Recurrent Midventricular Takotsubo : a case report

Takotsubo Midioventriculaire Récidivant : A propos d'un cas

Houaida Mahfoudhi[1], Malak Talouh[1], Ameni Mardessi[1], Aymen Noomen[1], Abdedayem Haggui[1], Nadhem Hajlaoui[1], Younes Arous[2], Sarra Chenik[1], Wafa Fehri[1]

1. *Cardiology department of military hospital- Tunis*
2. *Radiology department of military hospital – Tunis*

Summary

Takotsubo cardiomyopathy is characterized by transient systolic dysfunction without associated coronary lesions. The apical segments of the left ventricle are affected in most cases. Atypical forms involving the midventricular segments with a normal apex are rare. The evolution is generally favorable, and recurrence is unusual. We report the case of a 61-year-old woman presenting with recurrent midventricular Takotsubo syndrome.

Keywords

Takotsubo, midventricular, Magnetic resonance imaging, recurrency, echocardiography, prognosis

Résumé

La cardiomyopathie de Takotsubo se caractérise par une dysfonction systolique transitoire sans lésions coronariennes associées. Les segments apicaux du ventricule gauche sont touchés dans la plupart des cas. Les formes atypiques impliquant les segments médio-ventriculaires avec un apex normal sont rares. L'évolution est généralement favorable et les récidives sont inhabituelles. Nous rapportons le cas d'une femme de 61 ans présentant un syndrome de Takotsubo médio-ventriculaire récidivant.

Mots-clés

Takotsubo, médio-ventriculaire, imagerie par résonnance magnétique, récidive, échocardiographie, pronostic

Correspondance

Houaida mahfoudhi

Email : houaida.mahfoudhi8@gmail.com.

INTRODUCTION

Takotsubo cardiomyopathy (TCM) was first described in Japan in 1983 as a transient left ventricular dysfunction characterized by apical ballooning in subjects under stress [1]. Since then, the number of reported cases in the literature has continued to increase, and atypical forms have been described with a better understanding of the syndrome. We report a clinical observation of a rare case of midventricular TCM that recurred during its course. Through this case and a literature review, we describe the diagnostic, prognostic, and therapeutic aspects of TCM, particularly its atypical forms.

CASE - REPORT

Mrs. C.K, aged 61, with no prior medical history, was admitted to our department for sudden retrosternal chest pain following the death of her son. She described the pain as retrosternal constriction lasting 30 minutes. Physical examination revealed no abnormalities. Electrocardiogram showed a regular sinus rhythm at 100 bpm. T waves were flattened in the high lateral leads, with no ST-segment elevation (Figure 1).

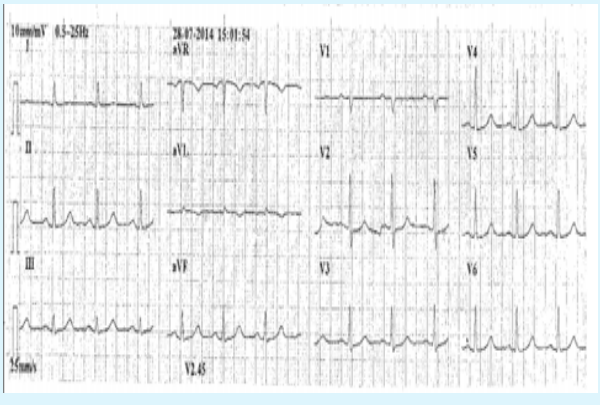

Figure 1. Initial electrocardiogram

Laboratory tests revealed elevated troponin at 2.25 ng/L (normal <0.01). The most probable diagnosis was non-ST elevation myocardial infarction. Coronary angiography performed 6 hours after symptom onset revealed angiographically normal coronary arteries (Figure 2).

