

Case Report

Rhythm Disturbances in the Acute Stage of Acute Rheumatic Fever; Report of Four Cases

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Keywords

- Acute rheumatic fever
- Second degree Mobitz type 2 blocks
- Supraventricular tachycardia
- AV dissociation

Abstract

Various rhythm and conduction disturbances have been reported in patients with acute rheumatic fever, that first-degree atrioventricular block is the most common one. The second or third-degree AV block, junctional tachycardia with or without AV dissociation, supraventricular tachycardia, premature ventricular contraction, ventricular tachycardia, right and left bundle branch block have been reported rarely during the course of the acute rheumatic fever. In this report, we present four children with acute rheumatic fever associated cardiac rhythm disturbances.

ABBREVIATIONS

ARF: Acute Rheumatic Fever; AV: AtrioVentricular; ECG: Electrocardiography; CRP: C-reactive protein; ESR: Erythrocyte Sedimentation Rate; ASO: Antistreptolysin O; SVT: Supra Ventricular Tachycardia

INTRODUCTION

Acute rheumatic fever (ARF) is the most common acquired cardiac disease in children in developing countries. The disease emerges after a latent period of about three weeks following untreated pharyngitis caused by group beta-hemolytic streptococci (GABHS). In the acute stage of ARF, various disturbances in conduction system and cardiac rhythm may develop. The PR prolongation (first-degree atrioventricular (AV) block) is the most frequently seen conduction anomaly in cases with ARF. However second or third-degree AV block, junctional tachycardia with or without AV dissociation, supra ventricular tachycardia, premature ventricular contraction, ventricular tachycardia, right and left bundle branch block have been reported rarely [1-11].

In this report we present four cases with rare cardiac rhythm disturbances associated with ARF are presented, and the literature is reviewed.

CASE PRESENTATIONS

Case 1

The 11-year-old female patient presented with pain and swelling of the right hip, right knee and right ankle, and being

unable to stand on her right foot. The patient had upper respiratory tract infection two weeks prior to her admission. Physical examination revealed body temperature of 36.5°C, blood pressure of 110/70 mm Hg, and heart rate of 80 beats per minute. Apical pansystolic and early diastolic murmur between the 2nd-3rd inter costal spaces at the left sternal border was noted in the cardiac auscultation. Swelling, hyperemia and warmth were present at the right ankle and right first meta tarso phalangeal joint. In the laboratory examination, C-reactive protein (CRP), erythrocyte sedimentation rate (ESR), and antistreptolysin-O (ASO) titers were 125 mg/L, 120 mm/h and 1070 IU, respectively. Throat culture yielded no pathogenic bacterial growth. The cardiothoracic ratio was normal on chest X-ray. Two-dimensional and color Doppler echocardiography revealed aortic and mitral insufficiency with a flow velocity of 4.3 and 2.7 m/sec respectively. Electrocardiography (ECG) showed second-degree Mobitz type-2 AV block. In the 24-hour Holter examination, first-degree and occasionally second-degree Mobitz type-2 AV block were noted. The patient was hospitalized, and salicylate treatment with a dose of 75 mg/kg/day was started. On the fourth day of treatment, second-degree Mobitz type-2 AV block disappeared on ECG whereas first-degree AV block was still present. The patient was discharged on the 10th day with salicylate and benzathine penicillin prophylaxis and with the advice of bed rest and to come to control. One week later, she admitted again with the complaint of swelling at the ankles and high titers of acute phase reactants (ESR: 60 mm/h, CRP: 40 mg/L) which was attributed to the noncompliance to the anti-inflammatory treatment. On the 3rd day of second hospitalization she suffered from supraventricular tachycardia (SVT) (Figure

1) unresponsive to adenosine, thus amiodarone with a loading dose of 5 mg/kg, followed by infusion therapy of 5 µg/kg/min was started. Two hours later, SVT resolved, and the treatment was changed into maintenance therapy of 5 mg/kg/d (p.o.) in the next day. The patient was discharged with anti-inflammatory treatment on the 12th day of her hospitalization without any conduction disturbance other than PR prolongation.

