Echocardiographic findings in a patient with Takotsubo syndrome: importance of measurements beyond the ejection fraction

Abstract

Takotsubo syndrome refers to an acute heart failure syndrome that mainly affects postmenopausal women, which is characterized by abnormalities in ventricular segmental contractility accompanied by a reduction in the ejection fraction, which is completely reversible. Although the first case of this disease was described 20 years ago, at present we only have information from observational and descriptive studies, with which in 2016 the European Society of Cardiology publishes a state of the art of this medical condition. We present the case of a 65-year-old woman who consults for chest pain with typical features with elevation of cardiac biomarkers and severe hypokinesia in all apical segments in the echocardiogram, which resolved spontaneously as evidenced in the follow-up images. We present not only the conventional measures but also the global longitudinal strain that shows a characteristic pattern in this type of patients.

Keywords: Takotsubo Cardiomyopathy, Hypokinesia, Echocardiography, Magnetic Resonance Imaging

Introduction

Takotsubo syndrome is a syndrome of heart failure, usually acute, reversible, initially described in the 1990s by Sato and colleagues for the way the left ventricle acquired ventriculography during cardiac catheterization. At that time, the surge due to invasive stratification and primary angioplasty allowed access to a catheterization room for patients with acute coronary syndrome, allowing the presence of a heart “abalonado” in the ventriculogram with contractility disorders but with epicardial arteries without angiographically documented lesions despite the electrocardiographic findings that simulated an acute myocardial infarction with ST segment elevation in the anteroseptal face.

Although more than 2 decades after its initial description, the currently available evidence for this type of cardiac involvement comes from case reports, case series, observational cohorts, and reports of national Takotsubo syndrome registries. The European Society of Cardiology (ESC) in the year 2016 publishes a state of the art of the disease where it proposes an algorithm for diagnosis and treatment of this disease. Within the diagnostic algorithm proposed by the ESC, coronary angiography with left ventriculography should be performed urgently to rule out coronary disease. If there is no compromise in angiography, it should be confirmed that it complies with the diagnostic criteria and indicates an early imaging is an echocardiogram or cardiac magnetic resonance with late enhancement.

Through transthoracic echocardiography as the initial image, left ventricular morphology and function, anatomical variants, possible complications (left ventricular outflow tract obstruction, mitral insufficiency, right ventricular involvement, thrombus formation and rupture cardiac) and follow up during recovery. The following is a case of Takotsubo syndrome in post-menopausal syndrome in which the specific echocardiographic findings are described in this case and the importance of performing additional measurements to conventional ones such as the overall longitudinal strain.

Presentation of the case

A 65-year-old female admitted to the Central Military Hospital (HMC) for a 24-hour period of progression consisting of slow onset thoracic pain with maximum intensity at the hour after emotional, oppressive, retrosternal, intense, irradiated stress upper limb and neck, associated with dyspnoea and dysautonomic symptoms. Consultation at a health center where studies are carried out with non-diagnostic electrocardiogram (Figure 1), report of a cardiac biomarker that is positively elevated, 5 times the cut-off point and echocardiogram with segmental disorders of contractility. Treatment is started for Acute Coronary Syndrome without Elevation of the ST Segment and refer to our institution.

Figure 1. Initial electrocardiogram.
On admission to HMC, the patient referred to persistence of pain of the described characteristics, which is present with an intensity of 4/10 and is not associated at that moment with the dysautonomic symptoms presented at the beginning of the picture. Within the systems review, it presents a NYHA functional class I-II/IV, without orthopnea and chest pain prior to this event. As an important antecedent, the patient is diagnosed with Sjögren’s Syndrome on treatment with pilocarpine, chronic costochondritis and recurrent urinary tract infections.

Among the studies performed on the patient, a positive troponin report was obtained in the initial care center with a delta less than 20%. Hemoglobin, coagulation times, electrolytes, renal function and glycemia were performed in the HMC, which were within normal limits. We documented by transthoracic echocardiogram performed in our institution a mildly decreased left ventricular systolic function (43%) due to hypokinesia (Figure 2). In all apical segments, both apical and lateral apical segments were present in all apical segments, as well as an overall longitudinal strain of -16%, being -7% and -11% in all apical segments.

With the findings of the echocardiogram, the patient is taken to a coronary arteriography where no significant lesions are documented and in the ventriculogram an apical albalonamiento with significant involvement of the ejection fraction is observed. Takotsubo syndrome was considered compatible, so the pharmacological management of the patient was adjusted and a new assessment was scheduled with electrocardiogram (Figure 3) and transthoracic echocardiogram at the month of the event.

On the new echocardiogram, a 60% left ventricular ejection fraction without segmental contractility disorders was documented with an overall longitudinal strain of -21%, which is within normal limits (Figure 4). The patient is currently asymptomatic.

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The Global Longitudinal Strain (SLG) can be used to evaluate regional myocardial function and in the case of STT it has been proposed that the pattern of distribution in the acute phase affects only the apical segments, similar to the image of the evil eye. In addition, the radial strain is reduced along the left ventricular mid-circumference as opposed to the acute myocardial infarction. In patients with the classic STT presentation, there is a decrease of the SLG from the base to the apex with a significant gradient indicating a more severe involvement of the apex, and these alterations in the regional strain improve in the early follow-up, on average at 34 days of the event.

