Case reports

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Bacterial endocarditis of mitral valve in Marfan syndrome

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An unusual case of bacterial endocarditis in Marfan syndrome is reported. A review of the published reports revealed 21 previously reported cases. The aortic valve, though commonly abnormal in Marfan syndrome, was rarely involved by the endocarditis. In contrast, the mitral valve was the favoured site of infection in these patients. Our own patient had staphylococcal endocarditis of both the aortic and mitral valves, the only such combination of infecting organism and sites in the published reports to date. The low incidence of aortic valve involvement remains unexplained. There is extreme mortality in Marfan patients affected by endocarditis, and, it seems, only one documented cure in the entire published reports.

The Marfan syndrome, a heritable disorder of connective tissue (Marfan, 1896), is characterized by variable abnormalities of skeletal, ocular, and cardiovascular systems. Cardiovascular involvement is important because of its prognostic significance (Murdoch *et al.*, 1972). The most commonly recognized cardiovascular defects are aortic dilatation and its complications, aortic regurgitation and dissecting aneurysm.

Deformity of the mitral valve in a patient with Marfan syndrome was first described by Salle (1912). Subsequently, others (Traisman and Johnson, 1954; McKusick, 1966) emphasized that mitral valve abnormalities may occur in patients with this syndrome. Few cases of bacterial endocarditis in Marfan syndrome have been reported, despite the known susceptibility of diseased valves to such infection (Hiejima *et al.*, 1968). Furthermore, it is curious that when bacterial endocarditis occurs it almost always involves the relatively uncommon mitral abnormalities rather than the more common lesions of the aortic valve (Di Matteo *et al.*, 1971; McKusick, 1972).

In this report we describe our experience with a patient who had typical Marfan syndrome and died of acute staphylococcal endocarditis involving both the aortic and mitral valves.

Case report

A 14-year-old white boy was admitted to the Jersey City Medical Center on 8 August 1971 in a semiconscious state. The day before admission he had fever, severe headache, two episodes of projectile vomiting, and gradually became drowsy. There was no history of convulsions, head injury, ear discharge, recent dental treatment, or narcotics use. A month before admission, the patient had an upper respiratory infection, for which he received symptomatic treatment.

Six years previously he was treated in another hospital for pneumonia, and was told that he had a heart murmur, but no diagnostic procedures were performed. There were no other major illnesses or operations.

Family history

The patient's mother was alive and well. His father had Marfan syndrome, and died suddenly at home in 1971, after having severe chest pain for several hours. No necropsy was performed. The patient had 3 brothers and 2 sisters. All but one (a sister) were said to have Marfan syndrome.

Physical examination

On admission the patient was stuporous, restless, and dehydrated. His temperature was 40·5°C, pulse 148 a minute and regular respirations 40 a minute, and blood pressure 130/60 mmHg. His height was 184 cm and his span was 207 cm. Extreme arachnodactyly was present. There were no skull deformities. He had a high arched palate. A pectus carinatum deformity was present on an elongated chest. The pupils were normal, reacted well to light, and showed no quivering of the irises. Slit-lamp examination was not done. The fundi were normal. There was slight neck stiffness. The deep tendon reflexes were depressed throughout, and the Babinski sign was elicited on the left. There were no other abnormal reflexes, sensory deficits, or motor weaknesses. Examination of the heart showed sinus tachycardia. The apex

beat was in the fifth intercostal space in the midclavicular line, with sounds of normal quality. There was a pansystolic grade 3/6 murmur, best heard at the apex, conducted towards the left axilla. No other murmurs were heard. All peripheral pulses were easily felt. The lungs were clear and the abdomen normal. There was no hepatosplenomegaly.

Laboratory investigations

White cell count 13,000/mm^3, 74 per cent segmented neutrophils, 15 per cent stab forms, 10 per cent lymphocytes, 1 per cent monocytes. Haematocrit, haemoglobin, serum electrolytes, and blood urea nitrogen normal. Lumbar puncture: initial pressure 250 mm (H_2O), final pressure 170 mm; protein 10 mg/100 ml, sugar 110 mg/100 ml, cell count 60/mm^3 with 90 per cent polymorphonuclears. Urinalysis: specific gravity 1·021, 4+ albumin, many red blood cells and epithelial casts, few white cells. Five blood cultures, reported after death: pure cultures of coagulase positive *Staphylococcus aureus*. Chest *x*-ray showed moderate dilatation of ascending aorta, clear lung fields, normal cardiac contour. Electrocardiogram was suggestive of left ventricular and right atrial enlargement.

Hospital course

A provisional diagnosis of Marfan syndrome with meningitis was made, and treatment was started with intravenous ampicillin (multiple blood cultures were drawn). However, four hours after admission, he lapsed into coma, and died 32 hours later.

Necropsy

The pertinent postmortem findings were in the heart, brain, liver, kidneys, and pituitary, and adrenal glands. The heart was enlarged and weighed 370 g. The left

