**ISSN:** 2584-0355
**DOI:** doi.org/10.51219/MCCRJ/Zovko-Tanja/88

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https://urfpublishers.com/journal/case-reports

Vol: 2 & Iss: 2

*Case Report*

# Cough-Induced Rib Fracture in a Healthy Woman: A Case Report

**Zovko Tanja[1,2]*, Galic Kristina[1,2], Vasilj Marina[1], Goluza Sesar Marija[1,2], Zovko Stanko[3] and Mandic Miro[3]**

[1]Department of Lung Diseases and tuberculosis, University Clinical Hospital Mostar, Bosnia & Herzegovina

[2]Faculty of Medicine, University of Mostar, Bosnia & Herzegovina

[3]Clinic for Surgery, University Clinical Hospital Mostar, Bosnia & Herzegovina

**Citation:** Tanja Z, Kristina G, Marina V, Marija GS, Stanko Z, Miro M. Cough-Induced Rib Fracture in a Healthy Woman: A Case Report. *Medi Clin Case Rep J* 2024;2(2):328-330. DOI: doi.org/10.51219/MCCRJ/Zovko-Tanja/88

**Received:** 11 June, 2024; **Accepted:** 12 June, 2024; **Published:** 14 June, 2024

***Corresponding author:** Tanja Zovko MD, Department of Lung Diseases, University Clinical Hospital Mostar, Bosnia & Herzegovina, Phone: +38763-044-108, Fax: +38736336264; E-mail: tanjazovko@net.hr



## ABSTRACT

**Background:** Only a few cases of cough-induced rib fracture have been described in the medical literature. The impact of decreased bone mineral density (BMD) on traumatic rib fractures remains unknown. In this study, we presented a case of a healthy 41-year-old female patient who was detected to have cough-induced rib fracture during the evaluation of symptoms of chronic cough with pleuritic chest pain. The patient developed left sixth and ninth rib fractures, after severe coughing for three months secondary to upper respiratory tract infection. The patient was treated conservatively with good clinical outcome. Conservative treatment is the first-choice approach except in cases of complications when the surgical approach should be considered. Cough-induced rib fracture should be remembered as a possible diagnosis, as diagnostic delays increase the risk of complications.

**Keywords:** Rib fracture; Cough; Chest pain, Spontaneous fracture; Bone mineral density

## Introduction

Coughing is considered an important physiological defense mechanism that is often self-limited and uncomplicated. However, when severe, it can be associated with pneumothorax, pulmonary herniation, or rib fractures[1,2]. Most commonly, rib fractures are caused by a thoracic injury. Infrequently, after the onset of coughing, patients presenting with persistent chest pain are found to have rib fractures[3]. Studies so far showed that cough-induced rib fractures occurred most frequently on the lateral side of the fifth through ninth ribs[1], with the sixth rib being the most common site[4].

## Case Presentation

We presented a case of a healthy 41-year-old female patient who was detected to have cough-induced rib fracture during the evaluation of symptoms of chronic cough with pleuritic chest pain who developed left sixth and ninth rib fractures, after severe coughing for three months secondary to upper respiratory tract infection. A 41-year-old female presented to the pulmonologist complaining of respiratory discomfort, pain in the left chest, and non-productive cough, in the duration for three months. Three months ago she had an upper respiratory tract infection. Since then, she has had an irritating, non-productive cough, and she felt pain in the lower part of the chest during more intense coughing, more pronounced on the left side. During seven days before the examination, the pain increased and was more pronounced when touching the left chest wall, and when taking a deep breath. She used analgesic therapy as needed. The patient denies any recent chest injury, and is healthy so far. Physiological functions are

normal. She is a non-smoker and does not consume alcohol. The patient does not take any drug for any chronic or acute disease.

On clinical examination was eupnoic, with normal body temperature at 36.5 *C, acyanotic (SpO2: 95%), with normal blood pressure (120/70 mmHg). Physical examination revealed no remarkable findings except for tenderness upon palpation of the left chest wall, mainly in the left lower quadrant. Lungs auscultation showed normal findings without crepitation and wheezing. Blood tests were performed. A complete blood count and a metabolic panel ruled out anemia or plasma cell dyscrasia. Liver function tests, serum creatinine tests, thyroid function tests, parathyroid hormone, 25-hydroxy vitamin D levels, showed no abnormal findings except for a low vitamin D level. Blood calcium measurement and other relevant studies performed to rule out secondary etiologies of pathological rib fracture were unchanged.

