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Case Report

A case of pheochromocytoma presenting with Takotsubo cardiomyopathy as the first symptom without hypertension

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Abstract: Pheochromocytoma is a rare neuroendocrine tumor that can causes serious metabolic and cardiovascular complications. Pheochromocytoma rarely presents with Takotsubo cardiomyopathy and uncontrolled angina as the initial symptom without concomitant hypertension. A 42-year-old man with heart failure, chest pain, high levels of cardiac markers, and uncontrolled angina without hypertension caused by pheochromocytoma was examined for this report. Symptoms of Takotsubo cardiomyopathy and uncontrolled angina were improved and a correct diagnosis of pheochromocytoma was achieved. The patient successfully underwent adrenalectomy with good outcomes. The patient has remained asymptomatic for 2 years after surgery. Concentrations of catecholamines should be tested in patients who have atypical presentation of Takotsubo cardiomyopathy, which may reveal an underlying pheochromocytoma.

Keywords: Angina, heart failure, pheochromocytoma, Takotsubo cardiomyopathy

Introduction

Takotsubo cardiomyopathy (TC), also referred to as stress cardiomyopathy (SC) or broken-heart syndrome, is characterized by stress-induced acute heart failure, ST segment and T wave changes on electrocardiography, and increased troponin levels. The condition was first reported by Sato et al. in 1990 [1]. A recent report described a case of pheochromocytoma-induced TC with concomitant hypertension [2]. It is difficult to make a diagnosis of pheochromocytoma based on clinical symptoms alone owing to the wide ranging systemic effects of increased levels of catecholamines produced by the tumor. Therefore, assessment of catecholamine levels is important for diagnosis of pheochromocytoma. Here is presented a case of pheochromocytoma that presented with Takotsubo cardiomyopathy as the first symptom without concomitant hypertension.

Case report

This case report was approved by the Institutional Review Board of the Hospital of Jilin University. Written informed consent for publication of the case report was from the patient.

A 42-year-old man was admitted to the emergency department with paroxysmal palpitations and chest pain associated with dyspnea and dizziness for 4 hours. The patient had a history of chest tightness for 2 years. He was a smoker for 10 years but there was no history of hypertension or diabetes. At admission, his body temperature was 36.5°C, respiratory rate was 20 breaths/min, pulse was 115 beats/min, and blood pressure was 155/90 mmHg. Electrocardiogram (ECG) showed sinus tachycardia with ST segment elevation in leads V1-V6 (**Figure 1**). Blood tests showed high levels of cardiac biomarkers [myoglobin >500 ng/mL (reference range: 0-107 ng/mL); troponin-T 8.15 ng/mL (reference range: 0-0.5 ng/mL); creatine kinase-MB 38.9 ng/mL (reference range: 0-4.3 ng/mL), and B-type natriuretic peptide (BNP) 529 pg/mL (reference range: 0-100 pg/mL)]. Owing to the initial impression of ST elevation myocardial infarction (STEMI), he was administered dual antiplatelet therapy with aspirin and clopi-

