

# Heart block in ankylosing spondylitis and uropolyarthritis

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*AV conduction disturbances, in most cases complete heart block, have been found in 18 patients with ankylosing spondylitis and uropolyarthritis. The progress of the cardiac disease is slow, and the PR time often conspicuously prolonged. A few patients responded favourably to steroids, but 10 had to be given artificial cardiac pacemakers.*

Rheumatic diseases are general diseases not infrequently associated with cardiac involvement. In acute rheumatic fever, heart disease is the rule. In other rheumatic diseases such as ankylosing spondylitis and rheumatoid arthritis, heart involvement may also be present but is less frequent than in rheumatic fever.

In rheumatoid arthritis, atrioventricular (AV) conduction disturbances, including complete heart block, have been described but infrequently and variably (Cathcart and Spodick, 1962; Curd *et al.*, 1963; Hoffman and Leight, 1965). Such conditions have, however, been reported to occur more often than might be expected by chance (Cathcart and Spodick, 1962). Pathological findings have also been reported with nodules or granulomas in the myocardium of the same type as those that might be found subcutaneously (Handforth and Woodbury, 1959; Lebowitz, 1963).

A special type of heart involvement, with aortic insufficiency as the dominant symptom, has been reported in ankylosing spondylitis, sometimes with conduction defects (Schilder, Harvey, and Hufnagel, 1956; von Suter and Steiger, 1962). Bernstein and Broch found in 1949 that 4.3 per cent of 352 patients with ankylosing spondylitis had definite cardiac involvement, 10 patients had valvular disease, and 3 had AV blocks, one of them with frequent Adams-Stokes attacks. Graham and Smythe found in 1958 an increasing frequency of aortic insufficiency, with duration of the spondylitis and the intensity and number of peripheral joint involvements from 1 up to as much as 18 per cent. The same authors reported increases in the frequency of AV blocks - from the same factors - from 1

to 10-16 per cent. It has been found that these manifestations may be dependent on pathological changes of a type different from those found in rheumatoid arthritis. In ankylosing spondylitis, fibrosis of the aortic valvular ring and changes in the media of the aorta have been found, similar to but not identical with those found in syphilitic aortitis. In addition, focal areas of collagen and elastic disruption, fibrosis, and lymphocyte infiltration in the myocardium, sometimes partly or even completely interrupting the atrioventricular conduction system, have been found (Storstein and Waaler, 1959; Weed *et al.*, 1966).

We report 18 patients with AV conduction disturbances in connexion with ankylosing spondylitis and uropolyarthritis.

## Definitions

*Uropolyarthritis* (Olhagen, 1960) is defined as an arthritis or as a condition around the joint (ten-dinitis, etc.), occurring in connexion with genito-urinary disease and sometimes with conjunctivitis or iritis. The urological disorder may be specific (gonococci) or non-specific (staphylococci, etc.). As a rule, peripheral joints are involved, but sacroiliitis may develop. If the sacroiliitis progresses to include also a spondylitis, the uropolyarthritis has reached a stage of an ankylosing spondylitis.

*Ankylosing spondylitis* (Marie-Strümpell's disease or pelvospondylitis ossificans according to Romanus, 1953) is an inflammatory arthritis of the spine always involving sacroiliac joints and less commonly the peripheral joints. Ankylosing spondylitis may occur after diseases such as psoriasis or regional enteritis but more commonly a urological focus is the aetiological background (Romanus, 1953).

*Reiter's syndrome* is included here in the uropolyarthritis group.

## Subjects

The 18 patients (all men) were found among those admitted to the department of medicine, Serafimerlasarettet, Stockholm. Most of them were admitted for evaluation with a view to implantation of an artificial cardiac pacemaker. The patients were admitted during the years 1960–1970 mainly from the greater Stockholm area but also from hospitals in other parts of Sweden. Thus, it is impossible from these patients to make an estimate as to the exact frequency of the cardiac disturbances in ankylosing spondylitis. Furthermore, the group of patients presented here is the result of an active search for the combination of heart block and radiological sacroiliitis, following our early findings of a small group of patients with this combination.

The differential diagnosis between the above-mentioned conditions has been difficult in some of our patients. In most instances the original infection dates back one or several decades. The uropolyarthritis or ankylosing spondylitis in several of the cases in this series have been diagnosed only in retrospect, and it has been impossible to establish the diagnoses with the aid of serological or other tests.

Two patients (Cases 9 and 10) did not have radiological sacroiliitis. One of them (Case 10) had had a non-specific epididymitis followed by acute polyarthritis. This patient thus fulfilled the criteria of uropolyarthritis. The other (Case 9), now 68 years old, had had a gonococcal infection in his youth but did not recall any joint involvement. He had recurrent iritis and complete heart block. A sacroiliitis is not necessary for the diagnosis of uropolyarthritis (*vide supra*), but in these cases has generally been the only sign upon which a retrospective diagnosis could be made with certainty. However, we felt justified in including this patient with genitourinary infection, recurrent iritis, and complete heart block though he did not show signs of sacroiliitis.

