Community-Associated Methicillin-Resistant
*Staphylococcus aureus* Mediastinitis

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Received 1 May 2009/Returned for modification 7 June 2009/Accepted 31 July 2009

Community-associated methicillin (meticillin)-resistant *Staphylococcus aureus* (CA-MRSA) continues to emerge as a cause of serious infections, chiefly of the skin and soft tissues. We present the first documented case of CA-MRSA mediastinitis in an adult. Blood and mediastinal isolates were characterized as CA-MRSA by pulsed-field gel electrophoresis and susceptibility testing.

**CASE REPORT**

A 47-year-old female presented to the Emergency Department with progressive, severe chest pain and dyspnea. She had been evaluated for fever and a productive cough on an outpatient basis 3 days prior and was prescribed levofloxacin when a chest X-ray revealed multilobar infiltrates. She denied any recent hospitalization or surgeries and reported no sore throat, oral lesions, dental problems, dysphagia, odynophagia, nausea, or vomiting. Her pertinent medical history included hypertension, hyperlipidemia, fibromyalgia, and well-controlled systemic lupus erythematosus.

On examination, the patient was febrile to 102.4°F, hypotensive (blood pressure, 88/60 mmHg), tachycardic to 131 beats/min, tachypneic (respiratory rate of 40 breaths/min), and hypoxic (90% oxygen saturation on 4 liters/min oxygen by nasal cannula). Physical examination revealed normal conjunctiva, an absence of oral or dental lesions, no crepitus or induration of the neck, no evidence of cardiac murmurs or rubs, and decreased breath sounds on auscultation. A neurological examination was normal. Within a few hours, the patient displayed evidence of respiratory distress, which required intubation. Nasogastric tube placement following intubation resulted in some epistaxis. A repeat chest X-ray was unchanged from that performed on admission, revealing multilobar infiltrates without pleural effusion or focal abscess or a widened mediastinum. Hematological testing revealed a white cell count of 33,400/µl. Evidence of elevated cardiac biomarkers and ST segment elevations on electrocardiography prompted immediate cardiac catheterization, which did not reveal any evidence of thrombosis or infarction. Since the patient was febrile and relatively hypotensive with leukocytosis and evidence of multilobar pneumonia, broad-spectrum antibiotics were initiated on hospital day 2, revealing a moderate pericardial effusion with no evidence of abscess. A transthoracic echocardiogram was performed on hospital day 2 and was negative for abscess or valvular vegetation. A transesophageal echocardiogram was attempted on hospital day 5 but was aborted due to the patient’s gag reflex and inability to pass the scope. The patient defervesced, and her clinical status improved, allowing extubation on hospital day 6. Surveillance blood cultures on hospital days 4, 6, and 8 remained negative.

The patient continued to report substernal chest pain, orthopnea, and dyspnea, prompting a chest CT on hospital day 8. This study revealed multiple, large mediastinal and deep neck abscesses, the largest (mediastinal) of which measured 3.2 by 18.6 cm (Fig. 1). Ultrasound-guided drainage of the large mediastinal abscess with placement of an indwelling drain was performed, and culture of the recovered fluids was also positive for MRSA. Evaluation of the oral cavity and esophagus ruled out oral abscess and esophageal perforation, respectively, as potential sources of the abscesses. The neck and chest drains were reimaged on hospital day 17 with a contrasted CT, which showed a significant decrease in the size of the abscesses (Fig. 1). The patient’s dyspnea and chest pain resolved, and the mediastinal drain was removed on hospital day 18. Thereafter, she made an uneventful recovery, completing a 4-week course of intravenous antibiotic therapy with vancomycin on an outpatient basis.

