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Case Report

# MRSA Community-acquired Pneumonia: Non-COVID-19 Related Bilateral Ground-glass Opacities

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## ABSTRACT

Methicillin-resistant staph aureus (MRSA) has been known to cause severe hospital-acquired infections with its multi-drug resistant nature. MRSA Infections could quickly escalate into severe sepsis resulting in death, if not recognized and treated abruptly. This pathogen uncommonly causes Community-Acquired Pneumonia (CAP), which can lead to under treatment due to delayed coverage with anti-MRSA antibiotics resulting in poor clinical outcome. We herein describe an unusual case of MRSA CAP during COVID-19 pandemic in an 80-year-old male who was unresponsive and found to be in septic shock, intubated outside the hospital setting, and then brought to intensive care unit for further management. Laboratory and radiographic studies revealed MRSA in sputum culture and extensive bilateral consolidation with bilateral ground glass opacities and pleural effusions on imaging. Our patient was successfully treated with linezolid and extubated within 48 hours with a favorable outcome. High index of suspicion and a timely coverage with anti-MRSA antibiotics would reduce mortality and lead to a better outcome in otherwise fatal infection.

***Keywords***: *MRSA; Community-acquired pneumonia; Respiratory failure; Critical care; Case report.*

## INTRODUCTION

Historically, methicillin-resistant staph aureus (MRSA) has been considered a nosocomial pathogen.[1] However, MRSA started to be observed more often in the community starting mid-1990s.[2] Having said that, MRSA is still considered an uncommon cause of community-acquired pneumonia (CAP), although increasing occurrence in the last few years with approximate incidence at 0.51 to 0.64 cases per 1,00,000 population.[1] MRSA CAP characterized by severe rapidly progressive multi-lobar necrotizing process with significant morbidity and mortality even in young and healthy individuals.[1,3] We report an 80-year-old male presented from home with altered mental status and found to have severe sepsis secondary to MRSA CAP..

## CASE PRESENTATION

An 80-year-old male with a medical history of atrial fibrillation status post ablation, left bundle branch block, hyperlipidemia, hypertension, and chronic back pain who was found unresponsive at home by his wife who called the Emergency Medical Services (EMS) immediately. Upon arrival of EMS, patient was minimally responsive, tachycardic, tachypneic, and hypoxic at 75% on room air; therefore, the decision to intubate him was made in the field. His wife stated that the patient only reported some nasal congestion and mild cough the night before, and then woke up in the morning in respiratory distress and later became less responsive. However, he did not report any shortness of breath, fever/chills, sore throat, chest pain, sick contacts, or recent travel. Patient is a former smoker and drinks alcohol socially with unknown family history. Drug history includes cyclobenzaprine 10mg daily, gabapentin 600 mg 3 times daily, metoprolol succinate 25 mg daily, atorvastatin 20 mg daily, oxycodone 15 mg as needed.

On arrival at our medical center, patient was already intubated with a temperature of 104.9 degrees Fahrenheit, blood pressure of 90/49 mm Hg, and heart rate of 104 beats per minute. His body mass index (BMI) was21.7 kg/m$^2$. Physical examination revealed bilateral rales on chest auscultation. Cardiac, gastrointestinal, and neurological

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examinations were unremarkable.

Laboratory studies revealed a white blood cell count of 18.310*3/uL(normal value: 4.5 – 11 10*3/uL),hemoglobin of 9.1 g/dL (normal value: 12-17.5 g/dL), platelet of 13610*3/uL (normal value: 140-45010*3/uL), blood urea nitrogen of 12 mg/dL (normal value: 5 – 25 mg/dL), and creatinine of 0.92mg/dL (normal value: 0.61 – 1/24 mg/dL).B-Type Natriuretic Peptide (BNP) 98 pg/mL (normal value:<100pg/mL). Procalcitonin of 0.49 ng/mL(normal value: <0.50 ng/mL) and lactate of 2 mmol/L(normal value: 0.5-2.0 mmol/L). A urine analysis was unremarkable.

