



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.

REC: CardioClinics

www.reccardioclinics.org

Cartas científicas

Heartbreaking applause: an unexpected consequence of the COVID-19 crisis



Un aplauso que te rompe el corazón: una consecuencia inesperada de la crisis de la COVID-19

Dear Editor:

Global pandemics may affect the population in a wide variety of ways and everyone is at risk of its consequences. In Spain, since the beginning of the confinement due to the COVID-19 pandemic, a daily tribute to healthcare professionals is organized, as up to 15% of positive cases belong to this collective. Every day, at 8 pm, people go out to their windows and balconies to cheer-up and thank doctors, nurses, and the rest of healthcare professionals for their work and effort in this health crisis.

The first day that this tribute took place, a 63-year-old woman presented to the emergency department with chest pressure irradiated to both arms. She was clapping at the window, moved by the applause, accompanied by her family when the chest pain started. She did not present shortness of breath, palpitations, or syncope.

Her initial blood pressure was 154/96 mmHg, her heart rate was 76 beats/min, her respiratory rate was 15 breaths/min and she had a saturation of 99% on room air. The physical examination, including the central nervous system examination, was unremarkable.

The patient did not have any cardiovascular risk factors. She was assessed 3 years ago because of exercise-related chest pain. A complete study was performed, including coronary angiography, and single-photon emission computed tomography with methoxy isobutyl isonitrile (SPECT-MIBI), without inducible ischemia or significant coronary stenosis. She did not take any medications.

The differential diagnosis was extensive in this previously healthy woman presenting with chest pain. It included acute coronary syndrome secondary to atherosclerotic disease, coronary vasospasm, microvascular angina, pericarditis, acute myocarditis, pulmonary embolism, and stress cardiomyopathy.

The first electrocardiogram (ECG), performed when the patient arrived, showed sinus rhythm with 1 mm ST-segment

depression in V4–V6 (Fig. 1A). Serial electrocardiograms after chest pain reduction showed correction of repolarization abnormalities. Her laboratory workup, including complete blood count, electrolytes, renal function, and N-terminal pro-brain natriuretic peptide levels, were normal. Cardiac biomarkers were elevated (troponin I 0.23–2.2–1.6; normal values < 0.01 ng/mL).

The patient was initially treated as an acute coronary syndrome without ST elevation and was given treatment with aspirin, ticagrelor, fondaparinux, and atorvastatin.

Bedside echocardiography demonstrated depressed left ventricular function with akinesia of the apical segments and mid anterior septum. The invasive coronary angiography, performed 24 h after admission, showed mild stenosis in the left anterior descending artery. Left ventriculogram exhibited apical akinesia with hypercontractility of basal segments, and moderate left ventricular systolic dysfunction (Fig. 2) (video 1 of the supplementary data).

Taking into account all the previous findings, the case was interpreted as a typical variant of stress cardiomyopathy. Dual antiplatelet therapy and anticoagulation were withdrawn, and angiotensin-converting enzyme inhibitors and beta-blockers were started.

Repeat transthoracic echocardiogram performed 48 h later, showed improvement of the left ventricular ejection fraction with an estimated left ventricular ejection function of 50%, with no evidence of systolic anterior motion of the mitral valve or outflow tract obstruction.

Serial electrocardiograms showed negative T waves in precordial leads and prolonged QTc interval (Fig. 1B), which progressively normalized in the following days, and the patient was discharged from hospital asymptomatic.

We present an unusual cause of acute stress-induced cardiomyopathy or tako-tsubo syndrome triggered by the collective acclaim of our population to the health care workers during the Spanish crisis.

