



Case report

Unusual Infectious Metastases Secondary to Acupuncture Induced MSSA Septicemia



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ABSTRACT

We describe a rare case of methicillin-sensitive *staphylococcus aureus* (MSSA) septicemia with metastatic spread leading to pulmonary septic emboli, sub-capsular perinephric renal abscess, prostatic abscess, and intramuscular calf and gluteal abscess in a 48-year-old male with uncontrolled diabetes mellitus (Hemoglobin A1c of 15.2). The patient developed right lower extremity pain after a session of acupuncture followed by a three-week history of fevers, chills, abdominal pain, left flank pain, and urinary retention. Evaluation was negative for endocarditis, intracardiac shunt, intravenous drug usage, or immunodeficiency.

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Introduction

MSSA is a gram positive bacteria commonly found on human skin. More often, the cause of minor integumental infections after a cut or scrape, MSSA can cause serious illness if able to achieve vascular access and spread hematogenously. In comparison to its methicillin-resistant counterpart (MRSA), literature describing septic sequelae from community-acquired methicillin-sensitive *Staphylococcus aureus* (CA-MSSA) is less developed. To date, only a few cases of septic emboli to the kidney and prostate have been described (2–7). Furthermore, MSSA septicemia associated with metastatic infections to the lungs, prostate, kidneys, and bilateral asymmetric intramuscular sites have not yet been described.

Case Presentation

48-year-old male with a history of chronic back pain, seminoma status post right orchiectomy (5 years prior), and uncontrolled type II diabetes (Hemoglobin A1c of 15.2) presented to the hospital with a 3-week history of localized pain to the right calf which evolved to include abdominal pain, left flank pain, dysuria, urinary hesitancy, and difficulty voiding. In the setting of chronic back pain, the patient has had weekly acupuncture sessions over the 2 months prior to symptom initiation. The most recent being 1 week prior to

onset of the right calf pain. Sites of acupuncture included the lower back, bilateral hips, and bilateral lower calves. The patient denied any history of intravenous drug usage, immunodeficiency, active dental caries, or wounds at primary presentation. He further denied any history of anal sex, self-digital rectal examinations, or possible causes of prostate trauma such as self-catheterization.

Vital signs on initial presentation to the Emergency Department showed tachycardia at 132 BPM with blood pressures ranging from 113/65 to 134/89, a respiratory rate of 18, O₂ saturation of 94% on room air, and a temperature of 98.6 °F. Physical examination on admission was significant for rales in the lower lobe of the left lung, bilateral lower quadrant abdominal tenderness, left flank pain with percussion, and right lower extremity swelling with erythema and tenderness. Exam was negative for heart murmurs, signs of thrombophlebitis, or stigmata of bacterial endocarditis. Laboratory studies on initial presentation to the Emergency Department demonstrated hyponatremia at 125 mmol/L, hypoalbuminemia at 1.9 g/dl, hyperglycemia at 353 mg/dl, leukocytosis of 16.2 K/uL, hemoglobin A1c at 15.2%, Blood cultures (3 of 4 bottles) within 12 hours of admission were positive, eventually speciating as MSSA. Computed tomography (CT) of the right lower extremity with contrast was concerning for a low-density abnormality within the lateral head of the gastrocnemius muscle consistent with phlegmon or abscess. Venous duplex ultrasound study was negative for any deep venous thrombosis. CT imaging of the abdomen/pelvis with contrast and Computed tomography angiography (CTA) of the chest at initial admission were concerning for

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multiple pulmonary septic emboli, perinephric subcapsular fluid collection on the left consistent with abscess and ascending pyelonephritis, and severe prostatitis with a prostatic abscess. Urology was then consulted and an ultrasound-guided drainage of prostatic abscess with Foley catheter placement was performed. A culture from the prostatic abscess grew many gram-positive aerobic cocci in clusters. The patient received percutaneous drainage of the left renal abscess with placement of a pigtail catheter. The patient's gastrocnemius fluid collection was considered too small to drain and was treated conservatively with antibiotics. The patient was initially started on intravenous Ceftriaxone 2 g, but later was switched to intravenous Ampicillin/Sulbactam 3 g. The rationale for this change was not documented. Subsequently, the patient required transfer to our facility for workup with Transesophageal Echocardiography (TEE). Following arrival, the patient was restarted on intravenous Ceftriaxone.