Chest xray showed focal opacities bilaterally and more in the right lung with bilateral effusions (Figure. 1A). A Computed Tomography (CT) scan of the chest without contrast revealedground glass opacities within the upper lobes bilaterally with more dense consolidation within the right upper lobe, and patchy airspace opacities within the lower lobes and right middle lobe with small bilateral pleural effusions (Figure. 2). Respiratory panel and testing for streptococcus pneumonia and legionella were negative. The COVID-19 RT-PCR (Reverse transcription polymerase chain reaction) and influenza A and B PCR testing were negative as well. Echocardiography showed normal systolic ventricular function.

**Figure 1A & 1B:** Initial chest X-ray revealing extensive bilateral lung infiltrates, more significant on the right side prior to treatment. Chest X-ray at 2-months follow up showing mild bilateral airspace opacities which are improved bilaterally compared to prior imaging.

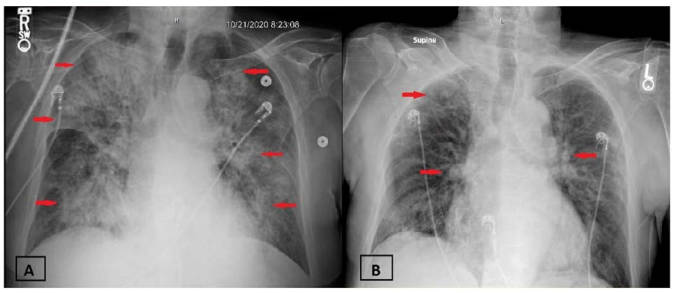
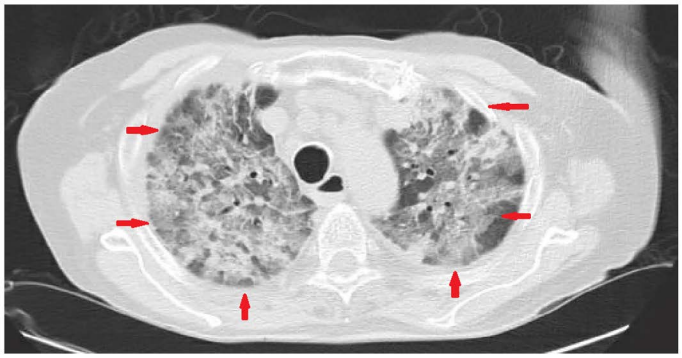



**Figure 2:** Initial computed tomography of the chest without contrast (axial view) revealing extensive bilateral consolidation with bilateral ground glass opacities as well as air bronchograms. Small bilateral effusions are also noted.



Patient's blood pressure responded initially to fluid challenge; however, he later required vasopressors briefly. He was given initially one-time IV (intravenous) azithromycin 500 mg, IV vancomycin 1.25 g, and IV piperacillin-tazobactam 3.375 gin the emergency department. Then, he was admitted to the intensive care unit (ICU) and was placed on standing IV piperacillin-tazobactam 3.375 gevery 8 hours along with IV vancomycin 1.25 g every 12 hours as an empiric coverage for severe community-acquired pneumonia.

Blood culture remained negative; however, sputum cx grew MRSA later and was sensitive to vancomycin and linezolid. Our patient did not have any risk factors suggesting hospital-acquired pneumonia, therefore, he was diagnosed with MRSA CAP according to clinical, radiographic, and culture findings. Vancomycin was switched to oral linezolid 600 mg every 12 hours for 7 days due to difficulty in maintaining optimal therapeutic level. Patient was successfully extubated in less than 48 hours to 3 L oxygen nasal cannula, and he was transferred to the medical floor for further management.

After extubation, our patient reported having a productive cough with blood tinged sputum; however, he remained afebrile. Patient was completely weaned off oxygen before discharge with significant improvement of his clinical and radiological features on latest follow-up (Figure. 1 B).