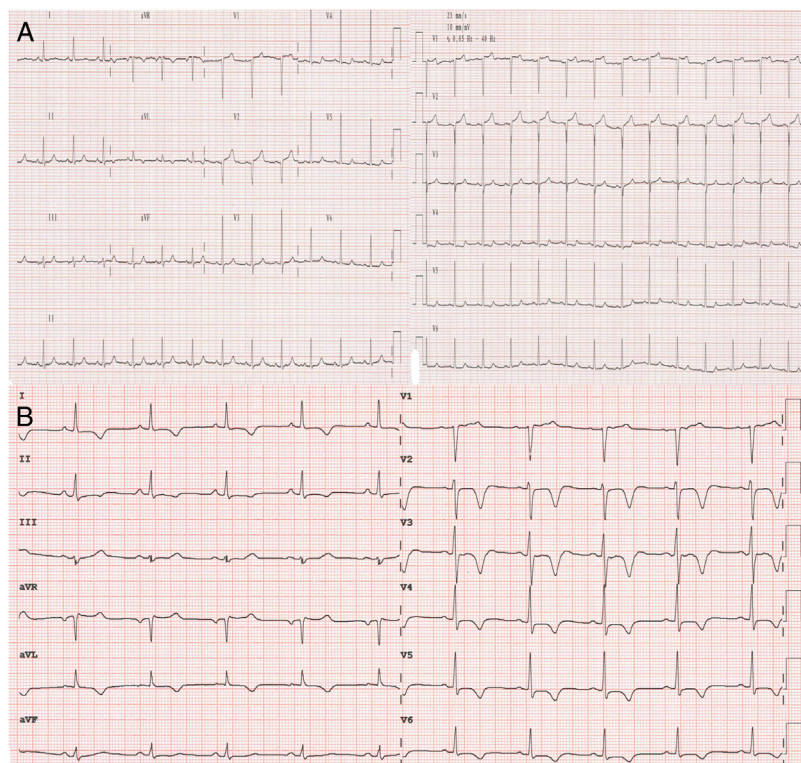


Fig. 1 – (A) The first electrocardiogram (ECG), performed when the patient arrived, showed sinus rhythm with 1 mm ST segment depression in V4–V6. (B) Serial electrocardiograms showed negative T waves in precordial leads and prolonged QTc interval.

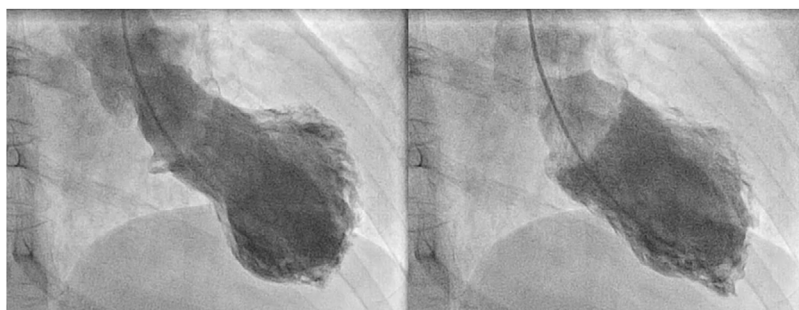


Fig. 2 – Left ventriculogram exhibited apical akinesia with hypercontractility of basal segments, and moderate left ventricular systolic dysfunction.

Acute stress-induced cardiomyopathy is a cardiovascular entity that mimics acute coronary syndrome. This syndrome usually affects postmenopausal women, and it is frequently triggered by physical or emotional stress.¹⁻³ It consists of transitory left ventricular systolic dysfunction in the context of normal coronary arteries.¹⁻³ The pathophysiology is not completely understood, but it is thought that sympathetic hyperactivity due to an increase in circulating catecholamines leads to ventricular dysfunction.^{2,3} Several variants are described: the apical variant is the most common one and is more frequently associated with emotional triggers, whereas the midventricular and inverted types are less frequent, and are more commonly related with associated neurological damage.^{4,5}

Since left ventricular function recovers in the following days or weeks after the beginning of symptoms, this syndrome was previously considered a benign entity with a very good prognosis. However, recent studies have demonstrated that the risk of mortality and complications in the acute phase of the disease is similar to that of acute coronary syndromes.³ The potential trigger involved in this pathology has been proved to be relevant regarding patients' outcome, and elderly patients with emotional triggers have a lower risk than younger patients with physical triggers.

Tako-tsubo syndrome provoked by emotional triggers is usually associated with negative, traumatic, or stressful events. However, positive emotions can also trigger this syndrome in a small proportion of patients, which has been

described as the “happy heart syndrome”,⁶ as in the herein case.

Repeat echocardiography performed 15 days after discharge demonstrated a complete recovery of left ventricular systolic function and wall motion abnormalities. The patient did not report new cardiovascular symptoms and continues clapping every evening during the COVID-19 quarantine.

