

*Annals of the*  
**RHEUMATIC  
 DISEASES**

---

*Leader*

---

## The heart in ankylosing spondylitis

Heart disease is a well recognised complication of ankylosing spondylitis (AS). The most characteristic lesions are aortic incompetence and conduction defects. The spectrum of disease is wide and includes mitral valve disease,<sup>1</sup> cardiomyopathy,<sup>2</sup> and pericarditis.<sup>3</sup> First described by Mallory in 1936,<sup>4</sup> Bauer drew attention to the association of aortitis with spondylitis in 1951.<sup>5</sup> The presence of aortic valve disease in a subgroup of patients with rheumatoid spondylitis was one feature which helped distinguish rheumatoid arthritis and AS as separate diseases.<sup>6</sup>

Prevalence of aortic incompetence increases with age, disease duration, and presence of peripheral arthritis.<sup>7</sup> Graham found a prevalence of 10.1% in patients who had had spondylitis for 30 years, compared with 1% in those with five years of disease.<sup>7</sup> Prevalence was approximately doubled in a subgroup of patients with peripheral joint disease (other than hip and shoulder involvement). Similarly, prevalence of atrioventricular block increased with duration of disease from 0.6% after five years of disease to 8.5% after 30 years. As with aortic incompetence, prevalence almost doubled if peripheral joints were affected. There is an apparently increased prevalence of pleuritis in those with cardiovascular disease,<sup>7</sup> though this may be due to the effect of disease duration, with which both are associated.<sup>8</sup> Studies show no increased prevalence of HLA-B27 in patients with lone aortic incompetence in the absence of spondylitis.<sup>9</sup> There is, however, some evidence of an increased prevalence of HLA-B27 in men with complete heart block.<sup>10</sup>

Studies show a slightly increased mortality in those with AS, and cardiovascular disorders have been implicated as one cause of this.<sup>11 12</sup> Court Brown studied cause of death in patients with AS treated with radiotherapy during 1935-54, who were followed up until 1960.<sup>11</sup> Relative risk of death due to chronic endocarditis, not specified as rheumatic, was 2.8 and other, non-cerebrovascular circulatory disease 1.3. Radford looked at mortality in 836 patients with AS not given deep x ray treatment, diagnosed during 1935-57, who were followed up until 1968.<sup>12</sup> There were no deaths due to endocarditis, but the relative risk due to other, non-cerebrovascular circulatory disease was 1.4 in men. In a retrospective series of 519 patients with AS,<sup>7</sup> aortic incompetence was present in 24 and progressed in 50% over a seven year period. Progression was associated with development of symptoms, including dyspnoea and angina. The spectrum of disease is wide, however, and acute cardiac decompensation may occur over a short period of time.<sup>13</sup>

The pathological features of aortitis in AS were characterised by Bulkley in 1973.<sup>14</sup> The proximal aortic wall behind and above the sinuses of valsalva is thickened primarily

because of adventitial scarring and intimal proliferation. The vasa vasorum are surrounded by plasma cells and lymphocytes, and their lumens often narrowed. Aortitis may extend below the aortic root to the base of the mitral valve and into the intraventricular septum. The adventitial scar tissue below the aortic valve may result in a subaortic fibrous ridge. The inflammatory process usually extends no more than a few centimetres distally into the ascending aorta, though there are reports of more extensive involvement.<sup>15</sup> Syphilitic aortitis has identical histological features, though does not extend below the aortic valve.

