Cough-induced Rib Fracture: An Unusual Cause of Acute Chest Pain

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Cough is one of the most common symptoms for which patients seek medical assistance. Usually, patients with cough recover without significant sequelae; however, violent cough can occasionally lead to complications such as pneumothorax and rib fracture. We reported a 34-year-old man who presented to our Emergency Department with intermittent non-productive cough for 2 weeks and sudden onset of right chest pain after an episode of violent paroxysmal cough. The initial chest radiograph revealed no abnormality. The subsequent chest computed tomography demonstrated linear non-displacement fracture at lateral aspect of right seventh rib. Cough-induced fracture of the rib should be suspected in a patient who presents with prolonged or severe coughing and abrupt onset of chest pain after cough.

Key words: cough, chest pain, rib fracture

Introduction

Although rib fractures are often related to blunt chest trauma, only few reports discuss rib fracture secondary to coughing (1-5). Because cough-induced fractures often occur simultaneously with an underlying disorder, initial diagnosis is often difficult (6).

Case Report

A 34-year-old man was brought to the emergency department (ED) for evaluation of severe right chest pain for two hours and cough for 10 days. He was not seized with whooping cough, persistent paroxysmal cough, or post-tussive vomiting. He had undergone several general physical examinations without significant findings. Approximately two hours prior to presentation, he felt a sudden severe sharp pain over the anterolateral aspect of his right chest wall after a violent paroxysmal cough. The chest pain over the anterolateral aspect of the right chest wall became worse while he was bending forward during coughing. He denied having any significant medical history or having undergone any trauma. On arrival in the ED, his blood pressure was 118/72 mm Hg, with a heart rate of 90 beats per minute and a respiratory rate of 18 breaths per minute. He had severe chest pain along with localized tenderness, but no palpable crepitus. His biochemical profile, coagulation function, cardiac makers, and platelet count were within the reference ranges. No remarkable findings were noted on chest radiography (Fig. 1). He was treated...
as myofacial pain with injection of Ketoprofen, oral acetaminophen and muscle relaxant, but his symptom got not improved with our medical treatment. The subsequent chest computed tomography (CT) (Fig. 2A) with volume-rendered image of ribs demonstrated linear non-displacement fracture at lateral aspect of right seventh rib (Fig. 2B). The patient gradually got improved after receiving another injection of analgesic and was discharged later on the same day. At a 2 weeks follow-up, the patient was doing well.

Discussion

Cough is one of the most common symptoms for which patients seek medical assistance. Usually, patients with cough recover without significant sequelae; however, violent cough can occasionally lead to complications such as pneumothorax and rib fracture\(^7\). Cough is usually self-limited and uncomplicated but can be associated with complications, particularly when chronic. One of the recognized complications is rib fracture\(^8\). Repetitive coughing paroxysms can lead to rib stress fractures\(^6\). Such rib fractures that are non-displaced or affect only one aspect of the bony cortex (analogous to the greenstick fractures in children) are often difficult to detect with radiography\(^6\). Rib fractures were most common along the lateral (50%) aspect of the rib cage followed by anterior (26%) and posterior (24%) locations; this distribution was similar for both right and left sides\(^8\). Two mechanisms have been proposed to explain cough-induced rib fracture\(^9\). A strong bending force on the middle third of the rib might result in tiny cracks on the rib. If repeated bending forces are exerted on the rib, such as those exerted during chronic cough, a thorough fracture will eventually result. The second plausible mechanism is related to the shearing forces generated by the serratus anterior and external oblique muscles, which interdigitate on the middle third of the rib. These two groups of muscles are antagonistic, and the opposite forces exerted by them on the rib during coughing could gradually establish a rib fracture\(^9\).
The typical manifestations of rib fracture include localized pain in the chest wall, worsening discomfort during chest wall movement, and crepitation with a palpable bump over the chest wall\(^{(10)}\). According to previous studies, cough can induce rib fracture most frequently on the lateral aspect of the fifth through ninth ribs\(^{(1,8,9)}\). In addition, female predominance has been well documented in case reports\(^{(1,8)}\). Despite its rare occurrence, rib fractures may lead to serious complications, such as pneumothorax, hemothorax, pneumomediastinum, lung contusion, and flail chest\(^{(1,8)}\).

Low bone mineral density (BMD) has been proposed as a risk factor for rib stress fracture\(^{(8)}\). However, our patient had normal BMD, unlike those presented in previous literatures regarding either osteopenia- or osteoporosis-related rib stress fractures. Although chest radiographic findings are negative in 60% of patients with rib fracture\(^{(8)}\), CT was an alternative technique for detecting rib fractures with extremely high sensitivity when chest radiography fails to provide a definitive diagnosis\(^{(11)}\).

In summary, cough-induced fracture of the rib should be suspected in a patient who presents with prolonged or severe coughing and abrupt onset of chest pain after cough.

**References**


咳嗽引起肋骨骨折：一個不尋常的急性胸痛原因

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咳嗽是尋求醫療最常見的症狀之一。通常情況下，治療咳嗽後沒有顯著的後遺症，但劇烈的咳嗽，有時會導致併發症，如氣胸和肋骨骨折。我們報告一位34歲的男子間歇性的咳嗽2週，劇烈的陣發性咳嗽發作後右胸痛突然發作。胸部X光顯示無異常。其後的胸部電腦斷層發現右第七肋骨側面線性非位移性骨折。如病人表現為長期或嚴重的咳嗽，一但突然胸痛發作時應懷疑咳嗽引起的肋骨骨折。

關鍵詞：咳嗽，胸痛，肋骨骨折