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Case report

Cardiopulmonary arrest due to bronchoscopy-induced Takotsubo syndrome in a patient with antineutrophil cytoplasmic autoantibody-associated lung disease: a case report

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Abstract

Objective: Cardiac arrest (CA) has been observed in some patients with Takotsubo syndrome (TTS), most of whom had CA at the initial presentation of TTS. The objective of this report was to discuss the factors underlying the onset of this syndrome.
Case presentation: A 72-year-old woman with refractory antineutrophil cytoplasmic autoantibody-associated lung disease was referred to our hospital. Twenty minutes after bronchoscopic examination, cardiopulmonary arrest suddenly occurred. Resuscitation immediately resumed her heartbeat and spontaneous breathing. Subsequent 12-lead electrocardiography, echocardiography, and left ventricular angiography revealed TTS.
Conclusion: This case indicates that bronchoscopy can cause severe TTS, especially in patients with systemic inflammation.

Key words: Takotsubo syndrome, cardiopulmonary arrest, bronchoscopy, antineutrophil cytoplasmic autoantibody (ANCA)

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Introduction

Takotsubo syndrome (TTS) is characterized by transient cardiac dysfunction caused by mental and physical stress; however, the details of its pathophysiology have not been fully elucidated[1)]. Recently, myocardial macrophage inflammatory infiltrates, increased systemic proinflammatory cytokines, and microvascular dysfunction have been observed in TTS[2, 3)]. Here, we report a case of sudden cardiac arrest (CA) in a patient with antineutrophil cytoplasmic autoantibody (ANCA)-associated lung disease as the initial presentation of bronchoscopy-induced TTS and discuss the factors behind its onset. Informed consent was obtained from the patient's son for the publication of this case report and any accompanying images.

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Case Report

A 72-year-old woman with a 10-month history of glucocorticoid therapy (10–30 mg/day of prednisolone) for refractory ANCA-associated lung disease (organizing pneumonia pattern) was referred to our hospital because of tumorous lesions in the hilum (Figure 1). She had hypertension, dyslipidemia, and steroid diabetes as complications. No abnormalities were observed on 12-lead electrocardiogram (ECG) at admission (Figure 1). Bronchoscopy revealed that the airway mucosa was edematous and bled easily, probably because of

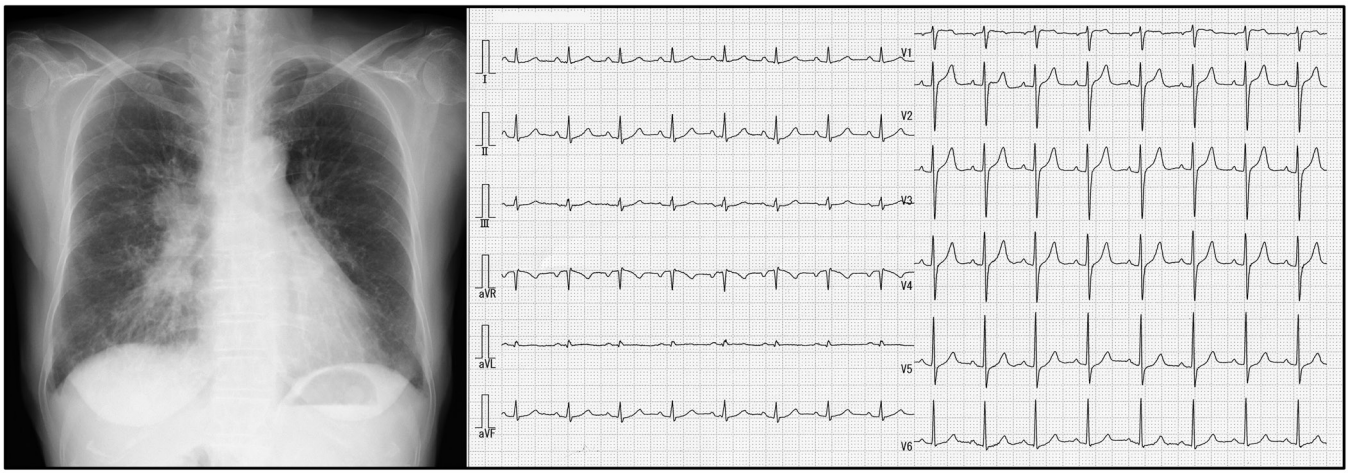

Figure 1 Pulmonary infiltration with tumorous lesions in the hilum and a normal 12-lead electrocardiogram before bronchoscopy.

