Transient Inferior Left Ventricular Dyskinesia: A New Tako-Tsubo Variant?

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Citation

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Abstract

Apical transient dyskinesia, presents features mimicking acute coronary syndrome, being their characteristics normal coronary arteries assessed by coronariography and the complete resolution of the motion alterations. We report 6 white patients who presented with inferior left ventricular wall involvement. A thorough chart review combined with a clinical and echocardiographic follow-up was performed. The inclusion criteria were Mayo criteria. Four patients (67%) were women; and the mean age was 54 years. Emotional stress situation was associated in 2 patients. Electrocardiographic changes were displayed in all of them. A complete left ventricular motion recovery was displayed in 100% by means of echocardiography. Mean follow-up was 9,5 months. One patient developed an asymptomatic myocardial infarction during the follow-up. This case series supports the idea that an inferior left ventricular involvement of this cardiomyopathy could exist. Its probable relationship with the typical form of Tako-tsubo raises further questions about the pathophysiology, prognosis and management.

INTRODUCTION

Apical transient dyskinesia, also known as apical ballooning, stress cardiomyopathy, “broken heart” syndrome or Tako-tsubo cardiomyopathy is a newly recognized entity. It was first described in Japan by Sato et al[1,2] in 1990, and later confirmed in other world locations and races[3,4]. This syndrome presents early features similar to acute coronary syndromes, including chest pain, elevation of myocardial necrosis markers, electrocardiographic alterations and segmental left ventricular dyskinesia/akinesia. The main characteristics are the presence of normal coronary arteries assessed by coronary angiography and rapid and complete resolution of segmental motion alterations[1,2,3,4]. Prognosis is excellent compared with classic myocardial infarction[5]. Frequently but not always, stress episode (emotional or physical) is associated with the development of this process. Patients are more likely women[5]. Its pathophysiology remains unclear, although several theories have been proposed. Its relationship with brain and cathecolamine cardiotoxicity disorders seems established[6]. Even more, the previously described profile has been stressed by recently published, data as other than apical left ventricular motion alteration with midventricular[7,8] basal involvement[9], biventricular[10] alterations and previous coronary artery disease[11].

This article provides, to our knowledge, the first description of this novel transient left ventricular abnormality variant.

SUBJECTS AND METHODS

We report a new variant of transient left ventricular ballooning in a multicentric 6-patient-case series, presenting as inferior acute myocardial infarction. We investigated patients who met the following inclusion criteria (Mayo)[12]: 1) Clinical presentation mimicking acute coronary syndrome; 2) Transient hypokinesis, akinesis, or dyskinesis of the left ventricular segments with main inferior involvement as assessed by ventriculogram; 3) Absence of significantly obstructive coronary disease or angiographic evidence of acute plaque rupture or thrombus.; 4) New ECG abnormalities (either ST-segment elevation and/or T-wave inversion) or elevated cardiac troponin.; 5) Absence of: brain or intracranial disease potentially responsible, pheochromocytoma, myocarditis, hypertrophic cardiomyopathy or previous coronary artery disease. Management was decided according to the currently STEMI and NSTEMI guidelines available. Cardiovascular risk factors and triggering factors were studied from a thorough chart review combined with a clinical and echocardiographic

follow-up. The inferior involvement was determined after assessment by cardiac catheterization analysed by al least two cardiologists unaware of the purpose of this study.

RESULTS

Patients´ characteristics: Patients´s features are shown in table 1. Mean age was 54 years (33-81). 4 were women (66%). Cardiovascular risk factors were present, al least one, in all patients. Clinical presentation was effort-chest pain in 2 patients and rest chest-pain in 4 of them. An emotional trigger factor was present in only two cases (33%). The onset of the pain was less than six hours in the majority (5/6) but one (number 3) of the patients reported a brief similar rest-pain 24 hours before.

Figure 1

Table 1: Clinical features.

Case	Age/ Gender	Hypertension	Diabetes Mellitus	Dyslipaemia	Smoker	Obesity (Bmi>30)	Familial History
1	54/F	Yes	No	No	No	No	No
2	81/F	Yes	No	No	No	No	No
3	48/F	Yes	No	No	Ex(>6months)	No	No
4	49/M	No	No	Yes	Ex(>6months)	No	Yes
5	33/M	No	No	Yes	No	Yes	Yes
6	59/F	Yes	No	No	Yes	No	Yes

Blood measurements: CK and troponin I were repeatedly determined. Tn I was elevated in all patients, CK in 5 of 6 (83%). Data are shown in Table 2.

Figure 2

Table 2: Myocardial necrosis markers and onset electrocradiographic findings.

Case	Troponin I* Admission	Peak	Peak Ck**	Ecg St/Elevation	T/Inversion	Max Qtc*
1	2,91	2,91	Normal	No	Inferior	Normal
2	12,1	50	825	No (St-Descent In V2-5)	No	510
3	1,84	5,34	296	No	Inferior	505
4	0,04	19,8	452	Inferior	No	505
5	10,21	10,21	345	Inf-Lat	Inferior	Normal
6	9,4	22,1	525	Inferior	Inf-Lat: V3-6	500

+ Normal < 0,2 ng/ml. ++ Normal < 160 u/dl. * Bazett (V3).

