CASE REPORT

Community-acquired Methicillin-resistant Staphylococcus Aureus Pneumonia: A Diagnostic Challenge

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Abstract

Even though methicillin-resistant Staphylococcus aureus (MRSA) is considered a source of nosocomial pneumonia, a few cases have likewise depicted instances of community-acquired pneumonia (CAP) among healthy individuals that were caused by MRSA. Mostly CA-MRSA causes skin and soft tissue infection but can be responsible for severe invasive infection with higher morbidity. Invasive CA-MRSA requires aggressive management to prevent complications. CA-MRSA strains are now recognized as distinct clonal entities that differ from traditional hospital-acquired MRSA (HA-MRSA) strains. The increasing prevalence of MRSA in the community is an important public health problem, which needs increased vigilance in the diagnosis and management of suspected and confirmed staphylococcal infections.

We present an intense case of CAP brought about by MRSA with impending respiratory failure in a 19-year-old male, who presented with acute febrile illness with swelling over lips with no co-morbid and insignificant past medical history. Through this case, we intend to increase awareness among physicians about the growing role of CA-MRSA in the population; they should be meticulous in treating patients with CA-MRSA, and be aware of the complications of this disease and the appropriate empiric and target antibiotics regimen for such infections, whenever it is suspected, to enhance better clinical outcomes.

Keywords: *Community-acquired pneumonia, methicillin-resistant Staphylococcus aureus (MRSA), febrile illness.*

INTRODUCTION

Skin and soft tissue infections are frequently brought on by CA-MRSA. Typically, it colonizes the perineum, vagina, axilla, throat, and anterior nares. Symptomatic infections typically start once the cutaneous or mucosal barriers are breached. Infections of the skin and soft tissues along with potentially fatal diseases including sepsis, endocarditis, and toxic shock syndrome are all caused by it.

The assessed rate of CAP caused by MRSA is 0.51 to 0.64 cases per 100 thousand [1]. A worldwide analysis revealed that among 3193 CAP patients, MRSA was positive among 3% of cases only [2]. MRSA can be responsible for serious CAP with significant morbidity and mortality. In terms of emergency room and in-patient mortality, admitted patients due to CA-MRSA pneumonia had a higher prevalence of worst clinical outcomes as compared to patients with pneumococcal CAP [3]. According to studies, the mortality rate for CA-MRSA pneumonia ranges between 56% to 63% [4, 5]. CAP caused by MRSA conveying the PVL quality can cause broad lung damage, multilobular infiltrates, leucopenia, hemoptysis, and sepsis, prompting increased mortality [6, 7].

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Methicillin-resistant strains of Staphylococcus bacteria are encoded by the mecA gene. Methicillin resistance is defined by the Clinical Laboratory Standards Institute (CLSI) as an oxacillin minimum inhibitory concentration (MIC) of 4 g/mL, whereas MICs of 2 g/mL are regarded as susceptible [8]. The European Committee on Antimicrobial Susceptibility Testing identifies oxacillin resistance as a MIC of >2 g/mL, which is different from CLSI [9]. Since methicillin is not currently marketed, the semi-synthetic penicillin oxacillin has replaced it as the treatment of choice.

The majority of CA-MRSA cases happen after a viral illness, and many CA-MRSA cases are linked to an influenza virus infection. This frequently results in inappropriate administration of empirical antibiotics, which has a negative therapeutic impact. The Panton-Valentine Leukocidin (PVL) gene, a crucial virulence-coding gene, is also linked to most CA-MRSA patients and can lead to higher mortality and can cause multilobular infiltration, lung necrosis, hemoptysis, and severe sepsis [10].

In this case report, we describe an uncommon type of community-acquired pneumonia caused by MRSA in a healthy young male presented with an acute history of abdominal pain, vomiting, and tachypnea along with a non-resolving swelling over lips which was being mistreated with local antiviral treatment with the diagnosis of herpes simplex labialis which was proved to cause by S aureus as well.

CASE REPORT

A 19-year-old male patient who had no significant prior medical history and presented with complaints of recent abdominal discomfort, vomiting, dyspnea, fever, and dry cough, was admitted to the hospital. The patient had previously visited the hospital due to swelling of the lip and had been prescribed topical antiviral ointment as a case of herpes simplex labials. The patient was tachypneic and febrile upon examination, and his vital signs included the following: pulse of 135 beats per minute; blood pressure of 130/85 millimeters Hg; a breathing rate of 26 beats per minute; capillary blood glucose 115 milligrams per deciliter; febrile 103.2 degrees Fahrenheit; GCS 15/15; and oxygen saturation of 86% that increased to 95% upon oxygen inhalation. Examination showed the lower lip to be extremely edematous with a few draining pustules. Further examination showed bilateral coarse crepitation along with decreased air entry on the left side, the rest of the examination was insignificant.

