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The Role of Splenectomy in Endocarditis

Donald J. Magilligan, Jr, MD* and Edward L. Quinn, MD**

Five patients with endocarditis, persistent sepsis, and positive liver-spleen scans underwent splenectomy. Three had splenectomy performed concomitantly with cardiac valve replacement, one after valve replacement and one as an isolated procedure. Four of five spleens contained abscesses, and bacterial cultures of two were positive. Histologic study of one spleen revealed splenitis. All patients improved after splenectomy, and all are well two to twenty months postoperatively. An aggressive approach to splenic abscess in endocarditis may lead to reduced mortality from bacterial endocarditis and infected prosthetic valves.

In a series of 44 patients who underwent prosthetic heart valve replacement for active infective endocarditis (1), two patients died from splenic abscess with continuing sepsis. The possibility that splenic abscess can occur caused us to look for this complication of endocarditis. In the past twenty months, five patients with active endocarditis have undergone splenectomy, three at the time of prosthetic valve replacement. The following is a report of that experience.

Case Reports

Case 1
A 30-year-old man underwent six weeks of treatment with tobramycin (200 mg IM q8h) and carbenicillin (6.5 gms IV q4h) for endocarditis due to Pseudomonas aeruginosa and was discharged afebrile. He returned two weeks later with fever, blood cultures positive for pseudomonas, and severe mitral valve incompetence. Antibiotic treatment was begun with tobramycin and moxalactam (6.5 mg IV q8h), but the fever persisted. The abdomen was normal at examination, but because of our previous experience with endocarditis associated with splenic abscess, a liver-spleen scan was performed. A defect was demonstrated at the inferior pole of the spleen (Fig. 1). On the sixth treatment day, the mitral valve was replaced, and concomitant splenectomy was performed. The spleen contained an abscess at a site (Fig. 1) corresponding with the defect on scintiscan. Positive cultures for Pseudomonas aeruginosa were obtained from both the mitral valve and the spleen. Tobramycin and moxalactam were continued for an additional six weeks before the patient was discharged, and he has remained well for twenty months subsequently.

Case 2
A 78-year-old man underwent uneventful aortic valve replacement with insertion of a porcine bioprosthesis in December 1979. When the patient returned to the hospital six months later with fever and chills, blood cultures were positive for Staphylococcus epidermidis. Therapy was initiated with vancomycin (500 mg IV q6h). Because of abdominal pain in the first week, a liver-spleen scan and computerized tomographic study of the abdomen were obtained. Neither showed liver or spleen defects. The antibiotic treatment was changed to cephalixin (1 gm IV q6h) after one week because of apparent vestibular toxicity. Treatment was continued for four weeks, and the clinical response was satisfactory. At this time, how-

Fig. 1
Liver-spleen scan on Patient 1 indicating a defect at the inferior pole of the spleen. Abscess shown in the photograph on the left.

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ever, the patient's temperature rose daily to 39.5°C, and the negative blood cultures reverted to positive for Staphylococcus epidermidis. Because the patient complained of left upper quadrant pain and developed left pleural effusion, a liver-spleen scan was obtained, and multiple defects were demonstrated. Echogram of the heart revealed no evidence of aortic valvular incompetence or vegetations. In the fifth week of antibiotic treatment, the aortic valve prosthesis was replaced by a new bioprosthetic valve, and concomitant splenectomy was performed. Vegetations positive for Staphylococcus epidermidis were present on the prosthesis, and the spleen contained multiple abscesses from which the same organism was recovered. The patient received intravenous cefazolin therapy for an additional five weeks before he was discharged. He is well 17 months after surgery.

Case 3
A 51-year-old man was transferred to Henry Ford Hospital after three weeks of treatment for Staphylococcus aureus endocarditis with nafcillin (1.5 gm IV q4h). With antibiotic treatment, blood cultures were negative, but the patient's temperature was still elevated to 38°C. A liver-spleen scan, obtained because of fever, showed a defect in the upper pole of the spleen. Computerized tomography confirmed the defect, and echogram revealed an echo-free space in the spleen consistent with abscess. Because the patient continued to harbor infection, splenectomy was performed during the fifth treatment week. Multiple, well-circumscribed yellow areas filled with purulent material were present in the spleen (Fig. 2). Microscopic sections demonstrated necrosis, aggregates of neutrophils, and cocci, but cultures were negative. Antibiotic therapy was continued for an additional two weeks, and the patient remains well 14 months after splenectomy.