Case 2

A 12-year-old male patient admitted to our clinic with the complaints of pain and swelling of the right knee and being unable to stand on his right foot. There was no clear upper respiratory tract infection history prior to admission. Physical examination revealed a body temperature of 38.0°C, blood pressure of 100/60 mm Hg and heart rate of 58 beats per minute. No murmur was noted in the cardiac auscultation. Swelling, hyperemia and warmth were present at the right knee. In the laboratory examination, CRP, ESR, and ASO titers were 67 mg/L, 51 mm/h and 636 IU, respectively. Throat culture yielded no pathogenic bacterial growth. The cardiothoracic ratio was normal in chest

X-ray. Two-dimensional and color Doppler echocardiography revealed mitral insufficiency with a flow velocity of 4.1 m/sec. Electrocardiography demonstrated AV dissociation with a ventricular rate of 58 beats per minute (Figure 2). In the 24-hour Holter ECG monitoring, normal sinus rhythm and periods of AV dissociation and premature ventricular contractions were noted. The patient was hospitalized and salicylate treatment with a dose of 75 mg/kg/day was started. On the second day of treatment, AV dissociation disappeared on ECG. Ten days after her hospitalization, the patient was discharged with salicylate and benzathine penicillin prophylaxis with normal electrocardiographic findings.

Case 3

A 16-year-old male patient presented with pain of left knee and right ankle, chest pain and syncope for last two days. Physical examination revealed no pathologic finding except hyperemia of pharynx and systolic murmur with a degree of 1/6 on the left sternal border. He had been diagnosed with rheumatic fever and mild mitral insufficiency and was on penicillin prophylaxis

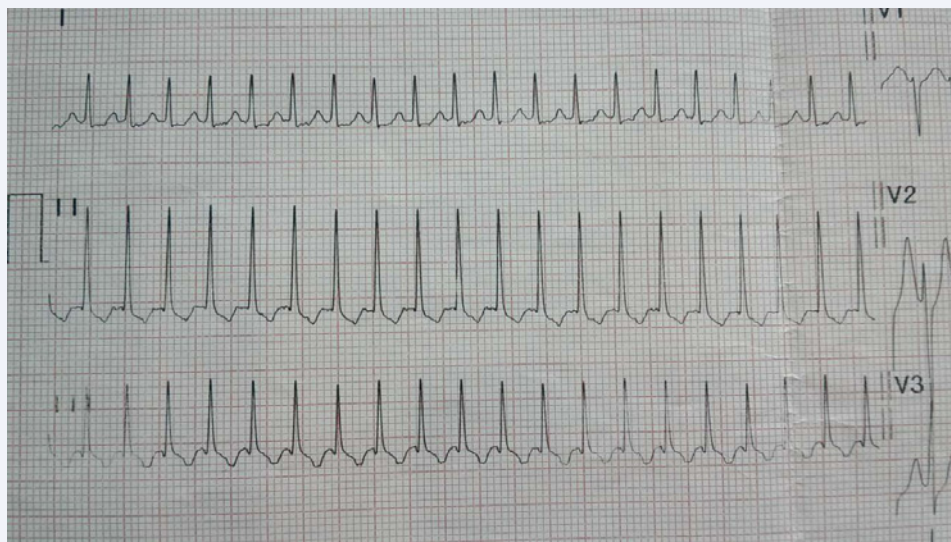


Figure 1 Case 1, supraventricular tachycardia.

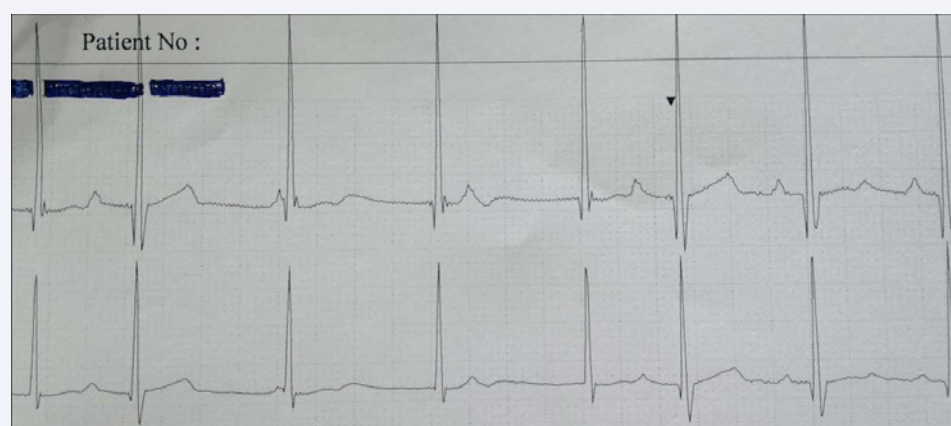


Figure 2 Case 2, AV dissociation.

