

Complete Atrioventricular Block in an Adolescent With Rheumatic Fever

Gyeong-Hee Yoo, MD

Department of Pediatrics, College of Medicine, Soonchunhyang University, Cheonan, Korea

ABSTRACT

Rheumatic fever is an acute inflammatory sequela following a group A, β -hemolytic streptococcal infection. Rheumatic fever is characterized by polyarthritis, carditis, chorea, subcutaneous nodules, and erythema marginatum as the major diagnostic criteria. Rarely, advanced heart block may also occur. A 13-year-old boy was admitted to the Pediatric Department for evaluation and management of complete atrioventricular block. The patient had exertional dyspnea for 1 month. Based on the findings of mitral regurgitation, fever, elevated acute phase reactants, and a high antistreptolysin O titer, the patient was diagnosed with rheumatic fever. A benzathine penicillin injection was administered, as well as salicylate therapy. On the 5th day of hospitalization, the electrocardiogram revealed a normal sinus rhythm with a 1st degree atrioventricular block. After discharge, the electrocardiogram normalized with the monthly penicillin injections. Herein we report a case of complete atrioventricular block associated with rheumatic fever. The heart block resolved without specific cardiac treatment, other than a non-steroidal anti-inflammatory medication. (**Korean Circ J 2009;39:121-123**)

KEY WORDS: Atrioventricular block; Rheumatic fever.

Introduction

Rheumatic fever (RF) is a known sequela of a group A, β -hemolytic streptococcal infection. The incidence of RF has decreased over the past 30 years in Korea along with economic growth and environmental improvement.^{1,2)} The major manifestations of RF include carditis and polyarthritis; repeated attacks of RF result in recurrent valvulitis and valvular heart disease.³⁾

Rarely, advanced conduction delay, such as 2nd-degree or complete block, or even Stokes-Adams attacks, are signs of RF, and may precede other signs.⁴⁾

Herein we report a case of RF associated with complete heart block.

Case

A 13-year-old boy was referred to the Department

of Pediatrics for evaluation of an abnormal electrocardiogram (ECG). The patient complained of exertional dyspnea for 1 month, and had a history of an upper respiratory infection about 1 month before the onset of symptoms. Because the symptoms were recently aggravated, the patient had presented to a local clinic where the ECG abnormalities were detected.

The patient appeared ill. The body weight was 45 kg. The axillary temperature was 37.7°C, the blood pressure was 110/70 mmHg, the pulse rate was 84/minute, and the respiratory rate was 20/minute. The cardiac examination revealed a regular rhythm without murmur. The findings from pulmonary and abdominal examinations were normal.

The first ECG recording revealed complete heart block with a ventricular rate of 77/minute (Fig. 1). An echocardiographic examination revealed mild mitral regurgitation in an otherwise structurally normal heart. The left ventricle ejection fraction was 69%, and the end-diastolic dimension was 50.6 mm. A chest radiograph showed a normal cardiothoracic ratio. Other laboratory studies showed the following values: white blood cell count, 9,970/ μ L; hemoglobin, 12.3 g/dL; erythrocyte sedimentation rate (ESR), 88 mm/hr (upper limit of normal=20 mm/hr), C-reactive protein (CRP) level, 76.3 mg/L (upper limit of normal=4.99 mg/L); and antistreptolysin O (ASO) titer, 1,475 IU/mL (nor-

Received: November 26, 2008

Revision Received: December 30, 2008

Accepted: December 31, 2008

Correspondence: Gyeong-Hee Yoo, MD, Department of Pediatrics, College of Medicine, Soonchunhyang University, 23-20 Bongmyeong-dong, Cheonan 330-721, Korea

