

A Rare Complication of Infective Endocarditis

Enfektif Endokarditin Nadir Bir Komplikasyonu

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ABSTRACT

Complete atrioventricular block (AVB) is one of the well described but uncommon complications of infective endocarditis (IE). The degree of AVB reflects the extension of infection. The degree of AVB is thought to be associated with increased morbidity and mortality. It is recommended to evaluate newly developed AVBs as predictors of IE, to diagnose and treat IE as soon as possible. We report a case with delayed diagnosis of aortic valve endocarditis that revealed first degree AVB in the earlier phase of disease and followed by complete AVB until accurate treatment was started. Successful surgical intervention and antibiotherapy resulted in a downgrading and diminishing of the high-grade conduction block without any complications.

Key Words: Atrioventricular block, Child, Infective endocarditis

ÖZ

Tam atriyoventriküler blok (AVB) enfektif endokarditin (EE) iyi tanımlanmış ancak nadir bir komplikasyonudur. Atriyoventriküler blok derecesi enfeksiyonun yayılımını yansıtır. Bu yüzden AVB derecesinin artmış morbidite ve mortalite ile ilişkili olduğu düşünülmektedir. Yeni gelişen AVB'nin EE göstergesi olarak değerlendirilmesi ve tanı koyulduktan sonra EE'nin mümkün olduğunca çabuk tedavi edilmesi önerilmektedir. Burada, erken dönemde 1.derece AVB olup uygun tedavi başlanana dek 3.derece AVB ortaya çıkan aort kapak endokarditli bir hasta sunulacaktır. Başarılı cerrahi girişim ve uygun antibiyotik tedavisi sonrasında AVB hiçbir komplikasyon olmaksızın düzelmiştir.

Anahtar Sözcükler: Atriyoventriküler blok, Çocuk, Enfektif endokardit

INTRODUCTION

Infective endocarditis (IE) has a high risk of morbidity and mortality (1). Complete atrioventricular block (AVB) is one of the serious and rare complications of endocarditis (2). Complete AVB in IE has been associated with increased morbidity and mortality (3,4). Herein, we report a case of complete AVB associated with aortic valve endocarditis following osteomyelitis. Additionally, the anatomic relation of valves and the conduction system is presented and discussed.

CASE REPORT

A 16-year-old male was admitted to hospital after presenting with complaints of fever and weakness. The medical history revealed osteomyelitis of the right leg after a knife injury during a game at home. The osteomyelitis had been treated surgically. After 2 months he presented to pediatric outpatients with intermittent mild fever and dizziness that had started 3 days ago. Physical examination was normal except for tonsillopharyngeal hyperemia. Cardiac examination was normal. There was no cardiac murmur. Electrocardiography (ECG) showed first degree AVB. Echocardiography performed to evaluate the IE possibility and to exclude the causes AVB such as car-

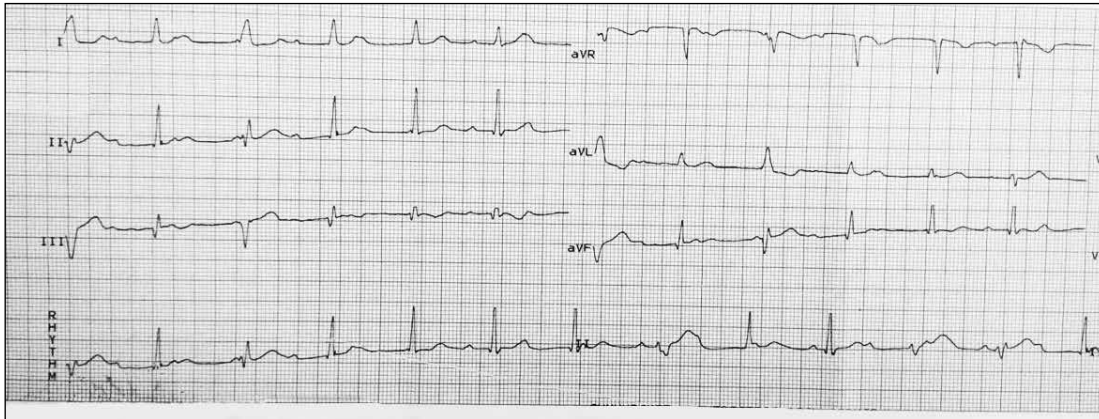


Figure 1: Third degree atrioventricular block in the patient's electrocardiography.



