

Brucellosis Mimicking Lung Cancer: A Case Report

Akciğer Kanserini Taklit Eden Bruselloz: Olgu Sunumu

¹Gokce Kulah, ²Tayfun Caliskan, ³Kadir Canoğlu, ⁴Özge Atış, ⁵Mustafa Çarkçı

Abstract

Brucella is a gram-negative intracellular microorganism that can infect humans when they come into contact with infected animals or consume certain foods, such as raw milk, unpasteurized cheese or undercooked meat. Brucellosis frequently develops with lung involvement. We present here a case who presented with brucellosis mimicking lung cancer. Although pulmonary involvement is a rare manifestation of brucellosis, it should be considered in the presence of persistent fever, arthralgia and pulmonary symptoms in areas where the disease is widespread. Lung cancer is carefully investigated by physicians due to its prevalence in the community and the high mortality rates involved, while brucellosis is less common in the community and has a relatively better prognosis. Brucellosis may be missed in patients lacking accurate anamnesis. Prolonged examination and treatment processes may lead to unnecessary expenses and the progression of the disease due to late diagnosis.

Keywords: Brucellosis, consolidation, Lung cancer.

Öz

Brusella, enfekte hayvanlarla temas ettiklerinde veya çiğ süt, pastörize edilmemiş peynir veya az pişmiş et gibi belirli gıdaları tükettiklerinde insanları enfekte edebilen gram-negatif hücre içi bir mikroorganizmadır. Brusellozun akciğer tutulumuna neden olması son derece nadirdir. Bu olguda akciğer kanserini taklit eden bir bruselloz olgusu sunulmuştur. Pulmoner tutulum brusellozun nadir görülen bir belirtisi olmasına rağmen, hastalığın yaygın olduğu bir bölgede bir hastada sürekli ateş, eklem ağrısı ve pulmoner semptomlar varsa dikkate alınmalıdır. Akciğer kanseri toplumda görülme sıklığı ve yüksek ölüm oranları nedeniyle hekimler tarafından dikkatle araştırılır. Bruselloz toplumda daha az görülür ve prognozu nispeten daha iyidir. Doğru anamnez alınamayan hastalarda bruselloz tanısında geç kalınabilir. Uzun süren tetkik-tedavi süreçleri ile geç tanıya bağlı olarak gereksiz harcamalara ve hastalığın ilerlemesine neden olabilir.

Anahtar Kelimeler: Akciğer kanseri, bruselloz, konsolidasyon.

¹Department of Pulmonology, Health Science University, Ümraniye Training and Research Hospital, İstanbul, Türkiye

²Department of Pulmonology, Anadolu Medical Center, Kocaeli, Türkiye

³Department of Pulmonology, Health Science University, Sultan II. Abdülhamid Han Training and Research Hospital, İstanbul, Türkiye

⁴Department of Internal Medicine, Çaycuma Public Hospital, Zonguldak, Türkiye

¹Sağlık Bilimleri Üniversitesi, Ümraniye Eğitim ve Araştırma Hastanesi, Göğüs Hastalıkları Kliniği, İstanbul

²Anadolu Sağlık Merkezi, Göğüs Hastalıkları Kliniği, Kocaeli

³Sağlık Bilimleri Üniversitesi, Sultan 2. Abdülhamid Han Eğitim ve Araştırma Hastanesi, Göğüs Hastalıkları Kliniği, İstanbul

⁴Çaycuma Devlet Hastanesi, İç Hastalıkları, Zonguldak

Submitted (Başvuru tarihi): 01.03.2024 **Accepted (Kabul tarihi):** 24.04.2024

Correspondence (İletişim): Gokce Kulah, Department of Pulmonology, Health Science University, Ümraniye Training and Research Hospital, İstanbul, Türkiye

e-mail: gokcekulah@gmail.com



Human brucellosis is a global zoonosis that is particularly prominent in undeveloped nations, leading to human illness and financial consequences for farms (1). *Brucella* is a gram-negative intracellular microorganism that can infect humans when they come into contact with infected animals or consume certain foods, such as raw milk, unpasteurized cheese or undercooked meat (2). Patients can exhibit such symptoms as fever, sweating, exhaustion and osteoarthritis, as well as potentially more serious problems in other organ systems (3). It is extremely uncommon for brucellosis to develop with pulmonary involvement (4). Brucellar infections can be diagnosed based on culture and serological testing, and nucleic acid amplification assays (5), while definitive diagnoses are not possible through routine screening tests. Curative treatments include antibiotic combinations and careful follow-up (6). We present here a case of brucellosis mimicking lung cancer.