for ten years. Laboratory examination showed a CRP of 205 mg/dl, ESR of 105mm/h and ASO titers of 1110 IU CK-MB and troponin I levels were mildly elevated with the values of 26IU/L and 0.6ng/ml respectively. Two-dimensional and colour Doppler echocardiography revealed mild mitral and trivalvular aortic insufficiency. Electrocardiography and 24-hour Holter ECG monitoring showed first-degree and occasionally second-degree Mobitz type-2 AV block (Figure 3). With these findings he was considered to be ARF reactivation and prednisolone treatment with a dose of 2 mg/kg/day was started. Mobitz type 2 AV block disappeared on the second day of treatment. The patient was discharged with anti-inflammatory treatment on the 10th day of his hospitalization with first degree heart block on surface ECG.

Case 4

A 13-year-old male patient admitted to emergency department with the complaints of pain and swelling of the right foot ankle and fever. He suffered from an upper respiratory tract infection three weeks prior to admission. Physical examination revealed an irregular heart rhythm and hyperemia of pharynx without any murmur in cardiac auscultation. Laboratory examination, CRP, ESR, and ASO titers were 90 mg/dl, 100mm/h and 800 IU, respectively. Two-dimensional and color Doppler echocardiography revealed mild mitral insufficiency with a flow velocity of 4.5 m/sec. Electrocardiography and 24-hour Holter ECG monitoring demonstrated first and second degree AV block. Prednisolone with a dose of 2 mg/kg/day was started. On the second day of treatment, Mobitz type-2 AV block and non-sustained SVT attacks were detected on ECG monitor that both disappeared in repeated 24-hour Holter ECG monitoring.

DISCUSSION

The cardiac involvement in ARF encompasses all the tissues; however, the inflammatory process involves the endocardium and myocardium most intensively. The edematous changes in the myocardium caused by the exudative and proliferative reactions in course of the inflammatory process are responsible for the dysrhythmia [12].

Since the 1920s, it is well known that PR interval prolongation occurs quite often in ARF patients, that was attributed to increased vagal tone. It remains still unknown by which mechanism the rheumatic course causes this vagal effect.

Clark and Keith suggested that AV block observed in ARF patients occurs proximally to the trifascicular system and demonstrated that first-degree AV block in ARF patients has been shown to regress with the use of atropine [3]. Although immunological similarity between group A streptococci and the glycoproteins in cardiac valves had been shown previously no similar association between these microorganisms and the glycoproteins of the conductive tissue had been observed until now [3,6,9]. In addition, compared to the peripheral conductive tissues, the glycoprotein content of the AV node is very low [10].

First degree AV block is not specific for carditis; it can also be observed in the presence of fever [8]. The incidence of first degree AV block in acute phase of the disease was reported between 10 and 75% [1,2,8]. In a study from Turkey, Karademir et al., reported the frequency of PR prolongation to be 19.2% [13]. Cases with second- and third-degree AV block have only been reported rarely in the literature [1,4,9,10]. In their study including the data of 65 children with ARF diagnosis, Zalzstein et al., reported the incidence of first-degree AV block as 72.3%, whereas only one patient (1.5%) developed second-degree Mobitz type 1 AV block, and three patients (4.6%) had complete AV block [8]. In the study conducted by Clark and Keith in 1972, 12 children out of 508 (2.4%) were shown to have second-degree AV block (Mobitz type 1 or Wenkebach), and 3 patients (0.6%) had complete AV block [3]. In neither of the two studies there was any case with Mobitz type-2 AV block. Second-degree Mobitz type-2 AV block was reported only in one patient among 64 cases with ARF in the study of Isikay et al., [11]. In an adolescent with ARF, Yoo et al. observed complete AV block initially which later on turned into second-degree Mobitz type 2 AV block, and then into first-degree AV block [10].

