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Case Report

Takotsubo cardiomyopathy or "broken heart syndrome" – A case report

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ABSTRACT

Introduction: Takotsubo cardiomyopathy (TTC) is an interesting syndrome and one of the essential elements of differential diagnosis of acute coronary syndromes. This disease entity is very rare and was first described in 1991.
Aim: The aim of this study is to present the disease entity of TCC, its diagnostic criteria and necessity for including it in the differential diagnosis of acute coronary syndromes.
Material and methods: Case report and analysis of a case of a 74-year-old patient with TTC.
Case study: Female patient, 74 years of age, was admitted to Cardiovascular Intensive Care Unit of Provincial Specialist Hospital in Olsztyn due to severe, acute chest pain that occurred after the death of her husband.
Results and discussion: TTC currently accounts for approximately 2% of initially diagnosed acute coronary syndromes. The etiology of TTC is not fully understood. Main clinical symptoms include severe, acute chest pain of sudden onset. Typically it occurs most frequently after a stressful situation, such as e.g. death of a loved one, serious surgical procedure or traffic accident. Characteristics also include changes in cardiac imaging studies (echocardiography) in the form of apical akinesis or hypokinesis, electrocardiographic abnormalities (ECG) presenting with ST-segment elevation in the anterior, lateral and inferior leads, as well as non-specific elevation of serum cardiac markers suggestive of myocardial injury. Coronary angiography does not reveal any coronary blockages. The proposed Mayo Clinic diagnostic criteria are useful for the diagnosis of the disease.
Conclusions: Similar clinical presentation and ECG changes indicate that this syndrome should be differentiated from ACS, particularly in atypical cases.

1. Introduction

Takotsubo cardiomyopathy (TTC) is also known as apical ballooning syndrome, stress-induced cardiomyopathy, ballooning cardiomyopathy and "broken heart syndrome."[7,11] This syndrome is a rare disease entity, with case reports found only in the literature.

The first case report of this syndrome was published in Japan by Sato et al. in 1990.[9] Name of the disease refers to end-systolic shape of the left ventricle (LV) observed on the

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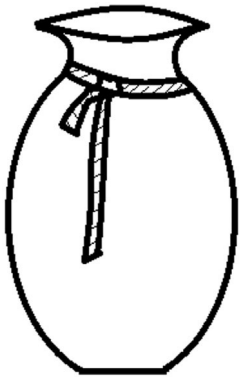

Fig. 1 – Pot used for trapping octopuses – takotsubo.

left ventriculogram. TTC is characterized by akinetic or dyskinetic apical or left mid-ventricular dilation with normokinesis or compensatory hyperkinesis of the basal segments of LV. The heart resembles a Japanese pot with a round bottom and a narrow neck used for trapping octopuses (takotsubo) (Fig. 1).

2. Aim

The aim of this study is to present a relatively new, interesting disease entity of TTC in the example of the following case, and draw attention to its prevalence, diagnostic criteria and necessity for differential diagnosis with acute coronary syndroms (ACS).

3. Material and methods

This article was prepared on the basis of physical examination, medical interview and laboratory and imaging findings of the patient hospitalized in Cardiovascular Intensive Care Unit of Provincial Specialist Hospital in Olsztyn.

4. Case study

Female patient, 74 years of age, was referred to Cardiovascular Intensive Care Unit of Provincial Specialist Hospital in Olsztyn from the district hospital with initial diagnosis of non-ST segment elevation myocardial infraction (NSTEMI). Medical history revealed sudden, severe, gripping chest pain, radiating to interscapular region, that occurred after a strong mental stress triggered by her husband's death. In addition, medical interview revealed type 2 diabetes, arterial hypertension, asthma, glaucoma, history of pulmonary embolism (3 years before). The patient was undergoing treatment for tuberculous lung mycobacteriosis.

Electrocardiogram (ECG) at the time of admission (Fig. 2) revealed a normal sinus rhythm, ST-segment depression in I, aVL, with ST-segment elevation in III, aVF, ST-segment

