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Letter to the Editor

Akinesis of the apex similar to takotsubo cardiomyopathy following tetanus

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Dear Editor,

The effect of tetanus on the cardiovascular system is one of the causes of morbidity and mortality [1]. In tetanus cases, prolonged stimulation of the sympathetic nervous system or continuous release of catecholamines is considered to cause vascular and myocardial damage, and several cardiovascular manifestations have been reported [2]. However, akinesis of the apex similar to takotsubo cardiomyopathy following tetanus has not been reported. We present the first case of a woman with akinesis of the apex following tetanus.

1. Case

A 75-year-old woman developed tetraplegia with hypertonia and trismus 7 days after right arm abrasion in which an arteriovenous shunt was present. She had no previous history of cardiovascular disease, but had hemodialysis for 5 years because of diabetic nephropathy. She was admitted to the Department of Nephrology 2 days after onset in our hospital. Stroke or Guillain–Barre syndrome was initially suspected as the cause of her condition. Because her symptoms became progressively worse, she was referred to our department the next day after admission. We diagnosed her with tetanus, and a single dose of adsorbed tetanus vaccine and two times of 3000 I.U. of immunoglobulin were initiated. However, she experienced respiratory failure following suffocation and cardiac arrest. Prompt cardiopulmonary resuscitation was initiated and return of spontaneous circulation was confirmed 10 min after the cardiac arrest. Her consciousness became clear and she was able to understand the request for opening her mouth. We administered midazolam under mechanical ventilation and she was transferred to our department and intensive care unit. During intensive care unit treatment, instability of heart rate and blood pressure was observed.

Rest in a dark room, and continuous administration of midazolam, propofol, and magnesium sulfate, and metronidazole administration for 10 days were performed for tetanus treatment. Unfractionated heparin was also administered for preventing deep venous thrombus. Hemodialysis for 3 days per week was continued. Tracheotomy was performed at 14 days after onset. Her tetany and hypertonia gradually disappeared. Therefore, we attempted to decrease the midazolam and propofol doses. At 16 days after onset, midazolam and propofol were completely stopped. However, ST elevation appeared in all induction of an electrocardiogram. Transthoracic echocardiography showed akinesis of the apex (Fig. 1A, B and Supplementary Video 1). We re-administrated midazolam until 21 days after onset. Owing to continuous administration of unfractionated heparin, stroke did not occur in the clinical course. ST elevation in an electrocardiogram disappeared at 32 days after onset. Her consciousness became alert at 40 days after onset. Transthoracic echocardiography at 45 days after onset showed that akinesis of the apex had completely recovered. She recovered by being able to walk by herself with a cane and continued rehabilitation in hospital at 83 days after onset. A summary of the clinical course is shown in Fig. 1C.

2. Discussion

Several cardiovascular manifestations have been reported in tetanus and one of them is myocardial dysfunction due to sympathetic overactivity [3]. A direct action of the tetanus toxin is considered to be a cause of cardiac dysfunction [4]. Our present case was severe because cardiac arrest occurred, and instability of heart rate and blood pressure suggested sympathetic overactivity. With regard to akinesis of the apex, previous reports have described that physical or emotional stress often precedes left ventricular apical ballooning [5,6]. Several diseases, such as subarachnoid hemorrhage, exacerbation of bronchial asthma, and Guillain–Barré syndrome, have been reported to be related to akinesis of the apex [5]. Emotional stress, such as a sudden accident, death of a family member, and severe anxiety, also induce akinesis of the apex [6]. In these situations, physical or emotional stress is considered to be related to a catecholamine-induced heart attack [7,8]. As these situations, sympathetic overactivity following tetanus in our presented case is thought to be involved in akinesis of the apex, similar to takotsubo cardiomyopathy [9]. A limitation of the present case is that we did not confirm takotsubo cardiomyopathy using diagnostic criteria [10] because cardiovascular angiography was not performed owing to chronic renal failure. However, the apex selected akinesis and complete recovery suggested a similar pathology to takotsubo cardiomyopathy. The clinical finding that cardiac manifestations occurred immediately after midazolam and propofol were stopped suggested that rapid sedation off could be associated with takotsubo cardiomyopathy. Continuous

