Case Report

Dynamic ECG Changes Mimicking ST Elevation Myocardial Infarction in a Patient with Acute Calculous Cholecystitis: A Case Report

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Abstract

Introduction: It is well known that acute cholecystitis can sometimes mimic coronary ischemia with similar pattern of chest pain and ST segment changes and T-wave inversions in ECG. However, dynamic ECG changes which are highly suggestive of coronary ischemia, in a patient of acute calculous cholecystitis is a rare phenomenon. A normal coronary angiogram established that the peculiar ECG changes in this particular patient was attributable to the acute abdominal pathology.

Case presentation: A 45 year old Indian lady with chief complaints of chest and upper abdominal pain associated with giddiness of four days duration was diagnosed to have acute calculous cholecystitis on abdominal ultrasound. Her serial ECG’s showed dynamic changes (initial bradycardia, PR prolongation followed by ST segment elevation in inferior leads) which was indicative of cardiac ischemia. This prompted us to subject the patient to a coronary angiogram which was normal. Repeat abdominal ultrasound and MRI supported the diagnosis of acute calculous cholecystitis. Our patient subsequently underwent successful laparoscopic cholecystectomy which led to complete resolution of her ECG changes. Although it is well known that ST segment changes in ECG may be associated with surgical conditions like acute cholecystitis, but such dynamic ECG changes which is usually indicative of cardiac ischemia, as was evident in our patient, is a rare phenomenon.

Conclusion: Physicians should be aware of transient or dynamic ECG changes in patients with acute cholecystitis. The symptoms of cholecystitis and acute coronary syndrome may be similar; therefore in abdominal pain patients especially with dynamic ECG changes as in this index case, acute coronary syndrome should be excluded.

ABBREVIATIONS

ECG: Electro Cardiogram; MRI: Magnetic Resonance Imaging; CK-MB: Creatine Kinase isoenzyme; CAG: Coronary Angiography; CAD: Coronary Artery Disease; STEMI: ST-Elevation Myocardial Infarction.

INTRODUCTION

Acute cholecystitis and biliary colic may have signs and symptoms similar to those of coronary ischemia. The ECG can have ST segment changes and T-wave inversions. Although chest pain with ST-segment elevation frequently indicates cardiac ischemia, it has also been reported with other gastrointestinal disorders like pancreatitis and gastric distension, apart from acute cholecystitis, [1] Appropriate surgical treatment could be delayed while a cardiac etiology is pursued, as in this patient. This was necessitated due to the rare presentation with dynamic ECG changes in our patient. Once again, this is a cause of a false-positive ECG.

CASE PRESENTATION

A 45 year old non-diabetic, non-hypertensive Indian lady without any history of heart disease presented to the local doctor with chief complaints of chest and upper abdominal pain associated with giddiness of four days duration. ECG revealed sinus bradycardia with PR prolongation (Figure 1) and
abdominal ultrasound was consistent with a diagnosis of acute calculous cholecystitis. She was referred to us because of her abnormal ECG findings to rule out any serious cardiac ailment. An ECG obtained a day later when she presented to our out patient department surprisingly showed ST segment elevation in inferior leads (Figure 2) and she continued to have chest discomfort. Transthoracic two dimensional echocardiogram was normal. Troponin and CK-MB were within normal limits. Hematological and biochemical investigation revealed an elevated total leucocytic count (14000/cu mm) with predominant neutrophils and normal blood sugar, amylase, renal parameters including electrolytes, liver and thyroid function tests. In view of the dynamic ECG changes (initial bradycardia, PR prolongation followed by ST segment elevation) and ongoing chest discomfort, she was taken up for coronary angiography (CAG) to rule out any underlying obstructive coronary artery disease (CAD) requiring urgent intervention. CAG revealed normal epicardial coronary arteries (Figure 3). Repeat abdominal ultrasound and MRI supported the diagnosis of acute calculous cholecystitis (Figure 4). Our patient subsequently underwent successful laparoscopic cholecystectomy which led to complete resolution of her ECG changes.

