

Clostridium septicum as a Cause of Pericarditis and Mycotic Aneurysm

ROBERT B. BRAHAN* AND RALPH C. KAHLER

Hattiesburg Clinic, P.A., 415 South 28th Avenue, Hattiesburg, Mississippi 39401

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***Clostridium septicum* is a bacterial species associated with gas gangrene in both humans and animals. Although not usually a pathogen in humans, it has been implicated in some cases of abscesses and bacteremia. We now report the first case of pericarditis with mycotic aneurysm due to *C. septicum*.**

A 70-year-old female diabetic was hospitalized with a 2-day history of malaise, myalgias, fever, and substernal chest pain. On physical examination, she had mild tenderness in the epigastrium. The admission laboratory tests revealed a leukocyte count of 10,600, with 78% neutrophils, 13% lymphocytes, and 8% monocytes. The chest X ray and electrocardiogram were normal.

The patient received parenteral cefuroxime empirically, 750 mg every 8 h; this regimen was stopped on day 8 of hospitalization. On day 10, the patient developed severe substernal chest pain with hypotension and a paradoxical pulse of 25 mm Hg. An echocardiogram showed a large pericardial effusion. Pericardiocentesis revealed an exudate, and culture of the exudate yielded *Clostridium septicum*. Because of the association of *C. septicum* with carcinoma of the bowel, a barium enema was performed. There was a mass in the right colon, and a right hemicolectomy was performed, revealing a Duke's B adenocarcinoma. The patient recovered from surgery uneventfully and completed 3 weeks of intravenous penicillin G therapy at 4×10^6 U every 4 h. At that point, a maculopapular rash developed, and her therapeutic regimen was changed to intravenous vancomycin, 1 g every 12 h for the next 7 days. She remained afebrile 48 h after the discontinuation of the vancomycin and was discharged.

Nineteen days after her discharge she was readmitted with a 3-day-history of fever, nausea, and vomiting. Blood samples obtained on admission yielded *C. septicum* when cultured. During her hospitalization she was examined extensively for an occult focus of infection. An echocardiogram showed minimal pericardial effusion, and no vegetations were noted. Susceptibility testing by broth dilution by the Centers for Disease Control revealed resistance to cefuroxime and ceftizoxime. After 14 days of intravenous ticarcillin-clavulanic acid at 3.1 g every 4 h, the patient was placed on oral chloramphenicol, 500 mg every 6 h, and completed an additional 28 days of therapy.

Two weeks after discontinuation of the chloramphenicol, the patient was readmitted with a 1-day history of fever and confusion. The admission chest X ray showed a left hilar mass. Blood samples drawn on admission yielded *C. septicum* when cultured. The patient had a new systolic murmur, but her echocardiogram revealed no valve abnormality. A computed tomographic scan of the chest revealed a large deformity of the cardiac silhouette at the level of the vascular pedicle of the heart. A computed tomographic scan

of the brain was negative. A cardiac catheterization revealed a large sacular aortic aneurysm arising from the aortic arch and extending into the descending thoracic aorta. The patient was transferred to the University of Mississippi Medical Center, where a resection of the aortic aneurysm and resection of a fistula between the aneurysm and the pulmonary artery were performed and repaired with a Dacron graft. The pathology specimen revealed focal acute suppurative inflammation. She subsequently completed 5 weeks of intravenous penicillin therapy, 4×10^6 U every 4 h. She was placed on long-term oral penicillin therapy at a dose of 500 mg every 6 h. After 36 months of follow-up she has demonstrated no recurrent bacteremia or evidence of metastatic colon carcinoma.

Pericardial fluid was plated onto blood agar plates, MacConkey plates, and chocolate agar. The MacConkey plate was incubated at 37°C for 48 h. The blood agar and chocolate agar plates were incubated at 37°C in 8% CO₂ for 48 h. The remainder of the pericardial fluid was placed into thioglycolate broth and incubated at 37°C in 8% CO₂.

Blood samples were drawn in Roche Septi-Chek blood culture bottles aerobically and anaerobically. They were incubated for 24 h at 37°C. There was no growth in the aerobic bottle, whereas the anaerobic bottle had hemolysis and abundant gas formation.

Aerobic culture of the pericardial fluid exhibited no growth. The thioglycolate broth was cloudy, and on Gram staining gram-positive rods with oval subterminal spores were found. The Gram stain of samples of the anaerobic blood culture bottles showed the same characteristics. The thioglycolate broth and the media from the anaerobic blood culture bottle were subcultured to a Centers for Disease Control anaerobic blood agar plate. This was incubated for 24 h at 37°C in a BBL Microbiology Systems GasPak pouch and aerobically in a sheep blood agar plate and on a chocolate agar plate. Colonies that grew on the anaerobic blood agar plate showed the classic Medusa head morphology. The colonies were placed on a MicroScan Rapid Anaerobe identification panel. After 4 h of incubation, the panels were read and gave reactions with a confidence percentage of 99.9% for *C. septicum*. There were no atypical reactions.

Susceptibility testing was performed at the Centers for Disease Control in Atlanta, Ga. Antimicrobial agents were tested via the broth microdilution method. Of the antibiotics tested, the organism was resistant only to cefuroxime and ceftizoxime. Antimicrobial agent susceptibilities are summarized in Table 1.

C. septicum infrequently causes infection in humans,

* Corresponding author.

TABLE 1. Antimicrobial susceptibilities determined by the Centers for Disease Control

Antibiotic	MIC ($\mu\text{g/ml}$)
Carbenicillin	≤ 4.00
Cefoxitin	≤ 1.00
Chloramphenicol	1.00
Clindamycin	≤ 0.12
Erythromycin	1.00
Metronidazole	2.00
Penicillin	≤ 0.12
Tetracycline	2.00
Vancomycin	1.00
Amoxicillin-clavulanic acid	≤ 2.00
Ticarcillin-clavulanic acid	≤ 2.00
Cefuroxime	8.00
Ceftizoxime	64.00
Ceftriaxone	≤ 2.00
Imipenem	≤ 0.50

although it has been associated with severe myonecrosis (12), cerebritis (3), meningitis (4), panophthalmitis (9), arthritis (7, 13), thyroiditis (1), bacteremia (2), osteomyelitis (10), and splenic abscess (6). The most common presentation is myonecrosis. It was summarized by Alpern and Dowell (1) in a series which was based on cultures sent to the Centers for Disease Control. A review of Koransky et al. (7) evaluated the records of 59 patients with bacteremia caused by *C. septicum*, isolates of which were sent to the Centers for Disease Control. In this series, 42 patients had malignancies. Of the solid tumors, 14 of 21 were colon cancer, with 8 of these 14 being carcinoma of the cecum. The usual site of infection was muscle and subcutaneous tissue. There is a high mortality associated with *C. septicum* infections. Koransky et al. (7), Alpern and Dowell (1), and Katlic et al. (5) reported mortality rates of 45, 68, and 70% respectively. A review by Kornbluth et al. (8) had similar statistics.

Whereas clostridial pericarditis caused by *C. perfringens* has been described (2), our case represents the first case of

pericarditis and mycotic aneurysm secondary to *C. septicum*. It again exemplifies the need for an evaluation of occult malignancy. It is unclear why our patient did not have a more fulminating course. As with many cases of recurrent bacteremia, an intravascular focus of infection was found.

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