Figure 2: Large vegetation on aortic valve in the patient's echocardiography.

diomyopathy, atrial septal defect and Ebstein's anomaly was normal. Oral penicillin was started for tonsillopharyngitis. At the 3rd day of penicillin therapy, he presented to hospital again with worsening of fever (39-40°C) and weakness in spite of oral antibiotherapy. On physical examination, he was debilitated. Body temperature was 39.7°C; heart rate was 72 beats/minute; respiration rate was 24/minute; and blood pressure was 120/70 mmHg. His lungs were clear on auscultation and cardiac examination demonstrated the decrescendo diastolic murmur of aortic insufficiency along the left sternal border. The liver was found normal in size and the spleen was nonpalpable. There was no erythematous lesion. The right knee and ankle were warm but there were no other arthritis signs. The peripheral leukocyte count was 13.190/mm³, with 80% neutrophils and 20% band forms. The hemoglobin level was 12.5 g/dL. Urinalysis showed 4 leukocytes per high-power field. The erythrocyte sedimentation rate was 71 mm/h and C-reactive

protein level was 140 mg/dL. Chest X-ray revealed normal lung and heart view. Ceftriaxone was started as empiric therapy and he was consulted to the pediatric cardiology division with suspicion of acute rheumatic fever and IE. There was complete AVB on ECG (Figure 1). Heart rate was 72 beats/minute and there was no hemodynamic deterioration. A large vegetation (17.9x8.9 mm) was seen at the aortic valve ventricular side on echocardiography (Figure 2). Systolic functions were normal and there was no significant sign such as chamber dilatation or pericardial effusion on echocardiographic evaluation. The recommended initial empirical therapy for native valve IE with unknown agent is ampicillin/sulbactam plus gentamicin (with or without vancomycin) (5). Therefore gentamicin was added to therapy. The patient was urgently consulted with pediatric cardiovascular surgery. The Ross procedure was performed successfully. During this procedure, the aortic root and valve were replaced with the patient's own pulmonary root and valve and a bovine pericardial valve conduit was used for coronary reconstruction. Ambulatory ECG before operation showed complete AVB. After surgery, complete AVB was observed for a few days with a heart rate of 70/min. After 2 weeks, ECG showed normal sinus rhythm. Blood cultures that were drawn at admission and follow up and cultures of excised materials revealed no growth. Antibiotherapy was completed to 6 weeks. The patient suffered no cardiac events during follow-up.

DISCUSSION

Although the majority of IE patients have a predisposing cardiac condition, in approximately 8% to 10% of pediatric cases, IE develops without structural heart disease or any other readily identifiable risk factors (5). This is often associated with central indwelling venous catheters (central lines) and the complexities of patient management in pediatric intensive care units. In our case, IE was probably associated with venous catheterization and the surgical procedures for osteomyelitis treatment.

Disturbance of the cardiac conduction system is one of the rare complications of IE (1-15% of cases) (6). Third-degree AVB is

more frequent in aortic valve endocarditis than in mitral valve endocarditis (36% and 33%, respectively) (7). The anatomical association between the aortic and mitral valves and the conduction system explains this relationship. The atrioventricular node is situated at the centre of Koch's triangle, close to the noncoronary aortic leaflet and the anterior mitral leaflet. The aortic valve is closely related to the conduction system—in particular, the left and right bundle branches. The mitral valve is in proximity to the atrioventricular node. In our case, IE was on the aortic valve consistent with the literature.

Atrioventricular block is potentially the result of the extension of infection from the valve leaflets into the surrounding myocardium or anatomical destruction of adjacent conduction tissue by the abscess formation (7,8). The degree of AVB varies with the extended effect of IE on conducting system. According to the literature, the development of cardiac conduction abnormalities (CA), particularly AVB, has a high positive predictive value for abscess formation but a low sensitivity (9). A new AVB has an overall positive predictive value of 66%, a specificity of 89%, and a sensitivity of 28% to 45% for identifying perivalvular extension in patients with IE (6,8). In our case, the diagnosis was delayed because mild fever and first degree AVB was not evaluated as a predictor of infective endocarditis. The delayed diagnosis gave us an opportunity to evaluate the deterioration in the conduction system. In the earlier phase, ECG revealed first degree AVB. In three days, 3rd degree AVB had occurred with a heart rate of 70/min. In patients with acquired AVB (third or second-degree type 2), pacing is indicated irrespective of symptoms (Class 1 recommendation). In patients with acquired AV blocks that are due to reversible causes, pacing (Class 3 recommendation) is not indicated (10). Normal sinus rhythm was recovered within two weeks of emergent surgery and accurate antibiotherapy.