This case highlights the fact that despite presence of a definite pathology known to cause ECG changes, the unusual presentation with fluctuating ECG findings along with ST segment elevation which is highly suggestive of cardiac ischemia in association with symptoms of chest pain necessitated to subject the patient to invasive tests like coronary angiography to rule out serious underlying obstructive CAD which would otherwise have warranted appropriate interventional therapy. A normal coronary angiogram also helped to avoid unnecessary and potentially harmful treatment in such a clinical scenario such as fibrinolytic therapy, anticoagulation and aggressive antiplatelet therapy.

**DISCUSSION**

Acute cholecystitis is an acute abdominal condition, which can produce an ST segment elevation that mimics acute myocardial infarction. Other acute abdominal conditions that can present with similar ECG changes are acute pancreatitis and gastric dilatation [1]. The exact underlying pathophysiological mechanism of such ECG changes remains unclear. Gallbladder distension in animal models have found to increase plasma rennin activity which involved afferent vagal pathways and
efferent sympathetic mechanisms related to β-adrenergic receptors, contributing significantly to pressor and coronary vasoconstriction responses [2]. Studies in animal models have also suggested that distension of the gall bladder caused a reflex coronary vasoconstriction that involved efferent sympathetic mechanisms related to α - adrenoreceptors and afferent vagal pathways [3].

Sir Zachary Cope in 1970 noted reflex bradycardia in two patients with cholecystitis (“Cope’s sign”). Because chest pain and bradycardia were considered compatible with an impending inferior-wall myocardial infarction, he emphasized that the initial symptoms (central epigastric/retrosternal pain and arrhythmias) may simulate coronary artery disease [4].

There are previously reported cases of ST segment elevation attributed to cholecystitis in the medical literature [5-9]. Three of the previously reported patients underwent cardiac catheterization, all being normal. Two of the patients who had angiograms, had resolution of ECG changes after cholecystectomy, one patient who was investigated with cardiac catheterization had resolution with antibiotic therapy [10]. Our patient is rare because of the dynamic nature of ECG changes (initial bradycardia, PR prolongation followed by ST segment elevation) which is highly suggestive of cardiac ischemia. Therefore, despite the absence of any history of cardiac disease, negative cardiac enzymes and regional wall motion abnormalities on two dimensional transthoracic echocardiogram, a coronary angiogram was warranted to rule out obstructive coronary artery disease. Our patient also had complete resolution of her ECG changes after she underwent successful laparoscopic cholecystectomy. In another study of acute cholecystitis mimicking or accompanying cardiovascular disease among Japanese patients hospitalized in a Cardiology Department, among 5552 patients, 16 patients were diagnosed with acute cholecystitis during the hospitalization in the cardiology department and they concluded that although it is a rare condition, acute cholecystitis may coexist with or be misdiagnosed as a cardiovascular disorder. This possibility should not be overlooked in cardiac patients because a delay in treatment may result in critical complications [11].

Therefore, physicians should be aware of transient ECG changes in patients with acute cholecystitis. The symptoms of cholecystitis and acute coronary syndrome may be similar; therefore in abdominal pain patients especially with dynamic ECG changes as in this index case, acute coronary syndrome...
may need to be excluded. Acute cholecystitis as a cause of such ECG changes also should be kept in mind in patients with similar clinical presentation.

Also, a rapid and accurate diagnosis of acute ST-segment elevation myocardial infarction (STEMI) is of crucial importance as early initiation of primary percutaneous coronary intervention confers mortality benefit to such patients; however, normal coronary arteries have been reported in 2.6% of patients with suspected STEMI on acute diagnostic coronary angiography, [12] suggesting alternative diseases and conditions apart from coronary spasm or a recanalized infarct related artery.

Therefore, timely recognition of cholecystitis can ensure relevant treatment and may prevent the performance of unnecessary diagnostic and therapeutic interventions.

REFERENCES


Cite this article