CASE

A 56-year-old female patient presented to the emergency department with acute chest pain and dyspnea. She reported no cough, sputum, hemoptysis, fever, night sweats or weight loss, and there were no other known comorbidities. She had an ongoing 15 pack/year smoking history, but no alcohol or other substance use disorders. She had travelled to the Eastern Black Sea region 15 days earlier, but had no pet or occupational exposure. Her father contracted tuberculosis when she was 2 years old. She had no history of coronavirus and had not been vaccinated. The patient's oxygen saturation at room air was 98%, respiratory rate was 18/min, axillary temperature was 37°C, heart rate was 90/min and systemic blood pressure was 110/70 mmHg, and a physical examination was normal. BUN was 90 mg/dL, serum creatinine was 3.09 mg/dL, serum C-reactive protein was 183.73 mg/L, white blood cell count was $15.29 \times 10^3/\text{mm}^3$, hemoglobin was 11.8 g/dL, neutrophil count was $13.05 \times 10^3/\text{mm}^3$ and procalcitonin was 1.65 ng/mL in laboratory tests. A chest x-ray revealed opacities in the right upper and lower lobes (Figure 1a), while thoracic CT revealed focal areas of parenchymal consolidation in the basal zones of both lungs, as well as a mass in the upper zone of the right lung (Figure 1b and c). She was diagnosed with community-acquired pneumonia and admitted to the hospital and was started on ceftriaxone and clarithromycin treatment. A nephrology evaluation revealed acute-on-chronic renal failure, and so anti-acidosis therapy was recommended, and a daily renal function test was scheduled.

As a result of a lack of clinical and laboratory response to the treatments on the fourth day, the antibiotherapy was changed to piperacillin/tazobactam. Sputum ARB tests

were negative, a SARS-CoV-2 PCR test was negative, and no microorganism growth was observed in the sputum or blood cultures. A PET/CT scan revealed diffuse infection in both lungs, being described particularly in the right lung and lymph nodes, raising concerns for malignant-metastatic processes. A heterogeneous enhanced FDG uptake was noted in the bone marrow, particularly in the sacrum and left femoral neck. During a detailed system interrogation, the patient also mentioned back pain. During a thorough questioning of the patient's history it was discovered that she had eaten raw butter during her trip to the Eastern Black Sea, as a result of which, brucella IgM and Wright tube agglutination tests were requested on the basis of infectious disease recommendations. A transthoracic needle biopsy was performed on the mass in the left upper lobe, with no evidence of pathological malignancy. Bronchial lavage performed using fiberoptic bronchoscopy revealed no bacterial growth in the bronchoscopic microbiological culture, and the cytopathology was negative. A subsequent *Brucella* IgM (ELISA) test result was 45 U/mL positive, and *Brucella* Tube Agglutination was also positive at 1/320 titer. The patient underwent other system examinations and investigations in the cardiology, neurology and infectious diseases departments, but no extrapulmonary organ involvement was detected, while pure pulmonary brucellosis was revealed. Combination therapy including Tetracycline and Rifampicin was initiated for the treatment of brucellosis, and after 3 months of treatment, the patient's symptoms were noted to have improved on a thorax CT showing a reduction in the lesions (Figure 2a, b, c).

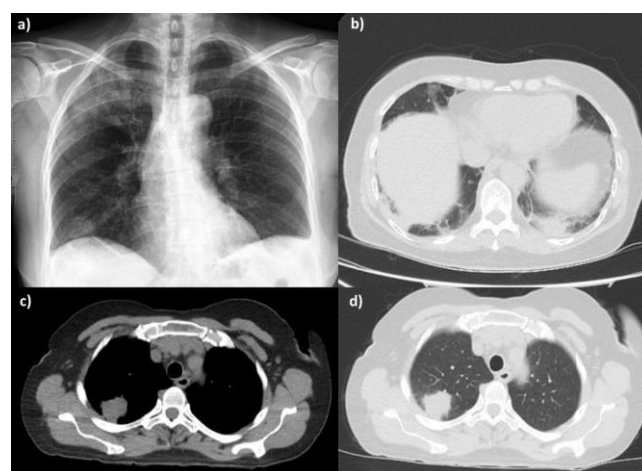


Figure 1: Chest x-ray revealed opacities in the right upper and lower zones (a) Thorax CT revealed focal parenchymal consolidation areas in the basal zones of both lungs (b) Thorax CT of the mediastinal section revealed a mass in the upper zone of the right lung (c) and the lung section (d)

