Rare disease

Successful treatment of methicillin-resistant *Staphylococcus aureus* bacteraemia and cholecystitisSantosh Kumar Nepal,¹ Smith Giri,² Keshav Panday¹¹Department of Hospitalist, Rapid City Regional Hospital, Rapid City, South Dakota, USA²Tribhuvan University Teaching Hospital, Kathmandu, Nepal

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Summary

Although *Staphylococcus aureus* can cause a variety of infections, involvement of the biliary tract is rare. We present a middle-aged Caucasian woman who presented with methicillin-resistant *S aureus* (MRSA) bacteraemia. Subsequent investigation revealed a diagnosis of acute cholecystitis with MRSA-positive specimen cultures. The patient showed clinical improvement after vancomycin therapy and laparoscopic cholecystectomy. This case adds to the growing list of infections that can be attributed to MRSA.

BACKGROUND

The term acute cholecystitis denotes an acute inflammation of the gall bladder often complicated by an infection. The disease usually starts with an obstruction of the cystic duct leading to ischaemia and inflammation.¹ Infection complicates 20–50% of patients with chronic cholecystitis and 40–75% of patients with acute cholecystitis.²

Members of the Enterobacteriaceae family, *Enterococcus* species and anaerobes are the most common organisms found in bile cultures of patients with acute cholecystitis.³ Isolation of *Staphylococcus aureus* is uncommon, accounting for about 0.8–5.6% of the organisms cultured from cholecystectomy specimens.¹ Cholecystitis caused by methicillin-resistant *S aureus* (MRSA) is rare in the literature, with only 11 cases reported till date.^{1 2 4–10}

We report a case of an acute cholecystitis caused by MRSA with an associated bacteraemia.

CASE PRESENTATION

A Caucasian woman in her 50s presented with 5-day history of repeated seizures, fever and increasing confusion. Her medical history was remarkable for presenile dementia secondary to prior traumatic brain injury, seizure secondary to trauma, alcohol abuse in the past and new onset diabetes mellitus. On examination, she appeared confused and lethargic and not oriented to time, place or person. She had the following vital signs at presentation: blood pressure 115/62 mm Hg, pulse rate 68/min, respiratory rate 16/min, temperature 38.6°C and oxygen saturation of 93% on room air. There was no heart murmur. The abdomen was non-tender on repeated examinations. There was no evidence of skin or soft tissue infection. Rest of her physical examination was unremarkable.

INVESTIGATIONS

Laboratory studies revealed a white blood cell count of 9700/cm³ with 87% neutrophils. Liver enzymes were minimally elevated with aspartate aminotransferase 54, alanine aminotransferase 51, alkaline phosphatase 307 and a total bilirubin of 0.7. Cerebrospinal fluid (CSF)

examination was normal except for mildly increased protein. CSF cultures and herpes simplex virus PCR were negative while MRI of the brain was unremarkable. Meanwhile, four blood cultures revealed MRSA bacteraemia. The source of bacteraemia, however, was not clear. A transoesophageal echocardiogram revealed no evidence of endocarditis. CT showed an inflamed gall bladder with multiple gallstones (figures 1). Similarly, an ultrasonography of the abdomen showed distended gallbladder with thickened gall bladder wall and a negative sonographic Murphy's sign (figures 2). A diagnosis of an acute cholecystitis was later confirmed by a hepatobiliary iminodiacetic acid scan.

Figure 1 CT scan-abdomen of the patient showing an inflamed gallbladder with multiple gallstones.

Figure 2 Ultrasonographic image of the gall bladder showing marked distension of the gallbladder with thickened wall. Sonographic murphy's sign was negative.

DIFFERENTIAL DIAGNOSIS

Because the patient presented with fever, seizures and confusion, one of the differential diagnosis was meningo-encephalitis. However it was ruled out on the basis of an unremarkable CSF analysis with negative cultures, normal MRI of brain and negative herpes simplex virus PCR.

TREATMENT

With the suspicion of meningo-encephalitis, the patient was initially treated with acyclovir, ceftriaxone and vancomycin which were later discontinued. However, vancomycin was later restarted guided by the sensitivity results of the isolated bacterial cultures. On the fifth day of admission, the patient underwent a laparoscopic cholecystectomy.