**Table 1:** Laboratory findings.

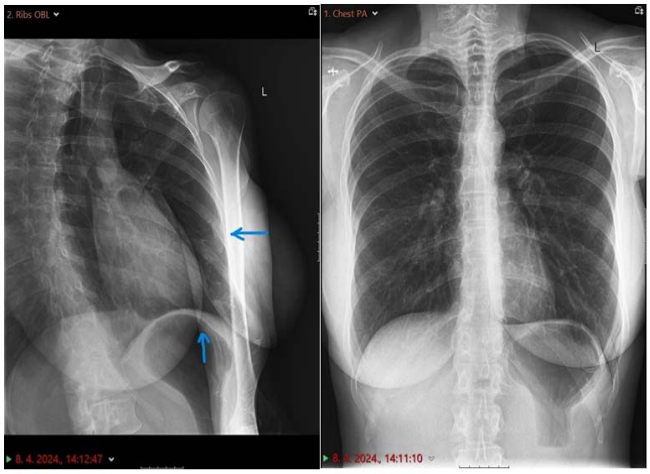
| Investigation | Value | Reference range with unit |
|---|---|---|
| WBC | 5.4 | 3.4–9.7 x× $10^9$/L |
| Hemoglobin | 133 | 138–175 g/L |
| Creatinine | 70 | 49–104 umol/L |
| Calcium | 2.42 | 2.14–2.53 mmol/L |
| CRP | 1.0 | 0.0–5.0 mg/L |
| AST | 16 | 11–38 U/L |
| ALT | 29 | 12–48 U/L |
| LDH | 155 | 124-241 U/L |
| GGT | 18 | 9–35 U/L |
| ALP | 84 | 54–119 U/L |
| 25-hydroxy vitamin D | 46.7 | 75–100 nmol/L |
| Total proteins | 74.2 | 66–81 g/L |
| Albumin | 47.1 | 40.6–51.4 g/L |
| TSH | 5.12 | 0.465–4.68 mIU/L |
| T4 | 14.9 | 10.0–28.2 pmol/L |
| PTH | 51.7 | 15.0–68.3 pg/mL |

**Abbreviations:** WBC, white blood cell; CRP, C-reactive protein; AST, aspartate aminotransferase; ALT, alanine transaminase; LDH, lacticacid dehydrogenase; GGT, gamma-glutamyltransferase; ALP, alkaline phosphatase; TSH, thyroid-stimulating hormone; T4, thyroxine; PTH, parathyroid hormone

## Methods (Differential Diagnosis, Investigations, And Treatment)

The chest X-ray posteroanterior (PA) and oblique radiograph projection view showed in the lateral part of the left sixth and ninth rib, visible fractures without major displacement of the bone fragments. There are no signs of pneumothorax. Lung parenchyma and bronchial wall thickness were normal **(Figure 1)**.

Osteodensitometry results showed signs of reduced bone mineralization at the level of osteopenia with the recommendation of antiresorptive treatment. The patient was examined by the thoracic surgeon who recommended conservative treatment, and the patient was discharged after pain control and supportive measures with antitussives and nonsteroidal anti-inflammatory drugs, and slowly improved. For chest pain, the patient was administered simple analgesia consisting of codeine phosphate, and acetaminophen. One month later, the patient completely recovered, and was symptom-free with no chest pain and with a complete normal examination with no pain in the ribs.




(A) (B)

**Figure 1**: **(A)** Radiological image of the thorax. Chest oblique and posteroanterior radiograph projection view (B). The blue arrow points an visible fractures of the left sixth and ninth ribs.

## Discussion

Cough-induced rib fracture is a very rare condition, with a few cases described in the medical literature[5]. Rib fractures may occur with chronic cough following chronic obstructive pulmonary disease, or bronchial asthma under steroid therapy. These were concluded to be risk factors for cough-induced rib fracture[6]. According to current knowledge, in most patients, the fracture is solitary (64.3%), and Sano et al. described the right side as the most common location (57%), especially the right tenth rib (42.8%)[4]. In our case, both fractured ribs were on the left side. The impact of decreased bone mineral density (BMD) on traumatic rib fractures remains unknown[7]. Conservative treatment is the first-choice approach. The surgical approach should be considered in cases of daily activities limiting symptoms (e.g. pain, dyspnea) or complications, such as pulmonary herniation, pneumothorax, or diaphragmatic laceration[8, 9].

## Conclusion

Our study showed sixth and ninth cough-induced rib fractures in a healthy female patient without an underlying predisposition. The only pathological finding recorded in our patient was mild osteopenia. It is important to remember this cause of pain after chronic cough, in the case of healthy individuals as a possible diagnosis. In conclusion, timely establishment of the diagnosis decreases the risk of complications, such as chronic pain and rupture of organs.

## Declarations

**Authors' contributions:** Tanja Zovko: Conceptualization; visualization; writing – original draft; writing – review & editing. Kristina Galic: Methodology; supervision; validation. Marina Vasilj: Data curation; writing; project administration. Marija Goluza Sesar: Investigation; resources. Stanko Zovko: Resources; software. Miro Mandić: Data curation; formal analysis.

**Author Disclosure Information:** Authors state no conflict of interest.

**Research funding:** Authors state no funding involved.

**Patient consent statement:** The signed informed consent was obtained from the patient for the publication of the case report.

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