

Original Article

Advanced atrioventricular conduction block in acute rheumatic fever

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Abstract We carried out a retrospective case control analysis to evaluate the outcome, and the need for treatment, of problems with atrioventricular conduction occurring during an acute attack of rheumatic fever, assessing the occurrence of second and third atrioventricular block versus first degree block.

We reviewed and analysed the clinical, electrocardiographic and echocardiographic records of all children diagnosed in a single institute as having acute rheumatic fever during a period of seven consecutive years.

During the period from October, 1994, through October, 2001, 65 children meeting the modified Jones criteria for acute rheumatic fever were hospitalized in the Soroka University Medical Center, Israel. First-degree atrioventricular block was identified in 72.3% of the children, and resolved with no specific treatment other than non-steroidal anti-inflammatory medications. Second-degree atrioventricular block of Mobitz type I, was observed in one child (1.5%), which progressed from first-degree block, and subsequently resolved. Complete atrioventricular block was found in 3 children (4.6%), one progressing from Mobitz type I second-degree block, and two being seen as the first presentation. Of the three children with complete atrioventricular block, one patient was not treated, the second was treated with aspirin, and the final one with combined aspirin and steroids. The disturbances of conduction resolved in all three.

We conclude that advanced atrioventricular block is rare during acute rheumatic fever. If occurring, block appears to be temporary, and resolves with conventional anti-inflammatory treatment. Specific treatment, such as insertion of a temporary pacemaker, should be considered only when syncope or clinical symptoms persist.

Keywords: Rheumatic fever; carditis; atrioventricular dissociation

ALTHOUGH THE INCIDENCE OF RHEUMATIC FEVER has been declining steadily in the continental United States of America,^{1–3} outbreaks have been reported,^{4,5} while in other parts of the world, it has always been a disease of significance. The Jones criteria⁶ are used to make an objective diagnosis. Carditis, a major sign, includes valvitis, pericarditis, and myocarditis. First-degree atrioventricular block is a well-known minor sign. Occasionally, although rarely, advanced conduction delay, such as second-degree or complete atrioventricular block, or even

Stokes-Adams attacks, are important early signs of acute rheumatic fever, and may precede other signs. So as to evaluate the frequency of these arrhythmic findings, we have reviewed our experience with children admitted to our unit with acute rheumatic fever, focussing on the occurrence of advanced disturbances of conduction, and reviewing their treatment and outcome.

Patients and methods

We reviewed retrospectively the inpatient medical records of 65 children in whom the diagnosis of acute rheumatic fever was made according to the Jones criteria. All had been hospitalized in a seven-year period from October, 1994, through October, 2001, at the Soroka University Medical Center. We reviewed

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Table 1. Clinical summary of the patients manifesting advanced heart block.

Age (years)	Gender	Major criteria	Minor criteria	Degree atrioventricular block	Treatment	Duration of advanced atrioventricular block	Outcome
11	Male	Migratory polyarthritis, mitral regurgitation, aortic regurgitation	Fever – 38.7°C ESR – 83 ASO – 333	Third degree atrioventricular block Ventricular rate 64	Aspirin, Penicillin	30 h	Resolved
	Female	Migratory polyarthritis, aortic regurgitation, mitral regurgitation	Fever – 39.3°C ESR – 76 ASO – 400	Second degree atrioventricular block 12 h later developed third degree atrioventricular block Ventricular rate 71	Aspirin, Prednison, Penicillin	Second degree atrioventricular block – 12 h Third degree atrioventricular block – 48 h	Resolved
9	Female	Migratory polyarthritis, normal echocardiography	Fever – 39.0°C ESR – 90 ASO – 362	Third degree atrioventricular block Ventricular rate 92	Penicillin	42 h	Resolved

Abbreviations: ESR: erythrocyte sedimentation rate (mm/h); ASO: anti-streptolysin O titer (Todd unit)

clinical data, past and family history, electrocardiographic recordings at admission and during the entire period of hospitalization, chest X-rays, and echocardiographic examinations. Special attention was given to patients with atrioventricular block of high degree.