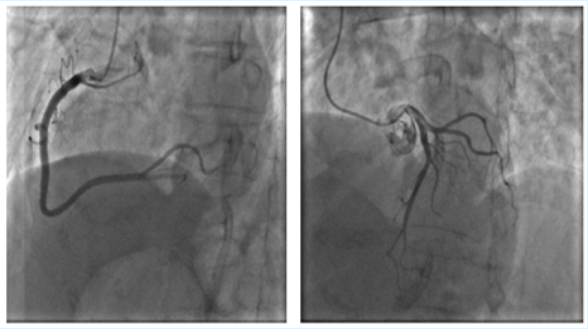

Figure 2. Normal coronary angiography

Transthoracic echocardiography (TTE) showed a dilated left ventricle with a tele-diastolic diameter of 61 mm and a tele-systolic diameter of 48 mm. Left ventricular ejection fraction (LVEF) was 52%, with severe hypokinesis of the mid-segment walls including anterior, anteroseptal, lateral, and inferior regions (Figure 3). Initial cardiac magnetic resonance imaging (MRI) demonstrated midventricular akinesia, myocardial edema without late gadolinium enhancement, and an LVEF of 49% (Figure 4).

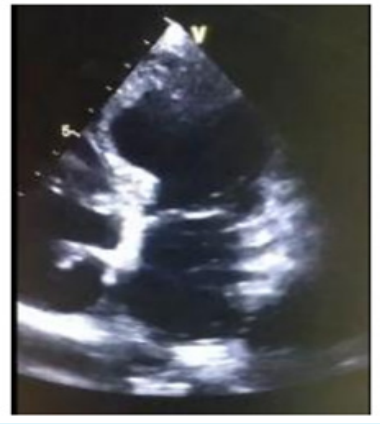

Figure 3. Appearance of midventricular ballooning on echocardiography (Apical 4-chamber view)

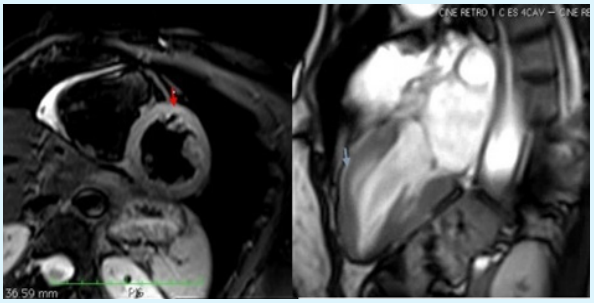

Figure 4. MRI appearance of myocardial edema without late gadolinium enhancement (red arrow). Hypokinesia of mid-segments (blue arrow).

The diagnosis of midventricular TCM was established, and the patient was started on Metoprolol 100 mg/day combined with Ramipril 2.5 mg/day. Psychiatric management was initiated, and selective serotonin reuptake inhibitors (SSRIs) were prescribed. The patient's condition improved markedly. Follow-up TTE and MRI on day 9 showed complete recovery (Figure 5). However, one month later, during a funeral visit, the patient experienced a recurrence of similar chest pain. A third MRI revealed myocardial edema of lesser severity compared to the initial MRI, with LVEF at 50% and midventricular hypokinesia. The patient rapidly improved again under the same treatment regimen as the first episode.

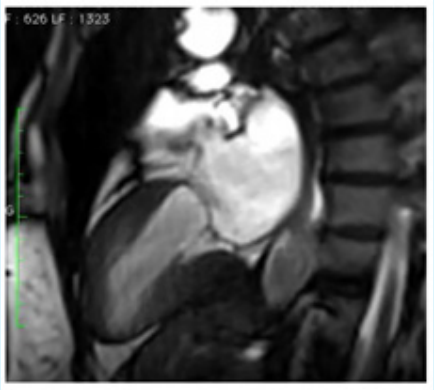

Figure 4. MRI appearance of myocardial edema without late gadolinium enhancement (red arrow). Hypokinesia of mid-segments (blue arrow).

TCM is the final diagnosis in 1 to 2% of patients hospitalized for acute coronary syndrome [2]. The demographic profile of our patient is typical for TCM, which predominantly affects postmenopausal women. Indeed, TCM occurs in 80 to 100% of cases in women with an average age of 62 to 76 years [3-5], often associated with psychiatric disorders, especially major depressive episodes [6].

Rare reports have described a midventricular form of TCM, as in our case. This atypical form is characterized by hypo- or akinesia with ballooning of the mid-ventricular segments [7], contrasting with the typical apical ballooning form.

