

Interventional Cardiology Management of a Cardiogenic Shock Induced by Takotsubo Cardiomyopathy at the Hospital Center of Montlucon: A Case Report

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Abstract

Background: Takotsubo cardiomyopathy is frequently considered as a benign disorder. We present an atypical form with cardiogenic shock that was managed by interventional cardiology measures. **Case presentation:** A 58 years old female patient with a past history of hypertension, obesity and multiple sclerosis was admitted at the Hospital Center of Montlucon for septic shock of urinary origin. During hospitalization in intensive care unit, the patient presented a markedly increasing of troponin levels with a diffused ST-segment elevation. Transthoracic Echocardiography showed an altered left ventricular ejection fraction at 35% with hypokinesia of apex and lateral ventricular segments in conjunction with compensatory hyperkinesis of the base; these findings were strongly suggestive of a diagnosis of Takotsubo cardiomyopathy. Despite concomitant anemia, renal failure and sepsis, all adequately treated with complete remission, the patient developed frequent episodes of ventricular tachycardia that prompted an emergency coronarography. During this procedure, the patient presented a cardiogenic shock and bradysystole that were successfully managed by intra-aortic balloon pumping and temporary transvenous pacing. Finally, there were no coronary lesions and ventriculography confirmed a Takotsubo cardiomyopathy. Given the unstable hemodynamic status of this patient, she was addressed to the University Teaching Hospital of Clermont-Ferrand for more specialized care. **Conclusion:** This case alerts the physician to be more vigilant when managing all patients with Takotsubo cardiomyopathy, because some cases could be

fatal. In severe cases, intra-aortic balloon pumping and temporary epicardial pacing can be life-saving.

Keywords

Interventional Cardiology Management, Cardiogenic Shock, Takotsubo Cardiomyopathy

1. Background

Takotsubo cardiomyopathy (TTC) is an uncommon cardiomyopathy that should be suspected in post-menopausal women with signs that mimic acute myocardial infarction in the absence of an obstructive coronary artery disease confirmed by angiography [1]. The disease was first described by Sato *et al.* in 1991. Its name refers to a contraption used for catching octopuses and suggests the aspect assumed by the ventricle during the systole due to the typical regional wall motion abnormalities that occur after onset [2]. The pathophysiology of TTC is not clear, but the main hypothesis postulated is the excess stimulation of sympathetic activity leading to myocardial stunning during physical or emotional stress [3]. Others suggested hypotheses involve microvascular spasm and transient coronary occlusion by a fast-dissolving clot and spontaneous reperfusion [2]. Till date, TTC was been considered as a benign disease since it has often not been associated with life-threatening complications and because the recovery of ventricular function occurs in the several days or weeks [2]. There is emerging evidence that suggests to pay attention of patients with TTC, because all of them are not benign [4]. We report an atypical form with cardiogenic shock and bradysystole that were managed by interventional cardiology measures at the Hospital Center of Montlucon in France.

2. Case Presentation

A 58-year-old female patient with a past history of hypertension, grade 3 obesity and multiple sclerosis was admitted at the Hospital Center of Montlucon for better management of a urinary tract infection. On the admission, she presented a history of dysuria and lower abdominal pain lasting for two weeks duration. Physical examination revealed a fully conscious patient with a low blood pressure of 90/50 mmHg (mean arterial pressure of 63 mmHg), heart rate at 101 beats per min, respiratory rate of 23 breaths per minute, oxygen saturation level at 96% in ambient air and temperature at 38.1°C. The quick Sequential Organ Failure Assessment (qSOFA) score of 2/3. The rest of physical examination was remarkable for hypogastric and right lumbar tenderness and a positive Murphy kidney punch. Biological workups revealed moderate normocytic normochromic anemia at 7.7 g/dl, leucocytosis at 205,100/mm³ with neutrophile predominance (90%), procalcitonin at 0.85 ng/ml (17 times the normal range), elevated troponin Tc level at 1220 pg/ml and NT pro BNP at 964 pg/ml, severe alteration of

renal function with an estimated glomerular filtration rate at 11.21 ml/min/1.75 m² according to CKD-EPI (baseline creatinine level at 41 mg/l). The working diagnosis was septic shock from a urinary infection. The patient was admitted to the intensive care unit and treated with intravenous ceftriaxone 2 g per 24 h, paracetamol 1 g/8h for pain relief, norepinephrine 0.6 mcg/kg/min administered through an electric pump syringe, and 3 liters of Ringer lactate. The evolution was marked by a stabilisation of hemodynamic parameters with a good diuresis at 0.9 ml/kg/h and a good control of the infection as evident by normalisation of the temperature, white blood cell count and procalcitonin level.

