CASE REPORT

Disseminated MRSA infection with purulent pericarditis

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SUMMARY

The risk of developing pericarditis secondary to Methicillin-Resistant *Staphylococcus aureus* (MRSA) infection in the absence of preceding surgical procedure is extremely low. We present a case report of a 36-year-old woman who developed disseminated MRSA infection leading to purulent pericarditis.

BACKGROUND

Pericarditis is the most common presentation of pericardial disease globally, and the causative factors vary in terms of geographical distribution. Clinically, pericarditis can present as an isolated condition or in association with an underlying systemic disorder. Pericarditis occurs more frequently in adults, particularly in men between ages of 20 and 50 years. The precise incidence and prevalence of the disease are not known but it is estimated to account for 0.1% of hospital admissions in the USA and for 5% of chest pain presentations to an emergency room.¹ Approximately 80%–90% of pericarditis cases are either idiopathic in origin or they are caused by viral infections. In terms of bacterial aetiology, tuberculosis remains the major causative factor in developing countries while it accounts to less than 5% of cases in the developed world.² The number of bacterial pericarditis cases has reduced in the recent times with the discovery of newer antibiotics and most common causes of bacterial pericarditis are *Staphylococcus*, *Streptococcus* and *Haemophilus influenzae*.³ Methicillin-resistant *Staphylococcus aureus* (MRSA), since it has been reported in 1960, has been predominantly associated with health-care-associated infections; however, recent trends suggest that there has been a rise in the incidence of infections caused by community-acquired MRSA.⁴ MRSA infections not only pose a great financial burden on the healthcare system and account for approximately 19 000 deaths annually in the USA but also are responsible for severe morbidity rates caused by complications arising secondary to the infection.⁵ MRSA is an extremely rare cause of pericarditis in the absence of prior surgical intervention and only a handful of cases have been reported in the literature so far around the world. We present a case of disseminated MRSA infection with purulent pericarditis in a 36-year-old female patient.

CASE PRESENTATION

A 36-year-old female patient with a medical history significant for mood disorder, presented

to the emergency department with 3-day history of reddish, itchy rash that started on her back and progressed towards torso and extremities associated with fever. The day before the patient presented to emergency room, she had facial swelling that was not relieved with diphenhydramine. The patient recently started taking oxcarbazepine for mood stabilisation but she reported that she stopped taking the medication when she noticed the rash.

Vitals on admission showed temperature of 100.2°F, heart rate of 145/min, blood pressure of 105/72 mm of Hg and respiratory rate of 20/min.

Complete blood count revealed an elevated white blood cell count to 18 000 cells/ μ L (reference range: 4000–11 000 cells/ μ L) with 15% of relative eosinophilia. Liver function tests revealed alanine aminotransferase (ALT) elevated at 211 IU/L (reference range: 10–40 IU/L), aspartate aminotransferase (AST) elevated at 82 IU/L (reference range: 7–56 IU/L), total bilirubin of 2.8 mg/dL (reference range: 0.3–1.9 mg/dL) and alkaline phosphatase (ALP) of 305 IU/L (reference range: 44–147 IU/L).

The patient was treated with fluid resuscitation and started on empiric intravenous vancomycin 20 mg/kg and piperacillin plus tazobactam 3.375 g every 6 hours. On the basis of skin rash, eosinophilia, abnormal liver enzymes and facial oedema, a working diagnosis of drug reaction with eosinophilia and systemic symptoms (DRESS) syndrome was made with oxcarbazepine being the possible offending agent. The patient was started on systemic steroids as per the recommendation of allergy and immunology team. Liver enzyme levels fluctuated during her hospital stay where they initially peaked and then started to trend downwards. After 10 days, the patient had a subsequent rise in liver enzyme levels (AST: 2391 IU/L, ALT: 2509 IU/L, total bilirubin: 11.4 mg/dL) at that time liver transplant options were explored and it was deemed that the patient was not a transplant candidate. Treatment with supportive care and systemic steroids was continued. After a couple of days, the patient began to complain of chest pain that gradually worsened. Patient was tachycardic and spiking fevers after remaining afebrile for several consecutive days. Blood cultures revealed MRSA at which time infectious disease was consulted for assistance.