The pathophysiology of TCM remains incompletely understood. Proposed mechanisms include multivessel coronary artery spasm, microcirculatory dysfunction, or catecholamine-induced cardiotoxicity [4,8,9,10]. One hypothesis for the morphological variants of TCM is inter-individual differences in adrenergic receptor density and sensitivity between the base and apex. However, recurrent TCM in different myocardial territories in the same individual challenges this theory [11].

Chest pain resembling myocardial infarction is the primary symptom, often accompanied by dyspnea [3,4]. Syncope or cardiac arrest have also been reported. Electrocardiogram findings vary from ST-segment elevation, T-wave inversion, nonspecific changes, or normal patterns. The prevalence of electrical abnormalities varies widely, with ST elevation in 30 to 90% of cases [12,13]. No clear correlation exists between ECG presentation, clinical symptoms, disease location, and prognosis. Troponin levels are elevated but generally lower than in ST-elevation myocardial infarction.

The typical presentation of chest pain, ECG changes, and elevated biomarkers often leads to coronary angiography, which usually shows normal or non-obstructive coronary arteries. Although obstructive lesions do not exclude TCM, they are uncommon, making diagnosis difficult in such cases. Ventriculography may reveal TCM features but is increasingly supplanted by TTE and especially MRI, which reveal segmental motion abnormalities extending beyond coronary territories—a key diagnostic criterion [2].

The midventricular form is rare but pathognomonic for TCM. Apical forms can mimic large anterior infarcts, whereas midventricular or basal (inverted) forms are specific to TCM [14]. MRI is promising for differential diagnosis with myocardial infarction. A 2011 study described MRI findings supporting TCM diagnosis, including myocardial edema without late gadolinium enhancement, consistent with our patient's images [15]. Complete recovery of left ventricular function is a strong diagnostic feature regardless of imaging modality.

Due to the lack of specific signs, diagnosis relies on a combination of ECG, biological, and imaging data, consolidated in the Mayo Clinic criteria [2].

Prognosis is difficult to assess given mostly anecdotal reports. A US national hospitalization database identified 24,701 TCM cases [5]. In-hospital mortality was 4.2%, with 81.4% of deaths due to extracardiac causes triggering TCM in patients with comorbidities. Mortality was 1.1% in patients without serious underlying disease, mainly from cardiogenic shock or arrhythmia. Male patients had significantly higher mortality. A prospective

study compared apical and midventricular forms, finding no significant differences in demographics, clinical presentation, or 30-day mortality [8].

A European registry (GEIST) reported recurrences in 4% of patients, with "super-recurrences" (≥2 recurrences) in 1.8% [16]. In this study, no correlation was found between beta-blocker therapy and recurrence risk. Beta-blockers do not reduce short-term mortality but a recent GEIST registry (2853 patients) showed a mortality decrease at 2.6 years, without effect on recurrences [17]. However, recurrence risk was significantly lower in patients treated with renin-angiotensin system blockers. Several retrospective studies associate these drugs with slight recurrence risk reduction and improved 1-year survival [18]. A retrospective study from the national RETAKO registry showed no significant benefit of renin-angiotensin system inhibitors (ACEI/ARB) on mortality or recurrence in Takotsubo survivors. Despite frequent prescription, these treatments do not appear to improve long-term prognosis [19].

CONCLUSION

The midventricular form of TCM, although rare, has a favorable prognosis. Recurrences are infrequent (~1.5%/year) but can occur repeatedly, as in our case. The GEIST registry shows that beta-blockers reduce mid-term mortality without decreasing recurrences, while ACEI/ARB effects remain uncertain. Current management relies on personalized treatment combining beta-blockers (especially in dynamic obstruction), ACEI/ARB when needed, psychological support, and MRI follow-up to confirm ventricular recovery. Further research is necessary to define effective pharmacological prevention of recurrence.

