



# Takotsubo cardiomyopathy following a virtual work meeting during COVID-19 pandemic: a case report

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**Background:** Coronavirus disease 2019 (COVID-19) has a great impact on both, physical and psychological wellbeing. The COVID-19 pandemic promoted increasing digitalization of the work environment and social isolation. This psychosocial stress in turn can induce physical distress with clinical manifestation. So can the changed work and social environment in the COVID-19 pandemic trigger acute cardiovascular disease?

**Case Description:** Here, we present a case of a 56-year-old postmenopausal woman suffering from Takotsubo cardiomyopathy (TTC) evoked by emotional stress during a virtual work meeting. Like many others, our patient was urged to work from home (WFH) in accordance with the contact restrictions due to COVID-19. She presented at our chest pain unit with typical angina pectoris-like symptoms such as chest pain and dyspnea. Laboratory analysis confirmed increased troponin levels and evolving T wave inversion in electrocardiogram. Acute coronary syndrome management was commenced. Coronary angiography and left ventriculography revealed non-obstructive coronary arteries and apical ballooning syndrome. Due to immediate guideline-directed treatment with bisoprolol, ramipril, spironolactone and acetylsalicylic acid the patient's condition improved so that she could be discharged after seven days. During a 3-month follow-up the patient showed a normalized ejection fraction and reported no discomfort anymore.

**Conclusions:** The ongoing COVID-19 pandemic has also elucidated the importance of the psychosocial health issues in acute cardiovascular care. Having in mind that the social and work environment recently has changed immensely, thus enforcing social isolation and emotional distress, doctors as well as patients must consider TTC as possible etiology of sudden chest pain.

**Keywords:** Takotsubo cardiomyopathy (TTC); coronavirus disease 2019 (COVID-19); left ventricular systolic dysfunction; case report; work from home (WFH)

Received: 08 February 2023; Accepted: 01 August 2023; Published online: 15 September 2023.

doi: 10.21037/acr-23-18

View this article at: <https://dx.doi.org/10.21037/acr-23-18>

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## Introduction

Takotsubo cardiomyopathy (TTC) is a cardiac disorder featuring acute myocardial infarction and transient left ventricular systolic dysfunction often triggered by recent emotional or physical stress. Both, the symptoms (chest pain and/or dyspnea) and the electrocardiogram (ECG) changes (ST elevation, T-wave inversion, ST depression, left bundle branch block) resemble those of acute coronary syndrome (ACS). Even more, since serum troponin levels are elevated in those patients (1,2).

TTC is usually diagnosed by coronary angiography displaying a systolic apical ballooning appearance (3) despite coronary arteries not being obstructed.

Studies suggest catecholamine cardiotoxicity, coronary microvascular impairment, and coronary artery spasm as possible underlying causes (4,5). We present this article in accordance with the CARE reporting checklist (available at <https://acr.amegroups.com/article/view/10.21037/acr-23-18/rc>).

## Case presentation

A 56-year-old female without previous cardiac history presented to the emergency department at the Evangelisches Krankenhaus Düsseldorf (Germany) with a complaint of chest pain and dyspnea. Following an online work meeting in the morning she had developed left substernal chest pain without any radiation. The patient reported that already during the online session she felt very excited and mentally tense and did not improve even after calming down.

### Highlight box

#### Key findings

- Psychosocial stress induces physical distress with clinical manifestation.

#### What is known and what is new?

- Coronavirus disease 2019 (COVID-19) pandemic promotes increasing digitalization of the work environment and social isolation.
- Psychosocial stress evoked by virtual work meetings can be a trigger of Takotsubo cardiomyopathy.

