Emotional personality vulnerability for Tako-tsubo cardiomyopathy with consecutive stressful events? A clinical case report

A. Compare1, D. Del Forno2, F. Giallauria2, A. Vitelli2, A. Grieco2, C. Vigorito2


Introduction: Although the onset of Takotsubo cardiomyopathy (TTC) can be triggered by an acute, intense emotional stress, the exact pathogenic mechanisms still remain undefined.

Presentation: An adult female (58ys) was brought to the emergency department with chest pain that radiated to the jaw and left upper limb started 4 hours before. Transthoracic echocardiogram showed severe systolic dysfunction with an ejection fraction of 20% and akinetic apex along with the distal left ventricular segments, consistent with Takotsubo cardiomyopathy. Myocardial contrast echocardiography showed a decrease in capillary blood flow and volume in the akinetic areas with delayed contrast replenishment, sparing the basal segments. Coronary angiography revealed normal arteries without any stenosis or obstruction. The patient required vasopressor and inotropic support for 4 days. Repeat echocardiography 4 days later demonstrated complete resolution of regional systolic dysfunction. A repeat echocardiogram, a month later revealed an ejection fraction of 45% with no identifiable wall motion abnormality. Four hours before symptom onset emotional trigger was identified be domestic argument by Paykel Life Stress Event Scale. Anamnesis history showed a major life stress event, death of a loved one, six months before symptoms. The patient underwent psychological assessment after hospital discharge by Emotional Regulation Questionnaire and BDI showing high suppression/ low reappraisal profile and moderate depression.

Conclusion: This case highlight hypothesis on a possible link between cognitive emotional processing and vulnerability to Takotsubo syndrome reaction.

Keywords: Takotsubo cardiomyopathy, personality traits, stressful event, emotional regulation, emotional trigger.

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1 University of Bergamo.
2 Department of Clinical Medicine, Cardiological and Immunological Science, University of Naples Federico II.

Corresponding author: Prof. Angelo Compare; Corso di Laurea in Psicologia; Università di Bergamo; P.le S. Agostino, 2; I-24129 Bergamo, Italy; Fax: +39 0352052916; Mobile: +39 328 3616304; E-mail address: angelo.compare@unibg.it

Introduction

The main features of Takotsubo cardiomyopathy (TTC) are transient apical left ventricular dysfunction that mimics myocardial infarction, but in the absence of significant coronary artery disease. The onset of TTC can be triggered by an acute, intense emotional stress [1-5], but the exact pathogenic mechanisms linking emotional stress to TTC still remain undefined [6, 7]. It is recognized that not all individuals are equally susceptible to stress-mediated cardiovascular events. Although has been previously reported a high prevalence of mood disorders in patient with TTC [8-13], however, studies specifically focused on analysing personality traits in TTC are still lacking.

Case report

An adult female (58ys) was brought to the emergency department of Sant’Andrea Hospital of Vercelli in 2010 with chest pain that radiated to the jaw and
evidence of acute anterior myocardial infarction, an urgent coronary angiogram was performed which revealed normal arteries without any stenosis or obstruction. A previous upper endoscopy revealed no abnormality and there was no family history of heart disease or sudden death. Apical ballooning and basal hyperkinesis was present at left ventriculography. A diagnosis of ‘transient left ventricular apical ballooning’ or ‘takotsubo cardiomyopathy’ was made, thus, therapy with IIb-IIIa inhibithiors was stopped at the re-entry in the ICCU. Due to persistent hypotension and clinical sign of incipient congestive heart failure, it was decide to proceed to intra-aortic balloon (IAB) counterpulsation and β-blockers per os was started.

The next day, patients was completely asymptomatic, ECG and blood pressure normalize and IAB was removed. Repeat echocardiography 4 days later demonstrated complete resolution of regional systolic dysfunction. The patient improved with medical management. A repeat echocardiogram, a month later revealed an ejection fraction of 45% with no identifiable wall motion abnormality.

Emotional trigger event before symptom onset were identified using Paykel Life Stress Event Scale [14] at acute phase. Four hours before symptom onset emotional trigger, was an domestic argument. But anamnesis history showed a major life stress event, death of a loved one, six months before (Table 1). The patient underwent psychological assessment after hospital discharge by Emotional Regulation Questionnaire showing high suppression/low reappraisal profile.
Depression and Emotional personality was assessed 2 week after the onset symptoms by Beck Depression Inventory (BDI) [15] and Emotion Regulation Questionnaire (ERQ) [16]. ERQ is a ten items (1-7 likert scale) measure of the habitual use expressive suppression (5-items) and cognitive reappraisal (5-items). Emotional Appraisal: Antecedent-focused regulation, in which intervention occurs early and is focused on altering the effect of emotion-generating cues [17]. This strategy modulates emotional response tendencies early on, before they give rise to full-fledged responses [18]. Cognitive reappraisal is an antecedent-focused strategy and involves construing a potentially emotion-elicitating situation in a way that changes its emotional impact. Emotional Suppression: Response-focused regulation, which acts late in the process and is focused on altering emotional output (e.g., action and expression) [17]. This strategy modulates the emotional responses themselves later on, once they have arisen. Expressive suppression is a response-focused strategy and refers to the inhibition of external cues to one’s internal emotional state (e.g., facial expression, verbal utterances, gestures). It is a form of response modulation that involves inhibiting ongoing emotion-expressive behavior, typically with little or no change in ongoing emotion experience, and increased sympathetic activation of the cardiovascular system [19-21].