Results

In all, we admitted 65 patients, of whom 37 (57%) were boys and 28 girls (43%). The mean age at admission was 10.7 ± 3.7 years, with a range from 4 to 17 years. Of the patients, 51% were of Arab-Bedouin origin, and 49% were Jewish. In 11 patients (16.9%), there was a family history of rheumatic fever in one or more of the family members, involving brothers or sisters in most instances. In 63 (97%) of the patients, a history of throat infection was positive, but in only 37 patients (57%) was this associated with fever. Titres of antistreptolysin O were positive in 51 patients (78%), but in only 11 patients (17%) was a throat culture positive for *Streptococcus hemolytic A*. With regard to the major criterions as established by Jones, carditis was present in 28 patients (43%), migratory arthritis in 27 patients (42%), chorea in 5 patients (8%), subcutaneous nodules in 2 patients (3%), and a rash in 2 patients (3%). We also found minor criterions, with a past history of rheumatic fever in 11 patients (17%), arthralgia in 11 patients (17%), fever in 11 patients (17%), leukocytosis in 13 patients (20%), an elevated sedimentation rate in 14 patients (22%), and positive C reactive protein in 13 patients (20%).

Echocardiography was performed in all patients, with mitral regurgitation of varying degree found in 53 patients (82%). Aortic regurgitation was seen in 29 patients (45%), and combined aortic and mitral regurgitation in 18 patients (28%). None had evidence of impaired myocardial function or pericardial effusion.

Electrocardiographic recordings were available for 62 patients (95%). We found evidence of disturbances of conduction in 51 (79%) of the patients. Thus, first-degree atrioventricular block was found in 47 children (72%), all of whom presented with both arthritis and carditis. Second-degree atrioventricular block of Mobitz type I was diagnosed in one patient (1.5%), a seven year-old presenting with migratory arthritis and moderate mitral insufficiency detected by echocardiography. At admission, his electrocardiogram showed first-degree atrioventricular block with a PR interval of 0.23 s. He was treated with aspirin at a dose of 100 mg/kg. The second-degree block developed on the second day, without any hemodynamic effect, and resolved on the third day, the tracings reverting to normal atrioventricular conduction.

Complete atrioventricular block was diagnosed in three patients (4.7%). Their clinical summary is shown in Table 1. One patient was treated with aspirin, the second patient with both aspirin and a steroid agent, while the third was not treated with any anti-inflammatory agent. The atrioventricular block in this case was noted retrospectively, and reverted spontaneously to sinus rhythm. All patients were hemodynamically stable, and asymptomatic.

Discussion

Prolongation of the PR interval is a common finding in acute rheumatic fever, and is a minor manifestation for diagnosis in the revised Jones criterions. Clark and Keith⁷ found prolonged PR intervals in almost nine-tenths of 508 children with acute rheumatic fever, with arrhythmias discovered in one-eighth of those with abnormal electrocardiograms. Of these, three had complete heart block, and one of these required artificial pacing for a Stokes-Adams attack.

In our study, we discovered three patients who had developed complete atrioventricular dissociations. Of these, one did not receive any anti-inflammatory treatment, while the other two received conventional anti-inflammatory treatment. Only one patient was treated with steroids. None of these patients were given atropine or beta-adrenergic agents, but valvitis had been present in two. There were no long-term sequels in any of our patients, with the advanced block lasting from two to four days. The complete block in our third patient had been asymptomatic, and was detected only at discharge.

Atrioventricular block of first degree is not a specific sign for carditis, and may present in many febrile conditions. Blocks of second or third degree are associated with various inflammatory conditions, but usually with involvement of the conduction system. Diphtheria and myocarditis, for example, are well known to produce advanced atrioventricular block.^{8,9} Acute rheumatic fever has also been known to cause complete atrioventricular block,^{10–12} and has been reported with many other arrhythmias.^{13–16} The exact mechanism by which the rheumatic process causes conduction disturbances is unknown. Immunologic relations between the group A streptococcus and the glycoproteins of cardiac valves, nonetheless, have been well established.¹⁷ Such a relationship, however, has yet to be associated with the conduction system. Furthermore, the atrioventricular node has a very low content of glycoprotein compared with the peripheral conduction system.¹⁸ Cristal et al.¹⁹ showed, in their study of 70 patients with acute rheumatic fever, that although atrioventricular block of advanced degree is a manifestation of cardiac involvement, it was not noted consistently to be associated with valvitis. While valvitis usually results in damage to the leaflets, with irreversible structural changes in the heart, advanced atrioventricular block appears to represent involvement of the conduction pathways in a reversible fashion. This can explain the appearance of complete heart block in our third patient, who demonstrated no valvar involvement.

We conclude, therefore, that although atrioventricular block of advanced degree occurring in a child can be a dramatic event during acute rheumatic fever, it appears to be a temporary event, resolving over a period of days with conventional treatment. Specific

treatment, such as a temporary pacemaker, should be considered only when there is syncope due to the block, or there is a Adams-Stokes attack.

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