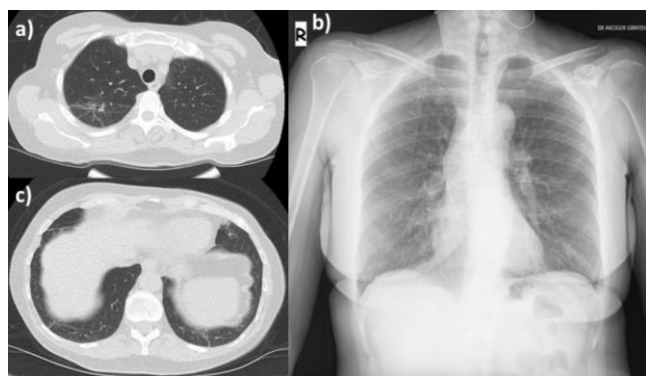


Figure 2: After three months of treatment, thorax CT showed a reduction in the lesions (a) and thorax CT lung section (c), Chest x-ray (b)

DISCUSSION

Brucellosis continues to be the most widespread bacterial zoonosis in the world, with over 500,000 new cases reported each year and prevalence rates in some nations exceeding 10 cases per 100,000 people (6). Brucellosis has become more common with the increase in global travel, trade and migration.

Brucellosis can present with a variety of symptoms, organ damage and other consequences, while pulmonary involvement is extremely rare (7). The pulmonary brucellosis symptoms reported to date include lung abscess, empyema, pneumonia, pleural effusion, granulomas, solitary nodules, and hilar and paratracheal lymphadenopathy (4,8-10). Community-acquired pneumonia and lung cancer are the leading respiratory system pathologies in the world (11,12).

In our case, the bilateral upper and lower lobes had round consolidated areas larger than 3 cm that were suggestive of metastasis or mass appearance, but not of brucella in the first instance due to the low respiratory system localization rate of brucella and the frequency of other pre-diagnoses. Lung cancer and pneumonia are carefully investigated by physicians due to their prevalence and mortality rates in the community, while brucellosis is less common in the community and has a relatively better prognosis, but may be missed in patients lacking an accurate anamnesis. This may lead to unnecessary expenditures and disease progression associated with late diagnosis and long-term examination-treatment processes. In our patient, antibiotic treatment was planned, culture and cytologic examinations were performed and the preliminary diagnosis was evaluated.

The most common symptoms of brucellosis reported in previous reviews are fever and myalgia (3), while dyspnea and chest pain were present at the emergency presentation of our patient and her fever became elevated during follow-up.

The consumption of raw dairy products has been identified as the leading factor contributing to the development of pulmonary brucellosis (13), and it was understood

during a later anamnesis that she had consumed raw dairy products.

Although there are many approaches to the diagnosis of Brucella, a titer of 1:160 or higher in a tube agglutination test is considered to have diagnostic value when the patient shows signs and symptoms of the disease (6,14). In the present study, our suspicion of brucella was confirmed by both tube agglutination and the ELISA method. While culture results have been diagnostic for brucella in many patients (1), the bronchoscopy and other culture results in our patient were negative.

While bacterial isolation provides the highest quality results, its sensitivity may be limited depending on the presence of the bacterium in the blood. In acute situations, culture results may be fairly high, but with a 10–20% false negative rate. In the present study, we attributed this situation to the disease process, the culture collection techniques applied, the laboratory conditions and, in particular, the use of antibiotics (15).

Doxycycline and rifampicin are the most commonly applied treatment regimens for brucellosis, followed by doxycycline and aminoglycoside (1). In our patient, due to the side effects that developed following the short-term administration of doxycycline, a combined regimen including tetracycline and rifampicin was preferred, and the patient's treatment continued. Regression was detected in the tomography images of the patient following treatment.

CONCLUSION

The involvement of such internal organs as the lungs, joints, brain and heart in brucellosis can lead to significant clinical consequences. Although pulmonary involvement is a rare manifestation of brucellosis, it should be considered if a patient has persistent fever, joint pain and pulmonary symptoms in regions where the disease is widespread.

