Spontaneous Rib Fracture Caused by Coughing: Report of Two Cases

ÖKSÜRÜK SONUCU GELİŞEN SPONTAN KOT FRAKTÜRÜ: İKİ OLGU SUNUMU

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Abstract

Spontaneous rib fracture is a distinctly rare event, regardless of its underlying pathological causes. Two male patients 52 and 57 year-old with atypical-pneumonia and chronic bronchitis were admitted to our emergency unit with severe chest pain. Physical examination and chest X-ray revealed single rib fracture in both patients. We report those cases with spontaneous rib fracture caused by vigorous coughing and also discuss the possible pathophysiological mechanisms underlying the fractures.

Key Words: Rib fractures; cough; complications

Özet

Spontan kot fraktürü altta yatan patolojik bir neden yok ise oldukça ender görülen bir durumdur. 52 ve 57 yaşlarında 2 erkek hasta şiddetli göğüs ağrısı nedeni ile acil polikliniğimize başvurdu. Olguların sırası ile atipik pnömoni ve kronik bronşit öyküleri mevcut idi. Her iki hastada fizik muayene ve akciğer grafileri sonucu spontan kot fraktürü tespit edildi. Bu olgu sunumunda, şiddetli öksürük sonucunda kot fraktürü gelişen 2 olgu ve bu fraktürlerin oluşumunda altta yatan muhtemel patofizyolojik mekanizmalar tartışılmıştır.

Anahtar Kelimeler: Kot fraktürü; öksürük; komplikasyon

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Coughing is a crucial defense mechanism for keeping foreign bodies out of the tracheobronchial tree. However, vigorous coughing may lead to several complications.[1-3] Spontaneous rib fracture (SRF) secondary to coughing is a rare entity. Most SRFs are the result of osteoporosis due to older age, renal failure, metastatic tumors, or therapy.

In this report, we present two cases of unusual cough-related stress injuries to the ribs and review the related literature.

Case Reports

Case 1

A 52-year-old man presented to our emergency medicine department with the onset of sudden chest pain on the right side, radiating toward the right arm, after forceful paroxysmal coughing due to atypical pneumonia. Physical examination revealed moderate tenderness over the eighth rib at the right posterior axillary line of the chest wall. There was no history of thoracic trauma, osteoporosis due to chronic renal disease, or any metabolic disease. Bone densitometry results were within normal limits. A chest x-ray revealed a spontaneous fracture of the eighth right rib, which recovered after 25 months (Figure 1).

Case 2

A 57-year-old man presented to our emergency medicine department with sudden pain in the upper chest, radiating toward the right arm, after strong paroxysmal coughing due to aggravation of chronic obstructive pulmonary disease symptoms associated with viral infection. On examination, he had mild tenderness over his right chest. The patient denied any trauma or pathological causes. There was no history of thoracic trauma. Bone densitometry results were within

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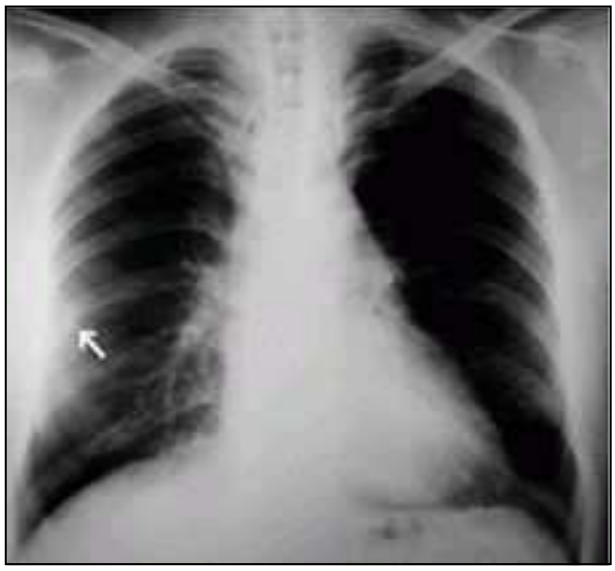

Figure 1. Chest radiograph showing fracture of the right eighth rib (arrow).

normal limits for the patient's age. A chest x-ray revealed spontaneous fracture of the seventh right rib and a 4 × 5 cm extrapleural hematoma of homogeneous density in the middle portion of the right hemithorax (Figure 2). The patient was admitted to the hospital for observation. He was symptom-free, with spontaneous resolution of the extrapleural hematoma within 1 month. At 20 months of follow-up, chest x-ray findings were normal.