Upon admission, a complete blood count (CBC) showed neutrophilic leukocytosis (15,100 cells/mm3), serum creatinine 1.2 gm/dl, and serum urea 60 gm/dl. Chest radiography illustrated basal consolidation and blunting of the left costophrenic angle indicating pleural effusion. Sinus tachycardia was seen on the ECG. The patient was admitted to the critical care unit for further treatment by an internist. Oxygen inhalation was commenced with frequent nebulizations with beclomethasone and ipratropium, along with strict vitals monitoring. Antibiotic coverage was given with Intravenous ceftriaxone 2 grams once daily and oral azithromycin 500mg once daily. Abdomen ultrasonography showed dilated bowel loops but required no urgent intervention as per the surgical specialist. MP smear, Mp (ICT)) and dengue serology were negative. Blood culture as well as culture from secretions of draining pustules from the lip were sent. Diagnostic thoracocentesis was carried out under ultrasound guidance by the radiologist, and plural fluid analysis disclosed neutrophil-rich exudate effusion. GeneXpert and AFB staining on plural fluid were negative. Erythrocyte sedimentation rate and CRP were found to be increased, whereas adenosine deaminase levels were normal as well. The patient remained febrile with a high-grade fever for the next 03 days with a high respiratory rate of 25 per minute and blood pressure of 110/65, along with cough, and was unable to expectorate sputum along with persistent oxygen requirement. The antibiotic was then escalated to intravenous meropenem 1 gram intravenous thrice daily along with azithromycin. Chest radiograph showed bilateral infiltrates. HRCT chest was done which revealed bilateral multiple consolidations with interspersed small lucent areas (**Figs. 1 and 2**).

Meanwhile, plural fluid studies showed multiple pus cells, and pairs and clusters of gram-positive cocci were seen after gram staining. The plural fluid culture produced colonies that were opaque and grew moderately.

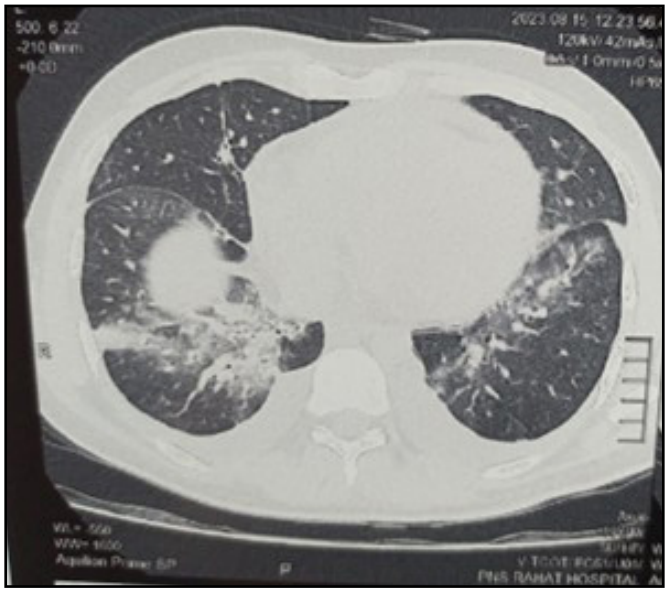

Fig. (1): Multiple opacities, ground glass haze with traction bronchiectasis along with basal consolidation left-sided effusion.

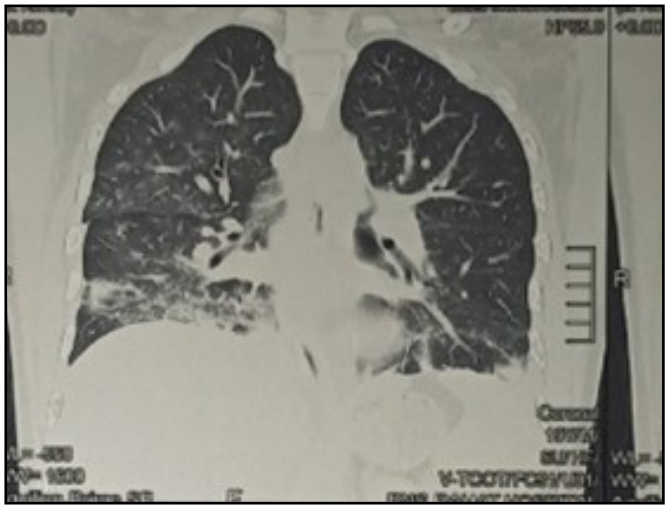

Fig. (2): Bilateral patch consolidations.