Table 2. - Emotion regulation Questionnaire Profile

<table>
<thead>
<tr>
<th>Emotional Personality</th>
<th>Score</th>
<th>Cut-off</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suppression</td>
<td>30</td>
<td>20</td>
<td>5-35</td>
</tr>
<tr>
<td>Reappraisal</td>
<td>9</td>
<td>20</td>
<td>5-35</td>
</tr>
<tr>
<td>BDI</td>
<td>48</td>
<td>29</td>
<td>0-63</td>
</tr>
</tbody>
</table>

BDI= Beck Depression Inventory; *moderate depression

Patient showed an high level in suppression style (score=30) and a low level in reappraisal style (score=9) and moderate depression symptoms (score=49) (Table 2).

Discussion

The results of the present single case they induce to hypothesize as emotional regulation personality based on suppression may be a potential vulnerable condition of Takotsubo reaction after emotional stressful event. Besides inappropriate or ineffective emotion regulation is emerging as a critical component in the development and maintenance of depression disorder [22-27]. The present case report data reinforce recent findings revealing a high prevalence of depression [8, 28] in TTC patients preceding the onset of the acute cardiomyopathy. This is consistent with that data showing as individuals with depression have decreased vagal tone and an increased adrenomedullary hormonal response to stressful events [29] and appear to have very high noradrenaline spillover [30]. Suppression is associated with decreases in facial behavior and body movement and an increase in sympathetic activation of the cardiovascular system [19]. The Expressive Suppression strategy comes relatively late in the emotion-generative process, and primarily modifies the behavioral aspect of the emotion response tendencies. Suppression should thus be effective in decreasing the behavioral expression of negative emotion, but might have the unintended side effect of also clamping down on the expression of positive emotion [31]. At the same time, suppression will not be helpful in reducing the experience of negative emotion, which is not directly targeted by suppression and may thus continue to linger and accumulate unresolved. It requires the individual to effortfully manage emotion response tendencies as they continually arise. Moreover, suppression creates in the individual a sense of incongruence, or discrepancy, between inner experience and outer expression. Investigations of inhibitory control in human and non-human primates, however, suggest that the right ventrolateral prefrontal cortex is associated with volitional response inhibition [32-39]. Over the long term, frequent use of expressive suppression results in diminished control of emotion and greater depressive symptomatology [16].

It is possible to hypothesize that the elevated level of suppression has contributed to the maintenance of the depressive symptom after the first major traumatic (death of a loved one), favoring the vulnerability to TTC by decreasing vagal tone and increasing adrenomedullary hormonal response to stressful events and noradrenaline spillover.

This case report evidence is consistent with others available affirming the pathophysiological importance of extreme sympathetic nervous system activation in TTC, suggesting that endothelial dysfunction is involved in mechanisms beyond high catecholamine levels [40]. Based on our results, it is reasonable to hypothesize that the origin of sympathetic hyperreactivity may be associated with specific personality emotional traits associate to high suppression. Thus, emotional regulation profile can be conceptualized as contributing to individual differences in cardiovascular reactivity to stress through sympathetic outflow to the heart, with cardiac noradrenaline spillover potentially achieving very high values [41].

Conclusion

This case highlight the possible link between Emotional Regulation personality and TTC reaction. This implies that the risk of an event may depend not only on the individual’s cardiovascular vulnerability following stress exposure, but also on his or her coping mechanisms. The results suggest to analyze by well designed prospective case control studies if personality traits may be considered as markers of risk and routinely screened, in the secondary prevention of TTC patients. However this data suggest a personality vulnerable profile, based on cog-
nitive style to process the emotions, that, by the link with depression symptoms, can make susceptible to physiological processes (e.g. heart rate, hormonal, or other physiological reactions), typical of TTC, after traumatic trigger. This implies that the risk of an event may depend not only on the individual’s cardiovascular vulnerability following stress exposure, but also on his or her coping mechanisms. Findings of future researches will allow to establish pathophysiological constructs, and develop and test associated diagnostic and treatment models, so that these patients can be identified and appropriately treated.

ABBREVIATIONS LIST:

Takotsubo cardiomyopathy (TTC)
Paykel Life Stress Events Scale (PLSE)
Emotional Regulation Questionnaire (ERQ)
Intensive coronary care unit (ICCU)
Intra-aortic balloon (IAB)
Beck Depression Inventory (BDI)

References


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