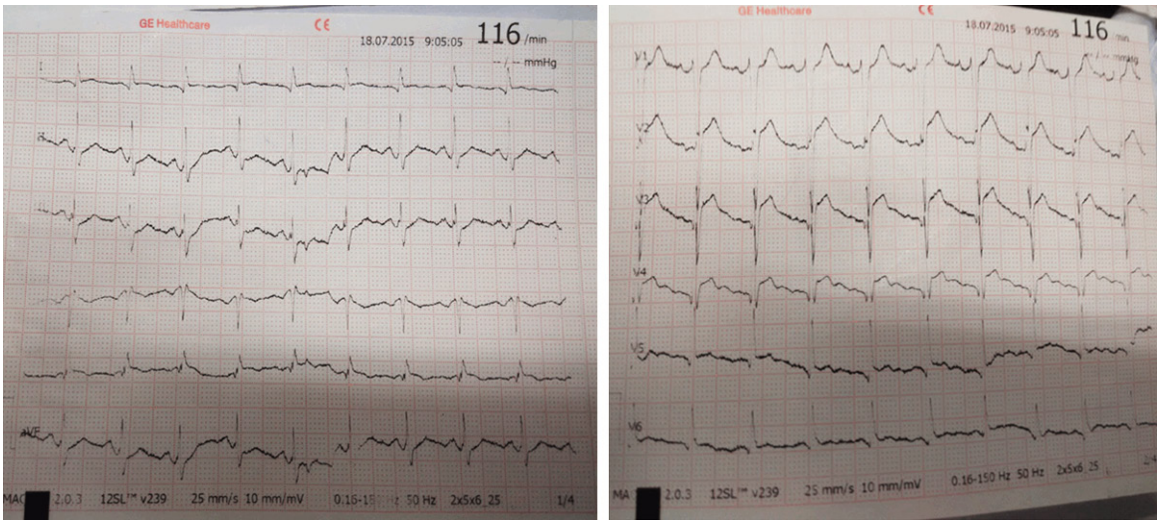

Figure 1. Emergency electrocardiogram showing ST segment elevation in V1-V6 leads (0.1-0.3 mv).

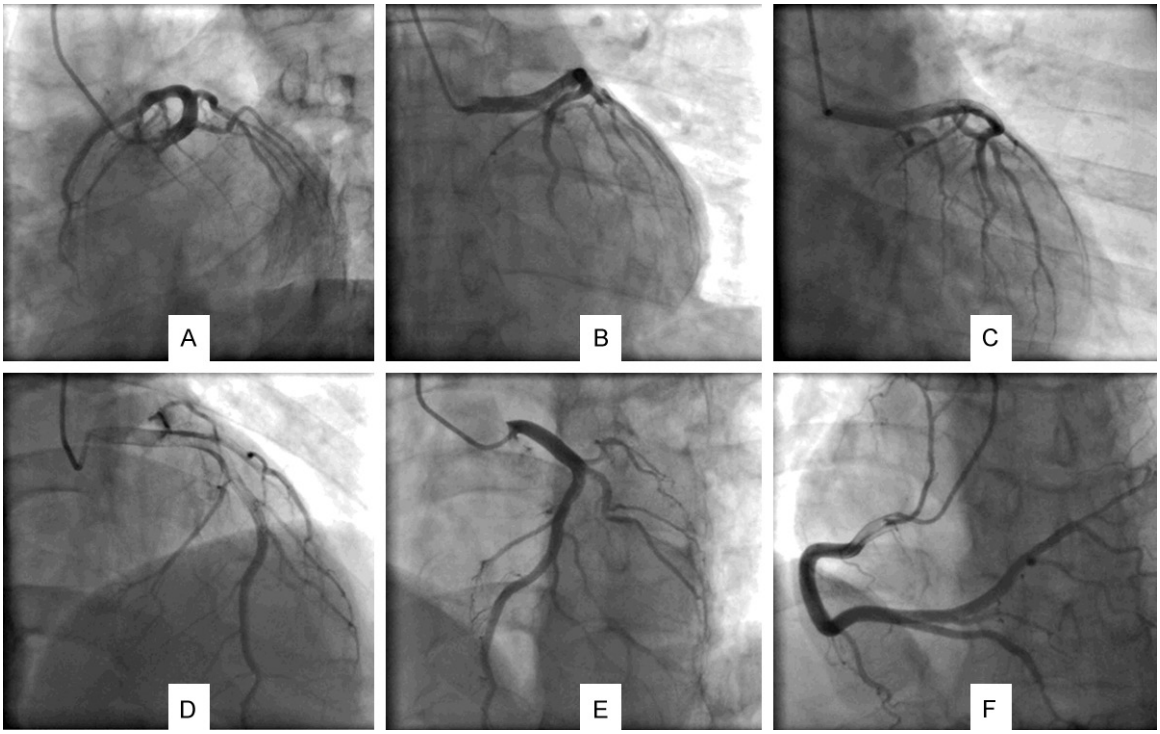

Figure 2. Coronary angiograms (A-F) showing no signs of coronary stenosis.

