

# *Staphylococcus aureus* Bacteremia Complicated by Psoas Abscess

David Bellin, Eric Chun-Pu Chu\*

New York Medical Group, Hong Kong, China

\*Corresponding author: [eric@nymg.com.hk](mailto:eric@nymg.com.hk)

**Abstract** *Staphylococcus aureus* (*S. aureus*) is a versatile pathogen capable of producing several types of toxins often associated with food poisoning and life-threatening infections. We herein describe the case of a 69-year-old non-diabetic woman presented with diarrhea, buttock pain and fever, which was finally identified as an iliopsoas abscess. Blood and pus cultures were positive for methicillin-resistant *S. aureus*. Following a full course of antibiotics and abscess drainage, our patient recovered uneventfully. Complications of *S. aureus* bacteremia are often difficult to identify. Clinical picture of psoas abscess is nonspecific and the common role of *S. aureus* playing for septic manifestations is complicated. Raised awareness, early diagnosis, and appropriate treatment are crucial to avoid debilitating complications and mortality associated with *S. aureus* infection.

**Keywords:** bacteremia, food poisoning, metastatic infection, psoas abscess, *Staphylococcus aureus*

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## 1. Introduction

*Staphylococcus aureus* (*S. aureus*) is a commensal organism found in the nose or on the skin and environmental surfaces, and often harmless. *S. aureus* is considered the classic opportunist in taking advantage of hosts with breakage of the skin or mucosal barrier, indwelling of intravascular devices, and a weakened immunity [1]. Its ability to modify virulence factors in adapting to host defense response and antibiotics is a key factor in enabling *S. aureus* to persist in the bloodstream [2] and to spread metastatic infection in deep tissues [3]. Recent transmission of antibiotic-resistant strains of *S. aureus*, particularly methicillin-resistant *Staphylococcus aureus* (MRSA), is a worldwide problem in clinical medicine. Better approaches to identifying, screening, and treating those at risk will reduce the morbidity and mortality associated with *S. aureus* infection.

## 2. Case Presentation

A 69-year-old Asian female presented with fever up to 38°C and non-traumatic pain at the right buttock for one week. The pain was sharp and worsened with weight bearing and movement. The earlier treatment with acetaminophan 3000 mg per day was not effective and her fever remained. Note that two weeks before, she had an episode of watery diarrhea more than 5 times per day for approximately two days. Her job was labor intensive predominantly consists of ditch cleaning and litter removal. She denied trauma or infection. She had tenderness over her lower back and right buttock. There

were no sign of respiratory symptoms or neurological deficit. Laboratory investigation revealed leukocytosis (WBC 20500/ml; Seg/Lym: 88/4), C-reactive protein was 9.92 mg/L (normal <5 mg/L). Urinalysis was unremarkable and no abnormal finding of chest radiograph.

Initial KUB plain film (Figure 1A) showed a clear and prominent psoas shadow in the right iliac fossa (arrows), without evidence of a calculus. The findings of echocardiography were basically normal. Gallium-67 citrate inflammation scan for infectious screening (Figure 1B) delineated intense uptake in right iliopsoas muscle, right sacroiliac articulation and the ipsilateral gluteal region (black arrow), implying right iliopsoas abscess. Since blood culture result was positive for methicillin-sensitive *Staphylococcus aureus* (MSSA), intravenous vancomycin (1 gram every 12 hours) and oral minocycline (100 mg twice a day) were started on the basis of susceptibility results.