TABLE *Reported cases of Marfan syndrome with bacterial endocarditis*

Reference	*Evidence of bacterial endocarditis*	*Organism*	*Valve affected*	*Operation and/or necropsy*	*Comments*
1) Olcott (1940)	Heart blood culture	*Esch. coli*	Mitral	Yes	
2) Vivas-Salas and Sanson (1948)	Histological examination of mitral valve	Gram-positive cocci	Mitral	Yes	
3) Schorr, Braun, and Wildman (1951)	Recurrent fever, responding to antibiotics; blood culture negative	Not isolated	Unknown	No	A case of arachnodactyly and aneurysmal dilatation of thoracic aorta
4) McKusick (1955)	Blood culture	*Strep. viridans*	Mitral	Yes	Positive family history
5) Tolbert and Birchall (1956)	Blood culture	Haemolytic streptococci	Mitral, ventricular septal defect, persistent ductus arteriosus	Yes	
6) Pappas, Mason, and Denton (1957) (Case 2)	History of subacute bacterial endocarditis	Streptococci	Aortic	Yes	No bacterial vegetations; perforation in aortic cusp from bacterial endocarditis
7) Hirosawa *et al.* (1957)	Blood culture	*Strep. viridans*	Ventricular septal defect	No	
8) Miller and Pearson (1959)	Mitral valve showed vegetations	Unknown	Mitral	Yes	History of acute rheumatic fever at age 10 years
9) Sinclair, Kitchen, and Turner (1960) (Case 15)	Past history of subacute bacterial endocarditis treated successfully	Unknown	Unknown (basal systolic murmur)	No	
10) Bowers and Lim (1962)	Blood culture	*Strep. viridans*	Eisenmenger's complex	No	Phenotypically Marfan syndrome with intracranial calcification and history of maternal rubella; probably first documented cure of subacute bacterial endocarditis
11) Wunsch *et al.* (1965)	Blood culture	*Strep. viridans*	Mitral	Yes	Patient's father probably had Marfan syndrome

TABLE (Cont'd)

Reference	*Evidence of bacterial endocarditis*	*Organism*	*Valve affected*	*Operation and/or necropsy*	*Comments*
12) Maekawa (1965)	Blood culture	*Strep. viridans*	Ventricular septal defect	Yes	
13) Read, Thal, and Wendt (1965)	History of pneumococcal endocarditis at age 7 years	Unknown	Mitral	Yes	Normal physical appearance, floppy-valve syndrome
14) Read *et al.* (1965) (T.J.)	History of streptococcal endocarditis at age 23 years	Unknown	Mitral	Yes	Moderate hypermobility of joints and scoliosis, floppy-valve syndrome
15) Shiina *et al.* (1966)	Blood culture	*Strep. viridans*	Mitral	Yes	
16) Keech *et al.* (1966) (T.J.Jr.)	Clinically probable-(repeated blood cultures negative)	Unknown	Unknown ?pulmonary ?aortic	No	Positive family history; mild pulmonary stenosis; abnormality of aortic valve on angiocardiography
17) Iwase (1967)	Blood culture	*Strep. viridans*	Ventricular septal defect	No	Positive family history
18) Cohen and Kaye (1967)	Blood culture	*Staph. aureus*	Mitral	Yes	Heroin addict; no 'predisposing lesion of mitral valve'; but histology consistent with bacterial endocarditis
19) Hiejima *et al.* (1968) (Case 1)	Blood culture	*Strep. viridans*	Mitral	Yes	Myopia in sibs and mother
20) Aslam *et al.* (1970)	Blood culture	Aspergillus	Aortic	Yes	Family history suggestive of Marfan; postoperative endocarditis; aortic valve showed thin fenestration
21) Di Matteo *et al.* (1971)	Blood culture	*Strep. viridans*	Mitral	Yes	Clinically *forme fruste* Marfan

ventricular wall measured 1·2 cm and the right ventricular wall 0·3 cm. The aortic and mitral valvular circumferences were enlarged: 7·5 cm and 11 cm, respectively. Both valves were thickened at their free borders and showed occasional pinpoint greyish elevations. No gross lesions could be recognized in the myocardium. The ascending aorta was moderately dilated. Microscopical examination of the mitral and aortic valves showed vegetations populated by Gram-positive cocci. At the bases, remote from any exudate, there was prominent mucinous degeneration of the ground substance. This was more noticeable in the aortic valve, where there was a minute linear defect partially filled by a few red blood cells. There were numerous micro-abscesses within the myocardium, liver, kidney, brain, pituitary, and adrenal glands. (Postmortem blood culture from the heart was positive for *Staphylococcus aureus*, coagulase positive.)

Discussion

The first case of bacterial endocarditis in Marfan syndrome was reported by Olcott (1940). While isolated cases continue to be reported, the exact incidence of endocarditis among patients with Marfan syndrome cannot be determined (Wunsch, Steinmetz, and Fisch, 1965; Iwase, 1967; Di Matteo *et al.*, 1971). Our own survey revealed 21 adequately documented cases, the important features of which are summarized in the Table.

Of the 21 patients, the infecting organism was identified in 15. It was not demonstrated in 6 cases, but other supporting evidence for the diagnosis of bacterial endocarditis was available. Streptococci were isolated in 11, of which 9 were *Streptococcus viridans*. A variety of organisms was isolated in 4 patients. *Staphylococcus aureus*, which was the offending organism in our patient, was present in only one other recorded case of endocarditis in Marfan syndrome (Cohen and Kaye, 1967).

Clinical examination pointed to the site of the

underlying cardiac lesion in 18 patients. This location was confirmed by surgery or necropsy in 15. Congenital malformations were present in 5. The mitral valve was involved alone 11 times and the aortic valve only twice. Thus, the mitral valve was the site of infection in almost two-thirds of these patients. Considering the well-known susceptibility of aortic valve lesions to bacterial infection, and the predominant involvement of the aortic valve in Marfan syndrome, this finding was unexpected. Why the aortic valve is so much less vulnerable than the mitral valve is unexplained. To our knowledge, our patient is the first showing histological evidence of bacterial endocarditis affecting both the aortic and mitral valves.

The Marfan syndrome with bacterial endocarditis has a dismal prognosis, one that is probably worse than that of patients with endocarditis complicating other forms of heart disease. We were able to find only one documented cure in the published reports. A high degree of suspicion, early diagnosis, and the prompt institution of treatment may improve the otherwise grave prognosis of these patients.

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