dogrel. Emergency coronary angiography showed no signs of coronary artery stenosis (**Figure 2**). Echocardiography revealed normal left ventricular (LV) end-diastolic diameter (52 mm), reduced contraction of apical wall with relatively preserved LV basal wall motion, and left ventricular ejection fraction (EF) of 59%. Based on chest pain, ST segment elevation in precordial leads, normal coronary angiogram, high level of cardiac biomarkers, and the reduced contraction of apical wall with relatively preserved LV basal wall motion in echocardiography, the patient was diagnosed as TC. However, the cause of TC was not clear. The symptoms of angina

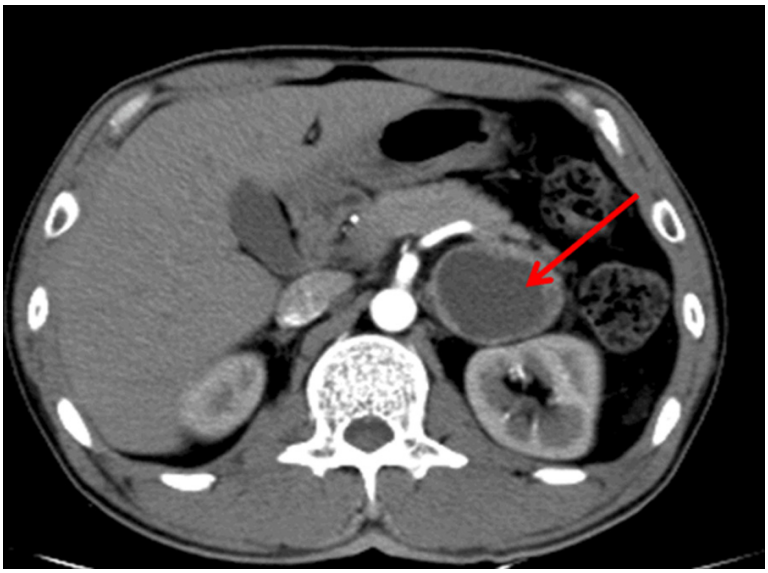

Figure 3. Contrast-enhanced CT of the adrenal gland showing a pathological mass (dimensions: 5.4×4.5×5.3 cm) with heterogeneous density in the left adrenal gland.

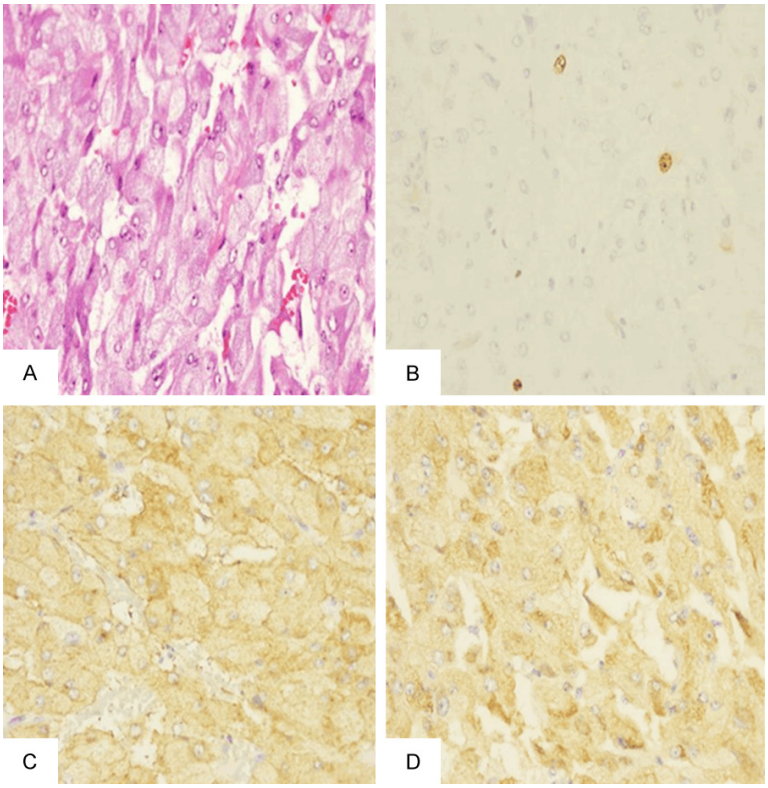

Figure 4. Microscopic appearance of the adrenal tumor. A. H&E-stained (40×) section of surgical specimen; B. Staining index of Ki-67 was 1%, which indicated a benign tumor; C. Synaptophysin positivity; D. Chromogranin A positivity; Chromogranin A and synaptophysin are neuroendocrine markers.

