Stress-induced cardiomyopathy following infection of the upper respiratory tract in an elderly female patient: A case report

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Abstract. Stress-induced cardiomyopathy (SIC), also known as takotsubo cardiomyopathy (TTC), is a relatively newly-described condition, which has been increasingly reported in the literature. It is characterized by acute onset of symptoms and electrocardiogram changes mimicking myocardial infarction, with transient but completely reversible left ventricular (LV) dysfunction. SIC commonly occurs following physical or emotional stress. The present study discusses the case of a 68-year-old female patient who had suffered from infection of the upper respiratory tract for 10 days before admission to the hospital with symptoms of chest stuffiness and dyspnea that persisted for 2 days. Coronary angiography showed normal coronary artery function, while LV angiography demonstrated systolic apical ballooning. Based on these observed characteristics, the patient was diagnosed with SIC and was successfully treated.

Introduction

Stress-induced cardiomyopathy (SIC), also known as takotsubo cardiomyopathy (TTC), is a type of nonischemic cardiomyopathy that has been described in recent decades (1). Cases of SIC are increasingly reported in the literature. This condition is characterized by acute onset of symptoms, such as chest pain and shortness of breath, and electrocardiogram (ECG) changes mimicking myocardial infarction (MI), with transient but completely reversible left ventricular (LV) dysfunction (2). SIC commonly occurs following physical or emotional stress (3). The prevalence of TTC in the USA is ~0.02% (4), and 90% of cases occur in women with an average age of onset between 58 and 75 years, and only 3% of cases occurring in women <50 years of age (5). The most common presenting symptoms include chest pain, shortness of breath and syncope. A number of patients present with signs and symptoms of heart failure, and up to 10% of patients may present with the signs and symptoms characteristic of cardiogenic shock (6). Although SIC generally has a good prognosis, intensive heart failure therapy is required for successful convalescence (7). The present study reports a rare case of SIC that resulted from an infection of the upper respiratory tract in an elderly female patient, with the aim to increase the understanding of the characteristics of SIC due to infection.

Case report

A 68-year-old female was admitted to The First Affiliated Hospital of Dalian Medical University (Dalian, China) in February 2015, with symptoms of chest stuffiness and dyspnea that persisted for 2 days. The patient did not suffer from hypertension, diabetes or chronic kidney disease, and did not have a history of smoking. Approximately 10 days prior to admission, the patient presented with fever, cough and expectoration, and was diagnosed with an infection of the upper respiratory tract. The patient's symptoms improved after receiving antibiotic and anti-inflammatory therapy with cefuroxime sodium (2.0 g per day, for 7 days). Upon physical examination, the body temperature of the patient was 36.4˚C, the blood pressure was 110/70 mmHg and the heart rate was 76 bpm. No rales were identified in the lungs upon auscultation. Written informed consent was obtained from the patient prior to publication of this study.

An ECG performed 10 days prior to admission appeared to be normal, and showed negative T-waves in the leads II, III, aVF and V3-V6 and QT-prolongation upon admission (Fig. 1). Continuous ECG recording between days 1 and 11 after admission demonstrated negative T-waves in the V3-V6 leads (Fig. 2). In addition, the troponin-I level increased to 1.66 g/l (normal value, <0.1 g/l) and the blood concentration of B-type natriuretic peptide (BNP) level was 776 pg/ml (normal value, <100 pg/ml).

Trans-thoracic echocardiography examination performed 3 days after admission revealed systolic dysfunction, as observed by the LV ejection fraction (LVEF) that was 43% (normal range, 50-70%), while apical dyskinesis and basal

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Figure 1. Electrocardiogram at (A) 10 days prior to admission, and (B) at admission, showing normal recording prior to admission, and negative T-waves in leads II, III, aVF and V3-V6 and QT-prolongation at admission.