On Day 2 of admission, the patient presented a markedly increased troponine Tc level at 1999 pg/ml with a diffused ST-segment elevation (**Figure 1**) without thoracic pain. Echocardiography showed an altered left ventricular ejection fraction (LVEF = 35%) with hypokinesia of apex and lateral ventricular segments in conjunction with compensatory hyper-kinesis of the base. These findings were

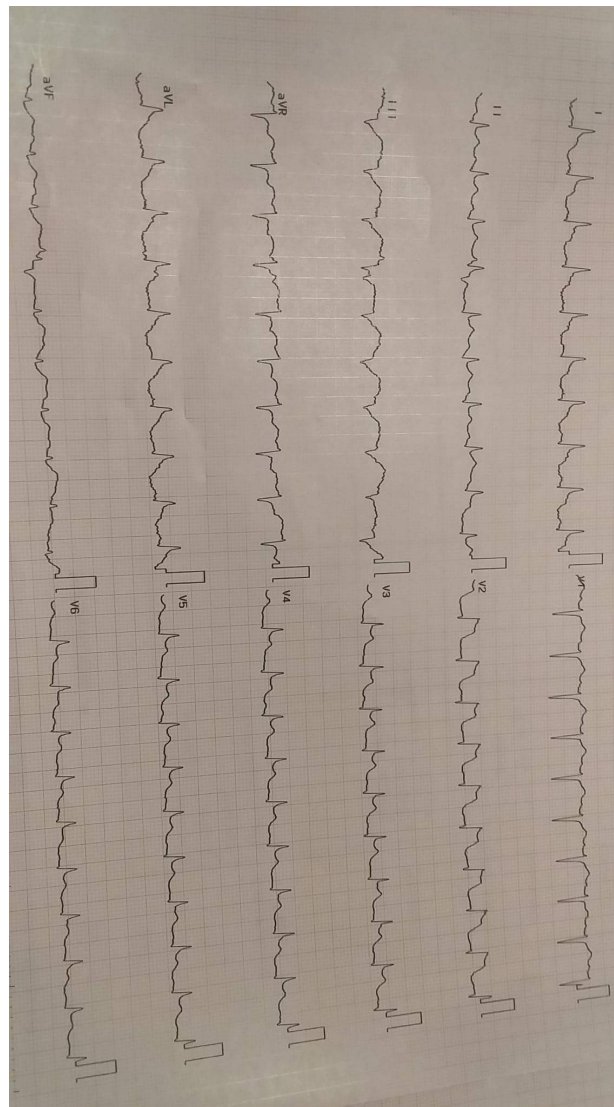


Figure 1. 12-lead ECG showing diffused ST-segment elevation.

in favour of Takotsubo cardiomyopathy. Despite the management of anemia, acute kidney injury and good control of the severe sepsis, the patient developed frequent episodes of ventricular tachycardia that were managed by amiodarone 300 mg intravenously. Considering the feature of severe left ventricular failure the team decided to perform an urgent coronarography. During procedure the patient presented cardiogenic shock and brady-asystole that were successfully managed by intra-aortic balloon pumping and temporary transvenous pacing (**Figure 2**). Finally, there was no coronary lesion (**Figure 3** and **Figure 4**) and ventriculography confirmed a Takotsubo cardiomyopathy (**Figure 5**). Given the complexity of the hemodynamic status of this patient, she was referred to the

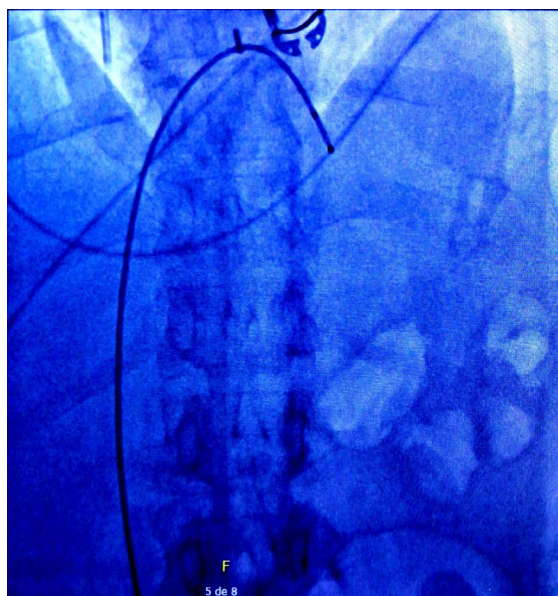


Figure 2. Intra-aortic balloon pumping and transvenous pacing.

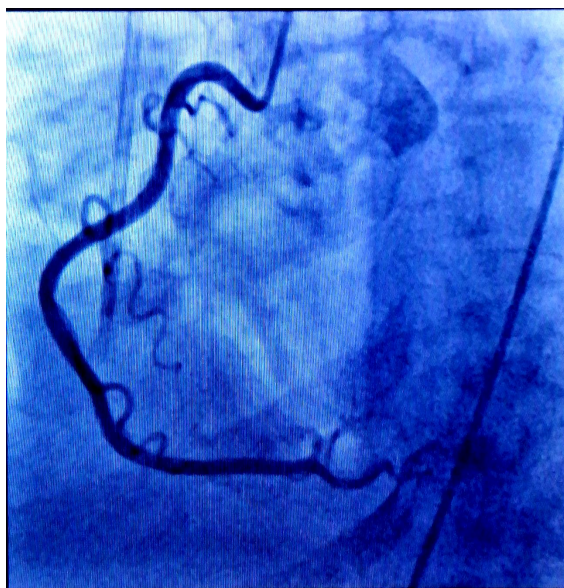


Figure 3. Normal right coronary artery.