Total elevated cholesterol levels (>5mmol/l) was only elevated in one patient. Thyroid hormones were determined in 5 of 6 patients and all were normal.

ECG: (Figure 1.) During their in-hospital stay, electrocardiographic alterations were displayed in all patients (table 2). 50 % presented ST elevation. One of them presented ST depression (>1,5mm) in V2-5 leads, which recovered after treatment and 66% showed negative T waves.

Figure 3

Figure 1: Case 6Â´s electrocardiograms. A: On admission; B 12h later; C: 15h later; D: 96 h later. E: Follow-up, 2 months later; F: Follow-up, 18 months later. E y F are the basal ECG before control-stress test. Both of them were normal.

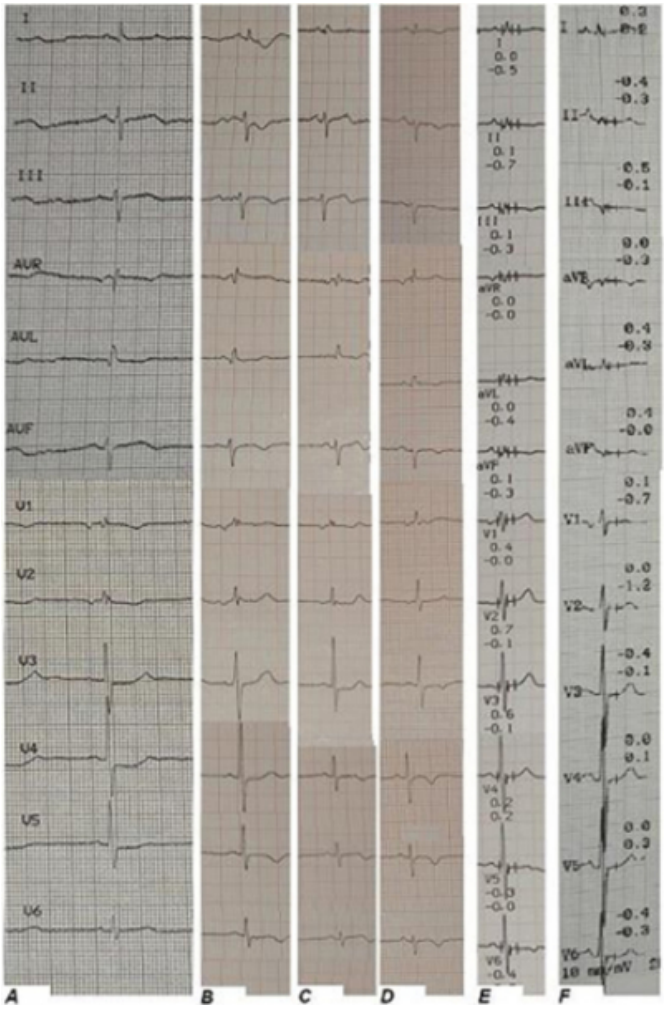


Figure 4

Table 3: Cardiac Catheterisation findings

CASE	Coronary Arteries	Dominance	LVEF	LV Outflow Tract obstruction	LV	MITRAL REGURGITATION	Time to recovery*
1	Normal	Right	69%	No	Inferior Akinesia	No	85 Days.
2	Normal	Right	60%	No	Inferior Hypokinesia	I/Iv	6 Days.
3	Normal	Right	68%	No	Inferior Hypokinesia	No	130 Days.
4	Normal	Right	60%	No	Inferoapical Akinesia	No	38 Days.
5	Normal	Both	60%	No	Inferoapical Hypokinesia	No	192 Days.
6	Normal	Left	60%	No	Inferior Akinesia	No	104 Days.