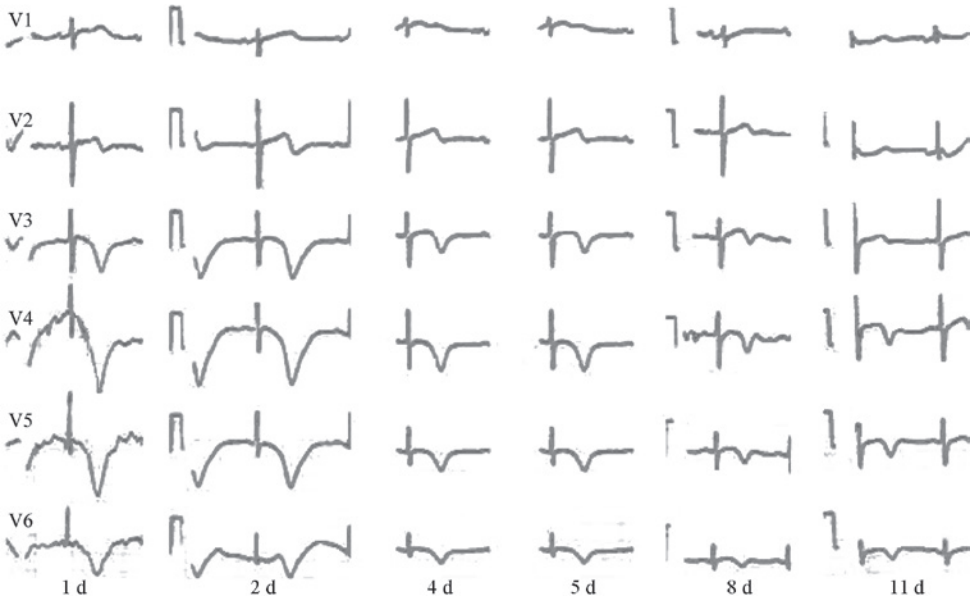

Figure 2. Continuous electrocardiography recording showed negative T-waves in V3-V6 leads.

hyperkinesis were also reported. These observations resembled apical ballooning, which is a typical characteristic of SIC. Prior to diagnosis, the patient was treated with aspirin (100 mg orally qd), clopidogrel (75 mg orally qd,), fondaparinux (2.5 mg by subcutaneous injection qd) and isosorbide dinitrate (20 mg by intravenous infusion qd) during the initial days after admission. After 2 days, coronary angiography was performed, which showed normal coronary arteries (Fig. 3A-C), followed by LV angiography, which confirmed LV apical ballooning (Fig. 3D and E). Due to the limited availability of instruments,