REFERENCES

1. Aizawa K, Suzuki T. Takotsubo cardiomyopathy: Japanese perspective. Heart Fail Clin 2013;9:243–247.
2. Prasad A, Lerman A, Rihal CS. Apical ballooning syndrome (Tako-Tsubo or stress cardiomyopathy): A mimic of acute myocardial infarction. Am Heart J. 2008;155:408–17.
3. Tsuchihashi K, Ueshima K, Uchida T, Oh-mura N, Kimura K, Owa M et al. Transient left ventricular apical ballooning without coronary artery stenosis: A novel heart syndrome mimicking acute myocardial infarction: Angina Pectoris-Myocardial Infarction Investigations in Japan. J Am Coll Cardiol. 2001;38:11–18.
4. Bybee KA, Kara T, Prasad A, Lerman A, Barsness GW, Wright RS et al. Systematic review: Transient left ventricular apical ballooning: A syndrome that mimics ST-segment elevation myocardial infarction. Ann Intern Med. 2004;141:858–865.
5. Brinjikji W, El-Sayed AM, Salka S. In-hospital mortality among patients with takotsubo cardiomyopathy: A study of the National Inpatient Sample 2008 to 2009. Am Heart J. 2012; 164: 215–221.
6. Delmas C, Lairez O, Mulin E, Delmas T, Boudou N, Dumonteil N,et al. Anxiodepressive disorders and chronic psychological stress are associated with Tako-Tsubo cardiomyopathy: New physiopathological hypothesis. Circ J. 2013; 77: 175–180.
7. Hurst RT, Askew JW, Reuss CS et al. Transient midventricular ballooning syndrome: a new variant. J Am Coll Cardiol .2006;48:579–83.
8. Kurowski V, Kaiser A, von Hof K et al: Apical and midventricular transient left ventricular dysfunction syndrome (tako-tsubo cardiomyopathy): frequency, mechanisms, and prognosis. Chest. 2007; 132: 809–816.
9. Wittstein IS, Thiemann DR, Lima JA, Baughman KL, Schulman SP, Gerstenblith G,Wu KC, Rade JJ, Bivalacqua TJ, Champion HC. Neurohumoral features of myocardial stunning due to sudden emotional stress. N Engl J Med. 2005;352:539–48.
10. Gopalakrishnan P, Zaidi R, Sardar MR. Takotsubo cardiomyopathy: Pathophysiology and role of cardiac biomarkers in differential diagnosis. World J Cardiol, 2017; 9(9): 723–30
11. Lal Y, Stys A, Stys T. Recurrent midventricular ballooning, a rare phenomenon. J Cardiol Cases. 2012; 6: 112–115.
12. Dib C, Asirvatham S, Elesber A, Rihal C, Friedman P, Prasad A. Clinical correlates and prognostic significance of electrocardiographic abnormalities in apical ballooning syndrome (Takotsubo/stress induced cardiomyopathy). Am Heart J. 2009; 157: 933–938
13. Sharkey SW, Lesser JR, Menon M, Parpart M, Maron MS, Maron BJ. Spectrum and significance of electrocardiographic patterns, troponin levels, and thrombolysis in myocardial infarction frame count in patients with stress (tako-tsubo)

cardiomyopathy and comparison to those in patients with ST-elevation anterior wall myocardial infarction. Am J Cardiol. 2008; 101: 1723–1728.

14. Patel SM, Lennon RJ, Prasad A. Regional wall motion abnormality in apical ballooning syndrome (Takotsubo/ stress cardiomyopathy): Importance of biplane left ventriculography for differentiating from spontaneously aborted anterior myocardial infarction. Int J Cardiovasc Imaging. 2012; 28: 687–694.
15. Eitel I, von Knobelsdorff-Brenkenhoff F, Bernhardt P, Carbone I, Muellerleile K, Aldrovandi A, et al. Clinical characteristics and cardiovascular magnetic resonance findings in stress (takotsubo) cardiomyopathy. JAMA. 2011; 306: 277–286.
16. ACC. Takotsubo Syndrome: Expanding Insights, Unanswered Questions. American College of Cardiology. 2024.
17. Santoro F, Stiermaier T, Guastafierro F, et al. Beta-Blocker Therapy in Patients With Takotsubo Syndrome and Long-Term Outcomes. Journal Scan – ACC. 2025.
18. Templin C, Ghadri JR, Diekmann J, et al. Clinical Features and Outcomes of Takotsubo (Stress) Cardiomyopathy. Eur Heart J. 2015;36(26):1823–1832.
19. Effects of pharmacological interventions on mortality in patients with Takotsubo syndrome: a report from the SWEDEHEART registry. ESC Heart Failure. 2024;11(8):1720–1729. doi:10.1002/ehf2.14713