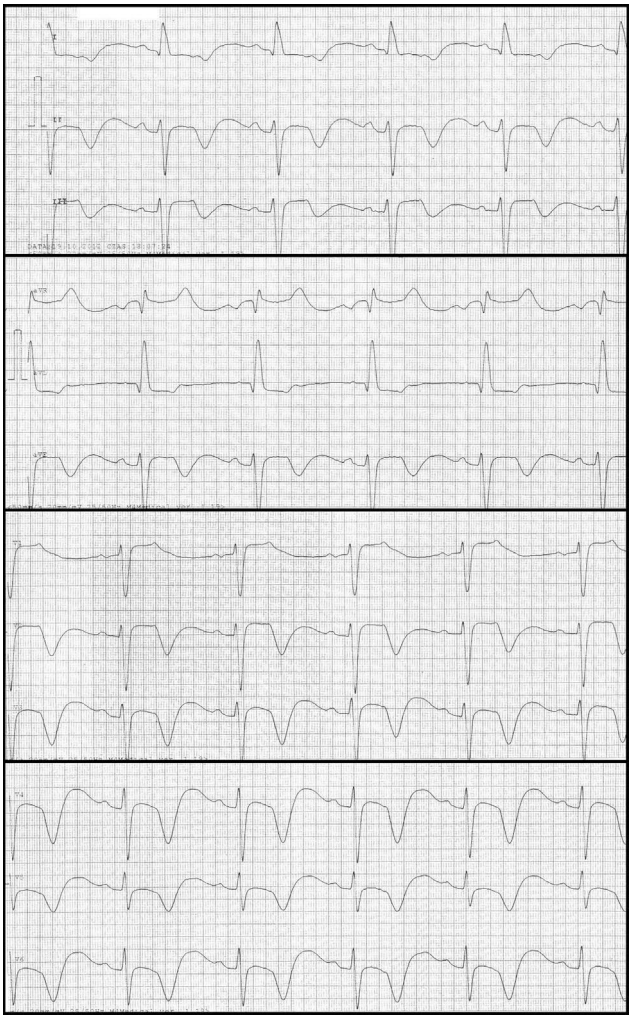

Fig. 2 – ECG obtained at patient's admission.

elevation in leads V1–V4 with inverted T-waves in all leads. Blood samples were collected to measure the serum concentration of troponin T (TnT). The patient was qualified for urgent coronary angiography.

Physical examination did not reveal any significant abnormalities.

Laboratory tests, including blood cell count, blood sugar, creatinine, urea, electrolytes, serum lipid profile, did not demonstrate any significant abnormalities. In addition, the activity of AlAT, AspAT, D-dimer levels, thyroid hormones, coagulogram did not exceed the normal range. Elevated markers of myocardial necrosis: TnT – 0.055 ng/mL (normal values <0.010 ng/mL; 0.010–0.100 ng/mL moderately elevated), CK-MB – 24 U/L (normal values 0–24 U/L), and increased plasma levels of NT-pro-BNP – 1647 pg/mL (normal values <125 pg/mL) were observed.

Transthoracic echocardiogram performed in the district hospital revealed apical akinesis. Ejection fraction was 45%. Coronary angiography on admission demonstrated that coronary arteries were patent, with no significant obstructive lesions and with good flow of contrast (Fig. 3).

During subsequent days of observation, the patient did not report any stenocardial symptoms. The patient was in a good general condition, physical examination showed regular heart

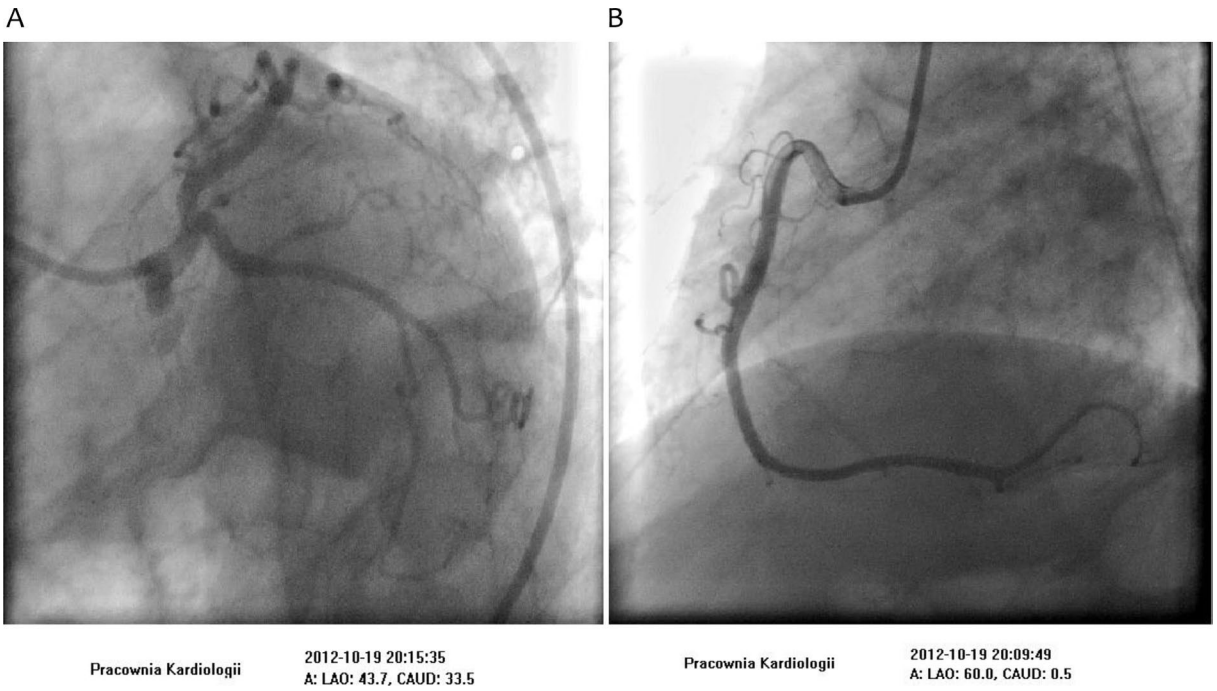

Fig. 3 – Patient's coronary angiogram at the time of admission: left coronary artery (A) and right coronary artery (B).

