Community acquired pneumonia with shock, severe hypoxemia and leucopenia: Is the etiology methicillin resistant *Staphylococci*?

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ABSTRACT

A young, male presented to the emergency department with respiratory signs and symptoms along with shock and leucopenia. The suspected diagnosis of methicillin resistant *Staphylococcus aureus* (MRSA) necrotizing pneumonia was confirmed later radiographically and microbiologically. This entity is common in childhood, but rarely reported in adults. This form of pneumonia affects young individuals without any comorbid illness. This is the first reported case of necrotizing pneumonia caused by community acquired-MRSA from Indian subcontinent. The probability to predict etiology of pneumonia from clinical signs is low; yet in the presence of shock, severe hypoxemia and leucopenia suspicion of MRSA should be kept high and hence that prompt initiation of appropriate antimicrobials may reduce mortality.

Key words: *Leucopenia, methicillin resistant* Staphylococcus aureus, *necrotizing pneumonia*

INTRODUCTION

Community acquired methicillin resistant *Staphylococcus aureus* (CA-MRSA) pneumonia is a catastrophic illness, which affects young, healthy individuals with no previous comorbid illness. CA-MRSA presenting as necrotizing pneumonia with multiorgan failure is rarely reported in the literature. The clinical trial of shock, severe hypoxemia and leucopenia in patients with community acquired pneumonia should be clinched in early and hence that early diagnosis of CA-MRSA pneumonia can be made and timely intervention can save patient's life.

CASE REPORT

A 22-year-old male patient was admitted to intensive care unit (ICU) with a history of fever for 10 days, cough with sputum production for past 8 days, respiratory distress and altered sensorium for past 1 day. There was no history of hospitalization within past 1 year.

At the time of admission, he was in altered sensorium, tachycardic, tachypnea and hypotensive (heart rate-130/min, blood pressure-90/60 mm Hg). Initial arterial blood gas analysis revealed hypoxemia. Chest X-ray revealed right lower lobe consolidation. Further investigations revealed haemoglobin-9.3 g%, white blood cell (WBC) count-3,500/cu.mm, platelets-80,000/cu.mm, serum creatinine-1.8 mg/dl and liver function test and general blood picture were normal. In view of tachypnea and hypoxemia, he was intubated and initiated on mechanical ventilation. Bronchoalveolar lavage (BAL) and blood samples were sent for culture and sensitivity testing. Provisional diagnosis of acute febrile illness with pneumonia with septic shock was made. He was started on a broad spectrum antibiotics viz. piperacillin — tazobactum, vancomycin and antimalarials. Tests for malaria, leptospirosis, dengue and typhoid were done as a part of tropical infective profile, all which were negative.

After initiation of mechanical ventilation his PaO_2/FiO_2 ratios were 100, for which he was ventilated as per acute respiratory distress syndrome (ARDS) net protocol and prone ventilation was done. His blood and BAL cultures were positive for MRSA for which i.v. vancomycin was added. As his PaO_2/FiO_2 ratios

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improved (P/F > 300), he was extubated on day 7. Post-extubation, only issue was continuing hypoxia with respiratory rate of 28-30/min. Computed tomography pulmonary angiogram along with high resolution computed tomography chest to rule out pulmonary embolism revealed, patchy consolidation with the cavity in lateral basal segment of right lower lobe [Figure 1]. The pulmonary angiogram was normal. He was continued on vancomycin for 3 weeks; his respiratory rate settled and was discharged after 28 days of ICU stay.

DISCUSSION

Since the 1990s, CA-MRSA has emerged as a major cause of skin and soft-tissue infections.[1] Centers for Disease Control and Prevention has epidemiologically defined, CA-MRSA specimens as those recovered no more than 48 h after hospitalization and from a patient without a history of hospitalization, surgery, dialysis, residence in the long-term-care facility within the past 12 months, prior MRSA infection or indwelling devices.[2]

Staphylococcal pneumonia is clinically defined by the signs of lower respiratory tract infection (e.g. cough, expectoration and chest pain) and pulmonary infiltrates on chest radiograph that were not attributable to other causes, coinciding with isolation of *S. aureus* as the only potential pathogen by at least one of the following procedures: (1) Puncture of a pleural effusion or lung abscess, (2) culture of BAL fluid ($\geq 10^3$ CFU/ml), Wimberg brushing ($\geq 10^2$ CFU/ml) or protected tracheal aspiration ($\geq 10^5$ CFU/ml); and (3) blood culture yielding the same *S. aureus* strain as that found in tracheal secretions.[3]

