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Editorial

Editorial: Variants of takotsubo cardiomyopathy

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In 1990, Sato et al. first proposed the concept of takotsubo cardiomyopathy characterized by chest symptoms, electrocardiographic changes, and reversible regional wall motion abnormality (RWMA) in the apical to mid segments of left ventricle (LV) extending beyond a single epicardial coronary distribution [1]. Clinical characteristics of takotsubo cardiomyopathy resemble those of acute myocardial infarction (AMI), but with no evidence of obstructive coronary artery disease or acute plaque rupture [2,3]. In 2006, takotsubo cardiomyopathy was formally recognized as an acquired cardiomyopathy by the American Heart Association, and the diagnosis of takotsubo cardiomyopathy has become more common, likely because of heightened awareness. After the late 2000s, variants of takotsubo cardiomyopathy such as midventricular or basal type have been reported although their LV shapes do not resemble a takotsubo (Table 1) [4–7]. Sharkey et al. analyzed LV contraction patterns of 95 patients with takotsubo cardiomyopathy undergoing cardiac magnetic resonance (CMR) imaging, and showed a substantial variety of LV contraction patterns including combined mid-ventricular and distal LV (76%), mid-LV only (17%), and distal LV only (7%) [4]. Eitel et al. also evaluated LV contraction patterns of 256 patients with takotsubo cardiomyopathy, and observed a variety of LV contraction patterns including typical apical ballooning (83.6%), midventricular variant (15.6%), and isolated basal ballooning (0.8%) [6]. According to these CMR studies, it appears that midventricular type is relatively common, whereas basal type is rare. In addition to accurate visualization of RWMA, CMR imaging also allows us to evaluate tissue characterization of LV wall by late gadolinium-enhanced (LGE) imaging and myocardial edema by T2-weighed imaging [8–10]. LGE is not generally present in takotsubo cardiomyopathy in contrast to AMI. Myocardial edema is detected in most cases of takotsubo cardiomyopathy although this finding is not specific to this disorder.

Recently, a registry from Europe and the USA showed that focal type was rare with an incidence of 1.5% [7]. In this issue of the Journal, Kato et al. described a rarer case of focal type with RWMA localized in the inferior mid-ventricular segment detected by left

Table 1 Left ventricular contraction patterns of takotsubo cardiomyopathy.

Study authors	Year	No. of patients	Age (years)	Female	Modality	LV contraction pattern
Sharkey et al. [4]	2010	136	68	96%	CMR	Analysis in 95 patients Combined mid-ventricular and distal LV (76%) Mid-LV only (17%) Distal LV only (7%)
Singh et al. [5]	2010	114	NA	93%	LVG	Analysis in 107 patients Classical variant (54%) Complete mid-ventricular (29%) Antero-lateral (11%) Localized apical (2%) Diaphragmatic (2%) Basal plus mid-ventricular (1%) Postero-basal (1%)
Eitel et al. [6]	2011	256	69	89%	CMR	Analysis in all 256 patients Typical apical ballooning (83.6%) Midventricular variant (15.6%) Isolated basal ballooning (0.8%)
Templin et al. [7]	2015	1750	67	90%	LVG	Analysis in all 1750 patients Apical type (81.7%) Midventricular type (14.6%) Basal type (2.2%) Focal type (1.5%)

CMR, cardiac magnetic resonance imaging; LVG, left ventriculography; LV, left ventricle.

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ventriculogram and CMR imaging [11]. As they point out, it is important to distinguish takotsubo cardiomyopathy from aborted AMI associated with transient epicardial coronary artery thrombosis or spasm because some medical management is different between the two disorders. The differentiation remains more challenging especially in cases of focal type compared with those of typical or midventricular type. In the present case, the absence of LGE was evidence for takotsubo cardiomyopathy. It can act as supporting evidence of takotsubo cardiomyopathy that RWMA extends beyond a single epicardial coronary distribution. Recent development of computed tomography (CT) or nuclear imaging is also remarkable in the field of takotsubo cardiomyopathy. CT can identify RWMA and myocardial perfusion as well as concomitant coronary artery disease, and may allow us to confirm whether RWMA is explained by a single epicardial coronary distribution or not [12]. Single photon emission computed tomography and positron emission tomography can also provide useful information for myocardial perfusion, metabolism, or sympathetic innervation [13]. Furthermore, the combined image among CMR, CT, and nuclear imaging, so-called fusion image has become common [14,15]. Multimodal images may provide useful information for accurate differential diagnosis and further insight into the underlying pathophysiology of takotsubo cardiomyopathy.

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