Aortic valve disease occurs in 1-10% of patients with AS.<sup>3 7 16</sup> Differences in patient groups, such as age and duration of disease, may partly explain the varying prevalence between series. It is typically a feature of long-standing disease in adults, though has been reported in young children.<sup>17</sup> Graham found lone aortic incompetence present in 21 of 519 patients with spondylitis compared with three of 508 controls with RA.<sup>7</sup> Cardiac conduction disturbances are reported in 1-33%.<sup>7 18 19</sup> As with aortic valve disease, variations in prevalence may be due to differences in patient groups. As conduction disturbances may be intermittent, however, the frequency of electrocardiographic investigations and duration of follow up may also be important. Prevalence is higher in those with aortic valve disease.<sup>20</sup> A wide variety of conduction disturbances have been described, including first, second, and third degree atrioventricular block, bundle branch block, fascicular block, and Wolff-Parkinson-White syndrome.<sup>18 20 21</sup> Conduction disturbances may resolve spontaneously even in cases of complete heart block.<sup>18</sup> Electrophysiological studies in patients with complete heart block suggest that the block is preferentially located in the atrioventricular node, though the conduction system may be widely affected.<sup>22</sup> Mitral regurgitation is uncommon, though may be severe.<sup>1</sup> The prevalence of mitral valve prolapse does not seem greater than that found in the general population.<sup>21 23</sup>

Over the past 10 years there has been increased recognition of myocardial disease in AS.<sup>24 25</sup> Ribeiro found five of 28 patients with AS had a dilated and poorly contracting left ventricle.<sup>24</sup> Brewerton demonstrated early diastolic abnormalities of the left ventricle on echocardiography in 16 of 30 male patients with AS who had no cardiorespiratory symptoms or known cardiac abnormalities.<sup>25</sup> The findings were consistent with the presence of excess connective tissue in the myocardium. Computerised image analysis of myocardial tissue obtained at necropsy in 28 patients showed 30.7% interstitial reticulin compared with 17.7% in controls matched for age and sex ( $p < 0.0001$ ). Unlike rheumatoid

arthritis, pericarditis is not a prominent feature either clinically or pathologically. Clinical pericarditis was reported in only two of 222 patients with AS in Wilkinson's series.<sup>3</sup> Pericarditis is a more common feature of Reiter's disease than AS.<sup>26</sup> There are few reports of subacute bacterial endocarditis in patients with AS. This is surprising in view of the underlying predisposing abnormalities. It has been suggested this may be because cardiac decompensation due to subacute bacterial endocarditis is incorrectly attributed to progression of previously diagnosed cardiac disease, or because infection may occur in the setting of undiagnosed AS.<sup>27</sup> An aortic arch syndrome has been reported in association with AS.<sup>28</sup> Cor pulmonale may occur.<sup>3</sup>

Early detection of cardiac abnormalities, and particularly aortic valve disease, may have important therapeutic or prognostic implications. Aortic root dilatation and the presence of a subaortic bump or ridge on echocardiography have been reported as evidence of preclinical aortic valve disease.<sup>29-30</sup> Direct detection of aortic incompetence is now possible using the recently developed technique of Doppler echocardiography. The technique allows direct assessment of blood flow abnormalities and is more sensitive than conventional echocardiography in detecting valvular regurgitation.<sup>31</sup> Preclinical aortic incompetence has been shown in two recent studies.<sup>32-33</sup> Prospective studies using Doppler echocardiography would increase our knowledge of the prevalence and outcome of aortic valve disease in AS and might help to predict those at risk of severe valve disease. At present the technique is helpful in identifying valvular disease in patients who may be at high risk of endocarditis, such as those undergoing joint surgery.

Aortic incompetence or conduction disturbances may be the presenting feature of AS.<sup>34-35</sup> Bergfeldt<sup>35</sup> in a study of 223 patients with complete heart block found unrecognised AS present in seven. Eversmeyer reported two patients with aortic valve disease, who on subsequent investigation were found to have AS.<sup>34</sup> In the absence, therefore, of other known causes of aortic incompetence or conduction defects the possibility of AS should be considered, particularly in young men. Symptomatic presentation of cardiac disease is dependent on the site of underlying pathology. Angina, breathlessness, fatigue, effort syncope, or Stokes-Adams attacks may occur.<sup>26</sup> Presentation may be masked because of AS. Chest pain may be mistaken as musculoskeletal rather than anginal. Breathlessness may be a late presenting feature if there is associated musculoskeletal disability such as hip disease.