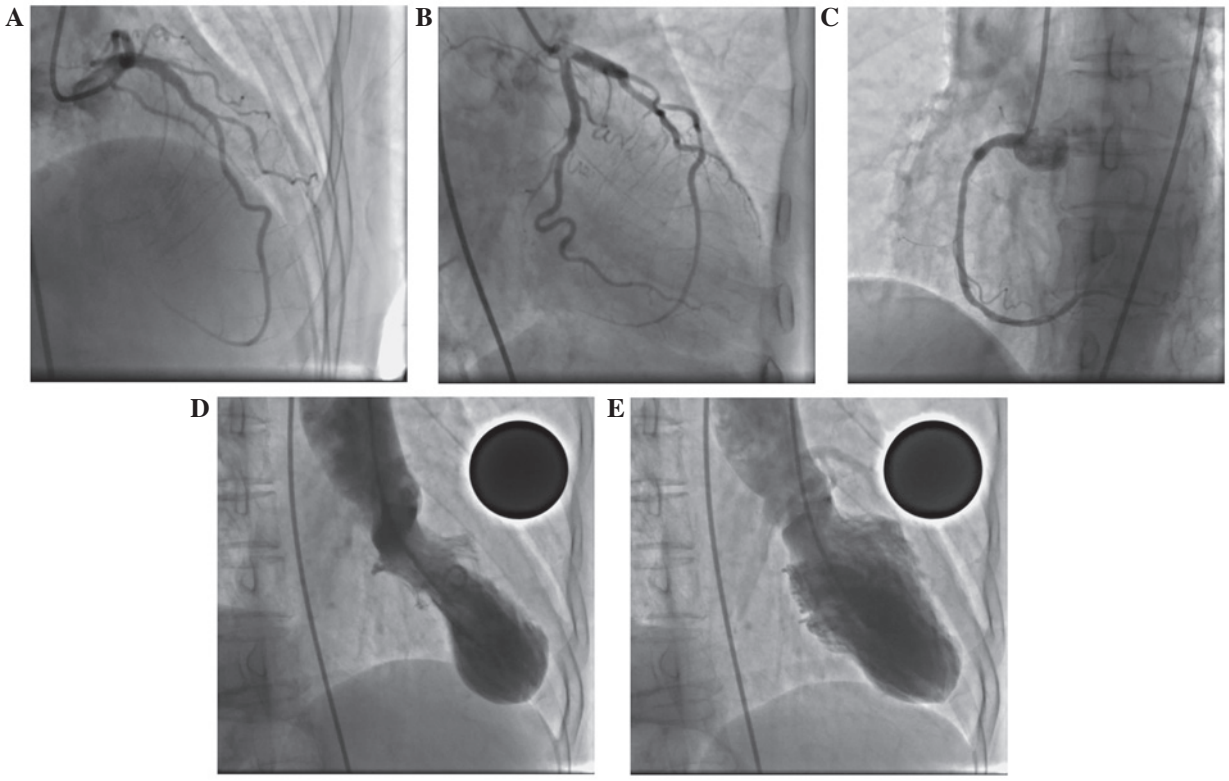

Figure 3. (A-C) Coronary angiography showed normal coronary arteries for the (A) left anterior descending branch, (B) left circumflex branch and (C) the right coronary artery. Left ventricular (D) systole and (E) diastole angiography showed systolic apical ballooning.

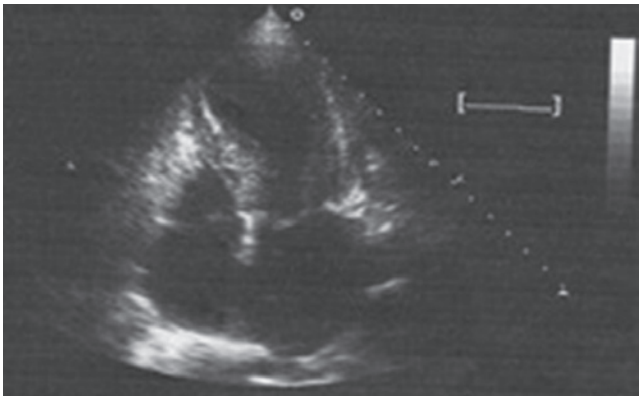

Figure 4. Echocardiography showed improved left ventricular motion subsequent to treatment for 1 week.

it was not possible to conduct a cardiac magnetic resonance imaging scan.

Based on the aforementioned characteristics, the patient was diagnosed with SIC. Medical treatment with furosemide (20 mg, oral twice daily), perindopril (2 mg, oral once daily) and metoprolol (25 mg, oral twice daily) was therefore administered. The patient gradually recovered and was discharged 11 days after admission, when echocardiography demonstrated an improvement in LVEF from 43 to 60% (Fig. 4). However, the ECG still showed negative T-waves in the leads II, III, aVF and V3-V6 on day 11 (Fig. 2). The patient was followed-up for a final time 3 months after discharge in February 2015, and presented a normal ECG and echocardiogram. Treatment with the above drugs was then stopped.

Discussion

SIC, also known as TTC, is a recently-described cause of reversible LV dysfunction, which commonly occurs following physical or emotional stress (8). A characteristic, non-coronary regional wall motion abnormality is typically observed in SIC patients. Although the mechanism of SIC remains unclear, sympathetic activity may serve a pathogenic role in SIC, which is characterized with excessive catecholamine release (a). Myocardial ischemia is also considered to be associated with SIC (b). Other common characteristics of SIC at the tissue level include myocardial edema as a sign of acute but reversible injury, as well as diffuse inflammation in the absence of significant necrosis or fibrosis (c). Furthermore, previous histological analyses of the heart in SIC patients demonstrated sparse foci of myocardial necrosis with contraction bands in the akinetic area (d). Initial reports of SIC cases described an association with psychological stress; however, further triggers were also identified in later studies (9).

Prior studies have linked SIC to various other conditions, including pulmonary infection (10), chronic obstructive pulmonary disease (11), antitumor drug administration (12) and even anaphylactic reaction (13). However, to the best of our knowledge, the present study is the first report of SIC associated with infection of the upper respiratory tract. The association of infection with SIC has not been previously reported in the literature, and the mechanism through which infection induced SIC remains unclear. It is possible that pathogenic microbes, such as bacteria or viruses, along with an inflammatory reaction induced sympathovagal imbalance towards adrenergic predominance. This hypothesis is consistent with the suggestion of a previous

study that increased catecholamine levels may be responsible for SIC (14). In addition, allergic reactions induced by upper respiratory tract infection may be involved in the occurrence of SIC, which may result in a delay between infection and SIC symptoms, as observed in the current patient.

In conclusion, the present study reported for the first time a rare case of SIC subsequent to an infection of the upper respiratory tract, observed in an elderly female patient. This case will help further the understanding of SIC.

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