Stress cardiomyopathy affects mainly middle-aged women and is frequently associated with emotional triggers. The daily touching tribute that takes place to acclaim health care professionals during the Spanish COVID-19 quarantine had in our case an unexpected cardiovascular consequence, as the heartwarming applause turned into a heartbreaking one.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at [doi:10.1016/j.rccl.2020.05.004](https://doi.org/10.1016/j.rccl.2020.05.004)

REFERENCES

1. Dawson DK. Acute stress-induced (takotsubo) cardiomyopathy. *Heart*. 2018;104:96–102.
2. Ghadri J-R, Wittstein IS, Prasad A, et al. International Expert Consensus Document on Takotsubo Syndrome (Part I): clinical characteristics diagnostic criteria, and pathophysiology. *Eur Heart J*. 2018;39:2032–2046.
3. Templin C, Ghadri JR, Diekmann J, et al. Clinical features and outcomes of Takotsubo (stress) cardiomyopathy. *N Engl J Med*. 2015;373:929–938.
4. Belliveau DJ, Weeks AC, McKelvey R, Mulvagh S. Cardiogenic shock in a healthy young woman with acute onset abdominal and chest pain. *JACC Case Rep*. 2020;2:24–27.
5. Olmos C, Islas F, Sánchez-Enrique C, Nombela-Franco L, das Neves B, Luaces M. Broken heart, broken spine: a case of inverted Tako-Tsubo syndrome. *Int J Cardiol*. 2014;174:e1–e3.
6. Ghadri JR, Sarcon A, Diekmann J, et al. Happy heart syndrome: role of positive emotional stress in takotsubo syndrome. *Eur Heart J*. 2016;37:2823–2829.

Pablo Zulet*, Irene Carrión, Fabián Islas, Iván Núñez-Gil, Javier Higuera, Carmen Olmos
 Instituto Cardiovascular, Hospital Clínico San Carlos, Instituto de Investigación Sanitaria del Hospital Clínico San Carlos (IdSSC), Madrid, Spain

* Corresponding author.

E-mail address: pazulet@hotmail.com (P. Zulet).

<https://doi.org/10.1016/j.rccl.2020.05.004>

2605-1532/

© 2020 Sociedad Española de Cardiología. Published by Elsevier España, S.L.U. All rights reserved.

Protocolo de manejo hospitalario de alteraciones electrocardiográficas en pacientes con COVID-19 con un sistema portátil vinculado a *smartphone*

In-hospital management protocol of electrocardiographic disturbances in COVID-19 patients via a smartphone-connected device



Sr. Editor:

Durante la pandemia por SARS-CoV-2, asistimos a una vertiginosa adaptación y creación de recursos científicos novedosos sin precedentes a fin de dar la mejor atención a nuestros pacientes y, al mismo tiempo, proteger al personal sanitario y al resto de la población de nuevos contagios. La elevada contagiosidad del SARS-CoV-2 obliga a reducir al máximo el contacto entre el personal sanitario y los pacientes con COVID-19. La infección de COVID-19 presenta un amplio abanico de manifestaciones clínicas, incluyendo afectación cardiovascular en forma de miocarditis o disfunción ventricular. Además, hasta un 17% de los pacientes hospitalizados registran arritmias en las series publicadas, con porcentajes de hasta el 45% en las unidades de cuidados intensivos¹. Des-

graciadamente no hay una descripción pormenorizada de las mismas, aunque se han descrito casos aislados de muerte súbita en relación a arritmias ventriculares. Esto, unido a la posibilidad de prolongación del QT secundaria al uso de fármacos dirigidos a la COVID-19, y su potencial desarrollo de *torsade de pointes*, más aún en el contexto de pacientes críticos con alteraciones iónicas², o a la tendencia a la bradicardia conocida en otros cuadros clínicos provocados por coronavirus³, hacen recomendable la seriación por electrocardiograma (ECG) de estos pacientes. Sin embargo, la realización de ECG tradicionales de 12 derivaciones se hace sumamente laboriosa debido a las medidas de protección individual que debe tomar el técnico y a la necesaria asepsia del sistema.

Para minimizar la exposición de personal y de equipo que supone la realización del ECG convencional, se ha puesto