Discussion
Splenic abscess, which occurs infrequently, has had an incidence of less than 1% in autopsy series both in the pre-antibiotic (2,3) and antibiotic eras (4). Antemortem diagnosis was rare in large early series (2,3). As diagnostic techniques improved, however, the diagnosis of splenic abscess was made before autopsy in 50% (4), 64% (5), and 43% (6) of cases reported in three more recent studies. In a review of the literature, Chun, et al reported that splenic abscess was not suspected until autopsy in 21% of
173 patients (5). These figures indicate that it is not so much the difficulty in diagnosis as lack of awareness that accounts for the rarity of antemortem diagnosis. In the pre-antibiotic era, the mortality rate of splenic abscess was 80-100% (7). More recent reviews (4-6) report that the mortality rate has decreased but still remains at 35-70%.

Splenic abscess arises as a sequela to infection elsewhere in the body in 75% of cases (8). In 1928 the commonest cause of splenic abscess was endocarditis (2); more recently, endocarditis was the cause in 17-38% of patients (4-6).

Infection of the spleen is not related to a particular organism other than salmonella (4). The pathogenesis in endocarditis is probably related to splenic infarction, since Caldiera (9) showed that he could not produce splenic abscess after intravenous injection of Staphylococcus aureus in rabbits unless the spleen had been traumatized or a terminal branch of the splenic artery had been ligated. In our series, splenic infarction leading to abscess formation most likely occurred in the first four patients. The fact that two of four abscesses were sterile is not unusual, since 29% of a series of 129 splenic abscesses were sterile on culture (5).

Splenomegaly occurs in 37% of patients with active infective endocarditis and in 64% of those with prosthetic valve endocarditis (10). It is most often due to congestion, hyperplasia, and infarction (11). At present, the actual incidence of splenic abscess in endocarditis is unknown. However, in the pre-antibiotic era, 10% of patients dying of bacterial endocarditis had suppurative lesions in their spleens (12).

Splenic abscess should be suspected when the patient presents with sepsis, left upper quadrant pain, and left shoulder pain with or without splenomegaly. Fever is accompanied by leukocytosis. The chest x-ray may indicate elevation of the left hemidiaphragm, left pleural effusion, displacement of the stomach, or left colon gas. These signs are nonspecific, however, and the most useful diagnostic test is the liver-spleen scan (13). Since scintiscans may not reveal multiple small splenic abscesses, splenic arteriography may be helpful when an abscess is suspected and the scan is negative (14). Computerized tomography and echogram of the abdomen, which were diagnostic in our third patient, have only recently been reported as helpful in the diagnosis (15). The fifth patient in our series must be considered to have had a false positive scan, since the pathologist's report indicated no abscess but many small emboli and splenitis. This patient's improved clinical course after splenectomy must be considered coincidental.

The first report of splenectomy for abscess in a patient with active infective endocarditis was made by Polowe in 1939 (16). In the 1950s attention was again focused on splenectomy for patients with active infective endocarditis for whom antibiotic therapy was unsuccessful (12,17). Finland (18) noted that in such cases splenectomy may be a useful and even life-saving procedure. Splenic abscess as the specific cause of failure of therapy...
for active endocarditis was also re-emphasized in our review of our experience in the surgical treatment of endocarditis (1).

At present, all patients with active infective endocarditis who have symptoms referable to the left upper quadrant undergo a liver-spleen scan. This procedure may be complemented by computerized tomography and echogram of the abdomen both to enhance diagnostic accuracy and to develop a correlation with scintiscans. If any diagnostic tests are positive, and if patients show signs of persistent sepsis even when they are receiving antibiotic therapy, splenectomy is recommended. All patients who are undergoing valve replacement for persistent sepsis with or without hemodynamic valvular dysfunction routinely have a liver-spleen scan before surgery. If the scan is positive, splenectomy is carried out concomitantly with valve replacement surgery.

Awareness that splenic abscess can result in a failure of medical and surgical therapy for endocarditis has led to the diagnosis and successful surgical treatment of four patients with splenic abscess and endocarditis. An aggressive diagnostic and surgical approach to splenic abscess in endocarditis will hopefully lead to an improved mortality rate among patients with active infective and prosthetic valve endocarditis.

References