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CLINICAL RESEARCH

A single pathophysiological pathway in Takotsubo cardiomyopathy: Catecholaminergic stress



Une seule voie physiopathologique à la cardiomyopathie de Takotsubo : le stress catécholaminergique

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Summary

Background. – Takotsubo cardiomyopathy (TTC) continues to be under-diagnosed, due to its varying presentation, with potentially serious consequences if treatment is delayed.

Aims. – To demonstrate the consistent involvement of catecholaminergic stress in TTC, regardless of the trigger.

Methods. – Between 01 July 2009 and 31 August 2013, patients managed in our centre for thoracic pain syndrome, with or without troponin release, were followed up prospectively.

Abbreviations: β +, β 2-mimetic intoxication; CK, creatine kinase; LV, left ventricular; LVEF, left ventricular ejection fraction; PCPG, pheochromocytoma/paraganglioma; TTC, Takotsubo cardiomyopathy.

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TTC was diagnosed from the apical ballooning seen on left ventricular imaging (angiography or transthoracic echocardiography) in the absence of a significant coronary artery lesion. Triggers (emotional trauma, surgical stress and β_2 -mimetic intoxication) were recorded; catecholamine-secreting tumours were screened for with a urinary methoxylate-derivative assay.

Results. – TTC was diagnosed in 40 out of 2754 (1.5%) patients with thoracic pain syndrome, with or without troponin release. Triggers were emotional trauma ($n=29$, 72.5%), surgical stress ($n=5$, 12.5%), adrenergic intoxication ($n=3$, 7.5%) and catecholaminergic tumour ($n=3$, 7.5%). Mean left ventricular ejection fraction at admission was $38.0 \pm 15.7\%$. Eight (20%) patients initially showed cardiogenic shock. In-hospital mortality was 7.5%, with no deaths from cardiogenic causes. Thirty-five (94.6%) of the survivors had recovered a normal left ventricular ejection fraction ($> 55\%$) by discharge.

Conclusion. – Whatever the trigger, the common denominator in TTC is catecholaminergic stress. Classically suggested after emotional trauma, TTC may also be induced by surgical stress or endogenous or iatrogenic β_2 -mimetic intoxication. The various contexts all have a similarly excellent cardiovascular prognosis if treated early.

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MOTS CLÉS

Takot-subo cardiomyopathie ;
Phéochromocytome ;
Catécholamine

Résumé

Contexte. – La cardiomyopathie de Takotsubo (CTT) est sous-diagnostiquée ou tardivement du fait des différents types de présentation pouvant conduire à des conséquences potentiellement léthales.

Objectif. – Mettre en évidence qu'un stress catécholaminergique est l'unique voie physiopathologique des CTT.

Méthodes. – Les patients hospitalisés en unité de soins intensifs pour douleur thoracique avec ou sans libération de troponine entre le 1^{er} juillet 2009 et le 31 août 2013 ont été suivis. Le diagnostic de CTT était porté devant l'aspect de ballonnisation apical (ou médian/basal) du ventricule gauche en l'absence de lésion coronaire. Les facteurs déclenchants étaient identifiés (stress psychologique, contexte péri-opératoire, intoxication bêta-2 mimétique). La présence d'une tumeur catécholaminergique était recherchée par dosage des dérivés méthoxylés urinaires.

Résultats. – Le diagnostic de CTT a été porté chez 40 patients pris en charge pour douleur thoracique avec ou sans libération de troponine (40/2754, 1,5%). Les facteurs déclenchants retrouvés étaient : stress psychologique ($n=29$, 72,5%) ; péri-opératoire ($n=5$, 12,5%) ; intoxication bêta-mimétique ($n=3$, 7,5%) ; et tumeur sécrétante ($n=3$, 7,5%). La fraction d'éjection moyenne ventriculaire gauche (FEVG) à la prise en charge était de $38,0 \pm 15,7\%$. La mortalité intra-hospitalière était de 7,5%. Trente-cinq survivants (94,6%) avaient retrouvé une fonction ventriculaire normale à la sortie d'hospitalisation.

Conclusions. – Peu importe le mécanisme, la décharge catécholaminergique est l'unique voie physiopathologique de la CTT. Le stress psychologique est la description la plus classique mais il est primordial d'évoquer ce diagnostic en cas de dysfonction ventriculaire gauche aiguë dans un contexte péri-opératoire, d'intoxication au beta-mimétique et de rechercher la présence d'une tumeur sécrétante de catécholamines.

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Background

Takotsubo cardiomyopathy (TTC) is a rare, but potentially severe, disease [1,2] that was first defined in 1990 [3]. Several retrospective studies have estimated that 0.7–4.9% of patients presenting with suspected acute coronary syndrome have TTC [4], and its incidence is estimated to be 29.8 per 1,000,000 inhabitants in a global population [4,5]. Classically, diagnosis is considered in cases of emotional trauma [3].

The clinical presentation of TTC may mimic acute coronary syndrome, generally involving chest pain, new electrocardiographical abnormalities and biological abnormalities

(release of troponin and creatine kinase [CK]) [6]. Imaging (transthoracic echocardiography, left ventricular [LV] angiography or cardiac magnetic resonance imaging) shows transient LV dysfunction; the regional wall motion abnormalities extend beyond a single epicardial vascular distribution (apical ballooning with an octopus trap [Japanese: takotsubo] pattern). Coronary angiography rules out significant coronary artery stenosis [6] and normal LV systolic function is usually recovered within a few weeks [7,8].

The pathophysiology of TTC remains controversial. Epicardial coronary spasm [9–11], atheromatous plaque rupture [12], myocarditis [13] or infarction with healthy coronaries [14] have been suggested, but are now dismissed

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