

MRSA Septicemia With Septic Arthritis and Prostatic, Intraretinal, Periapical, and Lung Abscesses

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ABSTRACT

Introduction: Methicillin-resistant staphylococcus aureus (MRSA) bacteremia is a life-threatening illness and a major global health care problem. It can cause metastatic and complicated infections.

Case Presentation: A 58-year-old man with uncontrolled type 2 diabetes mellitus presented with altered mental status after a fall. He was found to have a hip fracture, diabetic ketoacidosis, and MRSA bacteremia. This was complicated by septic knee arthritis, prostatic abscess, intraretinal abscess, periapical abscesses, and pulmonary abscesses. He was treated with intravenous vancomycin and oral linezolid and eventually recovered.

Discussion: Severe metastatic MRSA infection was likely due, in part, to the patient's uncontrolled diabetes, as he has no underlying immunodeficiency and was HIV negative. Prostatic abscesses are a relatively rare occurrence that typically develop in immunocompromised patients.

Conclusion: This case is an interesting confluence of sequelae of MRSA bacteremia and reinforces the necessity for clinicians to be diligent when evaluating a patient with a suspected prostatic abscess.

INTRODUCTION

Methicillin-resistant *Staphylococcus aureus* (MRSA) is a major nosocomial and community-acquired pathogen. *S aureus* can become resistant to penicillin by producing β -lactamase gene *blaZ*, and MRSA strains have acquired the *mec* and *fem* genes, which confer resistance to methicillin, penicillinase-resistant penicillins, and

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cephalosporins.¹ Bacteremia is a severe complication from MRSA infection and has a mortality rate ranging from 10% to 30%.² From 2005-2012, the rate of hospital-onset MRSA bacteremia decreased by 17.1% annually while community-onset MRSA declined by 6.9% annually, but this decline slowed from 2013-2016.³

Many risk factors for MRSA bacteremia have been identified. Host factors include advancing age, male sex, African American race, and the presence of comorbidities.^{2,4} Comorbidities most commonly associated with MRSA bacteremia include cirrhosis, congestive heart failure, chronic kidney disease, cancer, and alcohol use disorder.² Other risk factors include the use of multiple antibiotics—particularly fluoroquinolones and cephalosporins, HIV or other

immunosuppression, intravenous (IV) drug use, presence of an indwelling hemodialysis catheter, and residence in a long-term care facility.^{4,5} With bacteremia, MRSA has the potential to seed other sites, including the endocardium, bone, and skin and soft tissues. Herein we report a rare case of MRSA bacteremia in a patient with uncontrolled type 2 diabetes mellitus that seeded his knee, prostate, retina, mouth, and lungs.

CASE PRESENTATION

A 58-year-old man with history of insulin-dependent type 2 diabetes mellitus, stage 3 chronic kidney disease, alcohol use disorder, hyperlipidemia, and chronic right lower leg deep venous thrombosis (DVT) presented with altered mental status after a fall. Initial blood pressure on assessment by emergency medical services was 50/35 and increased to 80/56 after IV fluid administration. Workup for acute coronary syndrome was negative.

His white blood cell count was elevated to 34.9K/ μ L (reference 3.8-10.5K/ μ L), glucose was elevated to 736 mg/dL, hemoglobin A1c was 10.4%, lactate was elevated to 19.0 mmol/L (reference 0-2 mmol/L), pH of 7.3 (reference 7.36-7.44), bicarbonate of 17.7 (reference 22-26 mmol/L), base excess of -7.6 (reference -2.5 to 2.5), and anion gap of 25. In addition, his serum ketones were elevated to 15 mg/dL, and a diagnosis of diabetic ketoacidosis (DKA) was rendered, for which he was treated with IV fluids, insulin infusion, and electrolyte replacement. Computed tomography (CT) of his head showed no acute bleeding but did demonstrate periapical abscesses in the maxilla and mandible. CT of chest, abdomen, and pelvis demonstrated 2 left upper lobe cavitory pulmonary nodules (Figure 1) and right intertrochanteric femur fracture.

