

Images in Cardiovascular Disease



Two Fatal Cases of Stress-induced Cardiomyopathy in COVID-19 Patients

Jae-Hyeong Park , MD, PhD¹, Jae Young Moon , MD, PhD²,
Kyung Mok Sohn , MD, PhD³, and Yeon-Sook Kim , MD, PhD³

¹Division of Cardiology, Department of Internal Medicine, Chungnam National University Hospital, Chungnam National University School of Medicine, Daejeon, Korea

²Division of Pulmonology and Critical Care Medicine, Department of Internal Medicine, Chungnam National University Hospital, Chungnam National University College of Medicine, Daejeon, Korea

³Division of Infectious Diseases, Department of Internal Medicine, Chungnam National University School of Medicine, Daejeon, Korea



Received: Jul 27, 2020

Accepted: Aug 2, 2020

Address for Correspondence:

Jae-Hyeong Park, MD, PhD

Division of Cardiology, Department of Internal Medicine, Chungnam National University Hospital, School of Medicine, Chungnam National University, 282 Munhwa-ro, Jung-gu, Daejeon 35015, Korea.

E-mail: jaehpark@cnu.ac.kr

Copyright © 2020 Korean Society of Echocardiography

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<https://creativecommons.org/licenses/by-nc/4.0/>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ORCID iDs

Jae-Hyeong Park

<https://orcid.org/0000-0001-7035-286X>

Jae Young Moon

<https://orcid.org/0000-0001-8724-6289>

Kyung Mok Sohn

<https://orcid.org/0000-0002-3237-044X>

Yeon-Sook Kim

<https://orcid.org/0000-0003-1142-5488>

Conflict of Interest

The authors have no financial conflicts of interest.

Stress-induced cardiomyopathy (SCMP) is characterized by transient left ventricular (LV) systolic dysfunction with regional wall motion abnormalities that do not match coronary arterial territories.¹⁾ Although this syndrome is similar to acute myocardial infarction, the diagnosis of SCMP requires the absence of obstructive coronary artery disease or acute plaque rupture.²⁾ There are several types of SCMP: apical ballooning (typical type, about 75–80%), midventricular ballooning (about 10–20%), basal ballooning (inverted type, about 5%), and biventricular type (less than 0.5%). The estimated incidence of SCMP is about 1–2% of patients with suspected acute coronary syndrome.³⁾⁴⁾ Because it can be caused by intensive emotional or physical stress, there can be occurrences of SCMP in patients with novel coronavirus disease-2019 (COVID-19). In one study of 1,216 COVID-19 patients, SCMP incidence was 2% (19 patients).⁵⁾ The reported in-hospital SCMP mortality is up to 5%. We present 2 fatal cases of SCMP in COVID-19 patients requiring intensive care.

CASE 1

A 78-year-old woman presented with fever and sore throat for the previous 7 days. She was admitted to another hospital due to worsening dyspnea. Initial vital signs at admission were as follows: blood pressure, 114/76 mmHg, heart rate, 112 beats/min; respiratory rate, 24 breaths/min; and body temperature, 38.4°C. After admission, her systolic blood pressure dropped to 80 mmHg and her oxygen saturation was 60%. She was transferred to the intensive care unit and treated with a ventilator. Then, the patient was transferred to our hospital for further treatment. Initial chest X-ray showed diffuse infiltration of whole lung fields (**Figure 1A**). The electrocardiogram showed sinus rhythm with right bundle branch block, and initial echocardiography was normal LV systolic function without regional wall motion abnormality. Because her oxygen requirement worsened after admission, the attending physician decided to apply a veno-atrial type extracorporeal membrane oxygenator (ECMO). On the second hospital day, new T wave inversion appeared (**Figure 1B**), and transthoracic echocardiographic examination showed apical ballooning with severe LV systolic function (**Figure 1C and D, Movie 1**). Her troponin-I was 277.2 pg/mL (reference, 2.3–17.5 pg/mL) and N terminal pro B-type natriuretic peptide was 2,033 pg/mL (reference, < 314 pg/mL). She was treated with antiviral agents and an ECMO with supportive care, and apical ballooning disappeared after 7 days. Although the attending physician tried to remove