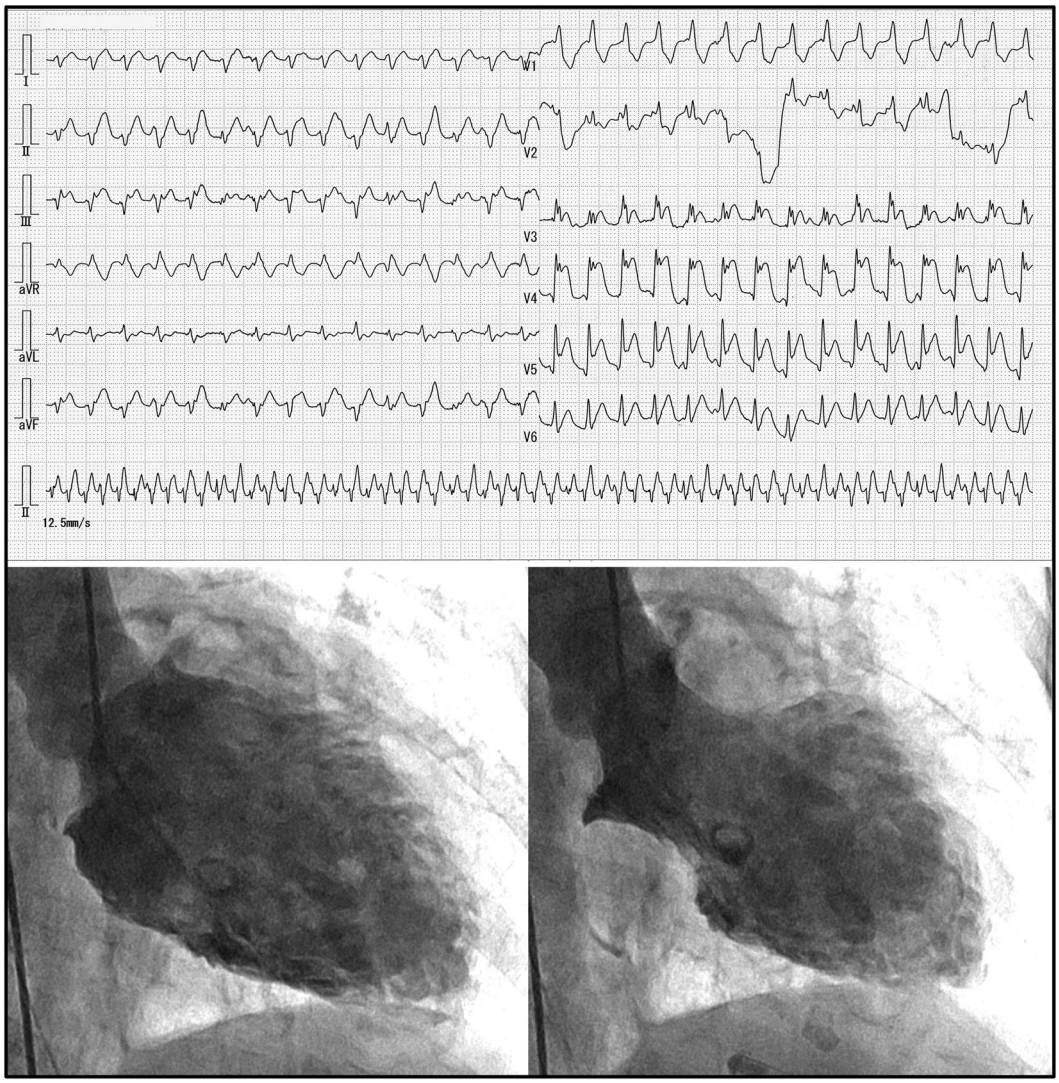

Figure 2 A 12-lead electrocardiogram after resuscitation showing ST elevation in V3-6, but not V1, and depression in aVR, and left ventricular angiogram indicating mid-apical segment hypokinesis and basal segment hyperkinesis (left: diastolic frame, right: systolic frame).

ANCA-associated vasculitis (AAV). As excessive bleeding was caused by transbronchial aspiration cytology of the tumorous lesion, epinephrine (0.005%) was locally administered, and the examination was completed after confirmation of hemostasis. Cytology was negative for malignancy, suggesting that increased hilar shadows were also a manifestation of ANCA-associated lung disease. Twenty minutes after the examination, cardiopulmonary arrest suddenly occurred immediately after the patient complained of chest pain, and pulseless electrical activity was displayed on an ECG monitor. Resuscitation immediately resumed her heartbeat and spontaneous breathing. ST elevation in V3-6, but not V1, and depression in aVR were observed on a 12-lead ECG (Figure 2), while echocardiography showed apical ballooning of the left ventricle. These findings suggested TTS rather than acute anterior myocardial infarction[1]. The patient was transferred to a cardiac center at another facility with endotracheal intubation and underwent cardiac catheterization. Coronary angiograms showed no stenosis that could cause CA, and a left ventricular angiogram revealed mid-apical segment hypokinesis and basal segment hyperkinesis, consistent with TTS (Figure 2)[1]. Extubation was performed 4 days later, and 3 weeks later, it was confirmed that the patient's left ventricular contractile function had returned to normal.

