

A Single-centre Report on the Characteristics of Tako-tsubo Syndrome

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Background: Tako-tsubo cardiomyopathy is an increasingly recognised phenomenon characterised by chest pain, ECG abnormalities, cardiac biomarker elevation and transient left ventricular dysfunction without significant coronary artery obstruction.

Aims: To report the clinical and echocardiographic characteristics from a large single-centre Australian series of patients with Tako-tsubo syndrome.

Methods: We prospectively collected data on 23 consecutive patients presenting between November 2005 and November 2007. Baseline demographics, ECG, echocardiography and coronary angiography were performed on nearly all patients.

Results: All patients presented with chest pain; 87% were female. Various stressors were noted and cardiac Troponin-T was elevated in 91% of patients. All patients had non-obstructive coronary disease at angiography. 19/23 patients had initial and subsequent echocardiography. Mean ejection fraction was 50% at baseline and 64% at follow-up ($p < 0.0001$). Right ventricular dysfunction was present in eight, dynamic left ventricular outflow tract obstruction in two, diastolic dysfunction in seven and two patients had the mid-cavity variant.

Conclusions: This large prospective single-centre Australian series of Tako-tsubo syndrome is in concert with previous published series. Complete recovery of left ventricular function on echocardiographic follow-up was typical. Although its pathogenesis remains unclear, early distinction from acute coronary syndromes is important and the prognosis is reassuringly good.

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Keywords: Tako-tsubo syndrome; Left ventricular dysfunction; Cardiomyopathy; Echocardiography; Apical ballooning syndrome

Introduction

Transient widespread left ventricular dysfunction associated with a presentation suggestive of an acute coronary syndrome with ischaemic chest pain, ECG abnormalities and cardiac biomarker elevation in the absence of obstructive epicardial coronary artery disease was first described in the early 1990s in Japan [1–3]. The term “Tako-tsubo” was coined after the striking similarity in appearance of the left ventricular dysfunction in systole to the Japanese octopus-trap pot. Over subsequent years, case reports and small series have emerged from outside Japan [4–7] with the alternative term transient left ventricular apical ballooning syndrome (TLVABS) being widely used. The syndrome is classically associated with an identifiable physical or emotional precipitant or “stressor”

and is more predominant in females. As there have been no large prospective series described from Australia, we sought to report on our local experience with this syndrome.

Methods

Between November 2005 and November 2007, there were 734 patients who were taken to our institution’s cardiac catheterisation laboratory for percutaneous coronary intervention for acute coronary syndromes (419 Non-ST elevation myocardial infarction (NSTEMI) and 305 ST elevation myocardial infarction (STEMI)). Of these, 23 patients (3%) were classified as Tako-tsubo syndrome based on the presence of chest pain, ECG changes, transient left ventricular dysfunction not correlated with a coronary artery segment distribution and non-significant stenoses on coronary angiography [7]. Each of the patients presented with chest pain and they were initially managed as acute coronary syndromes. Baseline demographics including age, sex and cardiovascular risk factors were collected. Serial ECG and cardiac biomarkers were measured. Troponin was not repeatedly measured once noted

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Table 1. Baseline Demographics.

	n = 23
Age (mean ± SD)	65 ± 11 years
%Males	3 (13%)
Diabetes	1 (4%)
Smoking history	9 (39%)
Hypertension	13 (57%)
Hypercholesterolaemia	4 (20%)
Number of patients with identified stressor	17 (74%)

to be elevated above the normal range for our laboratory (>0.03 mmol/L), and CK was measured 8 hourly until peak and decline were noted. Early coronary angiography including left ventriculography was performed in all patients. Patients who presented with ST elevation on their ECG were taken immediately to the cardiac catheterisation laboratory as part of our primary PCI protocol. Baseline echocardiography and follow-up echocardiography was performed in 19 patients. Left ventricular function was assessed using a 16 segment model and a Wall Motion Score Index (WMSI) was calculated. Right ventricular function was assessed visually. Diastolic dysfunction was assessed qualitatively according to standard guidelines from the American Society of Echocardiography [8]. Long-term outcomes were assessed with a follow-up phone call in 19 patients. The prospective collection of this data was approved by the Eastern Health ethics committee. Statistical analysis of echocardiographic variables at baseline and follow-up was performed using the Wilcoxon signed-rank test with a two-sided *p*-value of <0.05 considered statistically significant.