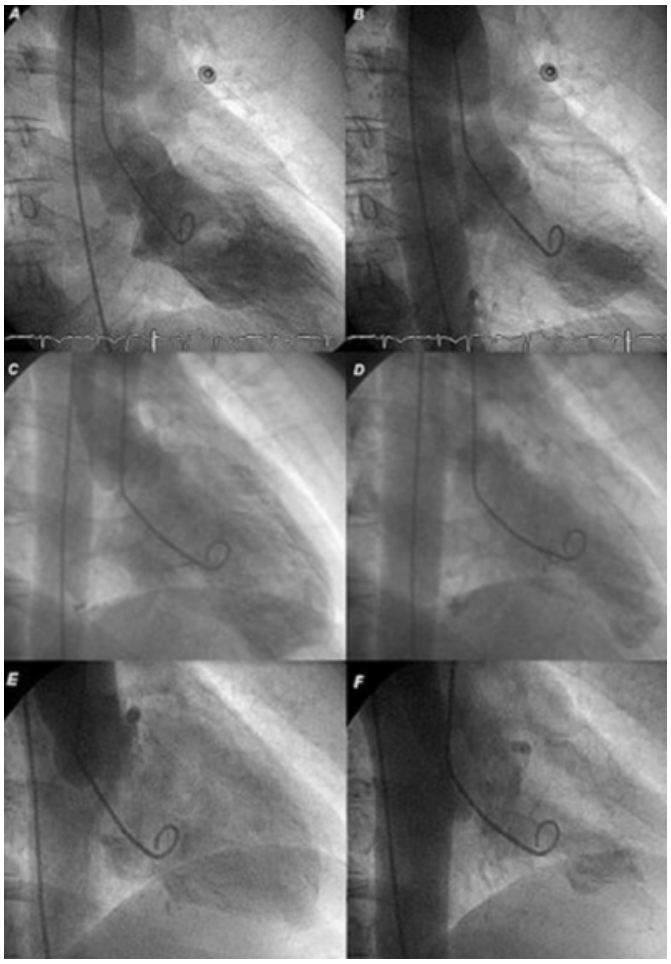
Cardiac catheterization findings: (Figure2) Cardiac catheterization was performed in all patients. 5 (83%) in the first 24 hours after admission.

The sixth patient underwent the angiogram 48 hours later. Coronary arteries were normal in all patients (6/6). Left ventricular segmental motion alterations were demonstrated

in 100%. Data are shown in table 3.

Figure 5

Figure 2: Cardiac catheterization findings. Case 1 (A,B), 4 (C,D) and 6 (E,F) ventriculogram are shown. Images on the left are diastole (A,C,E) and on the right systole(B,D,F).



Outcome: All patients presented a Killip I class on admission and were discharged without problems. In stay-complications were: an intraventricular thrombus (number 4, discharged on anticoagulation therapy), a transient ischaemic attack cath-related (number 5) and various episodes of rest-pain solved with nitrates (number 6). Mean stay was 6,8 days (3-12 days). Left ventricular motion recovery was completely accomplished in all cases. Mean follow-up was 9.5 months (1-18). One patient suffered from various episodes of pain during follow-up (18 months, number 6) but both of the treadmill stress-test yearly-performed were conclusive negative. The most serious complication was in number 4, a marathon-runner man who continued with intense physical exercise (several kilometres/day training running). He was discharged on anticoagulation therapy because a thrombus in the left ventricle. Thrombus resolution was achieved but in the follow-up-echocardiogram a new segmental infero-apical alteration was discovered after previous normalization on discharge, five months before. This finding was confirmed by means of cardiac magnetic resonance as a necrotic zone with motion alterations. However, the patient remained asymptomatic.

DISCUSSION

The Takotsubo myocardiopathy could represent an special form of left ventricular stunning, including a mild form of myocardial infarction. The pathophysiology remains unclear although several theories have been proposed: anatomic coronary alterations[13]; left ventricular outflow tract obstruction[14]; coronary microvascular dysfunction; vasospasm, evanescent intracoronary thrombus, myocarditis and catecholamine excess (brain-stress related)[6].

In order to standardize diagnosis, various clinical criteria have been proposed. Our cases fulfilled Mayo criteria[12], even though they were proposed for the typical Takotsubo. Although the apical affectation (Takotsubo classical or typical form) remains the most frequent transient cardiomyopathy of this type[15], the recent publication of new variants of transient myocardial dyskinesia arises new questions about this syndrome[7,8,9,10,11,15].

Our aim presenting this case-series was to remark that other left ventricular segments could be transiently affected, in the same manner that classical acute myocardial infarction can. This inferior variant may probably be related to the classical apical ballooning. It could represent a variant properly (inferior ECG alterations support that point) or the evolution to resolution of a typical case, although the ventriculograms were performed quite early after the onset of symptoms.

In ischemic cardiomyopathy it is well known that different segmental motion can be seen, depending on the coronary artery altered. Recently, Kurowski et al. reported that Scintigraphy and PET studies showing an strong correlation between location of wall motion abnormality and myocardial metabolism defects with a significantly higher apical decrease in glucose uptake in patients with a “typical” Takotsubo pattern compared with midventricular variant[8]. Likewise, a relationship between Takotsubo and ischemic cardiomyopathy is being recognised[11]. Therefore, it is possible we can not rule out Takotsubo and its variants to be a variant itself of ischemic cardiomyopathy, with mild anatomic or transient lesion assessed by angiogram but with functional repercussion.

Takotsubo cardiomyopathy, even if it is supposed to carry a

very good prognostic, is not lacking of complications. In fact, 2 of our 6 patients suffered mild in-stay complications (33%). On the other hand, 1 patient suffered complications related to the catheterization. Of note, is the interesting question raised by the silent myocardial infarction presented by one patient, the marathon-runner, during intense exercise, after a first transient episode. After that, It could be advisable to avoid extreme physical exercise, sometime, perhaps a month after the admission.

To conclude, further studies about this entity are needed in order to develop adequate management and preventive strategies.

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