Discussion

To the best of our knowledge, at least eight cases of TTS related to flexible bronchoscopy have been reported in the English literature[4]. This number is approximately the same as the number of cases reported to have developed after upper and lower gastrointestinal endoscopy[5]. Considering the frequency with which each test is performed in routine practice, the risk of developing TTS may be higher with bronchoscopy than with gastrointestinal endoscopy, although the exact incidence of endoscopy-related TTS is unknown. The clinical course of patients with endoscopy-induced TTS was generally favorable, except for frail elderly patients with complications[4, 5]. However, Gili *et al.* reported that CA was observed in 8.1% of patients with TTS, of whom 81.6% had CA at the initial presentation of TTS, and they showed worse outcomes compared to patients without CA[6].

Myocardial damage due to excess catecholamines has been proposed as a molecular mechanism of TTS, and many cases of TTS related to systemic or topical administration of epinephrine have been reported[7]. Recently, myocardial macrophage inflammatory infiltrates and increased systemic proinflammatory cytokines have been found in TTS[2]. The incidence of TTS was shown to be 10 times higher in hospitalized patients with systemic sclerosis, in which macrophage activation plays an important role in multiple organ fibrosis than in the general inpatient population[8, 9]. In addition, three cases of TTS that developed during the clinical course of AAV have been reported[10]. Similar to our patient, all three patients were women aged over 70 years who were receiving glucocorticoid therapy. AAV may induce microvascular dysfunction, resulting in myocardial ischemia, which is considered one of the mechanisms underlying TTS[3]. In this case, ANCA-related lung disease as a background disease, mental and physical stress due to bronchoscopy, and catecholamine-induced myocardial damage probably worked in combination to contribute to the development of TTS.

Conclusion

It should be noted that bronchoscopy can cause severe TTS, especially in patients with systemic inflammation.

Conflict of interest: The authors declare no competing interests.

References

1. Watanabe M, Izumo M, Akashi YJ. Novel understanding of Takotsubo syndrome. Int Heart J 2018; 59: 250–255. [Medline] [CrossRef]
2. Scally C, Abbas H, Ahearn T, *et al*. Myocardial and systemic inflammation in acute stress-induced (Takotsubo) cardiomyopathy. Circulation 2019; 139: 1581–1592. [Medline] [CrossRef]
3. Vitale C, Rosano GM, Kaski JC. Role of coronary microvascular dysfunction in Takotsubo cardiomyopathy. Circ J 2016; 80: 299–305. [Medline] [CrossRef]
4. Sazuka M, Yamamoto H, Usuki C, *et al*. Four elderly cases developing Takotsubo cardiomyopathy associated with flexible bronchoscopy. JJSRE 2017; 39: 333–342.
5. Patel A, Namn Y, Shah SL, *et al*. Takotsubo cardiomyopathy after an upper and lower endoscopy: a case report and review of the literature. J Med Case Reports 2019; 13: 81 [CrossRef]. [Medline]
6. Gili S, Cammann VL, Schlossbauer SA, *et al*. Cardiac arrest in takotsubo syndrome: results from the InterTAK Registry. Eur Heart J 2019; 40: 2142–2151. [Medline] [CrossRef]
7. Nazir S, Lohani S, Tachamo N, *et al*. Takotsubo cardiomyopathy associated with epinephrine use: a systematic review and meta-analysis. Int J Cardiol 2017; 229: 67–70. [Medline] [CrossRef]
8. Bhandari R, Ball MS, Martyanov V, *et al*. Profibrotic activation of human macrophages in systemic sclerosis. Arthritis Rheumatol 2020; 72: 1160–1169. [Medline] [CrossRef]
9. Gandhi Z, Fong HK, Manaktala P, *et al*. Epidemiology and outcomes of Takotsubo syndrome in hospitalizations with systemic sclerosis. Cureus 2020; 12: e9925 [CrossRef]. [Medline]
10. Harada M, Ichikawa T, Kobayashi M. Onset of Takotsubo syndrome during the clinical course of anti-neutrophil cytoplasmic antibody-associated vasculitis: a case report. Tohoku J Exp Med 2018; 246: 251–256. [Medline] [CrossRef]