Tel: 82-41-570-2160, Fax: 82-41-572-4996

E-mail: yoogh@schca.ac.kr

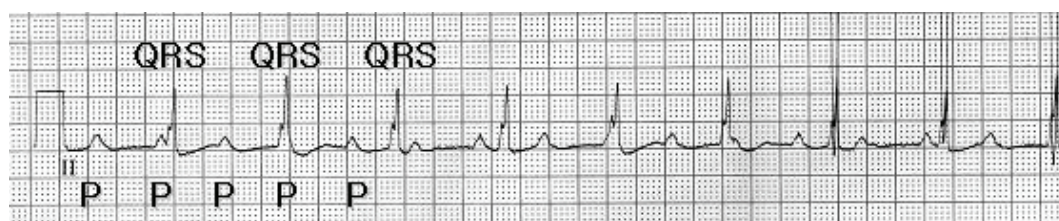


Fig. 1. Electrocardiogram depicts complete heart block with a ventricular rate of 77 on the day of admission.

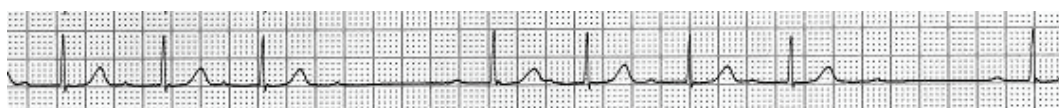


Fig. 2. Electrocardiogram on the 3rd day of hospitalization depicts 2nd degree atrioventricular block (Mobitz II) combined with PR prolongation.

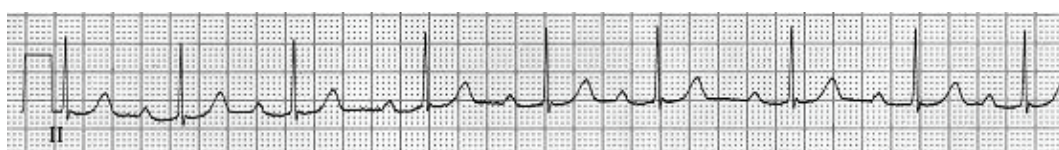


Fig. 3. Electrocardiogram shows 1st degree atrioventricular block on the 5th day of hospitalization.



Fig. 4. Electrocardiogram shows a normalized PR interval at the outpatient department visit.

mal <320 IU/mL).

The diagnosis of RF was established according to the Jones criteria, i.e., the presence of carditis, fever, elevated acute phase reactants, and high ASO titers. An intramuscular injection of benzathine penicillin was administered and salicylate (3 g/day) was also provided. On the 3rd day of hospitalization, a 24-hour Holter analysis revealed a second degree, Mobitz type II atrioventricular block (Fig. 2). On the 4th day of hospitalization, the patient became afebrile, and on the 5th day of hospitalization, the ECG revealed a normal sinus rhythm with PR prolongation (Fig. 3). On the 6th day of hospitalization, the patient was well enough to be discharged.

After 1 month, the ECG was normal (Fig. 4) and the acute phase reactants were also within normal ranges; the ESR was 15 mm/hr and the CRP was 3.3 mg/L. The salicylate medication was discontinued, and the patient was treated with monthly penicillin injections.

Discussion

First-degree atrioventricular block is a common finding associated with RF; however, it is not a specific sign of carditis, and may present with many febrile conditions.⁴⁾

Advanced atrioventricular block is rare during the course of RF. Second-degree and third-degree atrio-

ventricular block are associated with various inflammatory conditions, but usually with involvement of the conduction system, such as in the case of diphtheria and myocarditis.⁵⁾ RF is also known to cause complete heart block, and has been reported with many other arrhythmias.^{6,7)} The exact mechanism by which the rheumatic process causes conduction disturbances is unknown.

Clarke and Keith⁸⁾ found prolonged PR intervals in 84% of 508 children with RF, and arrhythmias were identified in one-eighth of the cases with abnormal ECG findings; among these cases, 3 children had complete heart block, and one required artificial pacing for Stokes-Adams attacks.

