A postvaccination complication

Takotsubo syndrome after COVID-19 vaccination with the Pfizer/Biontech or Moderna vaccines

Burbuqe Ibrahimi[a], Hanane Hireche[a,b], Igal Moarof[a]

[a] Cardiology, Kantonsspital Baden, Switzerland; [b] Radiology, Kantonsspital Baden, Switzerland

A 68-year-old female patient with history of arterial hypertension, renal failure KDIGO grade 3a and urothelial carcinoma was admitted to the emergency room with chest pain and high blood pressure (195/86 mm Hg). She was taking olmesartan and nebivolol. The symptoms started 7 days after receiving the second dose of mRNA-BNT162b2 (Pfizer/Biontech) COVID-19 vaccine. A retronasal severe acute respiratory syndrome coronavirus 2 polymerase chain reaction test was negative. Her high-sensitive troponin was elevated at a peak of 107 ng/l (reference <14 ng/l) with a normal creatine kinase and slightly elevated creatinine at 88 µmol/l (reference interval 44– 80 µmol/l). C-reactive protein and leucocytes were within the normal range. The ECG showed ST depression over the anterior leads (V3–V5). We decided on an invasive strategy. Her Grace score was 99 points. Invasive coronary angiography ruled out coronary artery disease, but the ventriculogram showed mid-ventricular ballooning with preserved basal contraction and a mildly reduced left ventricular ejection fraction of 45%. Midventricular ballooning was confirmed by echocardiography and cardiac magnetic resonance imaging (CMR). CMR tissue characterisation further depicted extensive oedema in the mid-ventricular segments without evidence of myocardial infarction. There was no late gadolinium enhancement suggesting peri-/myocarditis and no pleural or pericadial effusion (fig. 1). As there were no other stressors that could be determined to be underlying the midventricular oedema and ballooning, the most probable diagnosis of COVID-19 vaccine-induced takotsubo syndrome was made. There were not any other triggers for takotsubo syndrome as physical or emotional stress, which could have increased the cardiosympathetic system.

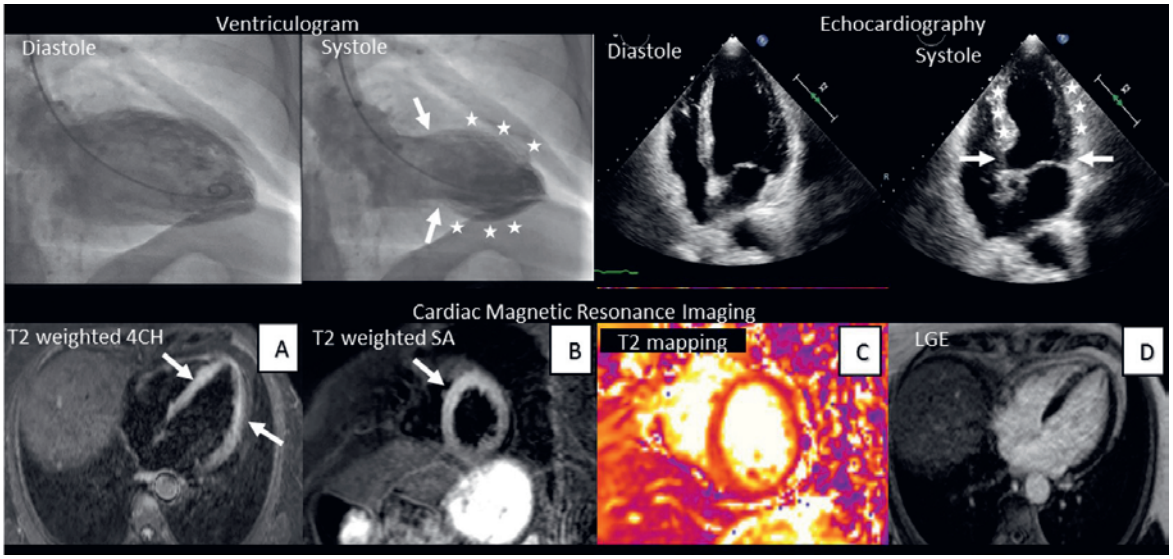

Figure 1: Multimodality imaging using ventriculography, echocardiography and cardiac magnetic resonance of Takotsubo syndrome after COVID-19 vaccination with Pfizer/Biontech.
CMR: **A+B**) T2w imaging 4CH and SA: myocardial hypersignal suggestive of diffuse myocardial oedema at the midventricular segments (white arrows). **C**) T2-mapping SA: raised T2 values at midventricular segments indicating oedema in these segments. **D**) LGE 4CH: no evidence of myocardial infarction after the contrast administration.