The medium-sized colonies were odorless, smooth, convex, and had uniform edges and borders. Gram-positive cocci in clusters that were catalase-positive and both tube and slide coagulase-positive were seen on smears produced from the colonies. The bacterium was identified as MRSA after antibiotic sensitivity testing (Kirby-Bauer disc diffusion technique) was carried out following CLSI Guidelines. Furthermore, Lip culture also showed Staphylococcus aureus infection.

The treating team was informed of the report right away. Additionally, isolation and contact precautions were put in place. After switching the patient to intravenous linezolid 600mg twice daily, the patient began to show signs of recovery. The temperature spikes started to subside and the symptoms improved, as seen by a reduction in coughing and shortness of breath. Vital signs improved with oxygen saturation on room air of 97%. Repeat chest radiography revealed decreased pulmonary infiltrates. Swelling over the lower lip also improved. The patient

was given intravenous linezolid for 05 days and he made significant clinical improvement and was later discharged on oral linezolid.

DISCUSSION

Methicillin-resistant Staphylococcus aureus associated with the community (CA-MRSA) has become a virulent disease practically everywhere across the globe. Soft tissue and skin infections are frequently caused by CA-MRSA. MRSA is the causative factor for a broad spectrum of illnesses, ranging from the less dangerous forms of skin infections like impetigo and cellulitis to abscess, osteomyelitis, necrotizing fasciitis, pneumonia, and sepsis.

Although it is uncommon, MRSA has been identified as an etiological factor of severe CAP [11]. Young, otherwise healthy people are more likely to develop CA-MRSA pneumonia, which can advance quickly and cause several sequels that have a high fatality risk [12]. CA-MRSA infections are defined by CDC as those that are discovered within 48 hours of hospitalization, without a prior history of hospital admission, dialysis, surgery, or residing in a long-term care facility within the year following the MRSA culture date; additionally, there must have been no history of known MRSA infection or colonization before the study period, and there must have been no permanent indwelling catheter or other percutaneous medical device in place at the time of the culture [13-15]. Before the onset of clinical signs and symptoms, our patient was in good health, he developed lip pustule followed by pneumonia. His HRCT chest revealed multilobular infiltrates and consolidations bilaterally. His plural fluid demonstrated strains of MRSA. So, we labeled him as a case of CA-MRSA pneumonia.

Despite CA-MRSA pneumonia is uncommon, it is important to remember that CA-MRSA can cause deadly pneumonia in previously healthy patients. Thus to enhance the prognosis, early detection of this illness and prompt antimicrobial therapy are crucial. Empirical therapy for MRSA is recommended for hospitalized patients with severe CAP, as defined by any one of the following symptoms: Necrotizing or cavitary infiltrates, emphysema, or a need for critical care unit hospitalization, depending on the results of sputum and/or blood culture tests [16]. As first-line treatments for CA-MRSA infections, vancomycin and linezolid were suggested [17].

The fact that CA-MRSA infections can happen to healthy people without known risk factors and that they spread quickly among low-risk groups raises the possibility that the strains are extremely virulent, it is extremely important to have a clinical suspicion of MRSA among patients admitted with CAP.

CONCLUSION

It is important to recognize that CA-MRSA strains, even in previously immunocompetent people, can cause fatal pneumonia. To enhance the clinical prognosis of the condition, the best course of action is to identify this infection as soon as possible. Timely initiating targeted antibiotics when S aureus infection is strongly suspected depending on the presence of S aureus infection anywhere else in the body on its typical sites or illustrated by unusual extensive lung involvements on radiograph may prevent complications which enhance morbidity and mortality.

CONSENT FOR PUBLICATION

Written informed consent was taken from the participants.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

ACKNOWLEDGEMENTS

Declared none.

AUTHORS' CONTRIBUTION

Muhammad Nadeem Ahmed Khan: Data curation and Visualization, writing of final manuscript, Sana Jabeen: Provision of Data, writing of initial draft, literature search, Shaheena Begum: Data curation and Visualization, Hera Nadeem: Editing final draft.

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