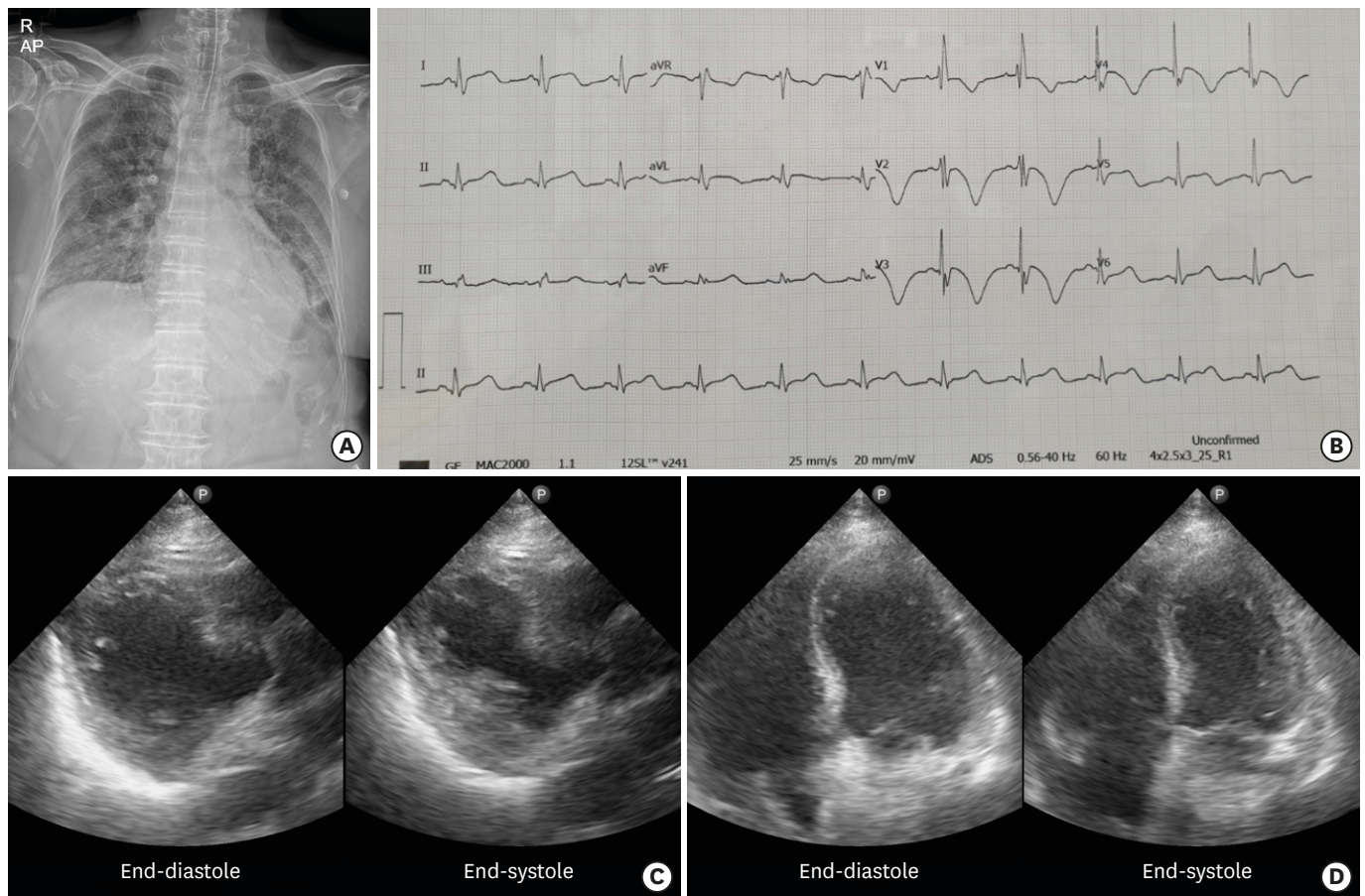


Figure 1. The initial chest X-ray shows diffuse infiltration of whole lung fields (A). Electrocardiogram taken on the second hospital day demonstrates T wave inversion on the precordial leads (V1–V5, B), and transthoracic echocardiographic examination reveals apical ballooning with severe left ventricular systolic function (C: parasternal long axis view, and D: apical 4 chamber view; **Movie 1**).

Author Contributions

Conceptualization: Park JH; Data curation: Moon JY, Sohn KM, Kim YS; Supervision: Park JH; Writing - original draft: Park JH; Writing - review & editing: Park JH, Moon JY, Sohn KM, Kim YS.

the ECMO and ventilator, the patient died with worsening stiffness of the lung on her 54th hospital day.

CASE 2

A 73-year-old woman presented with fever and cough for the previous 13 days. She was previously healthy without underlying cardiovascular disease. Initial vital signs at admission were as follows: blood pressure, 148/78 mmHg, heart rate, 70 beats/min; respiratory rate, 28 breaths/min; and body temperature, 37.6°C. Her chest X-ray showed the typical diffuse ground-glass appearance that suggests viral pneumonia (**Figure 2A**), and computerized tomographic examinations revealed diffuse infiltration of bilateral lung fields (**Figure 2B**). After admission, her systolic blood pressure dropped to 54 mmHg, and her heart rate was reduced to 43 beats/min. The echocardiographic examination demonstrated apical ballooning with dyskinetic movement and severe LV systolic dysfunction (**Figure 2C and D**, **Movie 2**). Her troponin-I was increased from 30.4 pg/mL to 1,037.9 pg/mL, and creatine kinase-MB type was elevated from 0.8 ng/mL to 6.7 ng/mL (reference, < 6.2 ng/mL). The patient died after 3 days due to profound hypotension despite intensive care with ventilator therapy.