Of advanced cardiovascular imaging, both cardiac magnetic resonance and coronary angiography by tomography are playing an important role both in the diagnosis and management of patients with STT, since not only is the limitation of the acoustic window of the transthoracic echocardiogram and are noninvasive studies unlike cardiac catheterization and ventriculogram. Both images allow the evaluation of the morphology and ventricular function in addition to the characterization of the myocardium allowing to rule out differential diagnoses such as myocarditis and myocardial infarction with non-obstructive coronary arteries or MINOCA. The disadvantage of these studies is that they are not available in all institutions, so the paraclinic recommended as an initial imaging approach would be transthoracic echocardiography.

Conclusion

Takotsubo syndrome is a rare condition of acute reversible heart failure in which an acute coronary syndrome should first be ruled out given the similarity of clinical presentation characteristics and findings in paraclinics such as cardiac biomarkers and initial echocardiographic images. In case of doubts regarding the possibility of secondary compromise to a non-obstructive effect of coronary arteries or other conditions such as myocarditis, studies with advanced images such as cardiac resonance or angiotomography should be complemented.

Ethical responsibilities

Protection of people and animals. The authors state that for this investigation no experiments have been performed on humans or animals.

Confidentiality of the data

The authors state that they have followed the protocols of their work center on the publication of patient data. Right to privacy and informed consent. The authors state that this article does not provide data on patients.

Conflict of interests

The authors declare that they have no conflicts of interest.

References

1. Sato H, Tateishi H, Uchida T. Takotsubo-type cardiomyopathy due to multivessel spasm. En: Kodama K, et al. editors. Clinical Aspect of Myocardial Injury: From Ischemia to Heart Failure. Tokyo: Kagakuhyouoursyusya Co; 1990. 56–64 p.

2. Tsuchihashi K, Ueshima K, Uchida T, 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(1):11–8.

3. Byhee KA, Kara T, Prasad A, et al. Systematic review: transient left ventricular apical ballooning: a syndrome that mimics ST-segment elevation myocardial infarction. Ann Intern Med. 2004;141(11):858–65.

4. Gianni M, Dentali F, Grandi AM, et al. Apical ballooning syndrome or takotsubo cardiomyopathy: a systematic review. Eur Heart J. 2006;27(13):1523–9.

5. Akashi YJ, Musha H, Kida K, et al. Reversible ventricular dysfunction takotsubo cardiomyopathy. Eur J Heart Fail. 2005;7(7):1171–6.

6. Lyon AR, Bossone E, Schneider B, et al. Current state of knowledge on Takotsubo syndrome: a Position Statement from the Taskforce on Takotsubo Syndrome of the Heart Failure Association of the European Society of Cardiology. Eur J Heart Fail. 2016;18(1):8–27.

7. Eitel I, von Knobelsdorff-Brenkenhoff F, Bernhardt P, et al. Clinical characteristics and cardiovascular magnetic resonance findings in stress (takotsubo) cardiomyopathy. JAMA. 2011;306(3):277–86.

8. Citro R, Rigo F, Ciampi Q, et al. Echocardiographic assessment of regional left ventricular wall motion abnormalities in patients with takotsubo cardiomyopathy: comparison with anterior myocardial infarction. Eur J Echocardiogr. 2011;12(7):542–9.

9. Bossone E, Lyon A, Citro R, et al. Takotsubo cardiomyopathy: an integrated multi-imaging approach. Eur Heart J Cardiovasc Imaging. 2014;15(4):366–77.

10. Meimoun P, Clerc J, Vincent C, et al. Non-invasive detection of tako-tsubo cardiomyopathy vs. acute anterior myocardial infarction by transthoracic Doppler echocardiography. Eur Heart J Cardiovasc Imaging. 2013;14(5):464–70.

11. Sharkey SW. A Clinical Perspective of the Takotsubo Syndrome. Heart Fail Clin. 2016;12(4):507–20.

12. Sharkey SW, Windenburg DC, Lesser JR, et al. Natural history and expansive clinical profile of stress (tako-tsubo) cardiomyopathy. J Am Coll Cardiol. 2010;55(4):333–41.

13. Sharkey SW, Maron BJ. Epidemiology and clinical profile of Takotsubo cardiomyopathy. Circ J. 2014;78(9):2119–28.

14. Deshmukh A, Kumar G, Pant S, et al. Prevalence of Takotsubo cardiomyopathy in the United States. Am Heart J. 2012;164(1):66–71.e1.
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15. Haghi D, Athanasiadis A, Papavassiliu T, et al. Right ventricular involvement in Takotsubo cardiomyopathy. *Eur Heart J.* 2006;27(20):2433–9.

16. 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(3):809-16.

17. Citro R, Pontone G, Pace L, et al. Contemporary Imaging in Takotsubo Syndrome. *Heart Fail Clin.* 2016;12(4):559–75.

18. Okura H. Echocardiographic assessment of takotsubo cardiomyopathy: beyond apical ballooning. *J Echocardiogr.* 2016;14(1):13–20.

19. Sosa S, Banchs J. Early recognition of apical ballooning syndrome by global longitudinal strain using speckle tracking imaging—the evil eye pattern, a case series. *Echocardiography.* 2015;32(7):1184–92.

20. Hegemann F, Weiss C, Hamm K, et al. Global and regional myocardial function quantification by two-dimensional strain in Takotsubo cardiomyopathy. *Eur J Echocardiogr J.* 2009;10(6):760–4.

21. Plácido R, Cunha Lopes B, Almeida AG, et al. The role of cardiovascular magnetic resonance in takotsubo syndrome. *Journal of Cardiovascular Magnetic Resonance.* 2016;18(1):68.

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