

# MRSA in the bursa: an unusual complication of MRSA bacteremia causing bilateral acromioclavicular septic arthritis

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## Abstract

**Background.** Bacteraemia is known to cause serious complications including metastatic infections such as infective endocarditis, vertebral osteomyelitis, iliopsoas abscesses and septic arthritis. Bilateral septic arthritis, however, is a rare medical emergency with limited previous reports. *Staphylococcus* species are the most common organisms identified as a result of suspected haematogenous spread from bacteraemia, direct inoculation or translocation from adjacent tissues. While unilateral septic arthritis due to intravenous drug use is a common phenomenon warranting prompt treatment to preserve mobility, function and quality of life, cases of bilateral infections are exceedingly rare. Furthermore, infections involving the acromioclavicular joint are not commonly documented in the literature.

**Case Presentation.** We present a case of a 41-year-old female with a history of intravenous drug use who presented with low back pain and was found to have methicillin-resistant *Staphylococcus aureus* bacteraemia that was complicated with metastatic infections causing bilateral acromioclavicular joint septic arthritis.

**Conclusions.** Metastatic infections from bacteraemia are serious complications that can lead to septic arthritis. Though septic arthritis is best known in previous case reports to present as a unilateral infection, rare cases of bilateral involvement warrant further consideration. A thorough history and physical examination evaluating all joints can identify such atypical presentations. Septic arthritis remains a medical emergency, and it is imperative that clinicians recognize unusual presentations to avoid delays in treatment that can lead to detrimental impacts to quality of life.

## INTRODUCTION

Bacteraemia, by definition, is the presence of bacteria in the blood, can be asymptomatic and can occur during regular daily activities such as performing oral hygiene. Infections are generally transient in healthy individuals, but in those whose immune response is compromised bacteraemia can become an infection that can evolve and cause septicaemia. Frequent sources include the respiratory tract, indwelling catheters, urinary tract infections, soft tissue, intra-abdominal infections, surgical wounds, local injection sites for pain control and intravenous drug use (IVDU) [1, 2]. The most common organism implicated in bacteraemia is *Staphylococcus aureus*, followed by *Escherichia coli*. A serious complication of bacteraemia is metastatic infections, particularly in those patients infected with *S. aureus*. These infections include but are not limited to infective endocarditis, vertebral osteomyelitis, iliopsoas abscesses and septic arthritis [2]. Here, we report a rare case of a patient with a history of IVDU, who presented with back pain and was found to have methicillin-resistant *S. aureus* (MRSA) bacteraemia that was complicated with metastatic infection causing bilateral shoulder septic arthritis.

## CASE REPORT

A 41-year-old female with a history of untreated hypertension, morbid obesity, chronic back pain and IVDU presented with 2 weeks of worsening low back pain and diffuse abdominal pain. She was experiencing lower extremity weakness, anorexia,

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**Keywords:** bacteraemia; bilateral acromioclavicular joints; intravenous drug user; MRSA infection; septic arthritis.

**Abbreviations:** AC, acromioclavicular; IDSA, Infectious Disease Society of America; IVDU, intravenous drug use; MRI, magnetic resonance imaging; MRSA, methicillin-resistant *Staphylococcus aureus*; TTE, transthoracic echocardiogram; WBC, white blood cell count.

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fever, chills, shortness of breath, dizziness and constipation. The patient reported recent use of acetaminophen, gabapentin, hydrocodone, methamphetamines and marijuana.

On admission, vital signs were significant for blood pressure of 79/53 mmHg and heart rate of 149 bpm, diagnostic values were remarkable for lactic acid of 4.2 mg dl<sup>-1</sup> [normal (N): <2 mg dl<sup>-1</sup>], white blood cell count (WBC) 37500 u l<sup>-1</sup> (N: 4–12000 ul<sup>-1</sup>) and erythrocyte sedimentation rate 75 mm h<sup>-1</sup> (N: <20 mmh<sup>-1</sup>), and urine toxicology was positive for cannabis and amphetamines. Physical examination revealed midline tenderness of the lumbar spine, 3/5 strength in bilateral lower extremities, and bilateral shoulder warmth, erythema and tenderness, with limited range of motion. There were multiple needle puncture sites on the antecubital fossas bilaterally, but it was unclear if these were from her prior IVDU or from laboratory draws/IV medications from the emergency room. There were smaller puncture wounds also noted between the toes of the right foot. Blood cultures were collected and the patient was empirically started on vancomycin, metronidazole, aztreonam and IV fluids.