In a study of patients with endocarditis and complete AVB, pathology workup revealed the presence of an infection, usually accompanied by abscesses and fistulas that affected the conduction pathways; in cases involving paroxysmal AVB, inflammation was observed at this level, which would explain the reversibility of the event (11). Electrocardiographic monitoring is important in patients with endocarditis, as the appearance of conduction abnormalities can alert us to the appearance of perivalvular complications; similarly, once a conduction block has been detected, its disappearance in less than a week indicates a good response to antibiotic treatment (12). Persistent conduction abnormality in native valve endocarditis, even after adequate antibiotic treatment, is a poor prognostic sign, and is often associated with invasive infection, hemodynamic deterioration due to valve dysfunction, and a high mortality rate (13). In another study, CA was found to be associated with a two-fold-higher mortality rate (4). Earlier studies found that 40–90% of patients with CA expired during hospitalization or within 12 months (7,11). In a recent study, it was shown that although there was tendency towards higher mortality in

patients with CA, the difference did not reach statistical significance but embolic events were found to be more in CA group (14). Patients with native valve active IE in whom persistent, unstable CA develop without other identifiable cause, especially in the presence of aortic valve infection, should be considered for valve replacement (7). Several factors predispose children with IE to potentially life-threatening complications that may require early surgery. These are prosthetic cardiac valves, left-sided IE, *Staphylococcus aureus* IE, Fungal IE, previous IE, prolonged clinical symptoms (>3 mo), cyanotic congenital heart disease, systemic-to-pulmonary shunts, poor clinical response to antimicrobial therapy (5). In our case, vegetation was located on aortic root and emergent surgical treatment was done successfully against the risk of systemic (especially cerebral) embolization. Although the signs of IE were missed at the previous evaluation, this patient had an uneventful course until surgery. After the disease was diagnosed, emergent aortic root replacement and a bovine pericardial valve conduit for coronary reconstruction were performed successfully. The symptoms improved with early surgical management and there have been no subsequent cardiac events.

In conclusion, although the ECG is often normal in patients with IE, minor or major but new ECG abnormalities may be the sign of IE and also may be the predictor of increased morbidity and mortality in IE. Therefore, the ECG has an important role in the diagnosis and follow-up of IE. Physicians should be alert for the possibility of IE in presence of fever and newly developed AVB even if it was transient first degree which can also be seen in the healthy population. Intensive antibiotic treatment and urgent surgical intervention are needed to decrease the morbidity and mortality associated with this condition.

REFERENCES

1. Bayer AS, Bolger AF, Taubert KA, Wilson W, Steckelberg J, Karchmer AW, et al. Diagnosis and management of infective endocarditis and its complications. *Circulation* 1998;98:2936–48.
2. Carpenter JL. Perivalvular extension of infection in patients with infectious endocarditis. *Rev Infect Dis* 1991;13:127–38.
3. Martínez-Urueña N, Hernández C, Duro IC, Sandín MG, Zatarain E, San Román A. Transient trifascicular block secondary to tricuspid valve endocarditis. *Rev Esp Cardiol* 2012;65:767–8.
4. Meine TJ, Nettles RE, Anderson DJ, Cabell CH, Corey GR, Sexton DJ, et al. Cardiac conduction abnormalities in endocarditis defined by the Duke criteria. *Am Heart J* 2001;142:280–5.
5. Baltimore RS, Gewitz M, Baddour LM, Beerman LB, Jackson MA, Lockhart PB, et al. Infective endocarditis in childhood: 2015 update: A scientific statement from the American heart association. *Circulation* 2015;132:1487–515.
6. Javaid M, Awasthi A, Fink G. Complete heart block associated with mitral annular abscess. *Mayo Clin Proc* 2005;80:1531–2.
7. DiNubile MJ, Calderwood SB, Steinhaus DM, Karchmer AW. Cardiac conduction abnormalities complicating native valve active infective endocarditis. *Am J Cardiol* 1986;58:1213–7.

8. Weisse AB, Khan MY. The relationship between new cardiac conduction defects and extension of valve infection in native valve endocarditis. *Clin Cardiol* 1990;13:337-45.
9. Blumberg EA, Karalis DA, Chandrasekaran K, Wahl JM, Vilaro J, Covalesky VA, et al. Endocarditis-associated paravalvular abscesses: Do clinical parameters predict the presence of abscess? *Chest* 1995;107:898-903.
10. Brignole M, Auricchio A, Baron-Esquivias G, Bordachar P, Boriani G, Breithardt OA, et al. 2013 ESC Guidelines on cardiac pacing and cardiac resynchronization therapy. Developed in collaboration with the European Heart Rhythm Association (EHRA). *Eur Heart J* 2013;34:2281-329.
11. Wang K, Gobel F, Gleason DF, Edwards JE. Complete heart block complicating bacterial endocarditis. *Circulation* 1972;46:939-47.
12. Dinubile MJ. Heart block during bacterial endocarditis: A review of the literature and guidelines for surgical intervention. *Am J Med Sci* 1984;287:30-2.
13. Mehta NJ, Nehra A. A 66-year-old man with fever, hypotension and complete heart block. *Chest* 2001;120:2053-6.
14. Ryu HM, Bae MH, Lee SH, Lee JH, Lee JH, Kwon YS, et al. Presence of conduction abnormalities as a predictor of clinical outcomes in patients with infective endocarditis. *Heart Vessels* 2011;26:298-305.