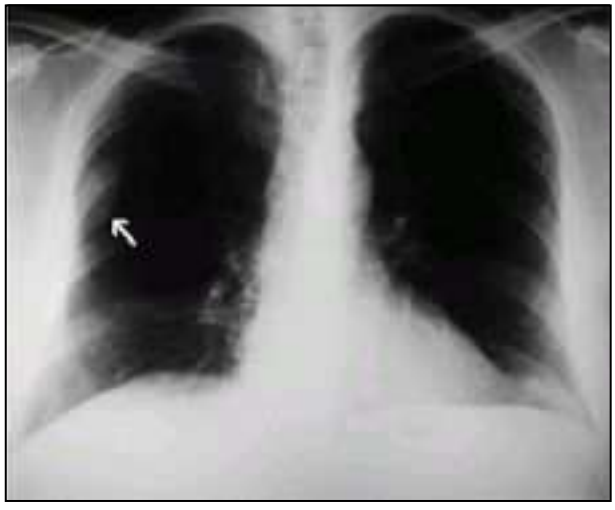

Figure 2. Chest radiograph showing fracture of the lateral arch of the right seventh rib and extrapleural hematoma (arrow).

Antimicrobial therapy was prescribed to first patient. The patients' bone densitometry readings were within normal ranges. Both patients were discharged without any complication, and treatment was continued with oral nonsteroidal anti-inflammatory drugs and muscle relaxants.

Discussion

Fractures of the rib may be classified by cause into 3 categories: Traumatic, pathological, and stress fractures. The most common cause of rib fracture is trauma. Pathological fractures may be encountered secondary to malignancy and osteoporosis. When repetitive opposing physical forces due to lifting and carrying objects overcome the limits of fatigued bone, stress fracture occurs.[4] Such fractures usually occur on the first rib as a result of repeated pulling of the surrounding muscles.[5] Cough fracture is a specific and less-common type of stress fracture.[6] Cough is a preserving, vital defense mechanism of the airways. Extreme changes in intrapleural pressure due to active contraction of inspiratory and expiratory muscles during coughing may result in various complications.[1,2]

Mechanisms of SRF include an increase in intrathoracic pressure (eg. coughing) or strenuous lifting. When muscle contraction is applied to a rib, it will cause stress. If the stress exceeds the elastic limit of the rib, the rib undergoes inelastic deformation. Repeated trauma, as in paroxysmal cough, may produce inelastic deformation of the mid portion of the third ribs, the point at which the ribs are most vulnerable. Cough fractures most commonly involve the fifth to tenth ribs, as in the two cases described in this report, whereas most other types of stress fracture more frequently occur on the first rib.[1,4-7]

Conversely, in a series of 12 patients, Oechsli described another mechanism in the development of stress fracture due to coughing.[8] According to the author, in case of high intrathoracic pressure due to coughing, the diaphragm may take on a role of an expiratory muscle. It attaches to the lower 6 ribs and their cartilages. The remaining expiratory

muscles, the abdominal muscles (internal and external oblique), attach to the fourth through tenth ribs at the midaxillary line. The inspiratory muscles (serratus anterior) attach at the same line. The opposing actions of these muscles on the ribs may result in cough fractures. In the current cases, the SRF of coughing occurred on a lateral arch of the right seventh and eighth ribs.

SRFs may be due to osteoporosis caused by older age, renal failure, pregnancy, chronic steroid use, mechanical ventilation, and radiation-therapy.[9] In our cases, the patients' risk factors included chronic obstructive pulmonary disease and coughing related to viral infection, and atypical pneumonia without chest trauma and pathological causes.

Chest roentgenograms are the most frequently used radiological procedures in the diagnosis of cough-induced fractures of the rib. However, they may not reveal evidence of rib fractures in all cases. Thin-section, angulated, helical computed tomography scan may be directly performed and focused on painful areas of the chest wall.[3] In addition, bone scintigraphy may reveal abnormal radionuclide concentrations on hidden fractures.[10] Chest roentgenograms were able to reveal SRFs in our cases.

Decision-making criteria in the treatment of SRF are closely related to the clinical condition of the patient. Pharmacological treatment and close clinical observation are the choices of treatment in such patients. However, surgical intervention may be indicated in the presence of some complications such as a large hematoma, diaphragmatic rupture, and lung hernia.[1,2] Complete spontaneous resolution of the extrapleural hematoma was observed in our patient after pharmacological treatment. Pain management was the only required treatment for both of our patients.

In conclusion, cough-related stress fracture is a rare complication. A high degree of suspicion in cases of acute onset of chest pain after coughing may prevent delay in the diagnosis of stress fractures.

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