CASE REPORTS

Complete Heart Block Secondary to Leptospirosis: A Case Report

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ABSTRACT

Complete heart block (CHB) is a rare but potentially life-threatening complication of leptospirosis, a zoonotic bacterial infection caused by spirochetes of the genus Leptospira. While leptospirosis primarily affects the kidneys and liver, cardiac involvement, including CHB, can occur and has significant clinical implications. The pathogenesis of CHB in leptospirosis is multifactorial and may involve direct cardiac invasion by Leptospira organisms, systemic inflammatory response, autoimmune reactions, electrolyte imbalances, and hemodynamic effects. Prompt recognition and management of CHB are essential to prevent adverse outcomes, including hemodynamic instability and sudden cardiac death. Treatment strategies include supportive measures such as hemodynamic support and correction of electrolyte imbalances, temporary pacing for symptomatic bradycardia, antibiotic therapy for the underlying infection, and consideration of permanent pacemaker implantation in refractory cases.. Cardiac manifestations may include myocarditis, pericarditis, arrhythmias, conduction blocks and cardiac failure. We are reporting a case of leptospirosis causing complete heart block in a previously healthy young gentleman.

Introduction

Leptospirosis is considered to be a widespread zoonotic disease globally, particularly in tropical and subtropical regions where conditions favor the survival and transmission of the causative bacteria, Leptospira spp. The true prevalence of leptospirosis is difficult to estimate due to underreporting and misdiagnosis in many parts of the world. However, it is believed to be a significant cause of morbidity and mortality, especially in regions with poor sanitation and hygiene practices.[1]

Severe infection with leptospirosis may cause multiorgan failure like pulmonary haemorrhage, acute kidney injury, neurological complications as well as cardiac involvement. Cardiac manifestations may include myocarditis, pericarditis, arrhythmias, conduction block and cardiac failure.[2]

One rare but serious complication of leptospirosis is the occurrence of complete heart block. Complete heart block is a conduction system disorder of the heart that results in the failure of electrical impulses to transmit from the atria to the ventricles. This can lead to symptoms such as dizziness, syncope, or even sudden death if not promptly managed.[3]

A cross sectional study done in India shown that ECG abnormalities may predict the development of acute respiratory distress syndrome, renal failure requiring dialysis, multiorgan dysfunction syndrome and prolonged hospital stay.[1-2] Therefore, it is important for a clinician to be aware of cardiac complications from leptospirosis so that appropriate measures can be taken to improve the morbidity and mortality.

Case studies and medical reports have indicated that leptospirosis can be a rare yet significant cause of complete heart block. This may be due to the direct effects of bacterial infection on cardiac tissues or due to the body's immunological response to the infection. However, the exact mechanisms linking leptospirosis and complete heart block require further investigation.

Case

This is a case of 25-year-old gentleman, a non-smoker, with no known medical illness who was referred from a district hospital for further management of severe leptospirosis complicated with complete heart block secondary to myocarditis, acute kidney injury and acute liver injury.

He initially presented to the district hospital with complaint of epigastric pain for five days associated with fever, headache, yellowish discoloration of sclera, bilateral eye redness, lethargy, myalgia and fainting episodes. Otherwise, there were no diarrhea and vomiting. There were also no chest pain, palpitation and shortness of breath. He was previously well. He is an immigrant, travelling to Malaysia for odd jobs. There were rats found around his house.

During the admission in the district hospital, he was hypotensive requiring double inotropes. ECGs done noted persistent 3rd degree heart block with multiple significant ventricular standstill despite no electrolytes abnormalities. Cardiac biomarkers sent were also negative. He also developed multiple episodes of syncopal attack while in ward. He was subsequently admitted to Critical Coronary Unit (CCU) for percutaneous temporary pace maker and close monitoring. Leptospira serology IgG and IgM were positive. While in CCU, he had developed one episode of breaktrough seizure requiring elective intubation.

He was subsequently referred to our tertiary hospital for further management. Noted that his renal function was worsening with increasing creatinine from 150 to 749 with metabolic acidosis and anuria thus intermittent hemodialysis was initiated. His liver enzymes were also worsening with worsening of coagulation profile.

Abdominal Ultrasound noted increased in liver echogenicity and moderate ascites with no evidence of abscess and intraabdominal collection. He has normal kidney size bilaterally with no evidence of obstructive uropathy.

Echocardiogram noted Ejection Fraction 65% with normal chambers size and no evidence of ventricular hypertrophy.

He was managed with IV Ceftriaxone 2g daily and T Doxycycline 100mg twice daily and has shown a good response in terms of improving septic parameters and decreasing inotropic requirements after about one week. His liver enzymes were returning to normal values and he was able to wean off from hemodialysis. He was able to be extubated. However, he had persistent complete heart block

despite improving general conditions so he was planned for a permanent pacemaker insertion.