All of the bacteria recovered from blood, respiratory, and mediastinal fluid specimens were identified as MRSA by the clinical microbiology laboratory with the Vitek 2 (BioMérieux, Inc., Durham, NC). Eight of these MRSA isolates were further characterized by pulsed-field gel electrophoresis (PFGE) and resistance and virulence genotyping. All were found to be pulsed-field type (PFT) USA 300 by PFGE with Smal restric-
tion enzyme digestion and a CHEF-DRIII system (Bio-Rad Laboratories, Hercules, CA) (5). PFGE patterns were interpreted and grouped into PFTs by using established criteria (5, 10). A multiplex PCR to simultaneously detect the staphylo-
cocal cassette chromosome mec (SCCmec) genes was per-
formed as described elsewhere (7). In addition, the isolates
underwent PCR to detect the Panton-Valentine leukocidin
(PVL) and arginine catabolic mobile element (ACME) genes
(6). All isolates possessed SCCmec type IV, PVL, and ACME
genes. All of the MRSA isolates (from blood, sputum, and
mediastinal fluid) were susceptible to vancomycin, clindamycin,
erthyromycin, gentamicin, nitrofurantoin, and trimethoprim-sul-
famethoxazole and resistant to oxacillin, penicillin, and cipro-
floxacin as determined by Vitek 2. Vancomycin susceptibility
(MIC, 1.5 μg/ml) was confirmed by Etest (BioMérieux, Inc.,
Durham, NC).

Discussion. While MRSA infections continue to increase in
hospital settings, accounting for >60% of the isolates in U.S.
intensive care units, community-acquired MRSA (CA-MRSA)
strains are also emerging pathogens with considerable associ-
ated morbidity and mortality (1). Historically, risk factors for
CA-MRSA infections have included injection drug use, prior
antibiotic therapy, and recent hospitalization (4). Recent re-
ports also identify young age, low socioeconomic status, and
minority race or ethnicity as emerging risk factors (1, 4). Most
CA-MRSA infections are associated with pyogenic skin and
soft-tissue infections in previously healthy individuals (1). PVL
toxin, in particular, is associated with community-associated
soft tissue infections, as well as necrotizing pneumonia (4, 11).
MRSA is occasionally associated with community-acquired
pneumonia, typically occurring after influenza or viral upper
respiratory infection and comprise 1 to 5% of community-
acquired pneumonia cases, most being of SCCmec type IV (8).

The majority of CA-MRSA isolates in the United States
carry the genes that encode PVL toxin and SCCmec type IV
and are identified as PFT USA 300 (3). However, 28% of
health care-associated infections and also 20% of nosocomial
bloodstream infections have also been identified as PFT USA
300 (1, 3), suggesting its movement into the health care setting.

Our patient initially presented with pneumonia that went
on to bacteremia and sepsis, requiring inpatient admission.
She developed multiple neck and mediastinal CA-MRSA ab-
scesses. Mediastinitis is a relatively uncommon infection in-
volving the mediastinal structures and may result from a vari-
ety of underlying etiologies, including esophageal perforation,
extension from head and neck infections, pneumonia, infected
lymph nodes, or an infected sternotomy site. Organisms fre-
cently implicated in infections stemming from the head and
neck or esophageal perforation include anaerobes (e.g., Pep-
tostreptococcus, Actinomyces, and Fusobacterium species),
Streptococcus species, Corynebacterium species, and members
of the family Enterobacteriaceae. S. aureus is more frequently
associated with mediastinal infections secondary to cardiotho-
racic surgery (9). Mediastinitis due to MRSA, in particular, is
uncommon, having previously been documented only in pa-
tients with a history of sternotomy and in children as a com-
plication of retropharyngeal abscess (2, 12). Of note, reported
cases of poststernotomy mediastinitis involve nosocomial
rather than community-acquired organisms (2). Our patient
did not have a history of cardiothoracic surgery, a pharyngeal
abscess, or trauma to the pharynx or esophagus. Moreover, our
patient had PFT USA 300 MRSA possessing PVL, ACME,
and SCCmec type IV genes, consistent with the majority of the
CA-MRSA strains found in the United States, in every isolate
from respiratory, blood, and mediastinal abscess cultures. As
our patient’s vancomycin trough concentrations were consis-
tently between 14 and 22 μg/ml, vancomycin treatment failure
was unlikely. We theorize that the virulent nature of PVL-
producing CA-MRSA significantly contributed to the develop-
ment of her mediastinal abscesses.

Methicillin-resistant S. aureus mediastinitis is a particularly
uncommon infection, and its known associations have previ-
ously been limited to complications of sternotomy in
adults and retropharyngeal abscesses in children. However,
our patient had neither a history of primary retropharyngeal
infection nor a history of cardiothoracic surgery. We present
a case of mediastinitis resulting from a complication of CA-MRSA
pneumonia, a previously undocumented causality.
The views expressed herein are ours and do not reflect the official policy or position of the Department of the Air Force, the Department of the Army, the Department of Defense, or the U.S. Government.

REFERENCES