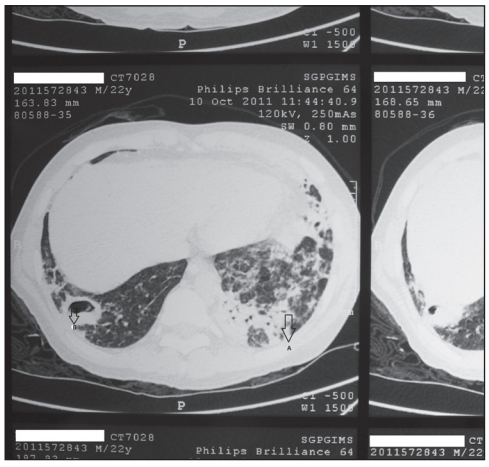

Figure 1: Chest computed tomogram with contrast obtained on day 4 of admission. (a) The left lung has diffuse consolidation with air bronchograms. (b) The right lung base has consolidation and areas of cavitation with right-sided pleural effusion

This entity is common in children, but rarely reported in adults. This is the first reported case of CA-MRSA from Indian subcontinent. This disease affects the young, with 80% of patients in previous reports being younger than 50 years.[1] Severe leucopenia appears to be characteristic of CA-MRSA pneumonia, with WBC counts less than 2500/cu.mm seen in 63% (5/8) cases at presentation. Our case was a young male who met the CDC epidemiologic criteria for CA-MRSA. His initial WBC counts were 3500/cu mm as explainable from previous reports that leucopenia is an ominous prognostic factor in these patients, due to affinity of Panton-Valentine leukocidin (PVL) for neutrophils leading to their lysis. It is speculated that WBC count is an inverse biomarker of the PVL burden.[4]

Hemoptysis is a common finding. Presenting vital signs are severe, reflecting incipient or frank septic shock. Cavitary pulmonary infiltrates may be seen on chest radiograph or chest computed tomography. Patient presented with hypoxemia and shock. Patient lacked hemoptysis, typical of most prior case reports, also bronchoscopy showed no hemorrhage. However, computed tomography revealed diffuse cavitations and necrosis. Clinical factors associated with fatal outcome are need for artificial ventilation, inotrope support, airway bleeding, ARDS, leucopenia, low platelet count.[3] Approximately, 50% of mortality is described in the literature.[1]

The *Staphylococcus* isolate was resistant to penicillinase-resistant penicillins, but sensitive to macrolides, quinolones, linezolid, clindamycin and vancomycin. This sensitivity pattern is characteristic of CA-MRSA and distinct from that of hospital-acquired MRSA, which typically exhibits resistance to numerous agents other than penicillinase-resistant penicillins.[4] Therapeutic options in case of severe CA-MRSA infections are vancomycin and linezolid.[5] In less severe infections, clindamycin, trimethoprim — sulphamethoxazole (TMP — SMX) and doxycycline are therapeutic options. The majority of strains remain susceptible to TMP — SMX, but more than 30% of isolates are resistant to clindamycin and doxycycline. Fluoroquinolone are not recommended because resistance to these agents develops rapidly.[5]

Commercially available intravenous immune globulin, which has *in vitro* activity against PVL, is another treatment alternative that was not used.[4] By the time, the diagnosis of necrotizing pneumonia is made, the pathology achieved by CA-MRSA and PVL is advanced and it may be difficult to neutralize the organism and its virulence factor. In absence of microbiological data, other etiology for necrotizing lesions on chest imaging includes *Klebsiella pneumonia*, *Pseudomonas eruginosa*, *Nocardia*, *Actinomyces* and anaerobes.[4] The ability to predict etiology of pneumonia from clinical

signs is limited; in the presence of shock, leucopenia and severe hypoxemia suspicion for MRSA should be kept high. Early diagnosis and intervention may be critical in improving outcomes of necrotizing pneumonia due to CA-MRSA.

We recommend considering CA-MRSA among pathogens that cause community-acquired pneumonia, in patients presenting to casualty with shock, hypoxemia and leucopenia.

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