Most rhythm disorders are independent of valvular involvement, and most of them are limited to the acute phase. Rhythm and conduction abnormalities in rheumatic fever

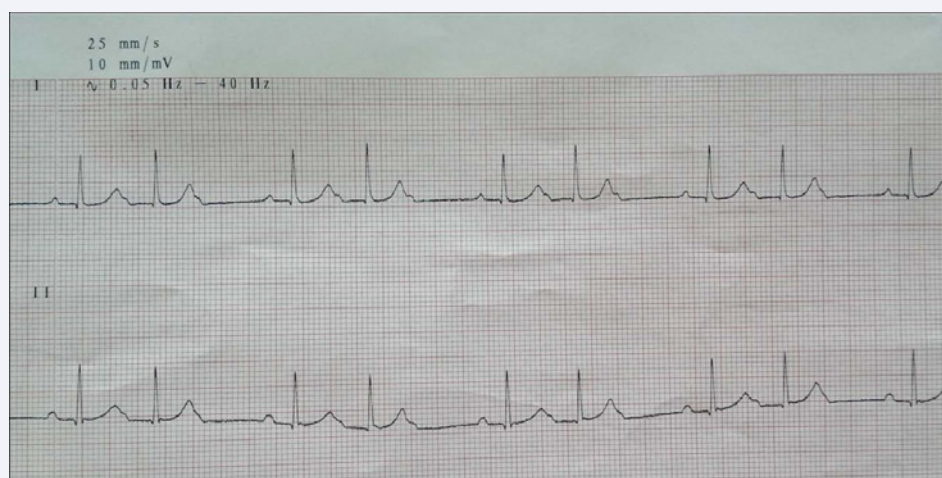


Figure 3 Case 3, 2nd-degree Mobitz type-2 AV block presenting with syncope.

appear to be temporary and resolve with conventional anti-inflammatory treatment. At first hospitalization of our first, third and fourth patients had first- and second-degree type 2 AV block. First-degree AV block generally resolves spontaneously without any clinical importance. However, second-degree type 2 AV block carries clinical significance it may turn into complete AV block and cause severe bradyarrhythmias and Stokes-Adams attacks as our third patient had experienced which may necessitate cardiac pacemaker [11,14]. After initiation of anti-inflammatory treatment, our patients did not develop any significant bradycardia, and second-degree AV block disappeared dramatically that cardiac pacemaker was not indicated. One of our patient developed sustained SVT attack which was attributed to the noncompliance to anti-inflammatory treatment. Supraventricular tachycardia did not recur after cessation of the acute attack with anti-arrhythmic medication.

In the reported studies, the incidence of AV dissociation in ARF patients was low [2,3]. Cristal and et al. showed in their study that AV dissociation had a transient feature. And this study also indicates that when AV dissociation is present in ARF it is always the consequence of enhanced nodal pacemaker activity, with or without some delay in atrioventricular conduction. And they also discriminate the term 'carditis' into two different conditions, namely, myocardial damage and myocardial involvement. In myocardial involvement irreversible structural changes in heart are of a much lesser grade, so the injury seems to be localized and probably transient [2]. As in our second patient, AV dissociation was noted only during the first 48 hospital hours.

Balli et al reported that every level of the conduction system can be affected in ARF patients [15]. They detected premature supraventricular and ventricular contractions in 19.1% and 16.4% of the patients respectively during 24-hour Holter ECG monitoring. One of our patients (Case 2) also presented had rare premature ventricular contractions during 24-hour Holter ECG monitoring.

In conclusion, various types of cardiac rhythm and conduction disturbances may be seen during the course of ARF. Patients should be monitored and evaluated carefully in terms of rhythm abnormalities especially in the acute period of the disease. These rhythm abnormalities mostly resolve after initiation of anti-inflammatory treatment. And we suggest that as intermittent rhythm disturbances may not be seen on standard 12-lead electrocardiograms, 24-hour Holter ECG examination should be performed to all ARF patients in the acute stage of the disease.

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