persisted after administration of isosorbide mononitrate. Since high level of catecholamines can induce TC and chest pain, the concentrations of serum catecholamines (epinephrine and norepinephrine) were assessed. The results showed high levels of epinephrine (471 pg/L, reference range: 0-100 pg/L) and norepinephrine (694.94 pg/L, reference range: 0-600 pg/L). Other serum hormone levels were normal (dopamine 65.67 pg/L, reference range: 0-100 pg/L; supine aldosterone 0.15 ng/L, reference range: 0.06-0.174 ng/L; upright aldosterone 0.16 ng/L, reference range: 0.065-0.296 ng/L; cortisol 229.46 nmol/L, reference range: 240-619 nmol/L). Contrast-enhanced computed tomography scan of the adrenal gland showed a mass (size: 5.4×4.5×5.3 cm) with heterogeneous density in the lateral branch of the left adrenal gland (**Figure 3**). The patient underwent left adrenalectomy and histopathological examination of surgical specimen confirmed pheochromocytoma (**Figure 4**). As of 2 years after hospital discharge, the patient has had no episodes of chest pain and follow-up CT shows no signs of recurrence in the adrenal gland.

Discussion

The patient presented with heart failure, uncontrolled angina, high levels of cardiac markers, reduced contraction of apical wall and no occluded coronary arteries. The initial diagnosis was TC. TC is characterized by a transient reduced contraction of apical wall, heart failure, no occlude coronary arteries induce by emotional stress. TC is most common in older and women [3]. However, the TC in this patient had some differences with the

common TC including that this patient had no emotional stress and was male. Recently it has been reported that pheochromocytoma also can present as TC and hypertension [2]. It need rule out pheochromocytoma if the patient with hypertension and TC. Because the classic symptoms of pheochromocytoma are hypertension, palpitations, sweating, tremor, and TC. It is rare for a patient to only present with pheochromocytoma only presented TC without hypertension. The investigation of catecholamine levels was important as it led to the correct diagnosis of pheochromocytoma, which secrete too much catecholamine induced coronary artery spasm due to uncontrolled angina. By the reason of the similar presentations of these diseases, diagnosis was difficult.

Pheochromocytoma is a rare neuroendocrine tumor that mainly occurs in the adrenal medulla, but may also occur in other parts of sympathetic nervous system, such as the sympathetic ganglion, carotid body, and chromaffin of the para-aortic system [4]. Secretion of catecholamines by pheochromocytoma may induce serious cardiovascular complications such as hypertension, TC, left ventricular hypertrophy, and heart failure [5]. Many patients present with clinical features similar to acute coronary syndrome (ACS). High levels of epinephrine and dopamine secreted by pheochromocytoma induce myocardial injury, myocyte necrosis and coronary arteries spasm. Pheochromocytoma-induced TC without concomitant hypertension is liable to delayed diagnosis or misdiagnosis because of the atypical presentation. This is because the pathophysiology of TC and pheochromocytoma-induced cardiomyopathy are both mediated by catecholamines [6].

Pheochromocytoma is often misdiagnosed. Cardiomyopathy induced by excess catecholamines has been ascertained in some cases of pheochromocytoma, and some cases of pheochromocytomas present as ACS [7]. In this patient, the correct diagnosis was established because of additional work-up owing to TC and uncontrolled angina during hospitalization. The case showed a complex clinical presentation: elevation of ST-segment, high levels of cardiac markers, left ventricular dysfunction, and uncontrolled angina. The features were consistent with Takotsubo cardiomyopathy and ACS. Concentrations of catecholamines should be tested in patients with atypical presentation of TC, which may reveal underlying pheochromocytoma.

Conclusion

This case presented with atypical Takotsubo cardiomyopathy and ACS without concomitant hypertension and was found to have pheochromocytoma. It is important to consider catecholamine-induced clinical presentation in such atypical cases at an early stage to reduce the risk of morbidity and mortality.

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Disclosure of conflict of interest

None.

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