#### What is the implication, and what should change now?

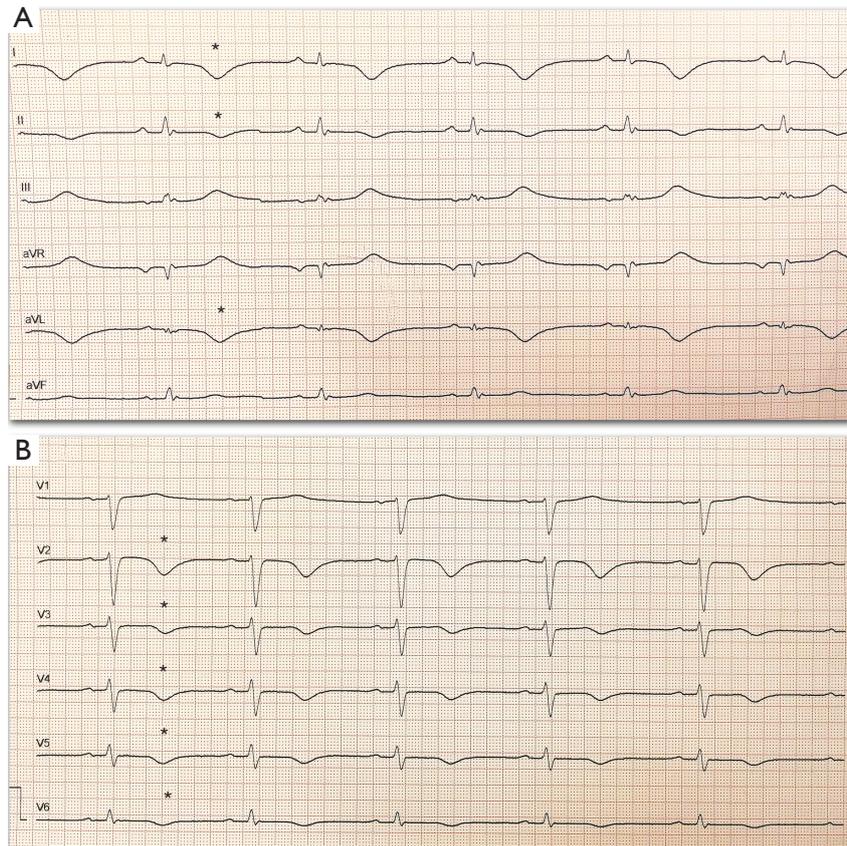
- Increase doctors' awareness of the increased load of psychosocial stress due to COVID-19 leading to more or aggravated physical problems.
- Decrease social isolation and re-establish social (work) environment hand in hand with the growing COVID-19 immunization rate.

Prior to this, the patient was in good health, both physically and mentally, and denied any previous history of angina or similar symptoms in the past. She is of normal weight and performed well in a stress ECG which was performed during a checkup at the family doctor in 2020. Thus, she did not display an increased cardiovascular risk profile. She further reported no history of anxiety or other psychological disorders. Apart from cortisone cream to treat psoriasis on her hands and feet she took no further medication.

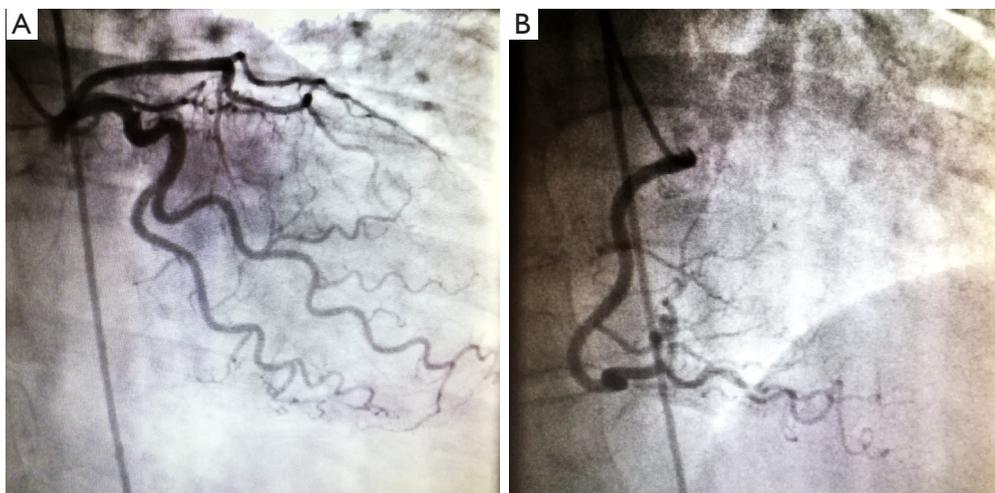
Upon arrival to the emergency department the initial vital signs were within normal limits and stable. Physical examination was essentially normal. ECG (*Figure 1*) showed a normal frequency sinus rhythm with T-wave inversions [leads I, II, augmented vector left (aVL) and anterolateral chest leads from V2 to V6]. Initial troponin-T levels were elevated at 352 ng/L (reference range <14 ng/L) and creatinine kinase levels at 119 U/L (reference range <170 U/L). After one hour the levels peaked at 359 ng/L and 121 U/L, respectively. A mildly reduced ejection fraction with hypokinesia of the anterior septum and apical segment was noted during transthoracic echocardiography.

