

## Complete atrioventricular block in an adolescent with acute rheumatic fever: a case report

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Prolonged atrioventricular conduction (first-degree heart block) is a well-known symptom of ARF, occurring in one-fifth to three-fifths of patients. This condition is a minor criterion for diagnosing ARF based on Jones's criteria. Advanced conduction delay, such as a second-degree or a complete atrioventricular (AV) block, is a rare condition of ARF that can occur before symptoms like carditis, polyarthritis, and Sydenham chorea appear. We present a case of ARF in an adolescent with complete AV block. [Paediatr Indones. 2024;64:87-91; DOI: 10.14238/pi64.1.2024.87-91 ].

**Keywords:** *atrioventricular block, adolescent, acute rheumatic fever*

**A**cute rheumatic fever (ARF) is an autoimmune, multiorgan inflammatory disease that occurs in genetically susceptible individuals after group A-hemolytic streptococcal infection.<sup>1</sup> Carditis and polyarthritis are the most common symptoms of ARF. Repeated streptococcal infections can cause recurrent valvulitis and valvular heart disease.<sup>2</sup>

### The case

A 16-year-old boy was referred from a district hospital in Magelang, Central Java, Indonesia, with the chief complaint of weakness and cold sweats. Fever and tightness in both fingertips were also present in the patient's history. **Figure 1** shows the patient's ECG results, revealing a complete AV block with a

junctional escape rhythm. No history of syncope or chest pain preceding this observation.

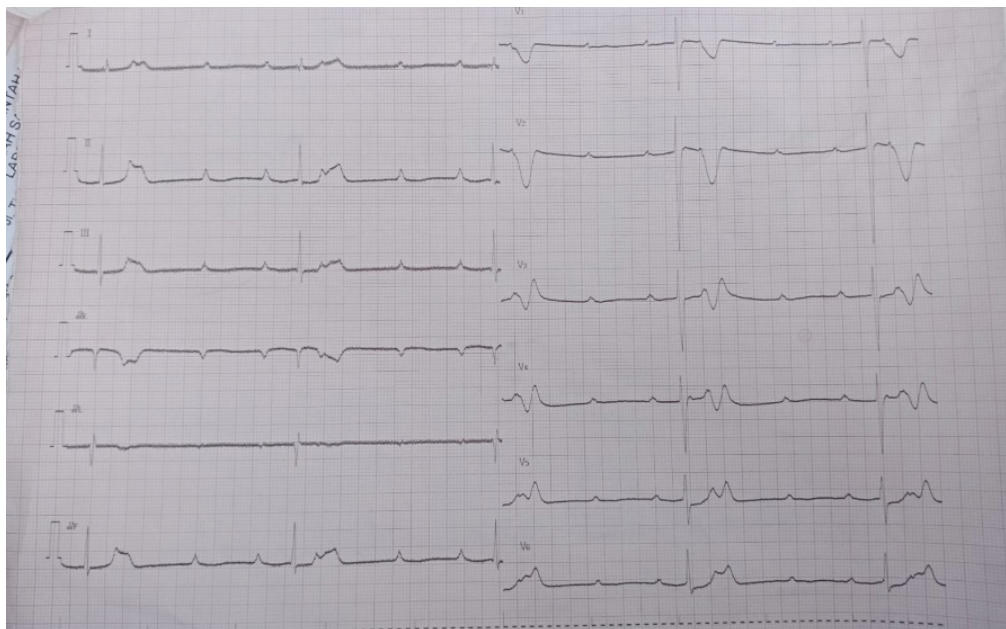
Clinical symptoms persisted when the patient was brought to the district hospital with the following vital signs: blood pressure of 90/40 mmHg, heart rate of 20 beats per minute, and oxygen saturation of 100% with oxygenation of 10 liters per minute using nasal rebreathing mask. A complete AV block with sinus rhythm was found on the ECG, as shown in **Figure 2**.

The patient received dopamine at a dose of 3 mcg/kg/minute. There were improvements in clinical symptoms (e.g., shortness of breath and cold sweats) and decreased heart rate to 50 beats per minute. Dopamine titration of 5 mcg/kg/minute was continued, and atropine sulfate 0.5 mg was administered as an additional treatment. Heart rate declined to 35 bpm within 24 hours of treatment, and dopamine was titrated up to 10 mcg/kg/minute, but the heart rate did not increase. At that time, the initial laboratory results were within normal limits. Chest X-ray (**Figure 3**) showed cardiomegaly with normal vascular markings.

