

**RESEARCH ARTICLE**

COUGH-INDUCED RIB FRACTURES DURING PNEUMONIA: A DIAGNOSTIC PITFALL IN EMERGENCY MEDICINE – A CASE REPORT

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Abstract

Cough-induced rib fractures are a rare but probably underdiagnosed complication of persistent cough, particularly in the context of respiratory infections. We report the case of a 52-year-old man presenting with persistent chest pain in the context of pneumonia, in whom the final diagnosis was multiple bilateral rib fractures secondary to prolonged coughing. This case highlights a common diagnostic pitfall in emergency medicine, where chest pain is often attributed solely to pulmonary pathology. Computed tomography plays a crucial role in diagnosis, especially when chest radiography is inconclusive. Early diagnosis allows for appropriate pain management and the prevention of respiratory complications.

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Introduction:-

Rib fractures are most often associated with chest trauma. However, non-traumatic rib fractures, particularly those induced by coughing, are increasingly reported but remain underdiagnosed (1,2). Persistent coughing generates repeated mechanical stresses on the rib cage, leading to stress fractures, particularly in the middle ribs (2,3). These fractures generally occur in patients with underlying respiratory conditions such as pneumonia, bronchitis, or chronic obstructive pulmonary disease (1,4). Despite their apparent benignity, these fractures can be responsible for significant morbidity due to pain-induced hypoventilation and secondary respiratory complications. We report a case of multiple bilateral rib fractures complicating pneumonia, emphasizing diagnostic pitfalls and clinical implications.

Observation:-

A 52-year-old patient, a chronic smoker (approximately 20 pack-years), with no known metabolic or bone history, presented to the emergency department with persistent right-sided chest pain. The illness began two months ago with respiratory symptoms including a persistent, hacking cough and flu-like symptoms, developing in a context suggestive of pneumonia. Chest pain appeared gradually, becoming localized, mechanical in nature, and exacerbated by coughing and deep breathing. On clinical examination, the patient was hemodynamically stable, with a respiratory rate of 18 breaths per minute and an oxygen saturation of 96% on room air. The examination revealed tenderness to palpation of the right lateral chest wall, without signs of respiratory distress. An electrocardiogram was performed and was normal. Laboratory tests revealed a white blood cell count of $9.9 \times 10^3/\mu\text{L}$ and an elevated CRP

of 12.4 mg/L, consistent with a moderate inflammatory syndrome. Hemoglobin was 15.3 g/dL and platelet count was $234 \times 10^3/\mu\text{L}$. Renal function was normal with a creatinine level of 6 mg/L, troponin was 1.3 ng/L, and liver function tests were unremarkable. Serum electrolytes were normal, with a normal calcium level. Given this clinical presentation, several differential diagnoses were considered, including pulmonary embolism, pleural pain related to pneumonia, musculoskeletal pain, and a pathological fracture. However, in light of the clinical data, the normal electrocardiogram, the laboratory results, and the imaging, these diagnoses were ruled out.

The chest X-ray was unremarkable. A chest CT scan revealed simple fractures of the 6th, 7th, and 8th right ribs, as well as a fracture of the 5th left rib (Figures 1 and 2). There was no evidence of traumatic lung parenchymal injury, pleural or pericardial effusion, or mediastinal or axillary lymphadenopathy. No intra-abdominal abnormalities were visualized on the scans. No history of chest trauma was reported. The diagnosis of multiple cough-induced rib fractures in the context of pneumonia was made. The patient received conservative treatment combining progressive analgesia, including level II analgesics, and treatment for pneumonia. The outcome was favorable, with progressive improvement in pain and no respiratory complications.

