informed patient education, resumption of aspirin therapy, and follow-up to rapidly detect hemothorax and avoid life-threatening ED presentation.

Tube thoracostomy is commonly necessary and sufficient for management of delayed hemothorax [14]. The importance of rapid recognition and evaluation of delayed hemothorax is further underscored due to the uncommon yet serious complication of retained hemothorax, with a reported incidence of 5-30%, that largely require surgical intervention [15,16]. An even rarer manifestation of delayed hemothorax is the

incidence of fibrothorax, reported to be found in 1% of retained hemothoraces, which also indicates surgical management with open thoracotomy [17]. Our patient's presentation of delayed hemothorax was initially intervened by VATS, which was converted to an open thoracotomy due to the presence of fibrothorax. Given the mortality often associated with these complications, delayed hemothorax should be regularly considered among critical manifestations of chest wall trauma.

Conclusion

Delayed hemothorax is an infrequently considered sequelae of chest wall trauma, however its clinical relevance is equal to or greater than that of other oft considered complications. Consideration of patient-specific factors and utilization of the Quebec clinical decision rule may better inform risk stratification for the development of delayed hemothorax, and improve patient outcomes via informed education and follow up [9]. While tube thoracostomy is often sufficient in management, the development of retained hemothorax or fibrothorax are less common complications that require invasive management [17]. The mortality associated with these complications underscores the importance of identification of delayed hemothorax.

Conflict of Interest

The authors have read and approved the final version of the manuscript. The authors have no conflicts of interest to declare.

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