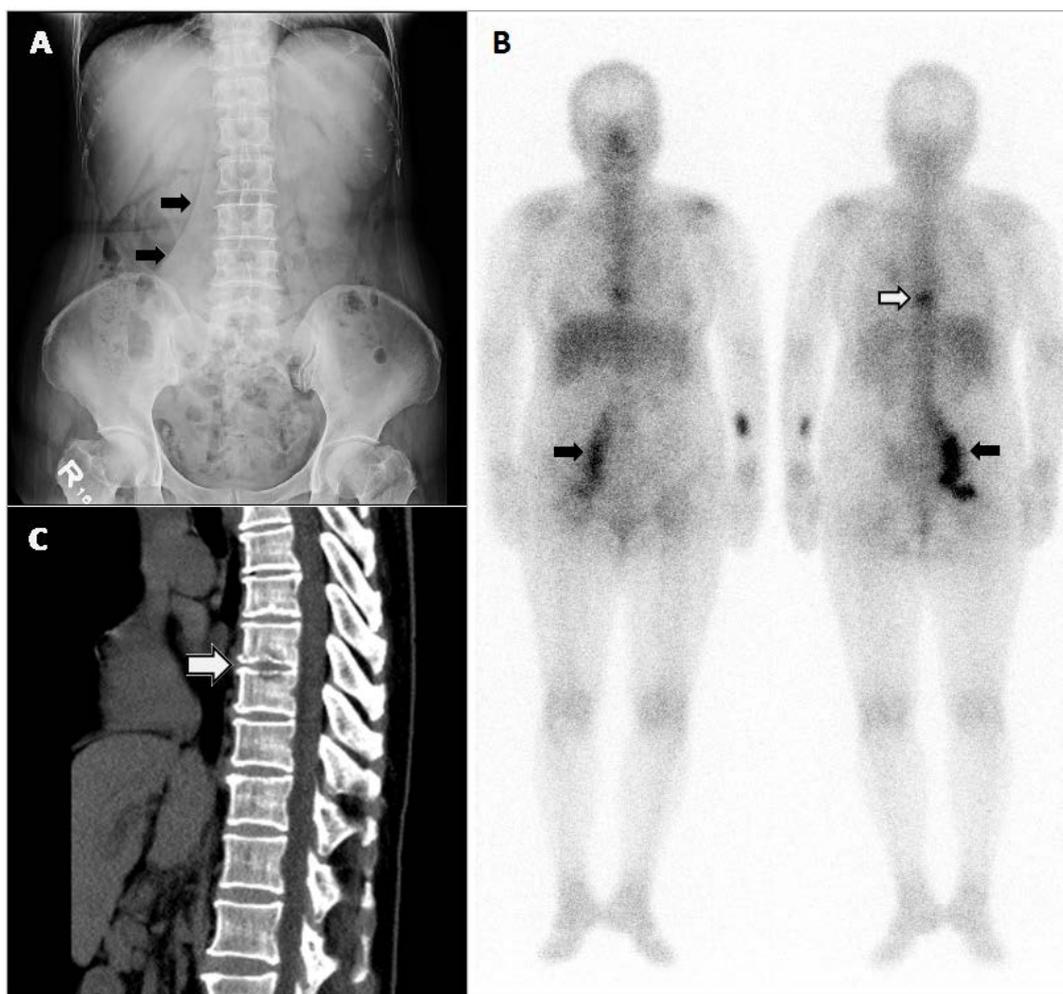
On subsequent CT examination (Figure 2), collection of intense fluid (asterisk) and air (arrow) densities was observed, extending from right psoas to *gluteus minimus*. The appearance was in concordance with muscle abscess. CT-guided drainage was performed and the pus culture was positive for MSSA. Following abscess drainage, intravenous vancomycin for 2 weeks and oral minocycline, the patient recovered uneventfully. She spent 4 weeks in the hospital and was discharged on her home medication of oral minocycline for further 2 weeks. Three months on, she is doing well without any complications.

## 3. Discussion

*S. aureus* is often found on the skin and in the nose of healthy people, but capable of transforming into a fatal

illness in hosts with compromised immunity or lower socioeconomic status. The ability to modify virulence factors to adapt to host defense response or circulating

antibiotics is a key factor in enabling of *S. aureus* to remain in the bloodstream and spread infections in deep tissues [2].



**Figure 1.** A plain KUB film (A) did not show any evidence of a calculus, but a clear and prominent psoas shadow in the right iliac fossa, indicating intramuscular space occupying lesion (arrows). A gallium-67 scan for infectious screening (B) delineated a fusiform lesion originates from the right paravertebral region of lower L-spine, extending downwards to the right sacroiliac articulation and the ipsilateral gluteal region (black arrow), implying right iliopectineal abscess. Cortical disruption of the inferior end-plate of T8 with erosion opposite vertebral end (open arrow) was consistent with degenerative spondylolysis on sagittal tomographic section (C)

Bacteria may enter the bloodstream from an occult infection or by direct inoculation, and are generally cleared from the blood within minutes, so the bacteremia is silent and transient. In immunocompromised hosts, viable bacteria remain in the blood and bacteremic symptoms would arise [4]. *S. aureus* is a major cause of bloodstream infections in most of the industrialized world [2,5], with wide variation in its manifestations. When present, symptoms may range from fever and chills to septic shock. *Staphylococcus aureus* bacteremia (SAB) is an urgent medical problem due to its poor outcome and the growing prevalence of methicillin-resistant *S. aureus* (MRSA). The presence of *S. aureus* in the blood does not establish the source of septic symptoms, because *S. aureus* is also incriminated in a number of infectious diseases. The crucial step in the assessment of a bacteremic patient is defining the extent of infection, as this will determine the nature of management. Patients with SAB are at risk for the development of metastatic foci [2,3], as was the case of this patient.