Two patients (Cases 11 and 13) had the diagnosis of rheumatic fever and rheumatoid arthritis, respectively. A retrospective evaluation of their history clearly indicated that they had been wrongly labelled with these diagnoses.

## Results

The findings in the 18 patients are shown in the Table. Ten of the patients' hearts had to be stimulated with a permanent artificial pacemaker. They all had complete heart block and 9 of them suffered from arrhythmic syncope before pacing was started. The mean age was 61 years (range 49–73).

Seven patients had aortic insufficiency. In every case the valvular disease was regarded as the result of uropolyarthritis. Two of the patients also had mitral insufficiency, probably secondary to heart enlargement from the aortic valve disease.

The heart volume was above the upper nor-

mal limit (500 ml/sq m body surface area) in 15 patients (Maurea, Nylin, and Sollberger, 1955). The mean volume was 617 ml/m<sup>2</sup> body surface area (Jonsell, 1939). The mean value for the maximal PR interval was 0.39 (SE = 0.13) sec (see discussion).

## Discussion

The term uropolyarthritis is not internationally accepted. It seems to us logical and practical, however, and from the definitions given above it should be quite clear which conditions are included. It should be emphasized that sacroiliitis is not mandatory for the diagnosis, but that the sacroiliac joints may become involved. Only if this involvement progresses to the spine do we get the picture of a classical ankylosing spondylitis. This is still a uropolyarthritis, if it has arisen from a genitourinary focus – which it generally has.

Heart involvement in ankylosing spondylitis has been known since the 1940's. The clinical manifestation in some instances becomes evident as a valvular disease (aortic insufficiency) and in others as disturbances of atrioventricular conduction. The underlying process seems to be focal degenerative changes of elastic and muscle fibres of the aortic media with dilatation of the aortic valve ring and fibrous thickening and inflammatory changes in the aortic cusps (Graham and Smythe, 1958). Furthermore, Weed *et al.* have described one deceased patient with ankylosing spondylitis in whom subsequent postmortem examination with sections of the conduction system showed that the fibrotic and endarteritic process continued from the base of the aortic valve all the way to the apex of the muscular septum. The finding of varying conduction disturbances from time to time might indicate a generalized pathology of the conduction system. The large heart volumes found (Table) – even in the absence of aortic insufficiency – could indicate also an involvement of the myocardium itself.

The aortic lesions have some similarities with those produced by syphilis, but all agree that they are not identical. The spondylitic heart lesions likewise are different from those produced by typical rheumatoid arthritis. In the latter disease the myocardium may contain typical rheumatoid nodules, which are never found in association with ankylosing spondylitis.

Though the combination of ankylosing spondylitis and heart disease has been known for some 25 years, we found that the frequency with which spondylitis was found among our presumptive pacemaker candidates warranted

another publication. Wemer (1957) discussed myocarditis in pelvospondylitis and reported pathological electrocardiogram findings in 10 out of 38 patients. He furthermore stated that in patients with myocarditis of unknown aetiology, one should take *x*-rays of the sacroiliac joints, regardless of whether the patient had symptoms from that region or not. Julkunen and Luomanmäki (1964) likewise established that in dealing with complete heart block of obscure origin one should consider the possibility of a rheumatoid spondylitis as the aetiological factor.

The interest in patients with complete heart block has increased enormously since the introduction of cardiac pacing. Nevertheless, we are of the opinion that the advice of Wemer, Julkunen, and others has seldom been taken, and that many patients are treated for heart block of unknown cause without a complete examination including *x*-rays of the sacroiliac joints and the lumbar spine.

Unfortunately, as stated above, it is impossible from the material at hand to form an opinion as to how common heart disease really is in ankylosing spondylitis. It may be said, for what it is worth, that in a series of 250 male candidates for pacemaker treatment, 18 had symptoms of previous uropolyarthritis, i.e. 7 per cent. Graham and Smythe's figures are probably the most reliable (see introduction). They clearly indicate that the prevalence of aortic insufficiency as well as AV block increases with the duration of the spondylarthritic disease as well as with the degree of involvement of peripheral joints. The prevalence also increases with the age of the patient, but this may be dependent upon the duration of the disease.

To get a true evaluation of the prevalence of cardiac abnormalities in ankylosing spondylitis and uropolyarthritis, a large group of patients must be followed for 10, 20, or 30 years with careful examinations even during intervals free from symptoms.