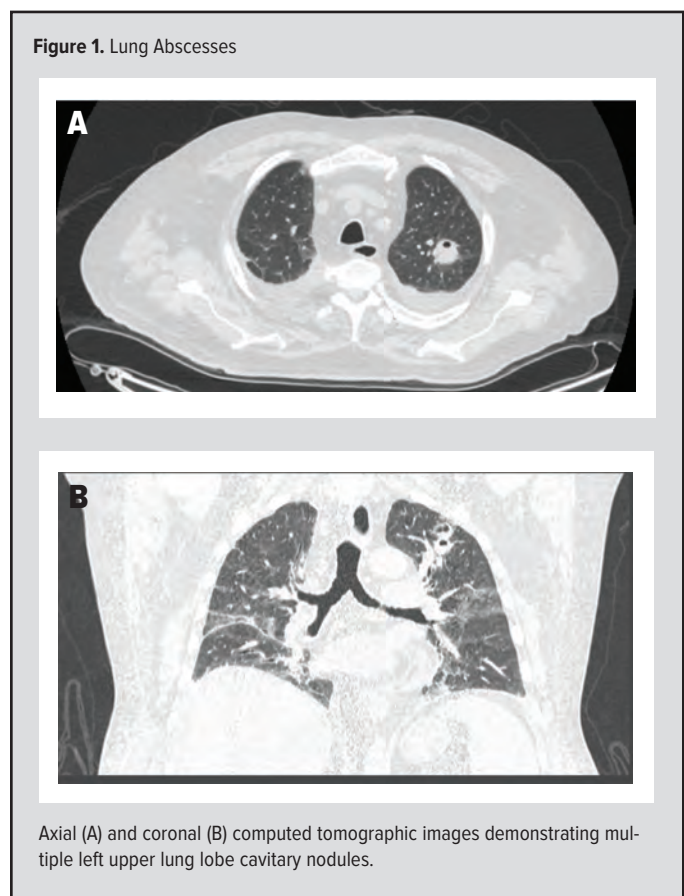
Given concern for sepsis, empiric broad-spectrum antibiotic treatment was started with vancomycin and piperacillin-tazobactam. Blood cultures grew MRSA after 10 hours. As his mental status recovered, he began complaining of right knee pain and was noted to have an erythematous, edematous, and painful right knee. The knee was drained and found to harbor Gram-positive cocci in clusters, which was eventually identified as MRSA. He subsequently underwent surgical drainage (Figure 2).

Urinalysis on admission was positive for bacteria and leukocyte esterase, suggesting a urinary tract infection. Furthermore, magnetic resonance imaging (MRI) for assessing hip fracture incidentally demonstrated diffuse enlargement of the prostate with multiloculated cystic appearance (Figure 3). Digital rectal exam revealed a smooth, nontender prostate. Transurethral deroofing was performed, and the prostate was drained. Both urine and suppurative prostatic fluid grew MRSA.

When his blood pressures normalized and fevers improved, the patient underwent open reduction and internal fixation for his nondisplaced right intertrochanteric femur fracture.

He later reported blurry vision in his right eye, raising concern for septic emboli and ischemia. MRI of his head demonstrated no abnormalities other than the known periapical abscesses. Ophthalmologic exam demonstrated endophthalmitis of the right eye and intraretinal abscess of the left eye. The abscess was drained from his left retina, and his right eye was treated with intraocular injections of vancomycin, ceftazidime, and dexamethasone with subsequent improvement of symptoms.

Upon identification of bacteremia, the infectious disease service was consulted. Systemic antimicrobial coverage initially was directed broadly with vancomycin and piperacillin/tazobactam. Confirmation of MRSA bacteremia and the presence of prostatic and intraretinal abscesses prompted the addition of linezolid. Additional workup included transthoracic echocardiogram (TTE) and transesophageal echocardiogram (TEE), which were both negative for vegetations. The patient's hospitalization was complicated by ongoing hematuria secondary to his transurethral deroofing procedure and anticoagulation (due to his history of chronic



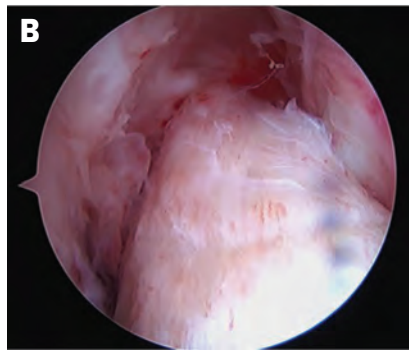
DVT), resulting in anemia and thrombocytopenia that required multiple erythrocyte and platelet transfusions. Linezolid was discontinued due to concerns of exacerbation of thrombocytopenia. He was discharged in stable condition on IV vancomycin, of which he completed a 6 week total course after negative blood cultures were achieved. Periapical abscesses management was deferred until after discharge once his anemia and thrombocytopenia resolved. He is currently doing well.

DISCUSSION

S aureus is a major cause of community- and health care-associated infections. MRSA has long been associated with infections in health care settings, and community-associated MRSA infections emerged in the 1990s.⁷ Approximately one-third of patients with MRSA bacteremia develop a metastatic or complicated infection,⁸ which is associated with increased mortality.⁹ Our patient's specific risk factors for MRSA bacteremia included uncontrolled diabetes (with A1c of 10.4% on admission), alcohol use disorder, and chronic kidney disease. We attempted to identify additional predisposing factors in our patient; his complete blood cell count with differential was unrevealing, and HIV testing was negative.

