Successful Conservative Treatment of Nontyphoid *Salmonella* Endocarditis Involving a Bioprosthetic Valve

STEFAN GOERRE, M.D., RAFFAELE MALINVERNI, M.D.,* BEAT C. AESCHBACHER, M.D.

Cardiology and *Medical Policlinic, University Hospital, Bern, Switzerland

Summary: We report a first case of *Salmonella enteritidis* endocarditis involving a bioprosthetic aortic valve. Despite additional native tricuspid valve involvement, the clinical course was favorable using an antibiotic regimen of ciprofloxacin and netilmicin. Although *Salmonella* prosthetic valve endocarditis is considered an indication for surgical replacement of the prosthesis, this case indicates that prolonged treatment with fluoroquinolones may be an alternative provided that the hemodynamic situation is stable.

Key words: heart valve bioprosthesis, salmonella, endocarditis, quinolone antibiotics, transesophageal echocardiography

Introduction

Mechanical and biological prosthetic heart valves are prone to infective endocarditis. The most commonly involved microorganisms are *Viridans Streptococci* and *Staphylococci*. Gram negative bacteria are an uncommon cause of prosthetic valve endocarditis.¹ Only six cases of *Salmonella* prosthetic valve endocarditis have been reported.^{2,3} We present the first case of nontyphoid *Salmonella* endocarditis on a bioprosthetic valve successfully treated with fluoroquinolones.

Case Report

A 79-year-old caucasian man was first referred with a 3-day history of vomiting, chills, and fever after he had continued to consume food from a defective refrigerator. His past

history included aortic valve replacement with a Carpentier-Edwards porcine prosthesis because of severe aortic stenosis 2 years previously. Prednisone 7.5 mg daily was given because of a minimal-change glomerulonephritis. The patient presented with a blood pressure of 115/70 mmHg and a heart rate of 100/min. A grade 3/6 systolic murmur at the right sternal border was heard. The electrocardiogram (ECG) showed normal sinus rhythm. Four of six pairs of blood cultures grew *Salmonella* group D, subtype enteritidis. Antibiotic treatment including amoxicillin and clavulanic acid, netilmicin, and ciprofloxacin was initiated. After 7 days, the patient was discharged with ciprofloxacin for another 2 weeks.

Twenty-five days later he was readmitted with recurrent fever. The findings at physical examination, ECG, and chest radiographs were unchanged. White blood cell count (WBC) was $7 \times 10^9/l$ with 21% band forms, and C-reactive protein (CRP) was 140 mg/l. While transthoracic echocardiography showed no signs of endocarditis, transesophageal echocardiography (TEE) revealed vegetations of 16 mm length on the aortic bioprosthesis (Fig. 1A) and 12 mm on the base of the native tricuspid valve (Fig. 1B). There was no evidence of prosthetic leakage, and the aortic mean pressure gradient was unchanged compared with a measurement one year previously. Only minimal tricuspid regurgitation was present. Blood cultures again grew *Salmonella enteritidis* with identical antibiotic susceptibility. Treatment with intravenous ciprofloxacin 200 mg b.i.d. and netilmicin 70 mg t.i.d. was initiated. Since the clinical course, including sterile follow-up blood cultures and stable hemodynamics, was favorable and there was no evidence of further local extension or systemic or pulmonary embolism, surgical replacement of the prosthetic valve was postponed. Repeat TEE after 17 and 24 days revealed complete resolution of the vegetation on the aortic bioprosthesis, but persistence of the tricuspid vegetation. At discharge 35 days later, the patient was free of fever, WBC was $7.4 \times 10^9/l$ (8% band forms), and CRP was 30 mg/l.

Oral ciprofloxacin 750 mg b.i.d. was continued for 15 weeks. A TEE 5 months after discontinuation of the antibiotic regimen showed resolution of both the aortic and the tricuspid vegetations. Twelve months later, the patient remained free of relapse and the transthoracic echocardiographic assessment demonstrated normal function of both aortic and tricuspid valve.

Address for reprints:

Beat C. Aeschbacher, M.D.
Cardiology
University Hospital, Inselspital
CH-3010 Bern, Switzerland

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FIG. 1 Initial transesophageal echocardiography. (A) The lateral view of the bioprosthesis in aortic position shows a filiform vegetation of 16 mm length. (B) Vegetation of 12 mm length on the basis of the septal leaflet of the native tricuspid valve. LVOT = left ventricular outflow tract, Ao = aortic root, LA = left atrium, RA = right atrium, RV = right ventricle.

Discussion

Infective endocarditis remains a serious complication of cardiac valve replacement with biological prostheses.^{1, 4} When compared with mechanical prostheses, the incidence of endocarditis as well as the spectrum of infective agents are similar.⁵ *Salmonella* prosthetic valve endocarditis has been reported in six cases, all of them involving mechanical valves.^{2, 3} The main reason why gram-negative bacteria are exceptional in prosthetic valve endocarditis is supposed to be their lack of adherence factors. However, *Salmonellae* exhibit increased stickiness to artificial surfaces due to a fibronectin peptide.⁶ Glucocorticosteroid treatment required for concomitant glomerulonephritis may have facilitated relapsing *Salmonella* bacteremia in our patient.⁶ Based on their excellent in vitro activity against susceptible strains and their marked intracellular penetration, fluoroquinolones are the agents of choice for *Salmonella* infections.⁷ In experimental endocarditis as well as in a case report on a patient with *Salmonella* endocarditis involving native valves, fluoroquinolones have been efficacious against *Salmonella enteritidis*.^{8, 9} Indeed, our patient was successfully treated with a long-time course of ciprofloxacin after failure of short-course treatment.

Following initial antibiotic therapy, replacement of the prosthetic valve is advised in the case of annular abscess, involvement of other valves, or immunocompromising medi-

cation.¹⁰ In addition, patients with vegetations exceeding a size of 10 mm, as in our case, have increased risk of embolization.¹¹ It has been suggested that combined medical and surgical treatment is the best management for bioprosthetic valve endocarditis, with preoperative antibiotic therapy to achieve sterilization of the damaged valve.¹² However, three of the six previously reported patients with *Salmonella* prosthetic valve endocarditis died despite early surgery. The antibiotic regimen in these patients included beta lactams, aminoglycosides, chloramphenicol, tetracyclines, and cotrimoxazole, but not quinolones.^{2, 3} We suppose that the relapsing course in our patient could have been avoided if TEE had been performed at first admission. Being alert to the presence of vegetations, antibiotic treatment would have been more intense and prolonged. Thus, in the case of *Salmonella* bacteremia in patients with prosthetic heart valves, TEE should be a part of the initial diagnostic assessment.

Conclusion

To our knowledge this is the first report on the successful use of fluoroquinolones in *Salmonella* bioprosthetic valve endocarditis. Further experience will reveal whether this conservative approach can be generally recommended in complicated cases of bioprosthetic valve endocarditis in hemodynamically stable patients.

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