Contractile pattern of inverted Takotsubo cardiomyopathy: illustration by two-dimensional strain

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We report a case of a 25-year-old man who was admitted to our emergency department for brain trauma, with electrocardiographic and echocardiographic features suggestive of inverted Takotsubo cardiomyopathy. Using myocardial strain obtained from bidimensional acquisitions, we describe the myocardial abnormalities in this patient presenting with this yet under-recognized syndrome.

**KEYWORDS**
Inverted Takotsubo; 2D strain imaging; Echocardiography

A 25-year-old man without any cardiovascular risk factor was admitted to our emergency department after a car accident. He presented with impaired consciousness. Blood pressure, heart rate, and temperature were 170/100 mmHg, 90 b.p.m., and 36.5°C, respectively. Physical examination did not reveal any sign of cardiac congestion. Brain CT scan showed subarachnoid haemorrhage. Diffuse T-wave inversion with QT prolongation was found on EKG. Cardiac troponin I was slightly elevated (1.6 μg/L, normal ≤0.1 μg/L). Echocardiogram revealed severe LV systolic dysfunction (LVEF 20%), no LV enlargement, and mild functional MR. The left ventricle was visually completely akinetic except at the apex (Supplementary data, Loop 1). Two-dimensional strain analysis (General Electrics®, Echo PAC, Norway) obtained from apical views demonstrated a decrease in longitudinal strain at the basal and at the mid portions of the left ventricle, whereas longitudinal strain was spared at the apex (Supplementary data, Loop 2, Figure 1A). Transverse strain was diminished in all segments (Figure 1B). Both time to peak longitudinal and transverse strain decreased from base to apex, with marked postsystolic shortening and thickening at the base and the mid-ventricular portion of the myocardium (Figure 1A and B, white arrows). Of note, dyskinesia (systolic expansion and thinning) was predominant in basal segments in comparison with mid segments, suggesting that post-systolic shortening may be related to passive recoil. The patient died 2 days later despite intensive care.

Transient apical ballooning has been first reported in 1991 by Dote et al.1 New variants of stress cardiomyopathy such as inverted Takotsubo and midventricular ballooning syndrome have recently been described in various settings such as acute cerebral disorders (e.g., multiple sclerosis exacerbation), pheochromocytoma, or incomplete epidural anaesthesia for childbirth.2–6 However, these syndromes are often misdiagnosed as acute myocardial infarction. Regional wall motion abnormalities extend beyond epicardial coronary distribution. Cardiac pathology reveals few abnormalities including myocyte necrosis with contraction bands without any evidence for an ischaemic process.7 Two-dimensional strain imaging is a new echocardiographic modality that may help the recognition of this new diagnostic entity namely inverted Takotsubo cardiomyopathy. However, its role in the management of these patients remains to be established.

**Supplementary data**
Supplementary data are available at European Journal of Echocardiography online.

**References**
Figure 1 Apical four-chamber views with tracking of LV walls showing longitudinal (A) and transverse (B) strain of the LV. White arrows indicate post-systolic shortening. AVC means aortic valve closure.