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Case Report

Staphylococcus aureus Pneumonia Following Closed Thoracic Trauma: A Case Presentation

Kapalı Toraks Travmasını Takiben *Staphylococcus aureus* Pnömonisi: Bir Olgu Sunumu

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ABSTRACT

In this article, a less common course of methicillin-resistant *Staphylococcus aureus (S. aureus)* (MRSA) is presented to raise awareness. A 14-year-old male patient who developed necrotizing pneumonia due to MRSA after blunt trauma is described. MRSA can cause high mortality and severe morbidity. In community-acquired pneumonia, MRSA should be considered, especially when there is a history of blunt trauma.

Keywords: Blunt chest trauma, methicillin-resistant *Staphylococcus aureus*, necrotizing pneumonia

ÖZ

Bu makalede, farkındalığı artırmak için daha az yaygın bir metisiline dirençli *Staphylococcus aureus (S. aureus)* (MRSA) seyri sunulmaktadır. Künt travmadan sonra MRSA nedeniyle nekrotizan pnömoni geliştiren 14 yaşında bir erkek hasta sunulmaktadır. MRSA çok ciddi mortalite ve şiddetli morbidite neden olabilir. Toplum kaynaklı pnömonide MRSA künt travma öyküsünde akılda tutulmalıdır.

Anahtar Kelimeler: Künt göğüs travması, metisiline dirençli *Staphylococcus aureus*, nekrotizan pnömoni

INTRODUCTION

Staphylococcus aureus (S. aureus) is a Gram-positive coccus and a component of the commensal flora found on human and warm-blooded animal skin and mucous membranes (1). It contaminates hospital and community surfaces (1,2). Classrooms, lockers, cellphones, elevators, toilet sets, fitness center, public computers, light switches, doorknobs, toilet flush handles, and bathroom flooring are just a few of the high-touch surfaces on campuses and universities where methicillin-resistant *S. aureus* (MRSA) has been isolated (1). *S. aureus* causes serious infections such as pneumonia, bacteremia, endocarditis, skin and soft tissue infections, central nervous system infections, bone and joint infections, and toxic shock syndrome (2). Necrotizing pneumonia is a clinical condition characterized by lung parenchyma destruction mostly caused by *S. aureus, Streptococcus pneumoniae,* and *Mycoplasma pneumoniae,* but sometimes by other bacteria, viruses and fungi (3,4). Here, a case of necrotizing pneumonia with trauma as its pathophysiology is presented.

CASE REPORT

A previously healthy 14-year-old male patient staying in a student dormitory was brought to the hospital with

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complaints of chest pain, shortness of breath, and fever. It was found that his chest was stuck in the door, 2 weeks ago. On examination, he was weak, tachypneic, dyspneic, and confused. He had neck stiffness, coarse rhonchi at the base of the lung, tenderness in the abdomen, but no defense or rebound, and the liver was palpable 2 cm below the costal margin. Laboratuary tests revealed white blood cell count 18600x10^3/mL, neutrophil 16700x10^3/mL, hemoglobin 12.2 g/dL, platelet 234000x10^3/mL, C-reactive protein 313 mg/L (0-5), D-dimer 3.65 mg/L, fibrinogen 773 mg/dL (200-400), NT-pro-BNP 120 ng/L (0-62), ferritin: 1783 mg/L, creatine kinase: 758 U/L (0-190), procalcitonin: 19 mg/L (0-0.5), erythrocyte sedimentation rate 44 mm/h (0-15), alanine aminotransferase 239 U/L, aspartate aminotransferase 113 U/L, sodium: 128 mEq/L. Patchy consolidations were seen on the chest X-ray (Figure 1). The patient was connected to Vapotherm at 25 L/minute with an FIO_2 of 30%. Empirical vancomycin, cefotaxime, azithromycin, and acyclovir were started. Lumbar puncture was performed due to suspected neck stiffness, late response to questions, and drowsiness. There were no cells in the cerebrospinal fluid (CSF); glucose in the CSF was 59 mg/dL, protein was 29 g/dL, and simultaneous blood sugar was 136 mg/dL. CSF opening pressure was 28 cmH_2O. Then, a 2 g/kg/day dose of intravenous immunoglobulin was given. During the follow-up, respiratory distress increased and he was placed on high-flow nasal oxygen support. Respiratory multiplex polymerase chain reaction (PCR) was found to be negative. In the thorax tomography, there were nodular, patchy consolidation areas and 7x2.5 cm of dense fluid in the pleural space (Figure 2). The patient was considered to have necrotizing pneumonia. Other preliminary diagnoses were malignancy, multisystem inflammatory syndrome in children, infective endocarditis-associated septic embolism, mesothelioma, and tuberculosis. Coronavirus disease PCR resulted negative. On the second day of admission, he was transferred to the pediatric intensive care unit due to confusion and superficial breathing. The next day, acyclovir and azithromycin were discontinued because the meningitis encephalitis panel was negative and atypical pneumonia was not considered. Acute respiratory distress syndrome was considered on the sixth day of admission (Figure 3). No acid-fast bacteria were