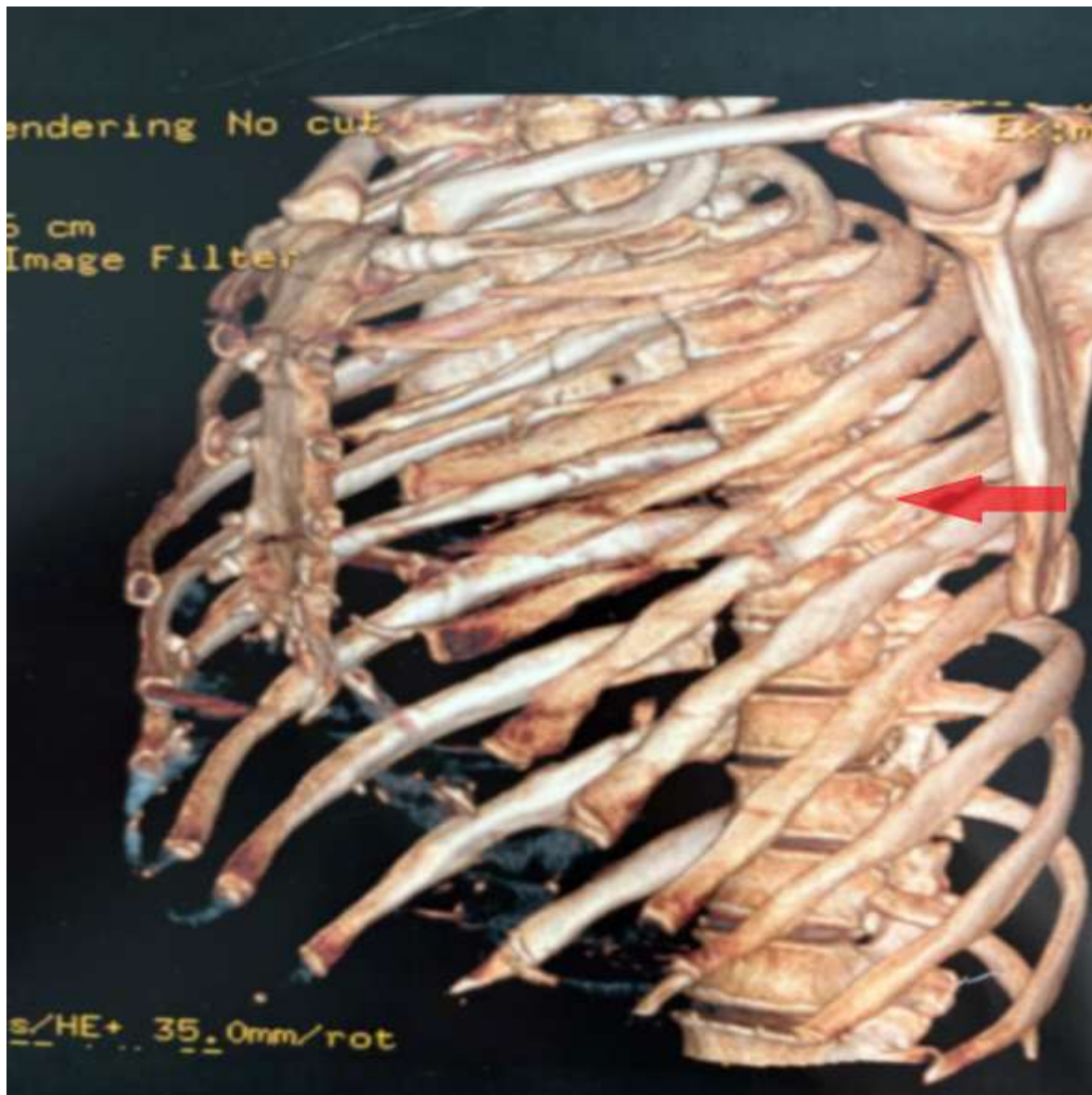


Figure 1: Three-dimensional reconstruction by computed tomography (CT) showing a fracture of the 5th left rib (arrow).