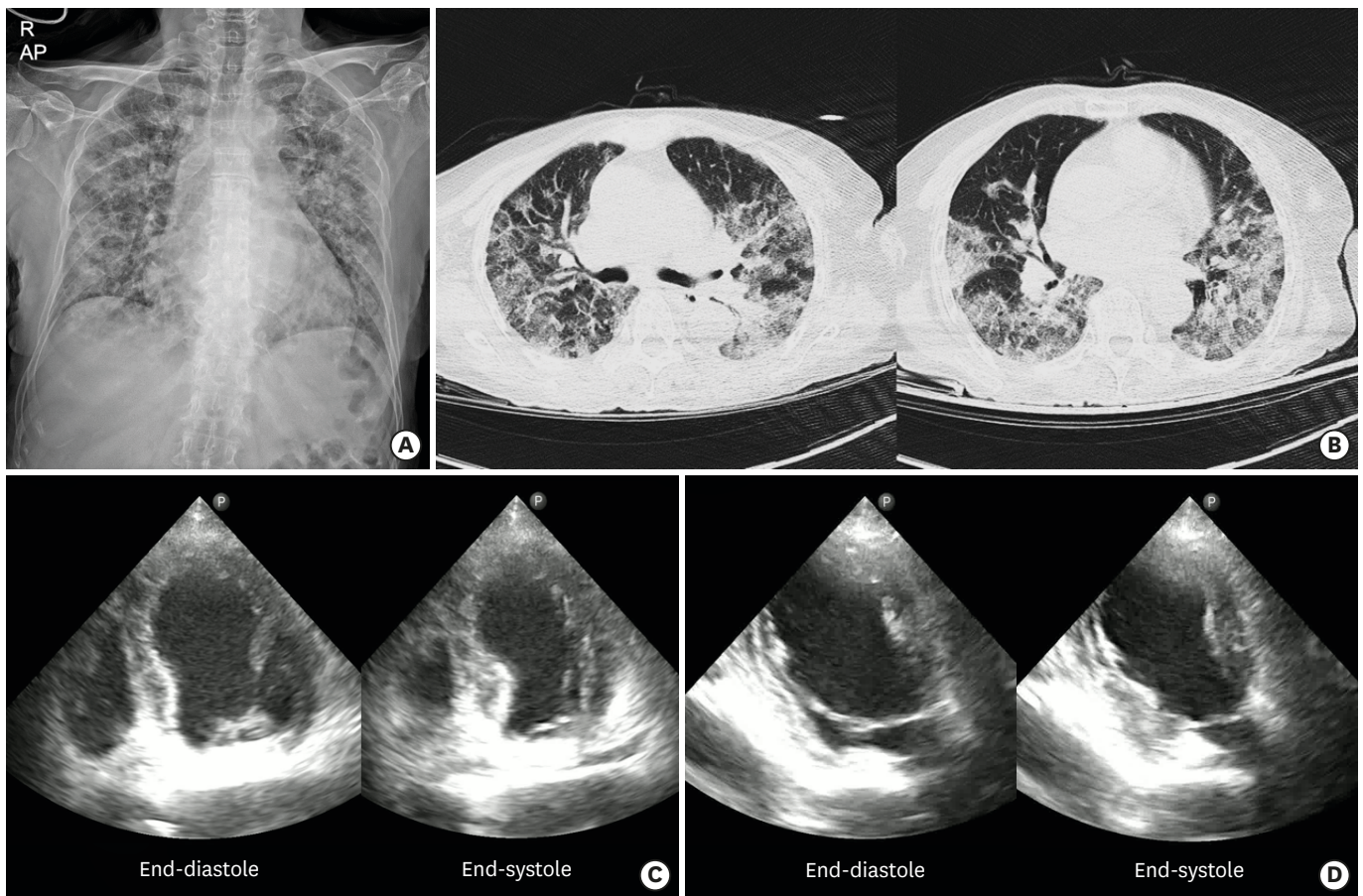


Figure 2. The initial chest X-ray demonstrates the typical diffuse ground-glass appearance that suggests viral pneumonia (A), and the computerized tomographic examinations show diffuse infiltration of bilateral lung fields (B). The echocardiographic examination reveals apical ballooning with dyskinetic movement and severe left ventricular systolic dysfunction (C: apical 4 chamber view, and D: apical 2 chamber view; **Movie 2**).

SUPPLEMENTARY MATERIALS

Movie 1

Echocardiographic examination of case 1.

[Click here to view](#)

Movie 2

Echocardiographic examination of case 2.

[Click here to view](#)

REFERENCES

1. Abe Y, Kondo M, Matsuoka R, Araki M, Dohyama K, Tanio H. Assessment of clinical features in transient left ventricular apical ballooning. *J Am Coll Cardiol* 2003;41:737-42.

[PUBMED](#) | [CROSSREF](#)

2. Medina de Chazal H, Del Buono MG, Keyser-Marcus L, et al. Stress cardiomyopathy diagnosis and treatment: JACC State-of-the-Art Review. *J Am Coll Cardiol* 2018;72:1955-71.
[PUBMED](#) | [CROSSREF](#)
3. Gianni M, Dentali F, Grandi AM, Sumner G, Hiralal R, Lonn E. Apical ballooning syndrome or takotsubo cardiomyopathy: a systematic review. *Eur Heart J* 2006;27:1523-9.
[PUBMED](#) | [CROSSREF](#)
4. 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;132:809-16.
[PUBMED](#) | [CROSSREF](#)
5. Dweck MR, Bularga A, Hahn RT, et al. Global evaluation of echocardiography in patients with COVID-19. *Eur Heart J Cardiovasc Imaging* 2020;jeaa178.
[PUBMED](#) | [CROSSREF](#)