Since blood results and ECG findings were suggestive of ACS, coronary angiography was performed. This examination revealed no obstructive coronary artery disease (*Figure 2*) but demonstrated akinesia of the inferior, apical, and anterior wall with hyper-dynamic basal segments with apical ballooning indicating TTC (*Figure 3*). Guideline-directed medical therapy was initiated with bisoprolol [2.5 mg 1-0-1 per os (p.o.)], ramipril (2.5 mg 1-0-1 p.o.), spironolactone (25 mg 1-0-0 p.o.) and acetylsalicylic acid (100 mg 1-0-0 p.o.) (*Figure 4*). The next day, the patient reported no thoracic discomfort anymore. The medication was well-tolerated assessed by daily physical examination such as measurement of blood pressure and heart rate. Biochemistry analysis revealed decreasing troponin levels. The patient was discharged after seven days and instructed to follow up with ECG and transthoracic echocardiography in 4 weeks. The follow-up transthoracic echocardiography confirmed that the ejection fraction had normalized. The patient reported no discomfort anymore.

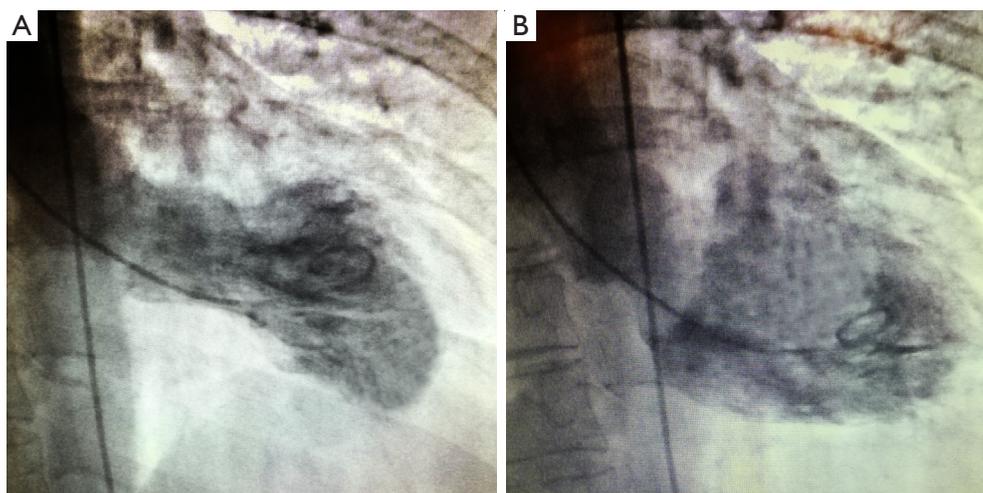
All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the editorial office of this journal.



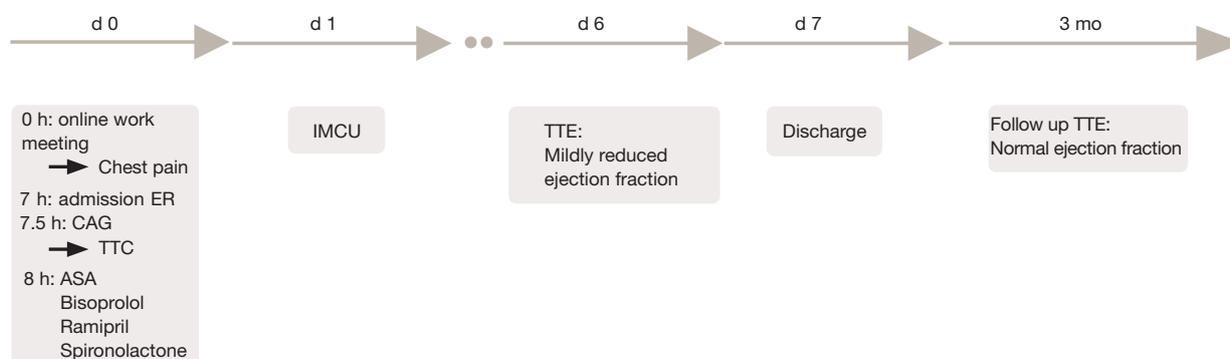
**Figure 1** ECG written at a speed of 50 mm/s showing T-wave inversions (\*) in leads I, II, aVL (A) and anterolateral chest leads from V2 to V6 (B). Each large square on the horizontal axis equals 0.1 s. aVR, augmented vector right; aVL, augmented vector left; aVF, augmented vector foot; ECG, electrocardiogram.