## DISCUSSION

MRSA has been conventionally known to cause a severe invasive nosocomial infection especially with its multi-drug resistance feature.[2] However, in the mid-1990s, MRSA started to emerge in the community as one of the most common causes of skin and soft tissue infections.[2] Having said that, MRSA is still considered an uncommon cause of community-acquired pneumonia.[1] MRSA pneumonia should be highly considered in patients with traditional risk factors such as history of MRSA infection, recent hospitalization or surgery, presence of invasive device, dialysis, enteral or parenteral feeding, or preceding influenza infection.[1,2] However, MRSA CAP should be considered in healthy individuals if associated with specific features such as hemoptysis, cavitary or necrotizing lesions on imaging, or critically ill CAP patients.[4] Noticeably, MRSA CAP has been associated with high morbidity and mortality even in young and healthy individuals.[4]

Lethality of MRSA CAP is believed to originate from Panton-Valentin-Leukocidin (PVL) toxin produced by MRSA causing leukocytes death and subsequently significant lung necrosis and lethal pneumonia.[3-5] In a study by Bhatta et al. reported PVL-positive in 90.4 % of community -acquired MRSA, whereas only 7.1% of hospital-acquired MRSA were PVL-positive, suggesting that PVL may be a marker of community-acquired MRSA.[6]

The incidence of MRSA CAP is undetermined yet.[4] However, upon literature review, a Spanish study by Cilloniz et al. conducted between 1996-2008 found 11 cases(1%) with MRSA out of 1,463 patients with CAP.[7] The prevalence of MRSA CAP was a 2.4% among 595 adults hospitalized with CAP in 12 US hospitals during the 2005–2007 influenza seasons in a study by Moran et al.[8] MRSA was identified in 0.7%

of 2,259 adults hospitalized with CAP in a study conducted by self et al. in five hospitals in Illinois and Tennessee from 2010 to 2012 with 2.7 % prevalence among patients admitted to intensive care unit and 0.1% among patients admitted to general medical floor.[9] Therefore, early starting of empiric anti-MRSA antibiotics for CAP patients who are critically ill considered a crucial step for optimal management of a fatal infection.[1]

Upon reviewing prior case reports and case series, patients with MRSA CAP usually presented with fever, productive cough, dyspnea, hemoptysis, and eventually respiratory failure along with septic shock. laboratory and radiographic work-up revealed either leukocytosis or leukopenia with multi-lobar cavitating infiltrates on imaging.[4]

Vancomycinand linezolid have been recommended for MRSA-pneumonia treatment.[1,3] However, linezolid has been favorably suggested as a better alternative to vancomycin as it has a better lung penetration, with almost 100% oral bioavailability, and does not need dose adjustment or frequent level monitoring comparing to vancomycin.[3,4] Several studies recommended a rapid test for early identification of MRSA to avoid the overuse of anti-MRSA antibiotics which may lead to antibiotics resistance, increased cost, and clostridium difficile infections.[9]

We herein report an uncommon case of severe MRSA CAP who presented with altered mental status and septic shock in a previously healthy old male. Diagnosis was confirmed by positive sputum culture and treatment with linezolid resulted in a significant clinical and radiographic improvement and a favorable outcome in otherwise fatal disease.

## CONCLUSION

In conclusion, MRSA is an uncommon causative organism in patients with community acquired pneumonia. However, it should be highly considered in CAP patients if associated with hemoptysis, cavitary/necrotizing lesions on imaging, and in critically ill patients with high recommendation for a timely coverage with anti-MRSA antibiotics until proven otherwise as it can be lethal even in previously healthy individuals. We herein highlight the need for rapid diagnostic testing in setting of difficulty in identifying MRSA CAP based on epidemiologic and clinical features and the overuse of anti-MRSA antibiotics.

## CONFLICTS OF INTEREST

None.

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