Some clinical facts should be pointed out. The progress of the cardiac disease is slow. A recurrent pattern is arthritis at the age of 20–30 after a urinary tract infection, sometimes untreated. Often cardiac disease may not be found until 10 to 20 years later. At this time it is often not clinically apparent and is diagnosed by means of electrocardiogram and/or chest *x*-ray. It may take another 10 to 15 years before the heart condition becomes manifest. By this time it may become serious with arrhythmic syncope, myocardial insufficiency, and chest pain – or even fatal, due to AV block with asystole or ventricular tachyarrhythmias.

Case 4 (see Appendix) well illustrates the time pattern of the cardiac involvement in ankylosing spondylitis.

A combination of complete heart block and aortic insufficiency has been regarded as a rare finding in patients with rheumatoid spondylitis (Liu and Alexander, 1969); only 6 patients had been reported until 1968. The finding of 6 such patients in the present series, 3 of them reported earlier (Edhag, 1969), makes us think that this entity is more common than previously believed. That so few cases have been hitherto reported may depend upon the usually long interval between the start of heart symptoms after the initial infection and the onset of joint symptoms.

The type of conduction disturbance may change from time to time. The PR time is amazingly long. The Table gives the maximal PR interval recorded in the patients before the development of complete heart block. As can be seen, the mean maximal PR time is 0.39 ( $\pm 0.13$  SE) sec, which is different from the mean value of 0.28 sec ( $\pm 0.07$  SE) found in a group of patients ( $n=72$ ) with AV block I without signs of spondylitis or uropolyarthritis who later on were given pacemakers ( $P<0.001$ ) (Edhag, 1969). It seems that in connexion with the very slow development of cardiac pathology, the PR time could be increased much more in patients with spondylarthrosis than in others, before the AV conduction sometimes fails (AV block II) or is totally interrupted (complete heart block).

Corticosteroids have been tried in complete heart block without a specific aetiology, but the results have been disappointing (Bellet, 1964). Among our 18 patients, however, all 4 who were systematically treated with steroids, responded favourably (Cases 5, 13, 14, and 16). This seems to be a higher incidence of positive response than is found in other types of AV conduction disturbances, even if evaluation of treatment is difficult to make in a group of patients with such a high degree of changes in the AV conduction as in the patients described here.

Once pacing is started in a patient with ankylosing spondylitis, it ought not to be terminated should AV conduction recur. This statement is based on the tendency to variations in the degree of block observed in patients in the present series.

Recurrent iritis was commonly found among our patients. This finding should indicate to ophthalmologists the need for lumbar and sacroiliac *x*-rays, as well as for careful cardiac examination with chest *x*-rays and serial electrocardiograms in all patients with iritis of unknown origin – at least if recurrent.

TABLE Data for 18 patients

Case No.	Age at last examination	Infection (type and localization)	Anamnestic joint involvement	Electrocardiographic findings			Radiological find
				Iritis (re-current)	Type	PR interval (sec)	Valvular heart disease
<i>Patients with pacemaker</i>							
1	49	Non-specific orchitis	—	—	AV I-II; complete heart block	0.48	—
2	54	Gonorrhoea	—	+	AV, I, II; complete heart block	0.26	Aortic insufficiency
3	55	Gonorrhoea	Bed-ridden 6 mth due to joint affection	—	AV I, II; complete heart block	0.40	—
4	57	Gonorrhoea	—	+	AV I; complete heart block	0.36	Aortic insufficiency
5	62	Gonorrhoea + prostatitis	—	+	AV I; complete heart block	0.37	—
6	63	Gonorrhoea	—	+	AV I, II; complete heart block	0.34	Aortic insufficiency
7	65	?	—	—	AV I; complete heart block	0.41	—
8	66	Gonorrhoea	—	—	AV II; complete heart block	—	—
9	68	Gonorrhoea	—	+	Complete heart block	—	—
10	73	Non-specific epididymitis	Polyarthritis	—	AV I; complete heart block	0.34	—
<i>Patients without pacemaker</i>							
11	51	'Rheumatic fever'	Multiple (including spine)	+	AV I	0.34	Aortic + mitral insufficiency
12	54	Non-specific prostatic-vesiculitis	Migrating joint pain	+	Ventricular ectopic beats in bigemini and trigemini	0.20	—
13	57	'Rheumatoid arthritis'	—	+	AV I; complete heart block	0.76	—
14	58	—	—	—	AV I; complete heart block	0.46	—
15	64	—	—	+	AV I, II; complete heart block	0.48	Aortic + mitral insufficiency
16	66	Gonorrhoea	Joint pain; stiff back	+	AV I; complete heart block	0.46	Aortic insufficiency
17	71	Non-specific prostatitis	Polyarthritis	—	AV I	0.24	—
18	65	Gonorrhoea	—	+	AV II; complete heart block	—	Aortic insufficiency
Mean age	61	—	—	—	—	Mean value 0.39 (SE ± 0.13)	—

\* Total heart volume/heart volume per square metre body surface area (ml) (Maurea *et al.*).  
AV, atrioventricular block (I-II).