Patients with angina should be carefully screened for evidence of conduction abnormality before receiving  $\beta$  blockers or verapamil because of their inhibitory effect on the conduction system. Pacing is usually successful in treatment of symptoms due to heart block, though in view of the sometimes transient nature of the block, a wait and see policy may be appropriate in asymptomatic patients.<sup>22</sup> In patients with heart disease exercises should be continued to maintain posture and spinal mobility. All patients with valvular lesions should be advised about prophylaxis against subacute bacterial endocarditis. When considering surgical replacement of an aortic valve, full preoperative assessment and consultation with anaesthetic colleagues should be made because of the likely associated musculoskeletal, cardiovascular, and pulmonary problems.

ARC Epidemiology Research Unit,  
Manchester University,  
Manchester M13 9PT,  
United Kingdom

T W O'NEILL

Department of Rheumatology,  
St Vincents Hospital,  
Elm Park,  
Dublin 4,  
Ireland

B BRESNIHAN

Correspondence to: Dr O'Neill.

- Shah A. Echocardiographic features of mitral regurgitation due to ankylosing spondylitis. *Am J Med* 1987; 82: 353-6.
- Takkunen J, Vuopala U, Isomaki H. Cardiomyopathy in ankylosing spondylitis. *Annals of Clinical Research* 1970; 2: 106-12.
- Wilkinson M, Bywaters E G L. Clinical features and course of ankylosing spondylitis as seen in a follow up of 222 hospital referred cases. *Ann Rheum Dis* 1958; 17: 209-28.
- Mallory T B. Case records of the Massachusetts General Hospital. *N Engl J Med* 1936; 214: 690-8.
- Bauer W, Clark W S, Kulka J P. Aortitis and aortic endocarditis, an unrecognised manifestation of rheumatoid arthritis. *Ann Rheum Dis* 1951; 10: 470-1.
- Graham W. Is rheumatoid spondylitis a separate entity? *Arthritis Rheum* 1960; 3: 88-90.
- Graham D C, Smythe H A. The carditis and aortitis of ankylosing spondylitis. *Bull Rheum Dis* 1958; 9: 171-4.
- Whitfield A G W. Ankylosing spondylitis. *J R Coll Physicians Lond* 1976; 11: 107-20.
- Calin A, Fries J F, Stinson E B, Payne R. Normal frequency of HLA B27 in aortic insufficiency. *N Engl J Med* 1977; 294: 397.
- Bergfeldt L, Moller E. Complete heart block—another HLA B27 associated disease manifestation. *Tissue Antigens* 1983; 21: 385-90.
- Court Brown W M, Doll R. Mortality from cancer and other causes after radiotherapy for ankylosing spondylitis. *BMJ* 1965; ii: 1327-32.
- Radford E P, Doll R, Smith P G. Mortality among patients with ankylosing spondylitis not given x ray therapy. *N Engl J Med* 1977; 297: 572-6.
- Stewart S R, Robbins D L, Castles J J. Acute fulminant aortic and mitral insufficiency in ankylosing spondylitis. *N Engl J Med* 1978; 299: 1448-9.
- Bulkley B H, Roberts W C. Ankylosing spondylitis and aortic regurgitation. Description of the characteristic cardiovascular lesion from study of eight necropsy patients. *Circulation* 1973; 48: 1014-27.
- Ansell B M, Bywaters E G L, Doniach I. The aortic lesion of ankylosing spondylitis. *Br Heart J* 1958; 20: 507-15.
- Kinsella T D, Johnson L G, Sutherland R I. Cardiovascular manifestations of ankylosing spondylitis. *Can Med Assoc J* 1974; 111: 1309-11.
