

## Letter to the Editor

### *Staphylococcus aureus* Bacteremia Associated With Intra-aortic Balloon Pumps

#### To the Editor:

Since its first clinical use in the late 1960s, intra-aortic balloon pump counterpulsation has been a significant means of supporting an inadequate myocardium.<sup>1,3</sup> The use of an intra-aortic balloon pump has increased greatly preceding open heart surgery for cardiogenic shock and left ventricular failure.<sup>1,2</sup> Additional indications include other conditions such as unstable angina refractory to medical treatment and mechanical complications of acute myocardial infarction.<sup>4</sup>

Of all of the complications of intra-aortic balloon pumps reported over the years, septic complications are rare.<sup>1,4,5</sup> Most septic complications of intra-aortic balloon pumps are local (eg, wound infection). Methicillin-sensitive *Staphylococcus aureus* (MSSA) bacteremia has been reported only rarely in patients with newly inserted balloon pumps. Recently, within a period of 8 days, three patients in our cardiac care unit developed MSSA bacteremia within a week of placement of an intra-aortic balloon pump. In these three symptomatic patients, blood cultures were positive for MSSA. The following three cases describe our findings.

#### CASE REPORTS

##### Case 1

A 74-year-old man presented to the emergency department with a 1-day complaint of chest discomfort. In the emergency department, the patient experienced an episode of ventricular fibrillation that successfully defibrillated to sinus tachycardia. The patient was found to have an ST elevation inferior wall myocardial infarction. The coronary angiogram revealed a 100% right coronary artery lesion, which was not stented due to complicated anatomy. An intra-aortic balloon pump was placed because of a second cardiac arrest with subsequent cardiogenic shock. The patient

was transferred to the cardiac intensive care unit. At that time, he had a temperature of 97.3°F, a pulse rate of 75 beats per minute, a respiratory rate of 70 breaths per minute, and an augmented blood pressure of 130/90 mm Hg.

On hospital day 2, the patient developed shaking chills, rigors, and a temperature of 101.6°F. The intra-aortic balloon pump was removed on day 2, and blood for cultures was obtained. The patient was given 400 mg of gatifloxacin intravenously for 1 day, then 200 mg intravenously every day thereafter. On hospital day 3, the patient's temperature spiked to 102.1°F. Additional blood for cultures was obtained, an infectious disease consultation was requested, and the patient was given 1 g of vancomycin intravenously. Blood for cultures was drawn on hospital day 2, and three of these cultures grew MSSA. The patient became afebrile on hospital day 5 and was discharged home on oral gatifloxacin.

##### Case 2

A 69-year-old woman was transferred from another hospital after presenting with a 3-day history of nausea and vomiting. Her laboratory work showed an elevated troponin level of 14.5 ng/mL and an electrocardiogram consistent with a non-ST elevation anterolateral myocardial infarction. Coronary catheterization revealed three-vessel disease with left ventricular dysfunction and a depressed ejection fraction. The patient had an intra-aortic balloon pump inserted while awaiting cardiac artery bypass graft surgery. She was admitted to the cardiac intensive care unit.

On hospital day 2, the patient had a temperature of 102.3°F and developed respiratory distress. She underwent intubation, and blood for cultures was obtained. Antibiotic therapy was started with 1 g of ceftriaxone intravenously every 24 hours. Blood cultures grew MSSA. The patient underwent extubation on hospital day 12. She had a long and complicated hospital course, and is currently awaiting elective coronary artery bypass surgery.

##### Case 3

An 84-year-old woman presented to the emergency department with a 1-day history of severe substernal chest pain. The patient was found to have an acute ST elevation anterior wall myocardial infarction (creatinine phosphokinase = 2,258 IU/L, troponin = 100 ng/mL). Coronary angiography revealed a 95% proximal right coronary artery lesion, a 100% mid left anterior descending coronary artery lesion, and severe-diffuse circumflex disease, with an ejection fraction of approximately 35%.

An intra-aortic balloon pump was placed at the time of the procedure due to ongoing chest pain, and the patient was transferred to the cardiac care unit. The intra-aortic balloon pump was removed on hospital day 3. On hospital day 4, the patient had a temperature of 102°F. She was given 3.375 g of piperacillin-tazobactam intravenously every 6 hours. Blood cultures and cultures from the site of the balloon were performed. The blood cultures grew MSSA and cultures from the groin also grew abundant *S. aureus*. The patient became afebrile on hospital day 5. The hospital course was complicated by a cardiac arrest. The patient was later diagnosed as having tachycardia-bradycardia syndrome and a permanent pacemaker was placed.