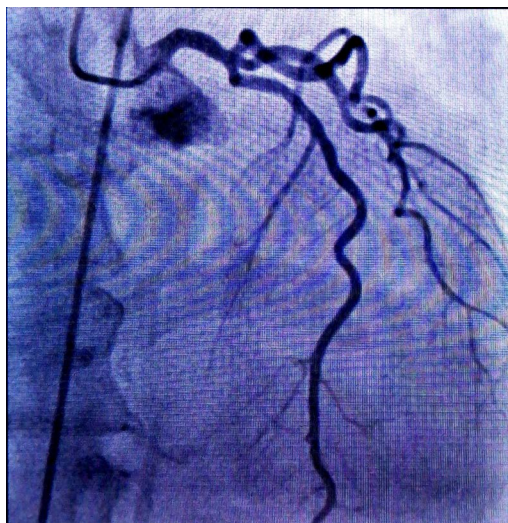


Figure 4. Normal left coronary artery.

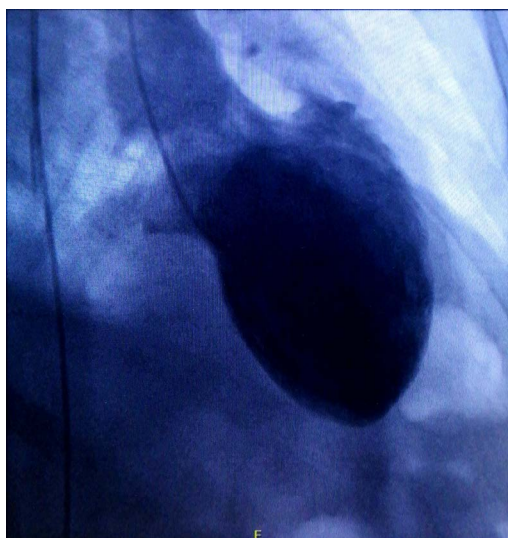


Figure 5. Ventriculography suggesting apical form of Takotsubo cardiomyopathy.

University Teaching Hospital (UTH) of Clermont-Ferrand for better management. The evolution was favourable after two days of intensive care management at the UTH of Clermont-Ferrand.

3. Discussion

This case illustrates that, although past concepts are in favour of Takotsubo cardiomyopathy (TTC) being a benign disease, it can be associated with potential lethal complications as recently reported more than a decade ago [4].

According to a multi-center registry, the complications occur in 52% within 2.6 ± 2.9 days (median 1 [IQR 1 - 3] days after symptom onset) [4]. The common in-hospital complications include cardiac arrhythmias, cardiogenic shock, ventricular thrombus, pulmonary oedema, ventricular septal defect and free wall rupture [5]. The main predictors of poor outcomes during TTC are physical

triggers, acute neurologic or psychiatric diseases, high troponin levels, and a low ejection fraction on admission [6]. The indexed patient we presented was followed-up for a chronic neurologic disorder (multiple sclerosis) with no evidence of acute decompensation. Hence, it is likely that the trigger of TTC was the urinary sepsis. Apart from increased level of troponin that may be observed in patients with renal failure or sepsis [7] and altered left ventricular function, we were not able to predict severe outcome of TTC in this patient.

Cardiogenic shock occurs in 7% of cases in TTC and the patients could be managed by intra-aortic balloon pumping and by administering vasopressors [4]. Few case of complete heart block have been described and management by temporary pacing [8]. According to the International Registry of Takotsubo cardiomyopathy, 103 patients over 2098 developed cardiac arrest or asystole/pulseless electrical activity during TTC [9]. Apart from classical predictors of poor prognostic, long QT, male gender and young age were strongly associated to this outcome [9]. It is very rare to combine several interventional cardiology measures to resuscitate a patient with TTC that is the particularity of this case. Despite resuscitation, the hemodynamic parameter of this patient were unstable, this reinforces the complexity of this case.

4. Conclusion

This case alerts the physician to pay attention of all patients with Takotsubo cardiomyopathy, because some cases could be fatal. In severe cases, intra-aortic balloon pumping and temporary epicardial pacing can have a life-saving role.

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Disclosures

Approval of the research protocol: Formal ethical approval from the University Research Ethics Board was not required for the completion of this study.

Informed consent: Written informed consent for publication of this case report was obtained from the patient.

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Author Contribution:

Management of the case: SC, LC, MNT, EH, TC, AB, ND, AS, GB.

Conception of the study: SC, MNT.

Manuscript writing: MNT, SC, JNT.

Critical revision: All the authors.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Abbreviations

bpm: beat per min
 BNP: Brain natriuretic peptide
 CKD-EPI: Chronic Kidney Disease Epidemiology collaboration
 CRP: C-Reactive Protein
 ECG: Electrocardiogram
 IQR: Interquartile Range
 LVEF: Left ventricular ejection fraction
 qSOFA: quick Sequential Organ Failure Assessment
 TTC: Takotsubo Cardiomyopathy
 UTH: University Teaching Hospital