Cristal et al.⁹⁾ reported in 70 patients with RF that although atrioventricular block of an advanced degree is a manifestation of cardiac involvement, it was not noted consistently to be associated with valvulitis. While valvulitis usually results in damage to the heart leaflets with irreversible structural changes of the heart, advanced heart block appears to represent involvement of the conduction pathways in a reversible fashion.⁴⁾

Carditis in RF involves all of the layers of the cardiac tissue, including the pericardium, epicardium, myocardium, and endocardium. The patient may have a new or changing murmur, with mitral regurgitation being the most common, followed by aortic insufficiency.¹⁰⁾ Massell et al.¹¹⁾ reported that significant mur-

murs were auscultated in 240 (53%) of 457 patients with initial attacks of RF. In our case, no murmur was observed, but the left ventricle was mildly enlarged.

Endocardial inflammatory changes are responsible for valvulitis, and acute rheumatic valvulitis results in chordal elongation with prolapse of the leaflet coaptation and mitral regurgitation. In cases with myocarditis, the ventricles and atria are often enlarged and the myocardium may be edematous and show non-specific inflammation.¹²⁾ It is presumed that myocardial involvement, including the conduction pathway may be more prominent than endocarditis in our case.

When advanced heart block occurs with RF, it appears to be a transient event, resolving over a period of days with anti-inflammatory treatment. Specific treatment, such as insertion of a temporary pacemaker, should be considered only when there is syncope due to the heart block or with Stokes-Adams attacks.⁴⁾

Our case illustrates the course of a patient who developed complete atrioventricular block with RF. The heart block resolved over a period of days with anti-inflammatory treatment.

REFERENCES

- 1) Jeong EY, Jun BJ, Kim NS, Yum MG, Seol IJ. *A study of clinical manifestations of acute rheumatic fever. J Korean Pediatr Cardiol Soc* 2007;11:116-23.
- 2) Yu JM, Park JE, Kim IO, et al. *The collaborative clinical study on acute rheumatic fever in adults from 27 referral hospitals in Korea. Korean Circ J* 1987;17:459-69.
- 3) Joshi MK, Kandath PW, Barve RJ, Kamat JR. *Rheumatic fever: clinical profile of 339 cases with long term follow up. Indian Pediatr* 1983;20:849-53.
- 4) Zalzstein E, Maor R, Zucker N, Katz A. *Advanced atrioventricular conduction block in acute rheumatic fever. Cardiol Young* 2003;13:506-8.
- 5) Uemura A, Morimoto S, Hiramitsu S, Hishida H. *Endomyocardial biopsy findings in 50 patients with idiopathic atrioventricular block: presence of myocarditis. Jpn Heart J* 2001;42:691-700.
- 6) Malik JA, Hassan C, Khan GQ. *Transient complete heart block complicating acute rheumatic fever. Indian Heart J* 2002;54:91-2.
- 7) Liberman L, Hordof AJ, Alfayyadh M, Salafia CM, Pass RH. *Torsade de pointes in a child with acute rheumatic fever. J Pediatr* 2001;138:280-2.
- 8) Clarke M, Keith JD. *Atrioventricular conduction in acute rheumatic fever. Br Heart J* 1972;34:472-9.
- 9) Cristal N, Stern J, Gueron M. *Atrioventricular dissociation in acute rheumatic fever. Br Heart J* 1971;33:12-5.
- 10) Special Writing Group of the Committee on Rheumatic Fever, Endocarditis, and Kawasaki Disease of the Council on Cardiovascular Disease in the Young of the American Heart Association. *Guidelines for the diagnosis of rheumatic fever: Jones criteria, 1992 update. JAMA* 1992;268:2069-73.
- 11) Massell BF, Fyler DC, Roy SB. *The clinical picture of rheumatic fever: diagnosis, immediate prognosis, course, and therapeutic implications 1958;1:436-49.*
- 12) Tani LY. *Rheumatic fever and rheumatic heart disease. In: Allen HD, Driscoll DJ, Shaddy RE, Feltes TF, editors. Moss and Adams' Heart Disease in Infants, Children, and Adolescents. 7th ed. Philadelphia: Lippincott Williams & Wilkins; 2008. p.1256-80.*