#### DISCUSSION

The use of an intra-aortic balloon pump is critical in treating patients with failing hearts who are awaiting open heart surgery. In the past, studies of complications from intra-aortic balloon pumps have found bacteremia to be a statistically insignificant complication (up to 2%).<sup>1,4,5</sup> Previously documented studies show that both cardiac catheterization and percutaneous transluminal coronary angioplasty are associated with low bacteremia rates.<sup>6</sup> Limb ischemia, bleeding, and dissection are more common than infection following placement of an intra-aortic balloon pump.<sup>1,4</sup>

Reported pathogens include *Pseudomonas cepacia* and *Serratia marcescens* as causes of bacteremia

associated with an intra-aortic balloon pump and have been attributed to contaminated water reservoirs or pressure-monitoring transducers associated with an intra-aortic balloon pump.<sup>7,8</sup> Rarely, *Enterobacter* and MSSA have also been reported following placement of an intra-aortic balloon pump.<sup>5</sup> Local wound infection may occur, because most intra-aortic balloon pumps are placed femorally and are prone to infection by the normal flora of the region. However, bacteremia associated with intra-aortic balloon pumps has been rare, and because of this, having three cases of MSSA bacteremia in our cardiac care unit within a week was remarkable.

We have not identified a common source for the three cases we described. Unfortunately, the isolates were discarded before they could be typed by pulsed-field gel electrophoresis. The intra-aortic balloons were also discarded before cultures could be performed. The clustering of these cases suggests a common source. All three cases reflected a sudden fever that ranged between 102°F and 102.8°F. No common factors were identified among the three patients. The members of the nurse-resident cardiac care unit teams varied among these three

patients. The insertion of the intra-aortic balloon pump was done in two patients by the same cardiologist, and in the third by another cardiologist. Two of the three patients were diabetic, and all three had catheters and balloon pumps following myocardial infarction. One of the three patients developed respiratory failure requiring intubation. A second also received bypass surgery, and the third patient was treated medically.

These cases illustrate that bacteremia is a potential complication of placement of an intra-aortic balloon pump. As with other infections involving vascular devices, the primary treatment of bacteremia or infection associated with intra-aortic balloon pumps is removal of the infected device. Clinicians should consider the intra-aortic balloon as a potential source of either early or late MSSA bacteremia in patients who develop fevers following placement of an intra-aortic balloon pump.

#### REFERENCES

1. Kantrowitz AT, Wafsie PS, Freed M, Rubenfire W, Wajszczuk MA. Intraaortic balloon pumping 1967 through 1982: analysis of complications in 733 patients. *Am J Cardiol* 1986;57:976-983.
2. Molner HM. Intra-aortic balloon pump: nursing implications for patients with an iliac artery approach. *Am J Crit Care* 1998;7:300-305.
3. Datascope Corporation. *Mechanics of Intra-Aortic Balloon Counterpulsation, Self Study Guide*. Fairfield, NJ: Datascope Corp.; 1990.
4. Mankhoul R, Cole CW, McCann RL. Vascular complications of the intra-aortic balloon pump: an analysis of 436 patients. *Am Surg* 1993;59:546-548.
5. Crystal EA, Borer J, Gilad I, et al. Incidence and clinical significance of bacteremia and sepsis among cardiac patients treated with intra-aortic balloon counterpulsation pump. *Am J Cardiol* 2000;86:1281-1284.
6. Shea KW, Shwartz RK, Gambino AT, Marzo KP, Cunha BA. Bacteremia associated with percutaneous transluminal coronary angioplasty. *Catheterization & Cardiovascular Diagnosis* 1995;36:5-9.
7. Rutala WA, Weber DJ, Thomann CA, John JF, Saviteer SM, Sarubbi FA. An outbreak of *Pseudomonas cepacia* bacteremia associated with a contaminated intra-aortic balloon pump. *J Thorac Cardiovasc Surg* 1988;96:157-161.
8. Villarino ME, Jarvis WR, O'Hara C, Bresnahan J, Clarke N. Epidemic of *Serratia marcescens* bacteremia in a cardiac intensive care unit. *J Clin Microbiol* 1989;27:2433-2436.

Lawrence Eisenstein, MD  
 Colleen Daly, MD  
 Burke A. Cunha, MD  
 Infectious Disease Division  
 Winthrop-University Hospital  
 Mineola, New York  
 and  
 State University of New York  
 School of Medicine  
 Stony Brook, New York