- Reid G D, Patterson M W H, Patterson A C, Cooperberg P L. Aortic insufficiency in association with juvenile ankylosing spondylitis. *J Pediatr* 1979; 95: 78-80.
- Bergfeldt L, Edhag O, Vallin H. Cardiac conduction disturbances, an underestimated manifestation in ankylosing spondylitis. *Acta Med Scand* 1982; 212: 217-23.
- Bernstein L, Broch O J. Cardiac complications in spondylarthritis ankylopoietica. *Acta Med Scand* 1949; 135: 185-94.
- Nitter-Hauge S, Otterstad J E. Characteristics of atrioventricular conduction disturbances in ankylosing spondylitis. *Acta Med Scand* 1981; 210: 197-200.
- Nagyhegyi G, Nadas I, Banyai F, et al. Cardiac and cardiopulmonary disorders in patients with ankylosing spondylitis and rheumatoid arthritis. *Clin Exp Rheumatol* 1988; 6: 17-26.
- Bergfeldt L, Vallin H, Edhag O. Complete heart block in HLA B27 associated disease. Electrophysiological and clinical characteristics. *Br Heart J* 1984; 51: 184-8.
- Alves M G, Espirito-Santo J, Queiroz M V, Madeira H, Macierira-Coelho E. Cardiac alterations in ankylosing spondylitis. *Angiology* 1988; 39: 567-71.
- Ribeiro P, Morley K D, Shapiro L M, Garnett R A F, Hughes G R V, Goodwin J F. Left ventricular function in patients with ankylosing spondylitis and Reiter's disease. *Eur Heart J* 1984; 5: 419-22.
- Brewerton D A, Goddard D H, Moore R B, et al. The myocardium in ankylosing spondylitis. A clinical, echocardiographic and histopathologic study. *Lancet* 1987; i: 995-8.
- Cosh J A, Lever J V. *Rheumatic disease and the heart*. New York: Springer, 1988: 165-92.
- Hoppman R A, Wise C M, Challa V R, Peacock J E. Subacute bacterial endocarditis in a patient with ankylosing spondylitis. *Ann Rheum Dis* 1988; 47: 423-7.
- Hull R G, Asherson R A, Rennie J A N. Ankylosing spondylitis and an aortic arch syndrome. *Br Heart J* 1984; 51: 663-5.
- Thomas D, Hill W, Geddes R, et al. Early detection of aortic dilatation in ankylosing spondylitis using echocardiography. *Aust NZ J Med* 1982; 12: 10-3.
- Tucker C R, Fowles R E, Calin A, Popp R L. Aortitis in ankylosing spondylitis. Early detection of aortic root abnormalities with two dimensional echocardiography. *Am J Cardiol* 1982; 49: 680-6.
- Grayburn P A, Smith M D, Handshoe R, Friedman B J, DeMaria A N. Detection of aortic insufficiency by standard echocardiography, pulsed Doppler echocardiography and auscultation. *Ann Intern Med* 1986; 104: 599-605.
- O'Neill T W, King G, Graham I M, Molony J, Bresnihan B. Cardiac abnormalities in ankylosing spondylitis. Early detection of aortic incompetence with doppler echocardiography. *Br J Rheumatol* 1991; 30: S60.
- Marshall D A S, Murphy E, Cobbe S M, Sturrock R D. Subclinical valvular and myocardial disease in ankylosing spondylitis. A Doppler echocardiographic study. *Br J Rheumatol* 1991; 30: S60.
- Eversmeyer W H, Rosenstock D, Biundo J J. Aortic insufficiency with mild ankylosing spondylitis in black men. *JAMA* 1978; 240: 2652-3.
- Bergfeldt L, Edhag O, Vedin L, Vallin H. Ankylosing spondylitis: an important cause of severe disturbances of the cardiac conduction system. Prevalence among 223 pacemaker treated men. *Am J Med* 1982; 73: 187-91.