Initial blood cultures grew MRSA with sensitivities to the following antibiotics: vancomycin with an MIC of 1 mg l<sup>-1</sup>, rifampin and levofloxacin with MIC of ≤1 mg l<sup>-1</sup>, clindamycin and daptomycin with MIC of ≤0.5 mg l<sup>-1</sup>, and linezolid with MIC of 2 mg l<sup>-1</sup>. Bilateral shoulder plain radiographs showed no abnormalities, and subsequent arthrocentesis of the acromioclavicular (AC) joints showed WBC of 93137 u l<sup>-1</sup> in one shoulder and 32043 u l<sup>-1</sup> in the other. The aspirates were cultured and also grew MRSA. She was taken for emergent surgical debridement of the shoulders and was intubated. Magnetic resonance imaging (MRI) of the lumbar spine showed L3–L5 osteomyelitis with facet septic arthritis, dorsal paraspinous myositis, L2–L5 epidural abscess, and bilateral psoas myositis and abscesses. MRI of the bilateral shoulders after debridement showed septic arthritis of the AC joints, right distal trapezius abscess, and left supraclavicular abscess. MRI of the brain showed no acute intracranial processes, and a transthoracic echocardiogram (TTE) was negative for any valvular vegetations. Cardiology deferred acquiring a transoesophageal echocardiogram due to the high quality of TTE images obtained confirming the absence of endocarditis.

Repeat surgical debridement of the shoulders was performed and neurosurgery evaluated the patient for possible debridement of the epidural abscess recommending medical management at that time. Leukocytosis continued to rise and peaked at 52100 u l<sup>-1</sup>. Trough levels of vancomycin were being monitored during this time frame, and although the levels were adequate, repeat blood cultures continued to be positive for MRSA, probably because not all sources of infections had been cleared surgically. On day 10, antibiotics were escalated to daptomycin and ceftaroline. Although the laboratory did not provide the MIC value for ceftaroline when the blood culture sensitivities were determined, ceftaroline is approved by the US Food and Drug Administration for the treatment of severe MRSA infections and is also recommended by the Infectious Disease Society of America (IDSA) [3].

Blood cultures ultimately became negative on day 14 at which point rifampin was added by the infectious disease physician. Rifampin was added to the current antibiotic regimen after the bacteraemia cleared as per IDSA recommendations, for the management of the patient's concurrent osteomyelitis of L3–L5 with the facet septic arthritis, along with multiple abscesses of the bilateral psoas, the left supraclavicular and the right distal trapezius abscesses [4]. The patient required critical care until she was stable for extubation. Repeat MRI of the lumbar spine showed worsening epidural abscess at which point neurosurgery took the patient for surgical drainage with drain placement on day 18. Intravenous antimicrobials were given for a total of 14 days after negative cultures were obtained. Intraoperative wound cultures were positive for MRSA and *Proteus mirabilis*. She improved clinically, all drains were removed and she was discharged on day 28. The patient was prescribed oral levofloxacin and rifampin for an additional 52 days due to her current financial situation and her history of IVDU, and unfortunately was lost to follow-up after she was discharged from the hospital.

## DISCUSSION

The definition of a metastatic infection is that of a deep, distal or a secondary infection that is anatomically unrelated to the site of the primary infection. During *S. aureus* bacteraemia, the prevalence of metastatic infections range anywhere from about 5.7 to 75.3% [2]. The persistence of bacteraemia should raise suspicion of metastatic infections. Early identification of these infections is important as morbidity and mortality are higher. In a prospective study by Vos *et al.*, only about 41% of metastatic infections were associated with signs and symptoms that guided towards the diagnosis leading to an incomplete focus eradication of the infections [5]. Of the previously mentioned types of metastatic infections, it has been reported that about 1.4–18.8% of patients with *S. aureus* bacteraemia were complicated with septic arthritis [2].