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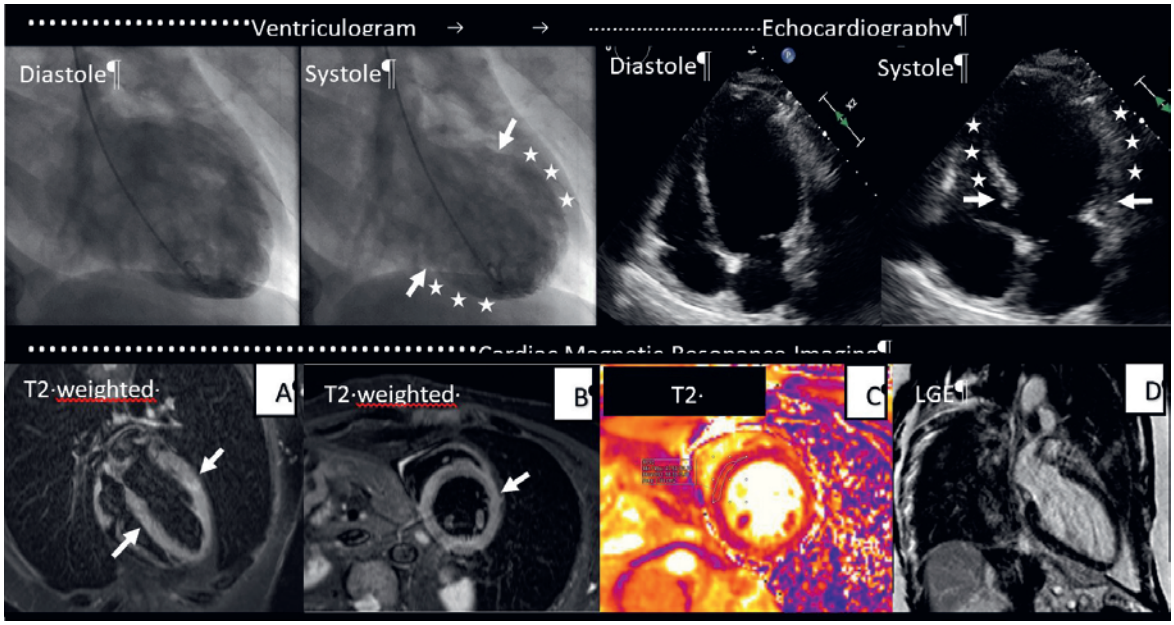

Figure 2: Multimodality imaging using ventriculography, echocardiography and cardiac magnetic resonance of Takotsubo-syndrome after Covid-19-vaccination with Moderna CMR: **A+B**) T2w imaging 4CH and SA: myocardial hypersignal suggestive of diffuse myocardial oedema at the midventricular segments (white arrows). **C**) T2-mapping SA: raised T2 values at midventricular segments indicating oedema in these segments. **D**) LGE 2CH: no evidence of myocardial infarction after the contrast administration.

Another patient, a 59-year-old male, with a bicuspid aortic valve with moderate to severe regurgitation and high blood pressure, was admitted to the emergency room with chest pain. He was taking candesartan/hydrochlorothiazide and bisoprolol. The symptoms started 13 days after receiving the second covid mRNA-1273 (Moderna) COVID-19 vaccination. A retronasal severe acute respiratory syndrome coronavirus 2 polymerase chain reaction test was negative. His high-sensitive troponin T was elevated at a peak of 787 ng/l (reference <14 ng/l) with elevated creatine kinase at a peak of 343 U/l (reference <190 U/l) and elevated creatinine 178 µmol/l (reference interval 62– 106 –mol/l). C-reactive protein was elevated at 21 mg/l (reference <5 mg/l) but leucocytes were within the normal range. The ECG showed a right bundle branch block with an AV-block I° (271 ms). We decided again for an invasive strategy due to the high Grace Score (112 points). Invasive coronary angiography ruled out coronary artery disease, but the ventriculogram showed midventricular ballooning with preserved basal contraction and a reduced left ventricular ejection fraction of 35%. Midventricular ballooning was confirmed by echocardiography and CMR. CMR tissue characterisation further depicted extensive oedema in the midventricular segments without evidence of myocardial infarction. There was no late gadolinium enhancement suggesting peri-/myocarditis, and no pleural or pericadial effusion (fig. 2). There were no other stressful causes, which could explain the development of takotsubo syndrome. He did not have any physically or mental stress recently.

Takotsubo syndrome as a complication after COVID-19 is well known and has already been described [1, 2]. Takotsubo syndrome after mRNA COVID-19 vaccination is a very rare complication. There have been only few cases published yet [3–6]. However, takotsubo syndrome has already been detected after influenza vaccination in two other cases. The hypothesis for a sudden postvaccination change in the cardiac sympathetic discharge was the most likely precipitant of takotsubo syndrome in these cases [1, 2]. Vaccination in general causes a systemic inflammatory reaction. This subclinical inflammation leads to imbalance in the cardiosympathetic system, with an increase in sympathetic discharge [8].

Myocarditis after mRNA COVID-19 vaccination has been described [7], and seems to be another heart complication of mRNA COVID-19 vaccines. As a large percent of the world's population will be vaccinated against COVID-19, healthcare professionals should be informed about this rare but severe complication after mRNA COVID-19 vaccines.

Burbuqe Ibrahimi, MD
Kantonsspital Baden AG
Cardiology Department
Im Ergel 1
CH-5404 Baden
burbuqe.ibrahimi[at]ksb.ch

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References
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