**Figure 2** Coronary angiography of the left (A) and right (B) coronary arteries. No signs of stenosis are detectable.



**Figure 3** Left ventriculography during systole (A) and diastole (B) demonstrating the left ventricle ballooning or apical ballooning syndrome.



**Figure 4** Timeline depicting specific times and important components of the case. d, day; mo, months; ER, emergency department; CAG, coronary angiogram; TTC, takotsubo cardiomyopathy; ASA, acetylsalicylic acid; IMCU, intermediate care unit; TTE, transthoracic echocardiogram.

## Discussion

To our knowledge we report the first case of TTC following a virtual work meeting (on a well-known online platform) during the coronavirus disease 2019 (COVID-19) pandemic. A previously healthy 56-year-old female acquired psychosocial stress-induced left ventricular dysfunction, diagnosed as TTC.

Proposed risk factors for TTC are stress-induced increase of catecholamines, microvascular dysfunction, inflammation, and estrogen deficiency (1,2,6). Often catecholamine levels are elevated in the plasma of these patients. Estrogen on the other hand executes protective effects on the vascular

system promoting vasodilation and on the endothelium function (3). Therefore, postmenopausal women are more likely to miss out on these protective effects. Indeed, studies have illuminated that women older than 55 years have an almost five-fold risk of developing TTC compared to those younger than 55 years (7).

Recent studies unveiled an overall negative impact of COVID-19 on daily life, work and social activity associated with greater psychological difficulties (8,9).

In accordance with the COVID-19 restrictions at the work place many employees, and so our patient, are urged to work from home (WFH). WFH bears higher risks to suffer from social distancing and social isolation. Virtual

meetings cannot replace face-to-face meetings in reality since they are often limited and regulated in terms of body language, interaction between colleagues and informal exchange of ideas. This promotes work conflicts more easily (10) associated with emotional distress.

Our patient matches this profile. She is post her menopause and older than 55 years. Furthermore, during the COVID-19 pandemic she worked from home for almost 12 months in a human resources department and had to face the psychosocial challenges evoked through the pandemic and the altered work situation. In this context, the emotional stress triggered at the work meeting may have been amplified out of scale.

## Conclusions

This case undermines the impact of the COVID-19 pandemic on the psychosocial issues in this altered work environment.

In times of the ongoing pandemic, this topic is of current interest, since TTC has a comparable death rate to ACS (11). Thus, an early consultation and timely treatment at a hospital affiliated with a chest pain unit is mandatory; even more, since people avoid hospitals in fear of a COVID-19 infection and being out of capacity. During this challenging time, doctors should be aware of the increased load of psychosocial stress due to COVID-19 leading to more or aggravated physical problems such as demonstrated by our case of TTC.

## Acknowledgments

*Funding:* None.

## Footnote

*Reporting Checklist:* The authors have completed the CARE reporting checklist. Available at <https://acr.amegroups.com/article/view/10.21037/acr-23-18/rc>

*Peer Review File:* Available at <https://acr.amegroups.com/article/view/10.21037/acr-23-18/prf>

*Conflicts of Interest:* All authors have completed the ICMJE uniform disclosure form (available at <https://acr.amegroups.com/article/view/10.21037/acr-23-18/coif>). The authors have no conflicts of interest to declare.

*Ethical Statement:* The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the editorial office of this journal.

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doi: 10.21037/acr-23-18

**Cite this article as:** Zhu E, Scherschel K, Schedlowski M, Meyer C. Takotsubo cardiomyopathy following a virtual work meeting during COVID-19 pandemic: a case report. *AME Case Rep* 2023;7:40.