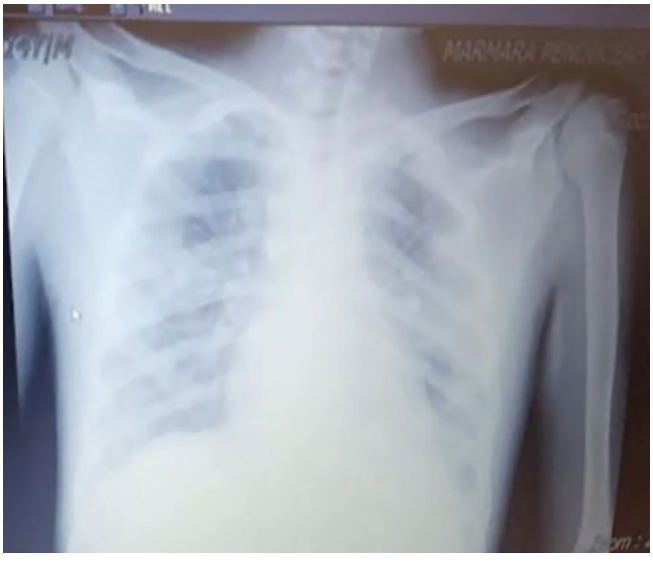

Figure 1. Chest X-ray on day 3, going to ARDS
ARDS: Acute respiratory distress syndrome