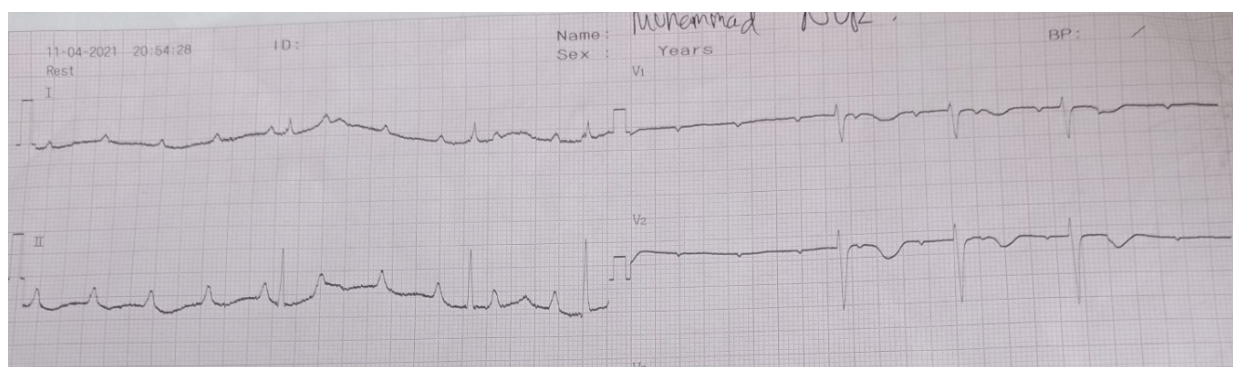
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**Figure 1.** ECG in a primary healthcare center showing a complete AV block with a junctional escape rhythm



**Figure 2.** ECG performed in the previous hospital showing high degree AV block with junctional escape rhythm

The patient was subsequently referred to Dr. Sardjito Hospital, Yogyakarta. At the emergency department, he had a heart rate was 35-47 bpm, blood pressure of 100/51 mmHg, respiratory rate of 18 breaths/minute, and the oxygen saturation of 100% with a nasal cannula at 1 liter per minute. His hemodynamic condition was stable. An ECG revealed a complete AV block without sinus rhythm (**Figure 4**).

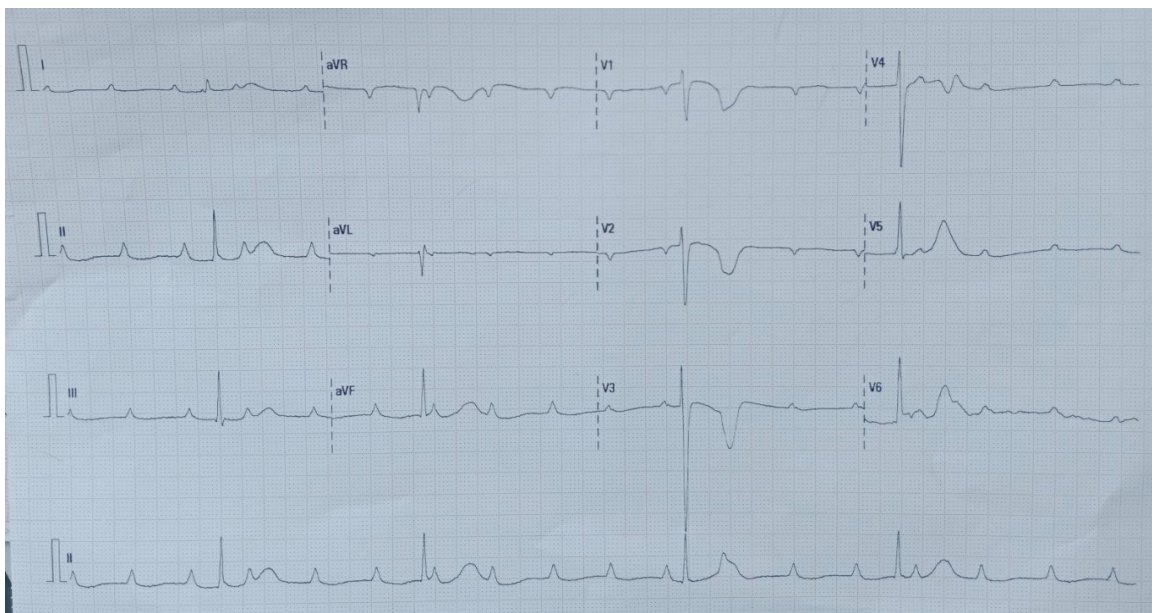
Two weeks before admission, the patient experienced fever without cough, pain, or joint swelling. He had non-pruritic skin lesions covered in thick crust on both legs since one month before admission. He did not seek treatment for the skin lesions.

Upon admission, the patient presented with a complete AV block and was suspected to have ARF. A temporary pacemaker (TPM) was inserted through the femoral vein to the right ventricle, set at a heart rate of 80 bpm, sense of 2.0 Mv, output of 1.5 mA, and TH of 0.5 mA. The patient was observed for 24 hours in the intensive care unit. Based on the temporary pacemaker settings, the vital signs were as follows: blood pressure 85-101/53-55 mmHg and heart rate approximately 80 beats per minute.