OUTCOME AND FOLLOW-UP

Although she looked confused at the time of her admission, her mental status rapidly improved within the first 24 h of hospital stay. The gall bladder specimen after her surgery showed acute cholecystitis with cholelithiasis and the specimen culture was positive for MRSA (figures 3). Her hospital course was complicated by atrial fibrillation which was successfully cardioverted. The patient showed

Figure 3 Biopsy image of the gall bladder showing marked inflammation.

a remarkable clinical improvement postoperatively, and was discharged on eighth postoperative day to a swing bed to complete 3 weeks of antibiotics in view of bacteraemia and visceral organ involvement.

DISCUSSION

The pathogenesis of an acute calculous cholecystitis starts with an obstruction of the cystic duct by gallstones. As a result, the gallbladder becomes distended leading to a compromised blood flow and lymphatic drainage, which results in mucosal ischaemia and necrosis.⁷ This is often complicated by an invasion of micro-organisms, usually *Escherichia coli*, *Pseudomonas aeruginosa*, *Enterococcus* spp, and *Klebsiella* spp.¹¹

S aureus is a Gram-positive bacteria, typically associated with skin and soft tissue infections, pneumonia, osteomyelitis, septic arthritis and infective endocarditis.² It is however rarely reported as a biliary pathogen, as the gastrointestinal tract does not harbour *S aureus* as normal flora.² In a review of 13 case series including 782 isolates from patients with biliary tract infections, the frequency of *S aureus* was found to be 2%.²

With the rising prevalence of MRSA globally, cases of acute cholecystitis caused by MRSA are being recognised. Our case adds to the limited clinical data available on MRSA cholecystitis.^{1 2 4–10} Similar to the previously reported cases, our patient had concomitant bacteraemia. It was however unclear if the gallbladder represented a metastatic focus or the source of bacteraemia. Haematogenous seeding of the gallbladder has been shown to be possible in other infections including typhoid fever.¹ Merchant and Falsey suggested that *S aureus* cholecystitis with bacteraemia should prompt an investigation for an intravascular catheter. Our patient did not have any evidence of infective endocarditis, or a long-standing intravenous catheter. In absence of a clear endovascular source, we considered the possibility of an ascending infection from the duodenum, which was initially swallowed from the nasal discharge. Another possibility could be an unidentified MRSA soft tissue infection from trauma during her previous seizure episodes, which haematogenously seeded the gallbladder and led to cholecystitis. Furthermore, our patient did not have frequent hospitalisation or recent antibiotic use that could explain her MRSA colonisation.

Our patient presented with fever, altered mental status and an episode of tonic clonic seizure. She had a history of recurrent seizures due to her past head trauma and contributed by her chronic alcoholism. Her seizure at presentation could have been precipitated by the underlying infection. No further seizures were reported during her hospital stay. Her altered mental status was likely due to her postictal state, as it improved rapidly within 24 h of admission.

Previous reports of MRSA cholecystitis have suggested that it generally occurs among older individuals with chronic medical conditions such as hypertension, diabetes mellitus, malignancy and cirrhosis.¹⁰ Our patient was in her late 50s and had multiple medical conditions including diabetes mellitus and alcoholic dementia.

After the blood cultures revealed MRSA bacteraemia, an extensive search for the foci of infection was carried out, which led us to the identification of acute cholecystitis. The isolated bacteria was sensitive to vancomycin hence, was

subsequently started on this antibiotic. Prompt laparoscopic cholecystectomy made sure that we removed the source of the bacteraemia. This probably led to the rapid clinical improvement in our patient. In view of bacteraemia and atrial flutter or atrial fibrillation, she underwent a transoesophageal ECG which ruled out endocarditis. The atrial fibrillation witnessed during hospitalisation was probably due to septicaemia.¹²

In summary, we describe a patient with MRSA infection of the gallbladder, a condition rarely reported in the literature. This case adds to the growing spectrum of MRSA-related infections. In treating acute cholecystitis, empiric coverage should be guided to the common enteric bacteria. However, if *S aureus* is isolated in blood, it should not be discarded as a contaminant. In patients with MRSA bacteraemia with an unclear aetiology, the possibility of gallbladder as a likely source should always be considered.

Learning points

- ▶ We describe a patient with methicillin-resistant *Staphylococcus aureus* (MRSA) infection of the gallbladder, a condition rarely reported in the literature. This case adds to the growing spectrum of MRSA-related infections.
- ▶ In treating acute cholecystitis, empiric coverage should be guided to the common enteric bacteria. However, if *S aureus* is isolated in blood, it should not be discarded as a contaminant.
- ▶ In patients with MRSA bacteraemia with an unclear aetiology, the possibility of gallbladder as a likely source should always be considered.

Competing interests None.

Patient consent Obtained.

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