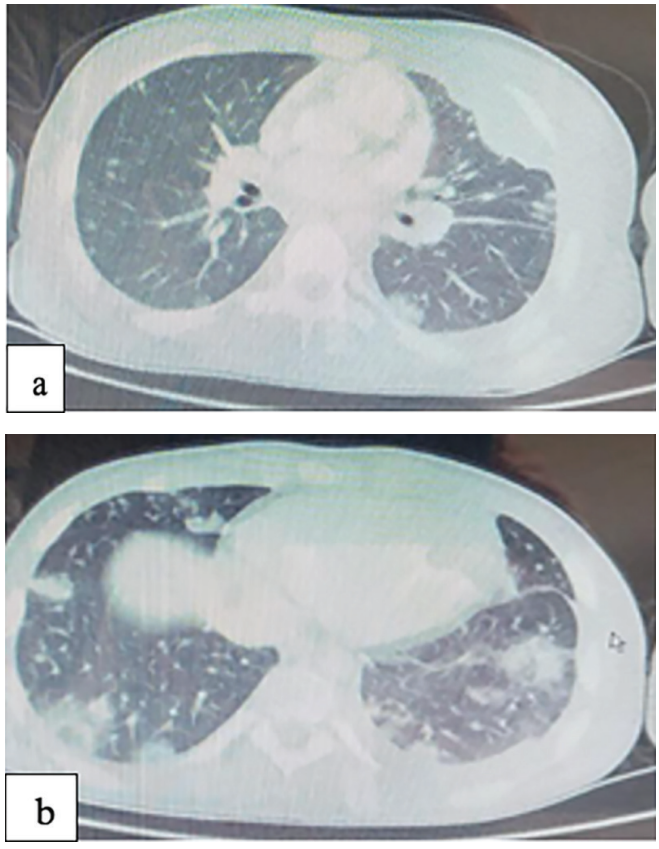

Figure 2. a-b) Thorax CT on 1st day
CT: Computed tomography

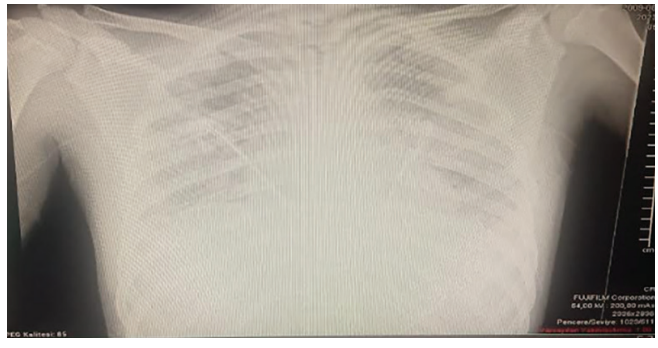

Figure 3. Chest X-ray on day 6, ARDS
ARDS: Acute respiratory distress syndrome

detected in fasting gastric aspirate. Pulmonary computed tomography angiography was normal. There was no growth in CSF culture. All blood cultures taken until the 9th day of hospitalization continued to grow MRSA. Purified protein derivative was anergic. Thoracic magnetic resonance imaging was consistent with infectious pathology rather than vasculitis and malignancy. Echocardiography was normal. From the 2nd day of hospitalization to the 8th day, the maximum temperature was 37.4 °C. MRSA was grown in the abscess culture taken from the lung.

Bone marrow aspiration was done. Myeloid series dominance, an increase in mature band formations and plasma cells, and a blast rate of less than 5% are observed. Therefore, malignancy was not considered.

MRSA grew in blood and abscess cultures. Since no clinical response was obtained on the 8th day of vancomycin and there was no significant improvement in acute phase reactants, vancomycin was discontinued and switched to linezolid. A 5-day body wipe with chlorhexidine was performed for decolonization. Lung biopsy was performed on the 11th day of hospitalization. On the 12th day of hospitalization, he was separated from the high-flow nasal cannula and placed on a nasal cannula (Figure 4). Monitoring continued, on room air, on the 16th day of hospitalization. The dihydro rhodamine test was normal; chronic granulomatous disease was excluded. Linezolid was discontinued on the 28th day, and he was discharged after a full recovery.

The patient's written informed consent was obtained for the publication of the case report concerning his family (clinical details and images).

DISCUSSION

It is thought that children's chest wall is more flexible and elastic, allowing kinetic energy to be transferred to the lung parenchyma more effectively in blunt trauma. Through a mechanism involving the transmission of strong compressive force to the lung tissue, the pseudocyst or pneumatocel forms (5,6). This mechanism results in a pulmonary laceration that disrupts the airway and causes air to seep into the pulmonary parenchyma. In blunt trauma, damage to the lung parenchyma may occur due to the disruption of the integrity of the bronchi, resulting in forms of contusion, hematoma, pseudocyst, pneumatocele, and cavitation (5-7). Serial compression-decompression ruptures the alveoli, leaving small air- or fluid-filled spaces; it expands until a pressure balance is established between the cavity and the surrounding parenchyma (5). Another theory is that if a bronchus is blocked or the glottis is closed, at the time of injury, the air cannot escape quickly enough, causing the parenchyma to rupture in a "burst" fashion, creating a gap (5). *S. aureus* should be considered in blunt thoracic trauma (7,8).

Our case, identified after investigating the differential diagnoses, was an example of this rare condition.

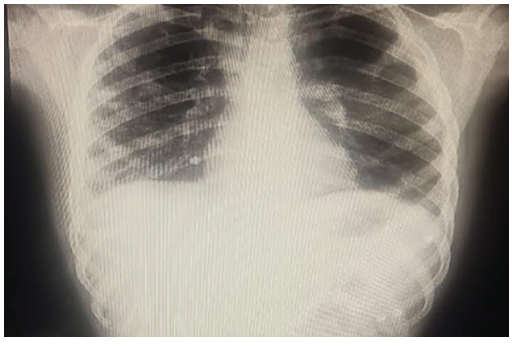

Figure 4. Chest X-ray on day 12

CONCLUSION

MRSA should come to mind when considering post-traumatic fever and severe pneumonia. An infected post-traumatic lung pseudocyst or necrotizing pneumonia should be considered in a patient presenting with chest pain and fever after blunt trauma. Trauma history should be investigated to elucidate the etiology of necrotizing pneumonia.

ETHICS

Informed Consent: The patient's written informed consent was obtained for the publication of the case report concerning his family (clinical details and images).

FOOTNOTES

Authorship Contributions

Surgical and Medical Practices: B.P., S.Ö.D., G.A., S.Y., S.A.T., D.B.A., M.Ç.A.Ç., P.C.E., A.D.I., Consept: B.P., S.Ö.D., G.A., D.B.A., A.D.I., Design: B.P., S.Ö.D., G.A., S.Y., S.A.T., P.C.E., Data Collection or Processing: B.P., S.Y., M.Ç.A.Ç., P.C.E., A.D.I., Analysis or Interpretation: B.P., S.Ö.D., G.A., D.B.A., Literature Search: B.P., S.A.T., M.Ç.A.Ç., Writing: B.P., S.Ö.D.

Conflict of Interest: No conflict of interest was declared by the authors.

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