CONFLICTS OF INTEREST

None declared.

AUTHOR CONTRIBUTIONS

Concept - G.K., T.C., K.C., Ö.A., M.Ç.; Planning and Design - G.K., T.C., K.C., Ö.A., M.Ç.; Supervision - G.K., T.C., K.C., Ö.A., M.Ç.; Funding - G.K., T.C., K.C., Ö.A., M.Ç.; Materials - G.K., T.C., K.C., Ö.A., M.Ç.; Data Collection and/or Processing - G.K., T.C., K.C., Ö.A., M.Ç.; Analysis and/or Interpretation - G.K., T.C., K.C., Ö.A., M.Ç.; Literature Review - G.K., T.C., K.C., Ö.A., M.Ç.; Writing - G.K., T.C., K.C., Ö.A., M.Ç.; Critical Review - G.K., T.C., K.C., Ö.A., M.Ç.

REFERENCES

1. Solera J, Solis Garcia Del Pozo J. Treatment of pulmonary brucellosis: a systematic review. *Expert Rev Anti Infect Ther* 2017; 15:33-42. [\[CrossRef\]](#)
2. Edathodu J, Alamri M, Alshangiti KA, Alfagyh NS, Al-naghmush AS, Albaiz F, et al. Clinical manifestations and treatment outcomes of human brucellosis at a tertiary care center in Saudi Arabia. *Ann Saudi Med* 2021; 41:109-14. [\[CrossRef\]](#)
3. Zheng R, Xie S, Lu X, Sun L, Zhou Y, Zhang Y, et al. A systematic review and meta-analysis of epidemiology and clinical manifestations of human brucellosis in China. *Biomed Res Int* 2018; 2018:5712920. [\[CrossRef\]](#)
4. Hatipoglu CA, Bilgin G, Tulek N, Kosar U. Pulmonary involvement in brucellosis. *J Infect* 2005; 51:116-9. [\[CrossRef\]](#)
5. Yagupsky P, Morata P, Colmenero JD. Laboratory diagnosis of human brucellosis. *Clin Microbiol Rev* 2019; 33:e00073-19. [\[CrossRef\]](#)
6. Franco MP, Mulder M, Gilman RH, Smits HL. Human brucellosis. *Lancet Infect Dis* 2007; 7:775-86. [\[CrossRef\]](#)
7. Lubani MM, Lulu AR, Araj GF, Khateeb MI, Qurtom MA, Dudin KI. Pulmonary brucellosis. *Q J Med* 1989; 71:319-24.
8. Ozturk O, Akcam Z, Sahin U, Bircan A, Akkaya A, Yayli G. A rare agent of pneumonia: *Brucella melitensis*. *Tu-berk Toraks* 2008; 56:443-7.
9. Batmaz E, Çiftçi A, Edis Çakır E, Hatipoğlu Nuri O, Akkoyun S, Gençhallaç H. Pulmonary involvement in brucellosis: Case report. *Balkan Med J* 2007; 24:70-3.
10. Zengi A, Elmas F, Tasbakan M, Basoglu OK, Ozhan MH. Exudative pleural effusion due to brucellosis in a patient with chronic obstructive pulmonary disease. *Trop Doct* 2006; 36:253-4. [\[CrossRef\]](#)
11. Leiter A, Veluswamy RR, Wisnivesky JP. The global burden of lung cancer: current status and future trends. *Nat Rev Clin Oncol* 2023; 20:624-39. [\[CrossRef\]](#)
12. Oliveira E Silva PG, Cerqueira Batista Filho LA, Ismael PF, Victoria VES, Alexandre TM, Larissa SM. Community-acquired pneumonia: Epidemiology, diagnosis, prognostic severity scales, and new therapeutic options. *Medwave* 2023; 23:e2719. [\[CrossRef\]](#)
13. Erdem H, Inan A, Elaldi N, Tekin R, Gulsun S, Ataman-Hatipoglu C, et al. Respiratory system involvement in brucellosis: the results of the Kardelen study. *Chest* 2014; 145:87-94. [\[CrossRef\]](#)
14. Alişkan H. Kültür ve serolojik yöntemlerin insan brusellozu tanısındaki değeri. *Mikrobiyol Bul* 2008; 42:185-95.
15. Shakir R. Brucellosis. *J Neurol Sci* 2021; 420:117280. [\[CrossRef\]](#)