

Unrecognized Hemo-Pneumothorax from Major Chest Injury Leads to Fatal Condition: A Case Report



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Abstract

A case of major chest injury with multiple fractured ribs and unrecognized hemo-pneumothorax is presented. The patient, initially hit by a truck, was admitted for a few days with conservative treatment. A 2nd examination of the chest revealed hemothorax but no additional treatment was provided. Nine days after discharge, the patient returned to the hospital with persistent chest pain. Three weeks later, the patient developed high fever (38.2 °C). Blood examination showed leukocytosis with predominant polymorphonuclear cells. A chest tube was inserted into the right chest and the patient was transferred to a higher trauma center for an operation, which revealed 2,000 ml of clotted blood, and 500 ml of pus. Pus culture was positive for *Staphylococcus aureus*. Two weeks after the operation, the patient passed away with severe sepsis along with acute renal failure, liver failure, and disseminated intravascular coagulopathy (DIC). Unrecognized hemo-pneumothorax from major injury should be included in differential diagnosis. Insufficient care may lead to a fatal condition. Rural hospitals should be equipped with modern digitalized x-ray equipment for picture archiving and communication system (PACs) and telecommunication for consultation with specialists in tertiary hospitals.

Keywords: hemo-pneumothorax, major chest injury, thoracic CT scanning, digital radiography, subcutaneous emphysema, rural hospital

Occult hemo-pneumothorax may remain unrecognized on conventional chest x-ray examinations due to poor image resolution. In the case of a major chest injury, digital radiography and computed tomography (CT) of thoracic scanning are recommended to reduce the risk of misdiagnosis. In addition, a digital system is required in rural hospitals for picture archiving and communication system (PACs), telecommunication and consultation with a tertiary hospital whenever this is required. This is a sample case for presentation as follows.

Case Report

A 68-year-old man presented at a rural hospital with a major chest injury after being hit by a truck. The initial diagnosis was multiple-fractured ribs (right 6th-8th ribs) without hemothorax or pneumothorax, however, a subsequent review of an AP chest x-ray supine position revealed no lung markings at the apex of the right chest (Figure 1 arrow). Small areas of subcutaneous air density were observed on the border of the right lateral chest wall compared with the left side (Figure 1 arrow head). The patient was admitted to the rural hospital for observation for two days. A subsequent chest film taken on the day after admission showed blunt costo-phrenic angle of the right side which was consistent with hemothorax (Figure 2) but no further management was provided. Nine days after discharge, the patient went back to the same hospital with persistent chest pain. He denied that there had been any additional chest trauma. The chest film showed progressive hemothorax with more displacement of rib fractures (Figure 3), but there was no chest tube (ICD) insertion. Three weeks later, he then developed dyspnea

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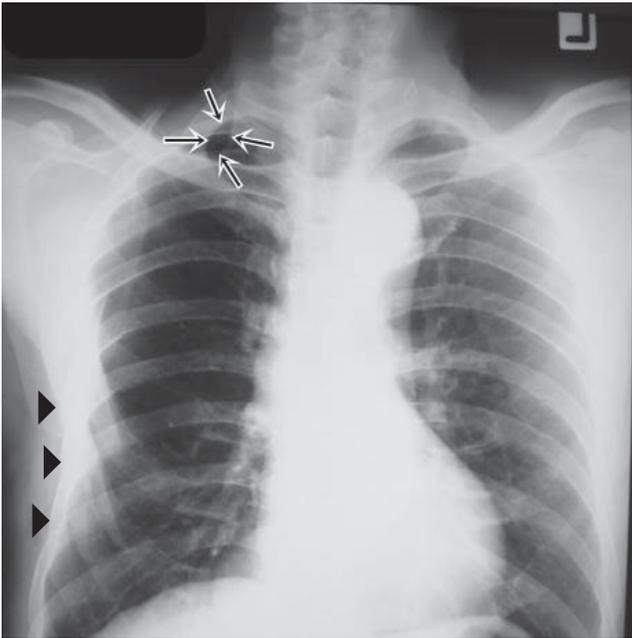


Figure 1: An upright chest film showing fracture of the right 6th-8th ribs with evidence of pneumothorax which presented as hypo-density area without lung marking at the apex of the right chest (arrow) and small areas of subcutaneous emphysema (arrow head). The right side of the chest also showed hypo-density compared with the left side, but many lung markings were also presented.

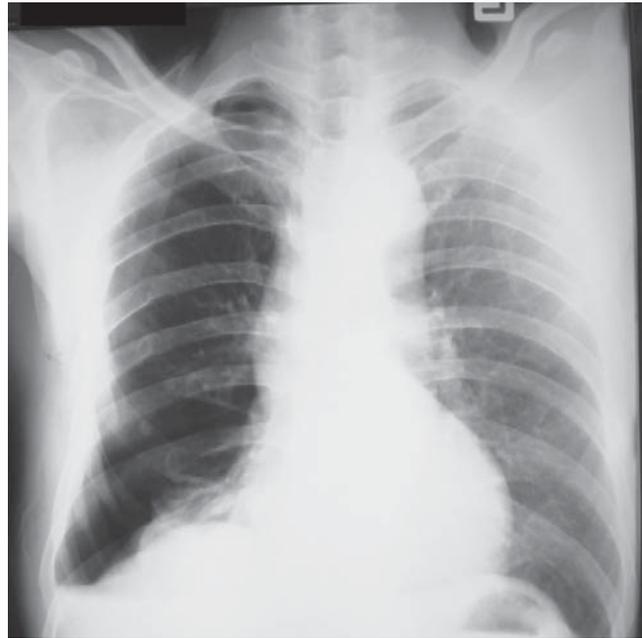


Figure 2: An upright chest film showing fracture of the right 6th-8th ribs with evidence of pneumothorax and hemothorax (blunt costophrenic angle on the right side).