After transfer to our facility, a TEE was performed and found no evidence of endocarditis. All valves were noted to be structurally normal. Furthermore, a Transthoracic Echocardiography (TTE) found no evidence of an interatrial septum defect; a finding corroborated by a negative bubble study. The patient continued to have severe ongoing right calf pain and as such, a repeat CT of the right lower extremity with contrast was completed and showed evidence of a right gastrocnemius intramuscular abscess measuring 2 × 3 × 6 cm. Incision and drainage of the right leg was performed with aspiration of 8 ml of pus on hospital day 7 out of 25. Several days later, the patient developed severe right gluteal pain with erythema as well as pain on palpation with a fluctuant mass. Ultrasound imaging was confirmatory and the intramuscular gluteal abscess was incised and drained. Cultures from both intramuscular samples were confirmed MSSA with repeat blood cultures negative for ongoing septicemia.

Repeat blood cultures (2 sets, 4 bottles) were negative and a PICC line was placed. The patient was discharged with home healthcare for wound care and antibiotic infusions. The patient has completed 6 weeks of Ceftriaxone with mild discomfort in the right lower extremity and no abnormal urinary symptoms. The patient is planned for an interval CT scan in 1 month to ensure complete resolution of the genitourinary abscesses. In addition, the patient was started on basal and mealtime insulin to optimize healing and his repeat hemoglobin A1c decreased to 12.4 from 15.2.

Discussion

This case highlights the unusual tendency of MSSA bacteremia to lead to multiple metastatic sites without the evidence of endocarditis or intracardiac on TEE and TTE with bubble study. The sensitivity of TEE for vegetation with native valves is 96% and for abscess is 90%. Post-embolization has been described as one of the reasons for a negative TEE. A TEE was not repeated therefore the diagnosis could have been missed but there was no evidence of functional change in valves either on TTE or TEE (1,2).

Only a few published cases detail prostatic and kidney involvement in immunocompetent patients, (3,6) and none of them are secondary to acupuncture as the initiating cause. Further, although established in pediatric literature, there are limited cases of MSSA bacteremia in adults, which resulted in simultaneous cutaneous, musculoskeletal, and pulmonary metastases without any evidence of endocarditis or thrombophlebitis (8–13). Finally, prostatic abscess in addition to renal subcapsular abscess, each an uncommon entity in isolation, have also not been described in connection with other sites as in this case.

MSSA has been previously reported in acupuncture-associated infections, but not within the United States (14). The most common infection at the site of needle insertion is local cellulitis. Of

infections secondary to acupuncture, MSSA is the most frequent cause (14,15). From a recent review of adverse events associated with acupuncture in the US, adverse events are now uncommon due to acupuncture safety practice guidelines such as the Clean Needle Technique (15). In a 2013 systemic review of adverse events of acupuncture case reports, from 25 countries and regions, 308 cases were found. 13 acupuncture related adverse events were from the United States. There were 239 cases of infection, with 5 of them from the United States. The causative organisms identified were *Staphylococcus Aureus* and *Pseudomonas Aeruginosa* (16).

The pathogenesis of septic pulmonary emboli and multiple abscesses involving the kidney, prostate, and musculoskeletal system remains unsubstantiated. As demonstrated in prior pediatric studies and systematic reviews on adult studies (9,10,14), it may be adequate to deduce that uncontrolled diabetes is a possible risk factor in this sequelae (17). As in our case, uncontrolled diabetes appears to be a major risk factor contributing to the several metastatic infections despite appropriate antibiotic treatment and negative TEE.

As such we believe that the initial acupuncture site resulted in the development of pyomyositis exacerbated by uncontrolled diabetes. As common in MSSA, haematogenous spread from this initial site resulted in prostatitis and pulmonary septic emboli. It is unclear whether the subsequent perinephric subcapsular renal abscess was secondary to further hematogenous spread or direct spread from the prostate leading to ascending pyelonephritis and subsequent perinephric sub capsular involvement.

Conclusion

Extensive morbidity including simultaneous pulmonary septic emboli, perinephric subcapsular renal abscess, prostatic abscess, gluteal intramuscular abscess, and lower extremity intramuscular abscess have potentially resulted from a combination of uncontrolled diabetes and acupuncture practice compounding the introduction and hematogenous spread of *S. aureus* from possibly a single abscess. This report illustrates the interaction between these host, environmental and organism factors with uncommon widespread infectious sites.

CRedit authorship contribution statement

Adwait Mehta: Conceptualization, Supervision, Writing - Review & Editing.

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