rate, approximately 72 beats/min, normal breath sounds, no congestion over the lungs in auscultation. In laboratory results no significant changes were observed compared to baseline, but TnT level decreased to 0.020 ng/mL.

Echocardiogram was done on the third day of hospitalization, which revealed apical-inferior and apical-lateral hypokinesis, undilated heart chambers, normal wall thickness, no major abnormalities in heart valves, pressure gradients across valves were normal, small degree of mitral and tricuspid regurgitation, no signs of fluid in pericardial cavity. Ejection fraction was 64%.

On the basis of clinical picture, ECG changes and echocardiographic wall motion abnormalities in the absence of coronary lesions, stress-induced cardiomyopathy was diagnosed – TTC.

On the fifth day of hospitalization the patient was discharged home in a good general condition, with no stenocardial symptoms, no signs of heart failure or arrhythmia.

5. Results and discussion

Typical presentation of TTC includes severe chest pain of sudden onset, accompanied by ECG changes, most frequently manifested by ST-segment elevation in anterior, lateral and inferior leads, with moderately elevated markers of myocardial injury.[1,2,3,4,5,6,7,8,11,12] All of these changes are in approximately 70% of cases caused by a strong mental stress, e.g. death or major illness of a family member, traffic accident, sudden job loss, major surgery, emergence from general anesthesia, severe pain.[11,12]

The prevalence of stress cardiomyopathy is unknown. In Japan it comprises 1%–2% of cases of hospital admissions of patients with chest pain and ECG changes; in the U.S., on the other hand, 2.0%–2.2% of such admissions have been noted.[4] A close predilection of stress cardiomyopathy for postmenopausal women has been observed.[4,6] Available literature data demonstrate that the average age of onset is in the range of 68 ± 12 years,[12] although there was a case report of the disease in a 2-year-old girl.[10] The cause of higher prevalence of TTC among women remains unclear, but low postmenopausal estrogen levels seem to play a role in pathogenesis of this syndrome.[4] TTC concomitant diseases often include arterial hypertension (43%), dyslipidemia (25%), smoking habit (23%) and diabetes (11%).[8,11,12]

Pathophysiology of this syndrome is not fully understood. Since the presence of TTC is preceded by a strong psychological stress, it is believed that catecholamines play an important role in the pathogenesis of this syndrome. To confirm this theory, Wittstein et al. investigated the blood catecholamine levels in patients with TTC and patients with Killip class III acute myocardial infarction. They found that concentration of studied amines was 2–3 times higher in subjects with apical ballooning syndrome. Such high catecholamine levels could result in myocardial ischemia due to epicardial coronary artery spasm.[13]

A theory of anatomical variant, including long course of the left anterior descending coronary artery, is also considered. Involvement of unstable eccentric atherosclerotic plaques detected by intracoronary ultrasound, which may not be detected by angiography, is also taken into account.[4,6,7]

The proposed Mayo Clinic diagnostic criteria are useful for the diagnosis of the disease (all of the following criteria should be met):

- transient apical akinesis in the left ventricular mid segments, that extend beyond a single epicardial vascular distribution,

– the absence of obstructive coronary disease or angiographic evidence of acute plaque rupture,
– new ECG abnormalities: ST-segment elevation or T-wave inversion,
– the absence of recent head injury, intracranial hemorrhage, pheochromocytoma, hypertrophic cardiomyopathy and myocarditis.[2]

Management of TTC consists of symptomatic treatment. It includes administration of acetylsalicylic acid, nitrates, low molecular weight heparins, beta-blockers, angiotensin convertase inhibitors, calcium channel antagonists, diuretics.[4,8]

6. Conclusions

In the presented case, all four of the proposed Mayo Clinic diagnostic criteria were met. Chest pain occurred on the day of a funeral of the patient's husband, with whom she had a strong emotional relationship. Coronary angiography did not reveal coronary obstruction, which allowed to exclude acute coronary syndrome. Echocardiography confirmed apical dyskinesis, most characteristic of stress cardiomyopathy. Recommended treatment was applied, which resulted in clinical improvement and symptoms resolution.

Similar clinical picture and ECG changes indicate the need for differential diagnosis with acute coronary syndrome, particularly of atypical course.

Conflict of interest

None declared.

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