

Takotsubo Cardiomyopathy After mRNA COVID-19 Vaccination



Martina Boscolo Berto, MD^a, Giancarlo Spano, MD^a,
 Benedikt Wagner, MD^b, Benedikt Bernhard, MD^a, Jonas Häner, MD^a,
 Adrian T. Huber, MD, PhD^b, Christoph Gräni, MD, PhD^{a,*}

^aDepartment of Cardiology, Inselspital, Bern University Hospital, University of Bern, Bern, Switzerland

^bDepartment of Diagnostic, Interventional and Paediatric Radiology, Inselspital, Bern University Hospital, University of Bern, Bern, Switzerland

Received 14 June 2021; accepted 22 June 2021; online published-ahead-of-print 15 July 2021

A healthy 63-year-old woman with no cardiovascular risk factors was admitted to the emergency room with new-onset dyspnoea and fever. The symptoms started 1 day after receiving the first of two mRNA-1273 (Moderna, Cambridge, MA, USA) COVID-19 vaccinations. She had no other prior

complaints. A retronasal severe acute respiratory syndrome coronavirus 2 polymerase chain reaction test was negative. Laboratory tests revealed normal results for creatinine, creatine kinase, and creatine kinase MB (myocardial type). High-sensitivity troponin T was elevated at 320 ng/L

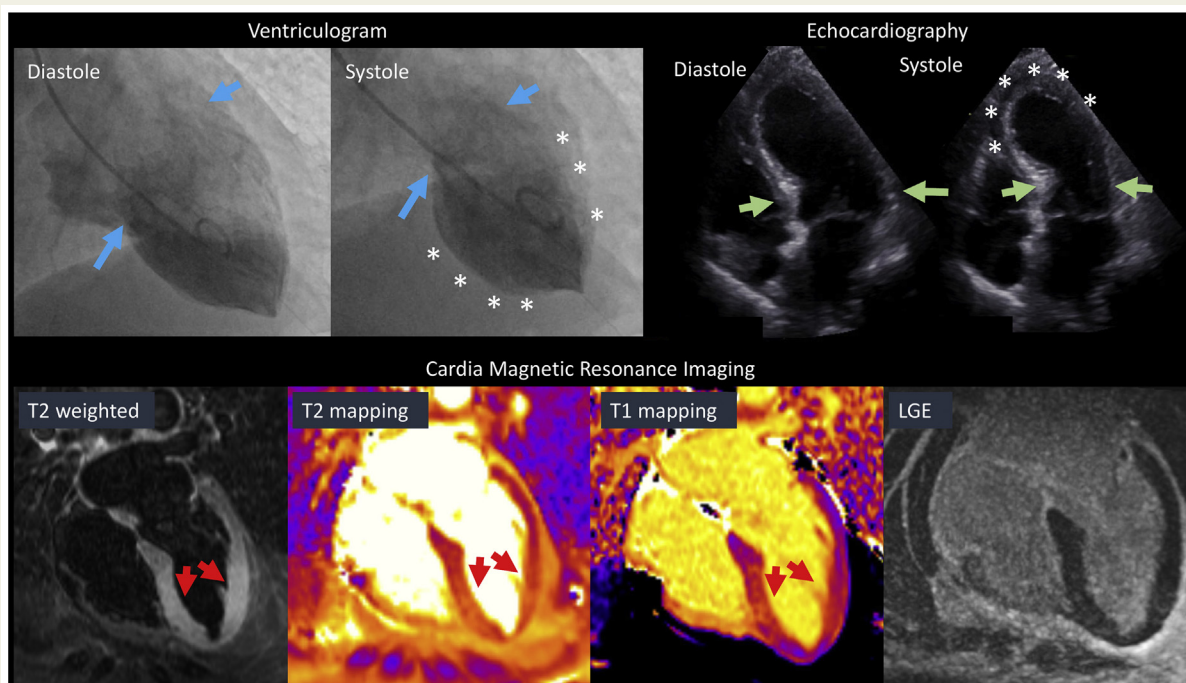


Figure 1 Multimodality imaging using ventriculography, Echocardiography and cardiac magnetic resonance of Takotsubo cardiomyopathy after COVID-19 mRNA vaccination.

*Corresponding author at: Department of Cardiology, University Hospital Bern, University of Bern, Freiburgstrasse 18, CH- 3010 Bern, Switzerland; Email: christoph.graeni@insel.ch; Twitter: @chrisgraeni

© 2021 The Author(s). Published by Elsevier B.V. on behalf of Australian and New Zealand Society of Cardiac and Thoracic Surgeons (ANZSCTS) and the Cardiac Society of Australia and New Zealand (CSANZ). This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

(normal: <14 ng/L), and N-terminal pro-B-type natriuretic peptide was highly elevated at 10,180 pg/mL (normal: <284 pg/mL). C-reactive protein was elevated, but the leucocytes were within the normal range at 8.44 g/L (reference interval [RI]: 3.00–10.5 g/L). Urine and blood cultures were negative. Computed tomography scan of the chest revealed no pulmonary embolism but did show signs of heart failure. An electrocardiogram showed negative T waves over the inferior/anterior leads. Invasive coronary angiography ruled out coronary artery disease, but the ventriculogram (Figure 1) showed mid-ventricular to apical ballooning (asterisk) with preserved basal contraction (blues arrows) and a moderately impaired left ventricular ejection fraction of 40%. Apical ballooning was confirmed by echocardiography and cardiac magnetic resonance imaging (CMR). CMR tissue characterisation further depicted extensive oedema in the mid-ventricular/apical segments (i.e., T2-weighted imaging in the myocardium vs skeletal muscle with a signal intensity ratio of >2.0), elevated T2 mapping at 56 ms (RI: 42–50 ms), elevated T1 mapping at 1,158 ms (RI: 903–1,059 ms), and the extracellular volume fraction was elevated at 35% (RI: 25±4%). There was no late gadolinium enhancement suggesting peri-/myocarditis and no pleural or pericardial effusion. As there were no other stressors that could be determined to be underlying the midventricular/apical oedema and ballooning, the

most probable diagnosis of COVID-19 vaccine-induced Takotsubo cardiomyopathy (TCM) was made. Although myocarditis is a possible differential diagnosis after COVID-19 vaccination [1], the clinical and investigative features of this case were strongly suggestive of TCM. There have been rare reports of TCM after influenza vaccination [2,3], with an underlying pathophysiology of systemic inflammatory stress reaction after vaccination with a sympathovagal imbalance towards adrenergic predominance [4]. TCM confirmed by CMR after a COVID-19 vaccination has not yet been reported and may be considered as a differential diagnosis besides myocarditis in this clinical setting.

References

- [1] Abu Mouch S, Roguin A, Hellou E, Ishai A, Shoshan U, Mahamid L, et al. Myocarditis following COVID-19 mRNA vaccination. *Vaccine*. 2021;39:3790–3.
- [2] Singh K, Marinelli T, Horowitz JD. Takotsubo cardiomyopathy after anti-influenza vaccination: catecholaminergic effects of immune system. *Am J Emerg Med*. 2013;31:1627.
- [3] Santoro F, Ieva R, Ferraretti A, Carpagnano G, Pappalardo I, De Gennaro L, et al. Tako-Tsubo cardiomyopathy after influenza vaccination. *Int J Cardiol*. 2013;167:e51–2.
- [4] Lanza GA, Barone L, Scalone G, Pitocco D, Sgueglia GA, Mollo R, et al. Inflammation-related effects of adjuvant influenza A vaccination on platelet activation and cardiac autonomic function. *J Intern Med*. 2011;269:118–25.