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SALMONELLA PROSTHETIC VALVE ENDOCARDITIS

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Salmonella endocarditis has been characterized by its destructive process and malignant clinical course.¹ Although an increasing number of such infections have been evident in recent years, *Salmonella* prosthetic valve endocarditis (PVE) is still rare.²⁻⁴ Only seven case reports have appeared in the English literature up to now. Because of its rarity and unusual clinical course, we describe the eighth case of *Salmonella* PVE in a patient who underwent rereplacement of the aortic and mitral prosthetic valves and simultaneous cholecystectomy. We also review the previous cases reported in the literature.

Case report. A 58-year-old man was admitted on an emergency basis on October 1, 1994, with fever, chills, and weakness of 3 days' duration. He had undergone aortic and mitral replacement, tricuspid annuloplasty, and closure of an atrial septal defect in 1981 at 45 years of age. He had two brothers who had died of enteric typhus. On admission, his temperature was 42.0° C and blood pressure was 86/60 mm Hg. He had normal regular prosthetic valve sounds at 76 beats/min. The white blood cell count was 12,100/mm³ with 61% segmented polymorphonuclear white cells and bands of 15% but with no eosinophils. The chest x-ray film showed moderate cardiomegaly and the electrocardiogram showed incomplete right bundle branch block with normal sinus rhythm. After intravenous antibiotics were given, the white blood cell count decreased, the eosinophil count increased, and spiking fevers disappeared. Because clinical examinations showed

no evidence of infectious endocarditis, antibiotics were discontinued on day 28 after admission. Five days later, his body temperature elevated again with chills. The white blood cell count increased and the eosinophil count decreased. *Salmonella typhimurium* was isolated from the blood three times after recurrent fever. A transesophageal echocardiogram (TEE) revealed a highly mobile echo mass attached to the anulus of the mitral prosthetic valve and an immobile echo mass on the subvalvular position of the aortic valve.

After 66 days of hospitalization, he underwent rereplacement of the aortic and mitral prosthetic valves and simultaneous cholecystectomy. The aortic prosthetic valve did not appear grossly infected but had moderate sized subvalvular pannus formation. A vegetation was found on the anterior anulus of the mitral valve. The mitral and aortic prostheses were replaced with a CarboMedics bileaflet prosthesis (29 mm in diameter; CarboMedics, Inc., Austin, Tex.) and a St. Jude Medical prosthesis (25 mm in diameter; St. Jude Medical, Inc., St. Paul, Minn.). After closure of the chest, the gallbladder was removed in the usual fashion. Gall stones were found in the gallbladder, but intraoperative cholecystography revealed no choledochal stones. The patient was moved to the intensive care unit in a stable hemodynamic condition. Microscopic examination of the tissue surrounding the mitral prosthetic valve showed diffuse infiltration of lymphocytes and neutrophils with clusters of micrococci. The gallbladder showed mild cellular infiltration. Culture of the vegetation and bile grew *Micrococcus* but no *Salmonella*. The concentrations of sulbactam and cefoperazone in the serum, the wall of the gallbladder, and the bile in the gallbladder were four times higher than the minimum inhibitory or bactericidal concentration for *S. typhimurium*, resulting in a failure to isolate *Salmonella* from these specimens. Imipenem, to which not only *Salmonella* but *Micrococcus* was sensitive, was given intravenously for 6 weeks after the operation. A TEE on postoperative day 35 revealed no vegetation, and he was discharged on postoperative day 36. He had no evidence of recurrent infection during 1 year of follow-up.

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Table I. Characteristics of the previous and present cases of preoperative *Salmonella* PVE

Case	Author	Year	Age, sex	<i>Salmonella</i> species	Preexisting heart disease	Preexisting prosthetic valve (position of valves)	Duration from the first replacement to onset of endocarditis (yr)	Antibiotic therapy	Total duration of antibiotic therapy (days)
1	Weinstein	1965	44, M	<i>S. schwarzengrund</i>	R (M and A)	Hufnagel (A)	4	CP	27
2	Fraser	1967	56, F	<i>S. hirschfeldii</i>	R? (A)	Bahnsen (A)	4	PC, CP, ABPC, SM, MC	Unknown
3	Yamamoto	1974	50, F	<i>S. choleraesuis</i> <i>S. enteritidis</i> (groupD)	R (M)	Unknown (M)	3	ABPC, TC	54
4	Shanson	1977	52, M	<i>S. enteritidis</i>	S (A)	Starr-Edwards (A)	3	GM, CEZ, CP, ABPC, mecillinam	48
5	Bassa	1989	NA, NA	<i>S. nontyphi</i>	NA	NA	NA	NA	NA
6	Choo	1992	62, F	<i>S. heidelberg</i>	R (M and T)	Hancock (M and T)	9 and 7	CTX, ABPC, GM	81
7	Lee	1994	42, M	Group B	R (M and A)	Björk-Shiley (M and A)	19	VCM, netilm- cin, CTX	>100
8	Present case	1996	49, M	<i>S. typhimurium</i>	R (M and A)	Björk-Shiley (M and A)	13	PIPC, SBT/ CPZ, GM, ABPC	64

R, Rheumatic; M, mitral; A, aortic; S, syphilitic; T, tricuspid; NA, not available; CP, chloramphenicol; PC, penicillin; SM, streptomycin; ABPC, ampicillin; MC, minocycline; TC, tetracycline; GM, gentamicin; CEZ, cefazolin; VCM, vancomycin; CTX, ceftriaxone; PIPC, piperacillin; SBT, sulbactam; CPZ, cefoperazone.