Results

Clinical Characteristics

Twenty of the 23 patients (91%) were female. The age was 43–85 years (mean ± SD: 65 ± 11 years). All patients were Caucasian and were a typical representation of the overall demographic seen at our institution. The incidence of coronary risk factors is shown in Table 1. All 23 patients described chest pain and on admission 17 patients volunteered an identifiable stressor prior to the event (see Table 2). Of interest, one patient developed the syndrome 1 week following a normal vaginal delivery

Table 2. Precipitating Event.

	n = 23
None identified	6 (26%)
Death of relative	3 (13%)
Argument	2 (9%)
Recent surgery	2 (9%)
Babysitting grandchildren	2 (9%)
Assault	1 (4%)
Spouse hospitalised	2 (9%)
Pregnancy and delivery	1 (4%)
Recently retrenched	1 (4%)
Strenuous Bike ride	1 (4%)
Unexpected cello repair bill	1 (4%)
Child unwell	1 (4%)

which was uncomplicated other than the use of forceps. The two patients with post-operative Tako-tsubo had normal coronary angiography and left ventricular dysfunction not consistent with a coronary artery territory distribution as distinct from a post-operative acute myocardial infarction. Sixteen patients had ST elevation on ECG, of which 10 met the criteria for reperfusion therapy. Eight of these patients were taken for primary angiography with a view to percutaneous revascularisation and a further two received thrombolysis at another institution before transfer to our hospital. Of the remaining eight patients with ST elevation, the ST elevation was insufficient to meet emergency revascularisation criteria in five (<2 mm in contiguous precordial leads or <1 mm in limb leads) or the presentation was late (>24 h) in three patients. One patient experienced an in-hospital VF arrest, four presented with clinical heart failure with a further three patients developing clinical heart failure during the admission. Although no patients presented in cardiogenic shock, two patients required haemodynamic support with intravenous dobutamine after admission and another required non-invasive positive pressure ventilation for hypoxia from acute pulmonary oedema. No patients had a history of a pre-existing cardiomyopathy or ischaemic heart disease to otherwise explain their presentation.

ECG Findings

At presentation, the ECG demonstrated ST-segment elevation in 16 patients (70%) (see example in Fig. 1). The next most common presenting ECG abnormality was widespread T-wave inversion. After presentation, 12 patients (52%) subsequently developed widespread symmetrical T-wave inversion on serial ECG (Fig. 2). The corrected QT interval (QTc) was prolonged (>450 ms) in 11 patients (48%) (mean: 457 ± 32 ms, range: 409–535 ms) and in particular, the patient suffering an in-hospital VF arrest had a QTc of 467 ms. Transient atrial fibrillation was noted in two patients.

Investigations

Cardiac Troponin-T levels were elevated in all but two of the series with most patients having normal or mildly elevated CK (Table 3). Two patients received thrombolytic therapy at regional centres for presumed acute ST elevation myocardial infarction. Inpatient coronary angiography was performed on all patients at a mean of 1.0 ± 1.2 days after admission and all revealed non-obstructive disease (<50% luminal stenosis). Angiography

Table 3. Investigation Results.

	n = 23
ST-segment elevation on ECG	16 (70%)
Peak Trop-T (median ± SD) ng/mL	0.42 ± 0.39
Peak CK (median ± SD) IU/L	172 ± 304
QTc (mean ± SD) ms	457 ± 32

Note: Laboratory reference range CK 30–180 IU/L, Trop-T <0.03 ng/mL.

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