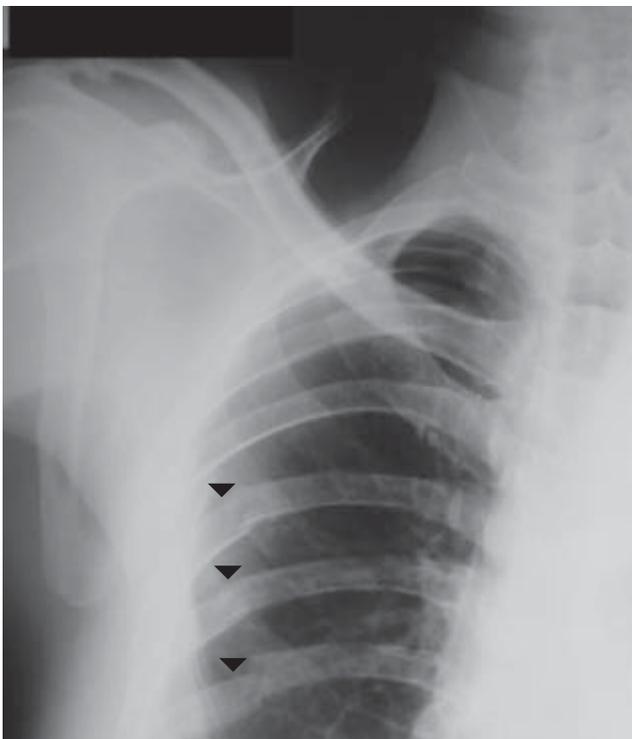


Figure 3: An upright chest film showing more hemothorax on the right chest with more displacement of rib fractures (6th-8th) compared with Figure 2.



Figure 4: An upright chest film showing massive right hemothorax with ICD in the right chest.

with fever (38.2 °C), leukocytosis with polymorphonuclear predominance and came back to the same hospital. He was diagnosed with a massive right hemothorax and ICD was inserted into the right chest (Figure 4).

Finally, he was transferred to the higher trauma center for a chest operation which revealed 2,000 ml of clotted blood with 500 ml of pus in the right chest cavity. Staphylococcus aureus was isolated from the pus culture. The patient was diagnosed with a massive hemothorax with empyema thoracis. He expired from severe sepsis and other complications resulting from acute renal failure, liver failure, and disseminated intravascular coagulopathy (DIC) two weeks after surgery.

Discussion

Ball CG¹ found that more than 50% of all traumatic pneumothorax in seriously injured patients were missed by the standard supine AP trauma chest x-ray. For this case, either overlooking subcutaneous emphysema on a plain chest x-ray examination or inadequate chest x-ray examination in a rural hospital where conventional analog radiographic system has been equipped or both resulted in an unrecognized pneumothorax. Subcutaneous emphysema can result from airway injury, lung injury, or blast injury. The underlying related-injury must be searched for.² Subcutaneous emphysema, pulmonary contusion, and rib fracture(s) are independent predictors of occult pneumothorax.¹ The presence of multiple-fractured ribs in this case should be considered and a search for other evidence of pneumothorax should be undertaken. The presence of an apical pleural stripe and a clearly visible cardiophrenic sulcus should have drawn attention to the diagnosis of pneumothorax.³ An upright, expiratory chest film will aid in the diagnosis.² Misdiagnosis for serious conditions may also result from poor resolution of conventional chest x-rays. Thus, digital x-ray equipment should be used to improve image resolution particularly where there is any doubt regarding the diagnosis. Thoracic CT scanning is

the gold standard for detecting traumatic occult pneumothorax and it is the imaging modality of choice for the seriously injured, even in stable blunt trauma patients.³ Thoracic CT scanning may be used for confirmation.³ Recently, with regards to rib fractures, digital chest tomosynthesis has been applied successfully for early detection of occult fracture instead of a CT. This is not only because of its lower cost, and low radiation dosage, but also because this method is a faster examination than CT.⁴ Any pneumothorax is best treated with a chest tube insertion. Observation and aspiration of an asymptomatic pneumothorax may be appropriate, but a choice should be made by a qualified doctor, otherwise, placement of a chest tube should be performed.² A simple pneumothorax can readily convert to a life-threatening tension pneumothorax, particularly if it is unrecognized initially and a positive-pressure ventilation is applied.² An acute hemothorax large enough to appear on a chest x-ray film is best treated with a large-caliber chest tube. The chest tube evacuates blood, reduces the risk of a clotted hemothorax, and importantly, provides a method for continuous monitoring of blood loss.² Delayed ICD insertion could have led to the empyema and sepsis in this case. The complications from acute renal, liver failure, and DIC resulted in a fatal outcome for this patient. The proper management of this condition was not applied in this case. Rural hospitals should be equipped with modern digitalized x-ray system for PACs and telecommunication in order to consult with a tertiary hospital with specialists and modern equipment when help is needed.

Conclusion

Unrecognized hemo-pneumothorax from major trauma may lead to unfavorable and severe complications. Misdiagnosis can be caused by inadequate management. A high index of suspicious serious complications in major chest trauma should be considered. Rural hospitals require modern digitalized x-ray equipment with facilities to consult with tertiary care hospitals by PACs and telecommunication when required.

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