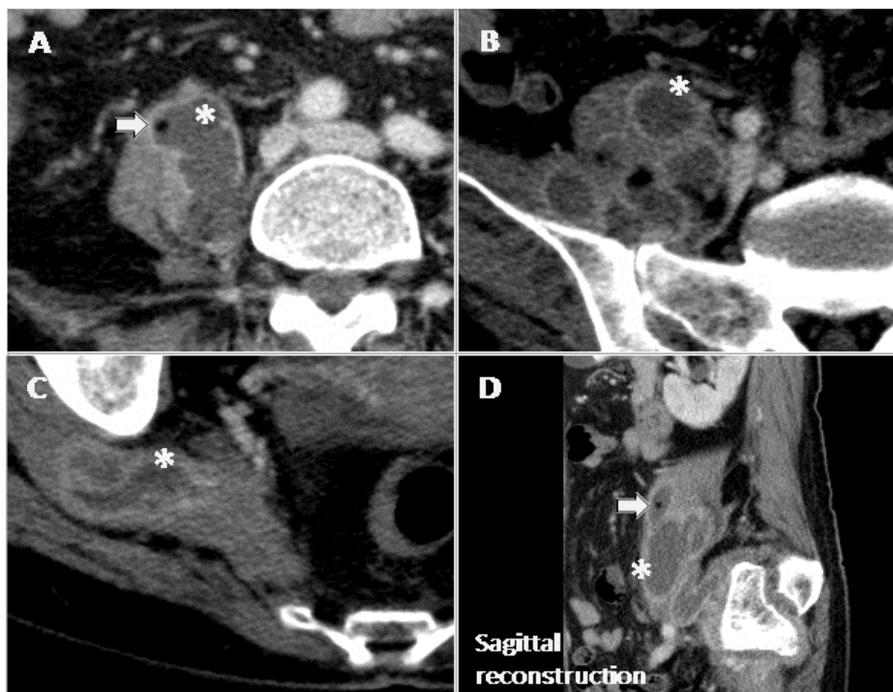
Metastatic infection is defined as deep-seated infection detected within 3 months after the initial positive blood

culture result is obtained [6]. The prevalence of metastatic infection in patients with SAB varies from 13% to 39% [7,8,9], with endocarditis, psoas abscess and spondylodiscitis were diagnosed most frequently [6,10]. Signs and symptoms guiding the attending physician in the diagnostic workup are present in only a minority (41%) of cases [11]. Any complaint of local pain indicates the possibility of underlying complication of SAB and should aggressively be pursued if no alternate explanation can be identified. Incomplete eradication of occult infections may lead to relapsing bacteremia or mortality [6].

The psoas is surrounded by a rich venous plexus and has lymphatics overlying the muscle from nearby organs. The psoas is also in close proximity to intra-abdominal organs, including the colon, appendix, terminal ileum, jejunum, ureters, kidneys and pancreas. Hence the psoas is susceptible to the infections of these organs [12]. The pathogenesis of psoas abscess is related to two mechanisms: primary, with hematogenic spread; and secondary, when related to adjacent structures infection. Moreover, the causative organisms differ among primary (*S. aureus*) and secondary (*Escherichia coli*, *Klebsiella* spp, *Bacteroides*

spp, *Streptococcus* spp) psoas abscesses [13,14]. In a review of 367 cases, Ricci et al noted that over 99% of iliopsoas abscess are primary in Asia and Africa, in which 88% are staphylococcal abscess, and that the mortality rate in untreated patients is 100% [15]. The classic triad of

fever, back pain and limping is present in only 30% of patients with psoas abscess [12,16]. Other common symptoms include malaise, weight loss, nausea, anorexia, and pain that radiates to the flank, groin, or anterior thigh [12].



**Figure 2.** CT of lumbar spine. (A, axial) Collection of intense fluid (asterisk) and air (arrow) densities was observed in the right psoas muscle. Note the collection extending from right iliopsoas muscle, (B, axial) to right *gluteus minimus* muscle (C, axial). The appearance was in concordance with muscle abscess. The extent of the abscess was also demonstrated on the sagittal reconstruction image (D, sagittal)

A major concern in the present case is about the possibility of simultaneous infections of bloodstream and of the psoas muscle caused by *S. aureus*. In fact, this event could have occurred in the case here described, considering that the etiologic agent was concomitantly found in samples from blood and pus. Notwithstanding, metastatic infections (endocarditis, osteomyelitis, psoas abscess, etc.) are more often described as a consequence of SAB. Likewise, infection that originates in a deep-seated focus can extend through the bloodstream to other sites. According to the literature, *S. aureus* is a major microorganism responsible for primary psoas abscess [15], metastatic infection [16], bacteremia [2] and food poisoning [17]. The conclusive evidence of staphylococcal food poisoning is the linking of an illness with a specific food or detection of the toxin in the food sample. We have no convincing data to establish that diarrhea, as an initial symptom in our case, is a clue to unexpected SAB or psoas abscess.

#### 4. Conclusion

Patients with SAB are at risk for the development of metastatic infections. These complications are associated with increased morbidity and mortality. Radionuclide imaging may delineate and assess the infectious foci in all parts of the body, based on functional changes of tissues. Early clinical recognition and appropriate management of staphylococcal infections are crucial to avoid debilitating complications.

#### Conflict of Interest

We declare that we have no conflict of interest.

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