Takotsubo cardiomyopathy and endocrine disorders

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Takotsubo cardiomyopathy (TTC) is a reversible cardiomyopathy induced by severe emotional stress or severe clinical conditions (1). It is also defined as “stress cardiomyopathy”. Takotsubo cardiomyopathy represents an uncommon clinical condition characterized by a clinical picture similar to that of acute myocardial infarction (2), but with no angiographical evidence of coronary vascular damage. It involves 1.7% to 2.2% of patients with suspected acute coronary syndrome (3).

Pathogenesis

The pathophysiology of TTC is not established but is likely multifactorial, involving the vascular, endocrine, and central nervous systems. Several mechanisms have been postulated to link the sympathetic hyperactivity and myocardial dysfunction including diffuse coronary artery spasm, coronary microcirculation alterations, and direct catecholamine mediated myocyte injury (4).

Prospectively showed that the most common pattern was

- Apical type (81.7%)
- Midventricular type (14.6%)
- Basal type (2.2%)
- Focal type (1.5%)

Clinical manifestations

In the acute phase, TTC is sometimes indistinguishable from acute myocardial infarction with respect to clinical symptoms, ECG changes, and cardiac biomarkers such as troponin and creatine kinase. Fast and accurate diagnosis on admission remains challenging, and exclusion of significant obstructive coronary artery disease is mandatory

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Several endocrine abnormalities may be associated with TTC. Takotsubo cardiomyopathy was more likely in the presence of thyroid (43.4%) or pituitary dysfunction (24.5%) and less likely in association with adrenal, pancreatic, and polyendocrine diseases (5).

Endocrine organ dysfunction associated with TTC

Endocrine organ	No. of cases (%)
Thyroid	23 (43.4%)
Hypothyroidism	2 (3.8%)
Hyperthyroidism	21 (39.6%)
Hypophysis	13 (24.5%)
Adenohypophysis	10 (18.9%)
Neurohypophysis	3 (5.6%)
Pancreas, endocrine	2 (3.8%)
Adrenal glands	7 (13.2%)
Polyendocrine syndromes	2 (3.8%)
Drugs with endocrine effects	6 (11.3%)

Thyroid disorder

Hyperthyroidism can also induce coronary vasospasm, especially in postmenopausal women, although prognosis is usually benign after treatment of endocrine disorder (6).

Hypothyroidism is associated with increased CV risk, via the reduction of systolic and diastolic ventricular function, increased peripheral resistance, and risk of atherosclerosis and coronary events (7).

Hypothalamic-pituitary-adrenal axis dysfunction

Lack of adrenocortical hormone induces adrenal deficit, with consequent reduction of glucocorticoid-mediated cardioprotective effect (8) and also associated with hypoglycemia and hyponatremia. Glucose has a protective effect on the myocardium, and hypoglycemia produces activation of the sympathetic nervous system (9). Pathophysiological mechanisms of hyponatremia to myocardial injury may depend on functional alteration of the pumps Ca++/Na+, and altered ionic concentrations contribute to inotropic state, systolic dysfunction, and arrhythmogenesis (10).

Gonadotropin releasing hormone deficiency

TTC is considered a typical postmenopausal disease after intense emotional stress. The role of alterations of sexual hormones in postmenopausal women is still a matter of debate. Estrogens have a protective effect on the heart during stress conditions by inhibition of vagal heart control and calcium-potassium modulation (11).

Androgens may downregulate the stress response and may present direct vasodilator effects on coronary arteries and low testosterone predicts the development of atherosclerosis and cardiovascular events (12).

Antidiuretic hormone (ADH)

Hyperosmolarity is associated with myocardial cellular dehydration, consequent increase of intracellular calcium concentration and cyclic adenosine monophosphate–mediated intracellular calcium,

production of oxygen free radicals, inhibition of Na+/K+ pump activity, and intracellular alkalosis (13). On the others hand clinical conditions characterized by inappropriate secretion of antidiuretic hormone may associate with TTC due to hyponatremia

Treatment

Therapeutical approach is based on supportive therapy associated with specific hormonal deficiency treatment.

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