With regard to treatment of MRSA bacteremia, current guidelines recommend treating with antibiotics for 4 to 6 weeks from the first negative blood culture for MRSA bacteremia and for 6 weeks for endocarditis. Initial antibiotic therapy for MRSA

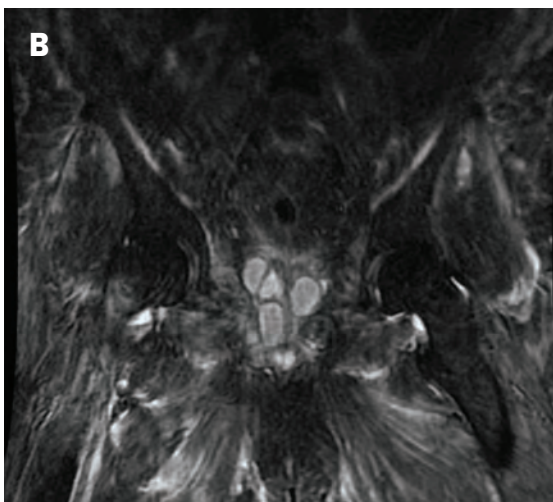
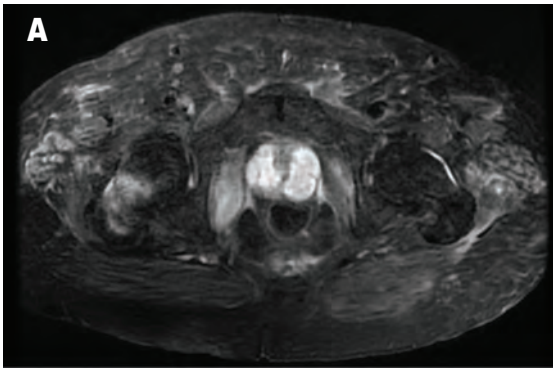
Figure 2. Right Knee Septic Arthritis



(A) X ray of patient's right knee demonstrating a joint effusion. (B) Image taken during right septic knee intra-articular irrigation and debridement showing evidence of septic arthritis.

generally includes vancomycin or daptomycin. Vancomycin typically requires serum concentration monitoring, especially in patients with renal dysfunction. Daptomycin is more costly and is associated with myopathy requiring creatine kinase monitoring and is inhibited by surfactant, limiting its use in pulmonary infections.⁶ Alternative agents include ceftaroline and linezolid. Infectious disease consultation has been shown to reduce the mortality from MRSA bacteremia.¹⁰ Patients with eradicable foci should have those foci drained or removed, as eradication has been associated with better outcomes and survival.¹¹ In addition, patients should undergo echocardiography to evaluate

Figure 3. Prostatic Abscess



Axial (A) and coronal (B) T1 weighted magnetic resonance imaging demonstrating diffuse enlargement of the prostate with multiloculated cystic lesions.

for presence of endocarditis, with TTE generally performed first followed by TEE, which is superior to TTE for detection of vegetations and cardiac complications, such as intracardiac abscess and valvular perforation.¹² In a study of 103 patients with MRSA bacteremia, 7% had endocarditis established by TTE versus 25% by TEE.¹³

A variety of factors influence mortality from MRSA bacteremia. One major factor is the primary source of infection, with infective endocarditis and primary pulmonary infection associated with the highest mortality rates and peripheral venous catheter-related infections associated with the lowest mortality rate.¹⁴ The presence of an uneradicated focus, septic shock, age over 60, and duration of treatment less than 14 days are also associated with higher mortality in MRSA bacteremia.¹⁵ Development of metastatic foci in the setting of MRSA bacteremia is more likely in cases of unknown portal of entry, treatment delay > 48 hours, and the presence of foreign body material. C-reactive protein is typically higher in metastatic MRSA, with mean values of 74 mg/L for MRSA bacteremia versus 160 mg/L for metastatic MRSA bacteremia. It has been proposed that FDG-PET/CT to detect metastatic infectious foci may lead to improved outcomes.⁹

Prostatic abscess is an infection rarely seen in nonhospitalized patients due to effective antibiotic therapies. The most common causative pathogen of bacterial prostatitis is *E coli*; however, in the reported literature, the most common causative pathogen of prostatic abscesses is MRSA (65% of reported cases).¹⁶ Risk factors associated with the development of *S aureus* prostatic abscess include chronic indwelling catheters, instrumentation of the lower genitourinary tract, diabetes mellitus, HIV and immunosuppression, and chronic hemodialysis requirement.¹⁶ Our case demonstrates a prostatic abscess formed by MRSA in a patient with a history of uncontrolled type 2 diabetes mellitus. Prostatic abscesses generally are treated with either transrectal ultrasound (TRUS)-

guided aspiration or transurethral deroofing. In a small prospective randomized trial, transurethral deroofing was associated with reduced recurrence rate and shorter hospital stay.¹⁷

CONCLUSION

We present an interesting case in which MRSA bacteremia led to septic arthritis, prostatic abscess, intraretinal abscess, periapical abscess, and multiple pulmonary abscesses. This case report reinforces the necessity for clinicians to be diligent when evaluating a patient with suspected MRSA bacteremia. At presentation, the extent of disease may not be obvious. In the setting of metastatic MRSA infection, thorough history and physical, blood and urine cultures, and evaluation of any additional suspicious sites with imaging and cultures should be sought.

Consent: Informed consent was obtained from the patient for publication of this case report.

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