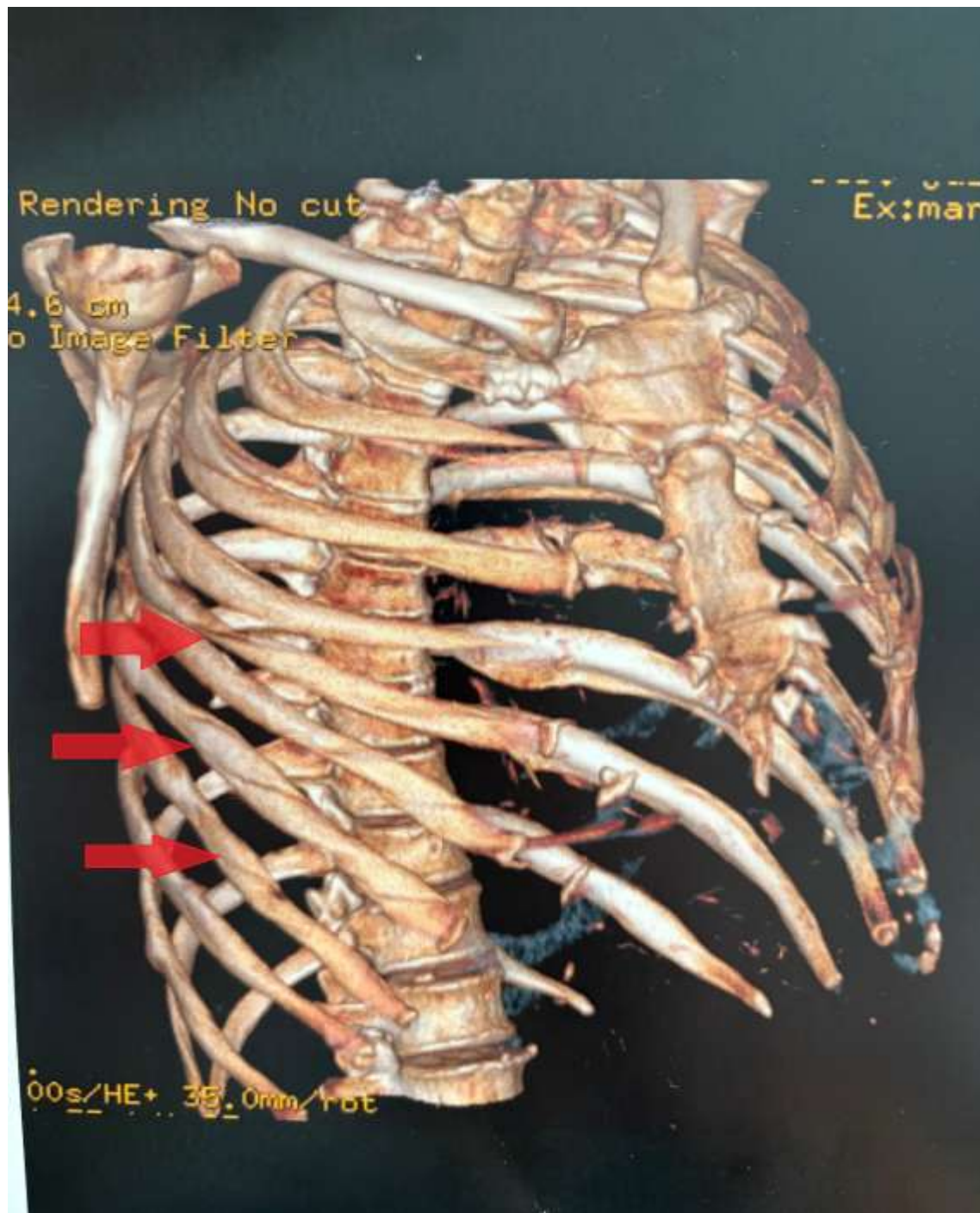


Figure 2: Three-dimensional reconstruction by computed tomography (CT) showing multiple fractures of the right costal arches (6th, 7th and 8th ribs) (arrows).

Discussion:-

Cough-induced rib fractures are a rare but probably underdiagnosed condition, particularly in patients with persistent or severe cough (1,2). In a large series reported by Hanak et al., the mean age of the patients was approximately 55 years, which is consistent with our observation (1). From a pathophysiological standpoint, these fractures correspond to stress fractures resulting from repeated increases in intrathoracic pressure. The mechanical forces generated by coughing involve complex interactions between inspiratory and expiratory muscles, particularly the intercostal muscles, the diaphragm, and the serratus anterior muscle (2,3). These opposing forces induce shear stresses on the

ribs, especially at the mid-ribs (5th to 9th ribs), which are the most frequently affected (1,3). In addition, factors such as smoking, age-related bone fragility and possible subclinical osteopenia may contribute to decreased bone strength, even in the absence of identified bone pathology (4,6).

Clinically, diagnosis is often difficult because chest pain is frequently attributed to the underlying lung disease. This constitutes a major diagnostic pitfall in emergency medicine (4,5). Persistent, localized chest pain triggered by movement should raise suspicion of this diagnosis. Imaging plays a central role. Chest radiography has limited sensitivity, particularly for non-displaced fractures (1). Computed tomography is the gold standard, allowing for precise detection of fractures and assessment of associated complications such as pneumothorax or atelectasis (5,6). Several similar cases of multiple, sometimes bilateral, cough-induced fractures have been reported, particularly in infectious contexts (6). Our observation is consistent with this trend and underscores the importance of considering this diagnosis in patients presenting with pneumonia associated with persistent chest pain. Management is generally conservative and relies on effective analgesia and treatment of the underlying cause (4,7). Adequate pain control is essential to prevent hypoventilation and secondary respiratory complications such as atelectasis or pulmonary infections (7). This case highlights that persistent chest pain in pneumonia should not be systematically attributed to lung involvement alone, and that rib fractures should be actively considered.

Conclusion:-

Cough-induced rib fractures are an underdiagnosed cause of chest pain in patients with pneumonia. Persistent or atypical chest pain should not be automatically attributed to lung disease alone. Computed tomography (CT) is essential for diagnosis. Early recognition and appropriate management help prevent complications. This case highlights the importance of rigorous clinical reasoning to avoid diagnostic errors.

Key points:-

- Persistent chest pain during pneumonia should raise suspicion of a rib fracture.
- Coughing can lead to stress fractures even in the absence of trauma
- A chest X-ray may be normal; a CT scan is the gold standard examination.
- Effective pain relief is essential to prevent respiratory complications.

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