Septic arthritis is considered a medical emergency with a mortality rate of up to 56% when polyarticular joints are infected with a *Staphylococcal* species [6]. Virtually any bacterial species can cause infection, but the most common bacteria implicated are from *Staphylococcus* species. A retrospective cohort study over a 10 year period reported that MRSA was the most common pathogen implicated in septic arthritis infections in IVDU [7]. Septic arthritis commonly affects large joints such as the hips, shoulders and knees. The most common pathogenesis is haematogenous seeding from a distal site, but direct trauma into the synovial fluid, as with a corticosteroid shot, has been reported [8]. Diagnosis includes a thorough history and physical, imaging can be used to support or refute a clinical suspicion of septic arthritis, but definitive diagnosis is by arthrocentesis with synovial fluid analysis and culture to guide antibiotic selection [6]. Treatment may require joint irrigation and debridement with an extended course of IV antibiotic therapy

for resolution. Antibiotics available for treatment include vancomycin, daptomycin, trimethoprim-sulfamethoxazole with rifampin, linezolid and clindamycin. For patients with concurrent bacteraemia, the addition of rifampin to the antibiotic chosen from those listed previously should be added after clearance of the bacteraemia [4]. Although the ARREST trial by Thwaites *et al.* showed that rifampin did not have a significant effect on reducing mortality, duration of bacteraemia or development of rifampin-resistant *S. aureus*, it did reveal a small but significant reduction in bacteriologically and clinically defined disease recurrence [9].

While the vast majority of septic arthritis cases have been monoarticular, only about 8.2% of all cases seen have been polyarticular. Furthermore, a retrospective study that reviewed over 1400 cases showed that septic arthritis in IVDU typically involved the knee (21%), sacroiliac (12%) or sternoclavicular (11%) joints. The AC joint was involved in only 5.4% of IVDU cases [10]. Polyarticular septic arthritis is uncommon and lacking in the previous literature. Classically, a patient with septic arthritis may present with acute monoarticular joint pain, fevers, localized erythema, and joint effusion with an inability to bear weight or a limited passive range of motion [8]. Risk factors for the development of a septic joint include: age older than 60 years, immunocompromised state, endocarditis, recent bacteraemia, recent joint injection, IVDU or history of crystalline arthropathy [11]. Additional studies can raise awareness of the disease process and prevent late identification or misdiagnosis. After a comprehensive review of the current literature, only two cases of bilateral AC septic arthritis have ever been reported. In one study, a patient with trauma to his right hand developed infective endocarditis and presented with bilateral AC joint septic arthritis [12]. The other study described a patient with rheumatoid arthritis developing bilateral AC joint septic arthritis after intra-articular injections [13].

This presentation demonstrates how bilateral shoulder septic arthritis warrants additional investigations for definitive treatment of multifocal infections, especially in the presence of *S. aureus* bacteraemia. This patient differs from the two aforementioned studies in that she had a history of IVDU, and initially presented with increasing low back and abdominal pain. After further evaluation, she was found to have MRSA bacteraemia that was complicated with metastatic infections causing bilateral AC septic joint arthritis. Arthrocentesis revealed a MRSA infection warranting emergency irrigation, debridement and IV antibiotics. Prompt recognition avoided delays in care and led to appropriate treatment of all sources.

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#### Author contribution

V.A.R.Q. – writing – original draft preparation, review, editing (lead), A.L. – writing – original draft preparation, K.D. – writing – original draft preparation, E.A.G. – Supervision, and C.L.Q. – writing – review and editing.

#### Conflicts of interest

The authors declare there are no conflicts interest.

#### Consent to publish

Written informed consent to publish the details from the affected individual was obtained.

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