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Cope's sign and complete heart block secondary to acute cholecystitis: A case report

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ABSTRACT

Rationale: Cope's sign is reflex bradycardia seen in the patient presenting with symptoms of acute cholecystitis. This bradycardia may be due to vagally mediated cardio-biliary reflex. Many of these reflexes due to acute cholecystitis have similar clinical features (some electrocardiographic changes like bradycardia, complete heart block, and asystole) mimicking that of acute coronary syndrome.

Patient's concern: A 60-year old male presented with symptoms of acute cholecystitis and referred to the emergency department with complete heart block and abdominal pain with hypotension requiring an emergency temporary pacemaker.

Diagnosis: Cope's sign and complete heart block.

Intervention: Emergency temporary cardiac pacemaker insertion.

Outcomes: The patient was discharged after three days with regular follow-up and advice for laparoscopic cholecystectomy.

Lessons: Complete heart block or any symptomatic bradycardia associated with abdominal pain should be under consideration of cholecystitis that may be associated with either presence or absence of gall stones due to cardio biliary reflex.

KEYWORDS: Cope sign; Complete heart block; Temporary pacemaker insertion

1. Introduction

Cope's sign is reflex bradycardia seen in the patient presenting with biliary colic. Acute cholecystitis is diagnosed on the basis of signs and symptoms of inflammation in the right hypochondrium due to localized peritonitis. Acute cholecystitis and biliary colic

may have similar clinical presentations mimicking to that of acute coronary syndrome. The clinical presentations may have several ECG changes such as ST-segment elevation, T wave inversion, right bundle branch block, and bradycardia[1]. In the year 1971, O'Reilly *et al.* first reported reflex bradycardia in two patients with acute gallbladder diseases with various other electrocardiographic changes[2].

2. Case report

The reporting of this case was approved by Departmental Ethics Committee, Paras Hospital, Darbhanga, Bihar, India, and the informed consent was obtained from the patient's relatives. We reported a case of a 60-year-old male having symptoms of acute cholecystitis, presented in the emergency department with complete heart block and abdominal pain with hypotension requiring emergency temporary pacemaker. He was referred to emergency department with breathlessness for the last 2 h and pain abdomen in the right upper quadrant since morning. There were two episodes of fever and vomiting two days back with no significant past history. He had no history of syncope and was not on any medication too.

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On performing physical examination, he was alert, oriented, and afebrile, hemodynamically stable with bradycardia and hypotension. Abdominal examination showed mild abdominal tenderness, active bowel sounds, and no organomegaly. Hypotension was managed with intravenous crystalloids. Urgent ultrasonography on whole abdomen showed thickened gall bladder with multiple tiny hyperechoic foci (1-2 mm in size) with pericholecystic collection. Apart from an elevated white cell count ($16 \times 10^9/L$) (normal range $4-10 \times 10^9/L$), electrolytes, random blood sugar, renal, and liver, thyroid function tests and serum amylase levels were normal. At the time of admission, his heart rate was 45 beats/min with no ischaemic change on ECG tracings, and it was suggestive of sinus bradycardia (Figure 1). Cardiac enzymes, echocardiogram, and a CT coronary angiogram were all normal. As bradycardia persisted with prolonged and frequent pauses, the patient was then immediately transferred to cardiac catheterization laboratory for temporary cardiac pacemaker insertion (TPI). An electrocardiogram following post-TPI was done (Figure 2). For pain relief, 100 mg tramadol was prescribed twice a day along with broad-spectrum antibiotics and intravenous fluids. After 24 h, patient's own cardiac rhythm was restored and the pacing wires were removed. Later on, Holter monitoring and

stress test using Bruce protocol was done showing no sign of any myocardial ischemia. Hence this presentation of complete heart block was considered secondary to acute cholecystitis. This patient got discharged after three days with regular follow-up and advice for laparoscopic cholecystectomy.

3. Discussion

The association between calculous cholecystitis and bradycardia was first reported by O'Reilly and Krauthamer[2] and it was known as "Cope's sign", named after Zachary Cope who was the first patient documented with such cardio-biliary reflex. Bradycardia in acute cholecystitis may be due to vagally mediated cardio-biliary reflex. Both heart and gallbladder are innervated by vagus nerves, T4, and T6 spinal neurons. There are other ECG arrhythmia like right bundle branch block and unspecific ST-T wave changes in conjunction with acute cholecystitis, which has already been published in the literature[1]. A study by Morrison *et al.*[3] demonstrated that this cardio-biliary reflex can be mediated *via* intermediate neurons connecting the two sets of spinal neurons.