Decision was made to start the patient on daptomycin instead of vancomycin because there have been reports in literature that vancomycin was

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Figure 1 CT chest with contrast showing large pericardial effusion and bilateral pleural effusions.

associated with DRESS syndrome. Daptomycin was switched after 1 day to intravenous ceftaroline 600 mg every 8 hours. The patient became haemodynamically unstable and was transferred to intensive care unit, where an echocardiogram demonstrated pericardial effusion with tamponade physiology. An emergent pericardiocentesis was performed yielding 400 mL of yellow purulent fluid, and right-sided thoracentesis revealed 100 mL of straw-coloured fluid. Chest imaging revealed pericardial effusion and bilateral pleural effusions (figure 1). The patient also developed left upper chest wall abscess, which was drained at bedside. Gram staining and cultures of the pericardial drainage, thoracocentesis fluid and chest abscess fluid, all grew MRSA. Transesophageal echocardiogram was recommended to rule out endocarditis; however, procedure was postponed due to patient's haemodynamic instability at that time. Cardiothoracic surgery was consulted and after review of the CT scan of chest with contrast, pericardiectomy was performed after sepsis had subsided.

INVESTIGATIONS

Complete haemogram, liver function tests, renal function test, blood gram stain and cultures, fluid cultures, CT scan chest with contrast, transthoracic echocardiogram.

TREATMENT

Ceftaroline 600 mg every 6 hours and prednisone.

OUTCOME AND FOLLOW-UP

The first negative blood culture was reported 6 days after ceftaroline was started and cultures were last reported negative 17 days after initiating ceftaroline with resolution of rash.

DISCUSSION

The incidence of MRSA is on the rise over the last few decades. Several factors, such as changing antibiotic regimens, co-morbidities and newer modalities, in patient management play a major role in contributing to this shift.⁶ One of the aspects of this changing paradigm has been rise in the number of cases and the varying presentations of MRSA. This aspect is of great concern

given the challenges in managing MRSA infections. In this particular case, we believe that the patient developed disseminated MRSA infection secondary to diffuse skin lesions (patient did not have any other risk factors for Staphylococcal bacteraemia like prosthetic devices, central lines) and the patient might have an immune deficiency disorder (although basic immune work up is negative), which predisposed her to disseminated staphylococcal infection. The case not only depicts a rare presentation of MRSA pericarditis in the absence of surgical intervention but also reveals a new approach that was adopted in the management with ceftaroline.

Learning points

- First-line treatment for methicillin-resistant *Staphylococcus aureus* (MRSA) infections is vancomycin. Because of the association of drug reaction with eosinophilia and systemic symptoms (DRESS) and vancomycin, vancomycin therapy was not seen as a viable option in this patient.
- Other potentially viable anti-MRSA agents for bacteraemia are daptomycin (which is FDA approved for *Staphylococcus aureus* bacteraemia) and ceftaroline (which is often used off label for MRSA infections not caused by Acute Bacterial Skin and Skin Structure Infections).
- Originally, the patient was started on daptomycin, dosed at 6 mg/kg/day and was switched to ceftaroline, which was dosed aggressively at 600 mg every 8 hours. The decision to switch anti-MRSA agents was due to conglomeration of factors. First, although the incidence is low (reported at less than 1%), there is a risk of hypersensitivity reactions (such as DRESS and Eosinophilic Pneumonia) with the use of daptomycin⁷.
- In contrast, there are no reports of ceftaroline causing DRESS, and the risk of increased liver enzymes is reported at 2% in adults.⁸ This case report shows safe and effective use of high-dose ceftaroline for treatment of MRSA pericarditis.

Contributors The following authors have contributed in the preparation of the manuscript. PKM, BC, ADS, MA.

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REFERENCES

- 1 Spodick DH. Acute pericarditis: current concepts and practice. *JAMA* 2003;289:1150–3.
- 2 Imazio M, Gaita F, Le winter M. Evaluation and treatment of pericarditis a systemic review. *JAMA* 2015;314:1498–506.
- 3 Pankuweit S, Ristic AD, Seferovic PM, et al. Bacterial pericarditis: diagnosis and management. *Am J of Cardiovasc drugs* 2005;5:103–12.
- 4 Chambers HF. The changing epidemiology of *Staphylococcus aureus*? *Emerg Infect Dis* 2001;7:178–82.
- 5 Kleven RM, Morrison MA, Nadle J, et al. Invasive methicillin-resistant staphylococcal aureus infections in the United States. *JAMA* 2007;298:1763–71.
- 6 Fowler VG, Miro JM, Hoen B, et al; ICE Investigators. *Staphylococcus aureus* endocarditis: a consequence of medical progress. *JAMA* 2005;293:3012–3021.
- 7 Daptomycin. *Lexi-Drugs online*. Hudson, OH: Lexi-Comp, Inc. Updated 10/07/2016. https://online.lexi.com/lco/action/doc/retrieve/docid/patch_f/6694. (Accessed Oct 25, 2016).
- 8 Ceftaroline. In: *lexi-drugs online*. 07. Hudson, OH: lex-comp, inc, 2016. [Updated 10/]. https://online.lexi.com/lco/action/doc/retrieve/docid/patch_f/2940159.

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