Results

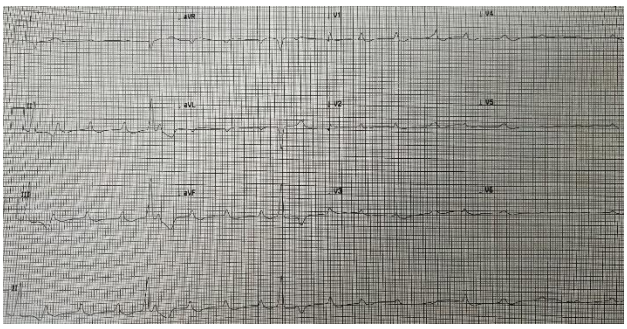

Figure 1: First ECG showing complete heart block and ventricular standstills

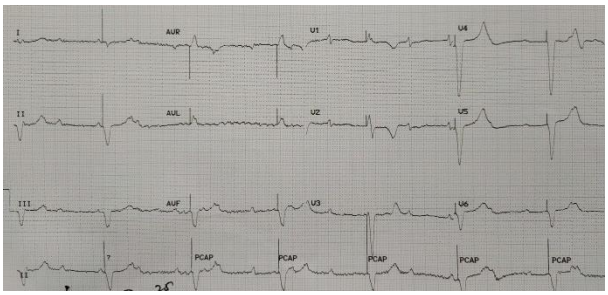

Figure 2: ECG after Temporary Pace Maker insertion

Discussion

Leptospirosis is a well-known zoonosis caused by a spirochete of the genus Leptospira. Weil's syndrome was described in 1886 which consists of jaundice, splenomegaly, renal dysfunction, conjunctivitis and skin rash and few years later the causative organism was found by Inada which described the organism as Spirochaeta which is now known as leptospirosis.[4]

Leptospirosis can be found throughout the world but the prevalence tends to be higher in tropical regions with high rain fall. However, despite traditional belief, recent reports indicated that it is also currently emerging as an important infection in developed countries.[5] Risk factors of leptospirosis may include workers in agricultural sector, sewerage workers, livestock handlers and people with chronic disease and open skin wounds. Incubation period is usually 10 days with a range of 2 to 30 days.

Most cases are usually self-limited, by but some patients may develop fatal complications with severe disease. Patients may present with mild influenza like illness, Weil's syndrome characterized by jaundice, renal failure, pulmonary haemorrhage and myocarditis, meningitis and pulmonary haemorrhage with acute respiratory distress syndrome.

World Health Organization has introduced Faine's criteria for diagnosis of leptospirosis, based on clinical history and epidemiological history supported by laboratory parameters.[5-6] Our patients demonstrated a score of 30 which are headache (2), fever (2), conjunctival suffusion (4), jaundice (1), rainfall (5), animal contact (1) and positive ELISA IgM (15) which mean that he falls into presumptive diagnosis of leptospirosis.

Cardiac involvement is one of the known complications of leptospirosis. A study conducted in India had found that 56% of leptospirosis patients had cardiac involvement and 52% of them had ECG abnormalities.[7] Among cardiac involvement can be found in leptospirosis may include myocarditis, heart failure, atrial fibrillation, atrioventricular conduction blocks and non-specific ventricular repolarization abnormalities. Our previously healthy young gentleman presented with complete heart block as one of the complications of leptospirosis. From our literature review, this is the first reported case of leptospirosis presented with persistent complete heart block requiring pacemaker insertion.[8]

Pathophysiology of cardiac involvement in leptospirosis is currently poorly understood. Post mortem studies has shown myocardial

inflammation and vasculitis in leptospirosis patients.[4] Echocardiographic evidence of myocardial dysfunction has not been adequately described which is also demonstrated in our patient which shown normal echocardiography.

The clinical implications of CHB in leptospirosis are significant, as it can result in hemodynamic instability, syncope, and sudden cardiac death if left untreated. Early recognition and prompt management of CHB are essential to prevent adverse outcomes. However, diagnosing CHB in the context of leptospirosis may pose challenges, particularly in resource-limited settings where advanced cardiac monitoring and specialized care may not be readily available. Clinicians should maintain a high index of suspicion for cardiac complications, including CHB, in patients with severe leptospirosis, especially those presenting with unexplained syncope or hemodynamic instability.[9-12]

It is important to note that leptospirosis with cardiac involvement, either demonstrated by ECG or clinically, tends to predict poor outcome with multi organ involvement.[13-14] This is also presented in our patients in which he had worsening renal function in ward that requires intermittent renal replacement therapy.

Severe leptospirosis requires adequate antibiotics together with careful management of renal, hepatic, hematologic and central nervous complications.[15-16] First line antibiotics for leptospirosis include IV Penicillin, Doxycyline, Ampicillin and Ceftriaxone. It's important to tailor treatment to the individual patient based on their clinical presentation, disease severity, and response to therapy. Close monitoring and timely intervention are crucial for improving outcomes in patients with CHB complicating leptospirosis.[17-19]

Patients should also be constantly monitored for any cardiac arrhythmias, renal function abnormalities as well as deranged liver enzymes. In our patient, despite the infection is resolving, the complete heart block persist thus necessitate the need of Permanent Pacemaker insertion.

Conclusion

Despite common presentation of leptospirosis with cardiac involvement is common, the presentation of complete heart block as a complication alone is rare. As currently there is no definite diagnostic method, high level of suspicion is required so that appropriate treatment of leptospirosis and supportive management of its complication can be constituted early.

Conflict of Interest

The authors declare no potential conflicts of interest or competing interests. The authors received no financial assistance or grants from public, private, or nonprofit funding agencies.

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