Table II. Surgical treatment and outcome of the previous and present cases of *Salmonella* PVE

Case	Surgical treatment	New prosthetic valves (position of valves)	Vegetation (position of valves)	Postop. antibiotic therapy	Duration of postoperative antibiotics therapy (days)	Complications	Outcome
1	None		Aortic abscess	None	48	Dissecting aneurysm	Died (preop.)
2	Re-AVR	McGovern (A)	Yes (A)	None	45	Cerebral emboli (preop.)	Died (POD1)
3	Re-MVR	Kay-Shiley (M)	Yes (M)	ABPC, SM	120	Cerebral emboli (preop.); fever and isolation of <i>Salmo- nella</i> from stool postop.	Alive
4	Re-AVR	Björk-Shiley (A)	Yes (A)	NA	NA	Cerebral emboli, pancytopenia	Died
5	None		Yes (?)	NA	NA	None	Died (preop.)
6	AVR, Re-MVR, Re-TVR	St. Jude Medical (A, M, and T)	Yes (T)	CTX, CPFX	102	None	Alive
7	None		Yes (A and M)	None	none	None	Died (preop.)
8	Re-AVR, Re- MVR	St. Jude Medical (A), CarboMedics (M)	Yes (M)	IPM, BAC, DFLX	156	None	Alive

AVR, Aortic valve replacement; MVR, mitral valve replacement; TVR, tricuspid valve replacement; A, aortic; M, mitral; T, tricuspid; NA, not available; ABPC, ampicillin; SM, streptomycin; CTX, ceftriaxone; CPFX, ciprofloxacin; IPM, imipenam; BAC, sulfamethoxazole and trimethoprim; DFLX, difloxacin.

Comment. Endocarditis resulting from *Salmonella* is rare but has a high mortality rate even when treated with intravenous administration of antibiotics.¹ Seven cases of *Salmonella* PVE have been reported in the English liter-

ature (Table I).²⁻⁴ Many types of *Salmonella* were isolated from the blood, valve, and aortic wall (Table I). All six patients were treated with intravenous antibiotic therapy that achieved an adequate serum bactericidal level for 34

to 100 days; however, rereplacement of valves was considered in all and three died before the operation. Four patients underwent rereplacement of the prosthetic valve and only two survived the operation (Table II). No patient underwent simultaneous cholecystectomy. Our patient represents the eighth reported case of *Salmonella* prosthetic valve infection and only the third to have survived. Because of high mortality and recurrence rates of *Salmonella* PVE, early surgical intervention should be considered. For a diagnosis of PVE, transthoracic echocardiography did not disclose a vegetation before the operation in five of seven cases of *Salmonella* PVE, whereas TEE could detect a vegetation in both cases in which TEE was done. TEE should be done if PVE is suspected.

In *Salmonella* PVE with a possible infectious origin of the gallbladder, it is still controversial to perform simultaneous operations. The previous patients did not undergo simultaneous cholecystectomy. *Salmonella* species can persist in the gastrointestinal system, especially in the gallbladder, in carriers who are symptom-free. It is difficult to eradicate *Salmonella* in patients with gallstones or scarring of the biliary tree even after intravenous antibiotics.⁵ Some patients with *Salmonella* infection resistant to intravenous antibiotic therapy required cholecystectomy to eradicate the carrier state.⁵ One of two patients who survived after surgery for *Salmonella* PVE had recurrent fever after the operation, and *Salmonella* was isolated from his stool on the fifth postoperative day. In the Japanese literature, one patient with *Salmonella* PVE who

survived after rereplacement of two prostheses had cholecystitis after the operation. Therefore simultaneous cholecystectomy should be considered in *Salmonella* PVE, especially in case of bile duct infection or gallstones, as in the present patient.

In summary, we described the eighth case of *Salmonella* PVE. Rereplacement of the aortic and mitral prosthetic valves and simultaneous cholecystectomy were done, without recurrence of the infection during 1 year of follow-up.

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UNUSUAL COMPLICATION SEVEN YEARS AFTER SUCCESSFUL AORTIC RECOARCTATION REPAIR WITH A DACRON GRAFT: ACUTE THROMBOEMBOLIC LEG ISCHEMIA CAUSED BY A MOBILE THROMBUS AT THE DISTAL SUTURE LINE

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Uncorrected coarctation of the aorta is associated with a substantially shortened life expectancy.¹ Corrective surgery for this condition was introduced in 1944. Resection

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and end-to-end anastomosis, extended end-to-end repair, prosthetic patch aortoplasty, prosthetic interposition grafts, subclavian flap aortoplasty, ascending aorta-descending aorta bypass, and balloon angioplasty have all been used in coarctation repair and have improved survival.^{2,3} The increases in late morbidity and mortality after coarctation repair are primarily related to anastomotic site complications such as recoarctation or pseudoaneurysms and associated cardiovascular disease such as bicuspid aortic valve, mitral valve lesions, ventricular septal defect, and persistent systemic hypertension and its sequelae. An unusual case of peripheral arterial embolism caused by an anastomotic site complication is presented.

Case report. A 22-year-old man was admitted to the emergency department because of acute left leg ischemia.