The number of patients with a history of gonorrhoea is much higher in the group given pacemakers than among those that had not. This may be due to the fact that the pacemaker patients have been more carefully examined regarding their past history than the others. On the other hand, it could be of aetiological and practical importance. Further studies are necessary to clarify this point.

It should be pointed out that in these patients heart disease is found in some patients with uropolyarthritis even without the development of ankylosing spondylitis. This has not been reported previously, with the excep-

tion of a few reports of cardiac disease in patients with Reiter's syndrome (Csonka *et al.*, 1961; Ford, 1970; Johansson, 1966).

It has been said that the cardiac complications in spondylitis are of 'a benign nature' (Bernstein and Broch, 1949) and that the electrocardiographic abnormalities in Reiter's syndrome 'have no great significance and usually can be ignored' (Ford, 1970). It is evident from our data, as well as from those of others, that such a view is too optimistic (Good and Preston, 1969). Cardiac disease in uropolyarthritis may develop slowly, but often ends in a severe condition that may be fatal.

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Sacroiliitis	Heart* volume (ml)	Comments
+	1250/700	
+	1400/770	Dead from arrhythmia during cardiac pacing
+	1200/580	Chronic alcoholism
+	1130/620	See Appendix
+	1120/560	Corticosteroid effect on AV block before pacing
+	1110/600	
+	720/450	Sudden death during pacing
+	1010/540	
-	860/410	
-	990/570	See Appendix
+	1200/580	
+	—	
+	1070/510	Corticosteroid effect on AV block
+	1120/640	Free from arrhythmic syncope when on steroids
+	1300/780	
+	1440/740	Corticosteroid effect on AV block
+	940/500	
+	1460/940	
-	Mean value	
	1136/617	

No effort should be spared to make a correct diagnosis of uropolyarthritic heart disease. Steroids may be tried in these patients in an attempt to prevent further rheumatoid development. Such steroid treatment may also improve AV conduction, but cardiac pacing must not be withheld when complete heart block and arrhythmic syncopes appear.

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## Appendix

**Case 4** A 57-year-old cabinet-maker. No family history of heart disease. No rheumatic fever. At the age of 25 gonorrhoea was followed by swollen feet, hands, and wrists for a 2-year period. Between the ages of 30 and 40 the patient had recurrent iritis, stiffness, and pain in the lower back. At the age of 48 a combined aortic valvular disease was discovered; he had no cardiac symptoms. Electrocardiogram at that time showed AV block type I. X-rays showed ankylosing spondylitis.

From the age of 56 the patient has had increasing pain in the shoulders, hips, and feet, with stiffness and restriction of movement. He also has had frequent nocturnal dyspnoea and often retrosternal pain. At the age of 56 ventricular ectopic beats were also noticed. Slow-release quinidine was given. After treatment with that drug for one week arrhythmic syncopes occurred; AV block II with frequent ventricular ectopic beats was seen and QRS-triggered pacing was started. No more arrhythmic syncopes occurred.

**Case 10** A 73-year-old retired stock-room man. No family history of heart disease, no venereal disease, no chest pain, and no severe or long lasting infections. At the age of 61 onset of pain and stiffness in knees, hips, and shoulders; aspirin, x-ray, and physical treatment were given with beneficial effect. Afterwards slight joint pains but a continuously raised sedimentation rate.

At the age of 64, he had acute epididymitis, recurring one year later. During that year he had arrhythmic syncopes – about 15 during the year. After a period of daily arrhythmic syncopes pacing was started when the patient was 67 years old. Pacing was continued for 7 years without arrhythmic syncopes. The patient was then admitted to hospital with profound hypotension after severe chest pain and died shortly after arrival.

At necropsy there was pronounced narrowing of the coronary arteries, especially the right, but no complete occlusion. In the lower part of the inferior wall of the left chamber there was a recent myocardial infarction. There were no scars from old infarcts.

*ECG-findings* 1959 (64-years-old): left bundle-branch block + AV block I (PR time 0.26 sec).

1961: right bundle-branch block + AV block I (PR time 0.30 sec).

1961: right bundle-branch block + AV block II, ventricular rate 45 per minute.

1962: right bundle-branch block with variations between AV block I and II. In one recording of AV block II a sudden asystole of about 20 seconds was seen followed by a complete heart block for half a minute.

During interruptions of pacemaker stimulation the patient had a complete heart block all the time with idioventricular activity from varying foci and a ventricular frequency of 28 to 40 beats a minute.

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