The patient's general condition stabilized after temporary pacemaker implantation and continuous treatment at the ward. The cause of complete AV block was ARF, supported by a positive qualitative



**Figure 3.** Chest X-ray showing cardiomegaly



**Figure 4.** ECG at the referral hospital showing complete AV block without sinus rhythm



Figure 5. Skin lesions

anti-streptolysin O, a C-reactive protein (CRP) level of 38 mg/l, an erythrocyte sedimentation rate (ESR) of 69 mm/hour (0-10), and the presence of carditis based on an echocardiographic examination. Cardiac enzyme examination showed a creatine kinase (CK) of 61 U/L, CK-MB of 8 U/L, and hs-troponin I of 17.4 ng/L.

Echocardiography examination identified trivial mitral regurgitation and mild anterior mitral leaflet prolapse, with a 55.2% ejection fraction. The patient was then treated with phenoxymethylpenicillin, prednisone, furosemide, and ramipril. The patient was already observed for two weeks with a temporary pacemaker but did not improve, and we planned to perform a permanent pacemaker. The laboratory examination results, such as routine hematologic and coagulation tests, electrolytes, and chest X-ray, were normal before PPM implantation. The permanent pacemaker VVI(R) was inserted via a subclavian vein without complications during the procedure. The patient's general condition and hemodynamic status were stable after PPM implantation, and the patient was discharged with a final diagnosis of complete AV block in ARF.

## Discussion

Acute rheumatic fever (ARF) is the most common acquired heart disease in children over five years, characterized by various clinical symptoms such as polyarthrititis, carditis, Sydenham chorea, erythema marginatum, and subcutaneous nodules.<sup>3</sup> The

incidence of acute rheumatic fever is estimated to be 8-51 per 100,000 people worldwide.<sup>4</sup> Sinus arrest, atrial tachycardia, junctional tachycardia, junctional rhythm, and AV conduction block are some of the rhythm disturbances associated with ARF.

Jones's criteria includes the most common AV conduction abnormality during ARF, such as first-degree AV block (up to 72.5%). Second-degree AV block (Wenckebach) is rare but has the same significance as PR prolongation. Complete AV block is rare, appearing in 0.016% to 4.6% of cases. Mobitz Type I atrioventricular block is less common, occurring in only 0.06-2.6% of cases.<sup>5,6</sup>

Abnormal conductions can be triggered by rheumatic processes. The atrioventricular block may be associated with the inflammation process of the AV node and the bundle of His.<sup>5</sup> During this process, an elevated vagal tone may cause conduction abnormalities. According to initial studies, a complete AV block during ARF arises proximal to the bundle of His, and the rhythm is typically narrow. However, the pathophysiology of this condition remains unclear. AV block can occur from a few minutes to ten days, but in most cases, a complete heart block appears transiently. Specific treatment, such as temporary pacemaker implantation, should be considered only when in cases of syncope due to the heart block.<sup>6</sup>

Anti-inflammatory drugs such as aspirin or steroids can be added as an additional treatment in ARF patients with advanced heart block. A corticosteroid should be added to the therapeutic regimen, although its effect is still controversial. The heart block can resolve over a period of days with anti-

inflammatory treatment, and clinical improvement can be achieved quickly if the treatment is appropriate and initiated promptly. Valvulitis commonly causes irreversible structural damage to the heart, and severe heart block can reversibly involve the conduction pathways.<sup>2</sup>

In conclusion, advanced degrees of heart block can occur in ARF patients. Acute rheumatic carditis can lead to complete AV block in rare cases. It is sometimes transient and recovers within several days. In symptomatic cases, a temporary pacemaker should be recommended. In the present case, the heart block was resolved, and the patient reverted to normal sinus rhythm. In individuals who have already been diagnosed with ARF, the ECG should be repeated as conduction abnormalities can change over time.

## References

1. Szczygielska I, Hernik E, Kołodziejczyk B, Gazda A, Maslinska M, Gietka P. Rheumatic fever - New diagnostic criteria. Vol. 56, *Reumatologia*. Termedia Publishing House Ltd.; 2018. p. 37-41.
2. Yoo GH. Complete atrioventricular block in an adolescent with rheumatic fever. *Korean Circ J*. 2009;39:121-3. DOI: <https://doi.org/10.4070/kcj.2009.39.3.121>
3. Rahmawaty NK, Iskandar B, Albar H, Daud D. Faktor risiko serangan berulang demam rematik/penyakit jantung rematik. *Sari Pediatr*. 2012;14:179-84. DOI: <https://doi.org/10.14238/sp14.3.2012.179-84>
4. Lahiri S, Sanyahumbi A. Acute rheumatic fever. *Pediatr Rev*. 2021;42:221-32. DOI: <https://doi.org/10.1542/pir.2019-0288>
5. Atmani S SF. Presyncope due to a complete atrioventricular block revealing a rheumatic heart disease. *J Clin Case Reports*. 2014;04:1000386. DOI: <https://doi.org/10.4172/2165-7920.1000386>
6. Umopathy S, Saxena A. Acute rheumatic fever presenting as complete heart block: Report of an adolescent case and review of the literature. *BMJ Case Rep*. 2018;2018:2017-9. DOI: <https://doi.org/10.1136/bcr-2017-223792>