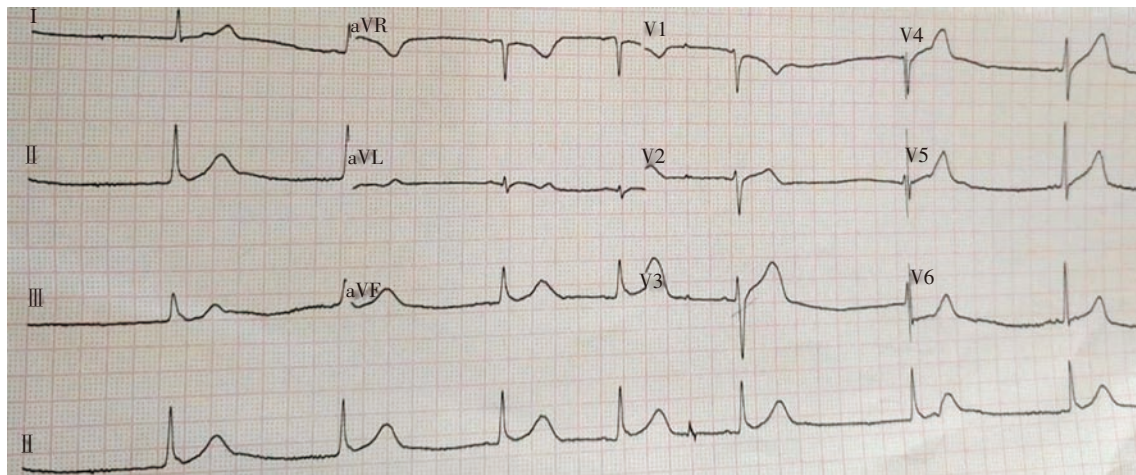


Figure 1. ECG changes showing bradycardia.

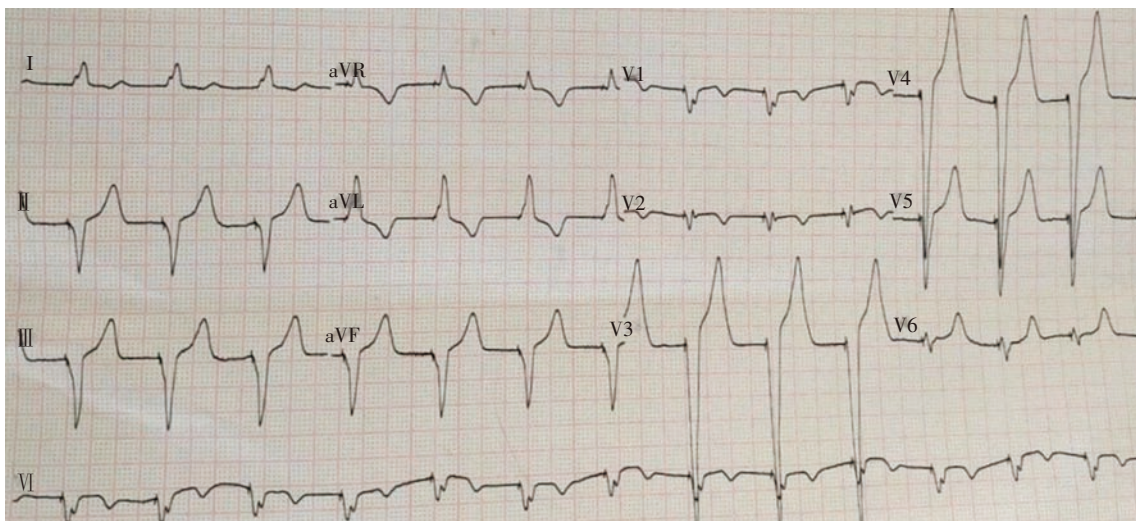


Figure 2. ECG tracing after temporary pacemaker placement.

A study by Kaufman *et al.*[4] demonstrated that these reflexes can be inhibited by giving atropine to patients with gall stone diseases. They have reported that a patient with gall stone disease treated by intramuscular atropine (2 mg), a muscarinic receptor antagonist showed marked T wave improvement and normalization of heart rate. A report by Daniel *et al.*[5] concluded that after performing cholecystectomy, arrhythmia like complete atrioventricular block is completely resolved. The inflamed gall bladder may not only lead to increase in vagal tone leading to bradyarrhythmias but also mimics acute coronary syndrome, as both these conditions are relative contraindication for surgery. In our case, atropine was not used as our patient initially presented with complete heart block and TPI was planned excluding the other contraindications. The left vagus nerve stimulation is useful in the management of refractory epilepsy but this vagally mediated stimulation may be associated with conduction defects like AV block and recurrent syncope possibly due to hyper-responsiveness of AV node to vagotonic reflexes[6]. But in our case, complete heart block was not associated with syncope, and the only notable finding was bradycardia leading to complete heart block and hypotension. This is a rare case report of complete heart block successfully managed by a temporary cardiac pacemaker with acute cholecystitis. Lau *et al.*[7] reported Cope's sign in a patient with acalculous cholecystitis as this patient had persistent bradycardia and pauses despite the absence of pain and fever after antibiotic treatment. If any patient with features of complete heart block or any symptomatic bradycardia associated with abdominal pain, always think of cholecystitis as this may be associated with either presence or absence of gall stones due to cardio biliary reflex. TPI is always a choice for symptomatic bradycardia but in cholecystitis, pain relief is the key to the management of bradyarrhythmias. Hence consideration for permanent pacemaker should be considered after treating underlying cause.

Conflict of interest statement

The authors report no conflict of interest.

Authors' contributions

N.K.: Manuscript writing, proof reading, and final drafting; P.K.: Case management; P.K.D.: Final drafting; A.K.: Manuscript writing and proof reading; A.K.: Manuscript writing.

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