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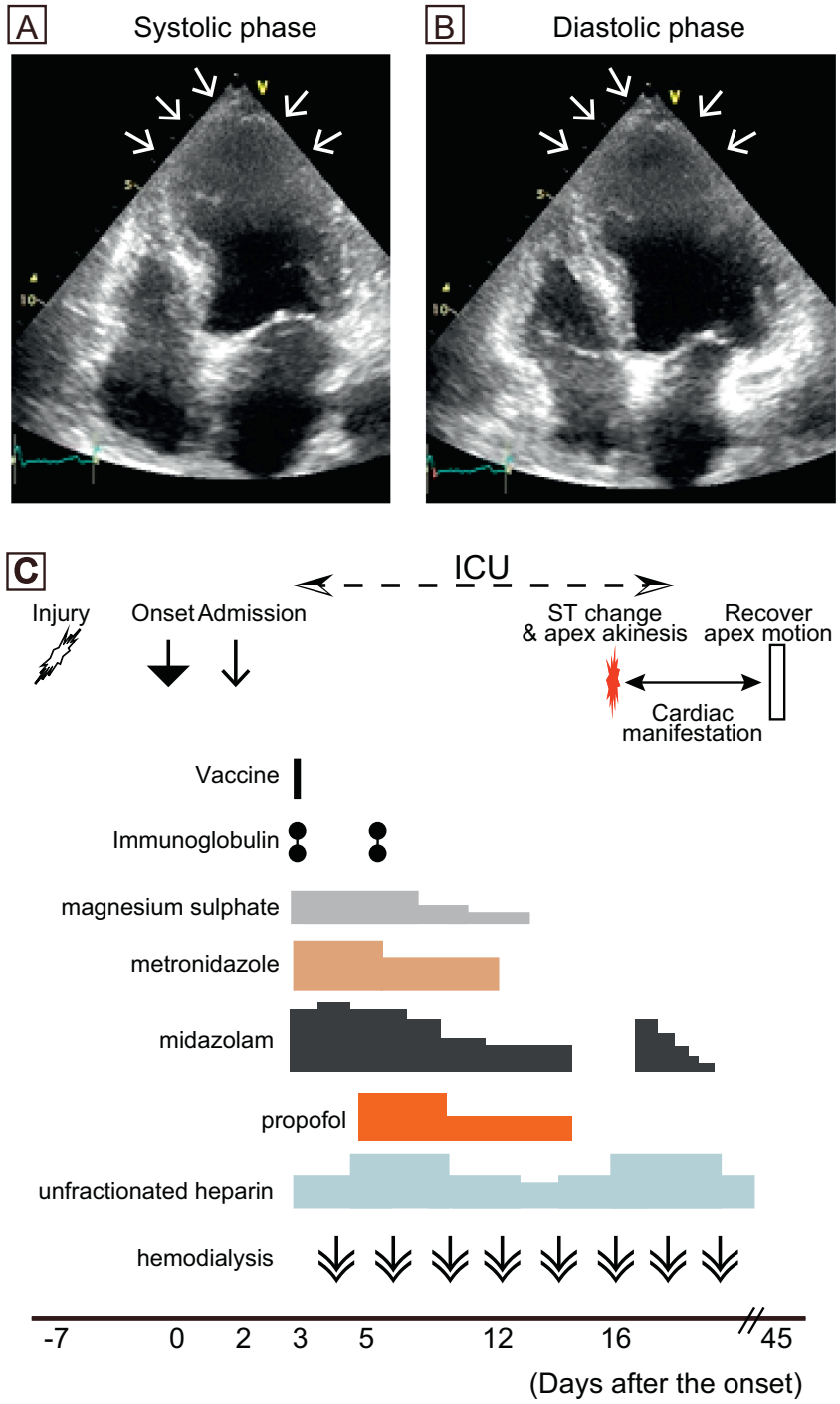

Fig. 1. Four-chamber view of transthoracic echocardiography at 16 days after onset. Systolic phase (A) and diastolic phase (B). Arrows show akinesis of the apex. A summary of the patient's clinical course showing the relationships among tetanus, cardiac manifestations, and treatment is shown (C).

unfractionated heparin treatment is one of the factors for a favorable prognosis.

In conclusion, akinesis of the apex, which is similar to takotsubo cardiomyopathy, might occur with tetanus and adequate treatment is necessary.

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Authors' contributions

K. Matsuzono, K.F., and A.H. were the attending doctors of the present case. K. Matsuzono drafted the manuscript. Y.K., K. Miura. T.O., T.M., H.S., R.K., and R.T. helped to draft the manuscript. S.F. conceived the study, participated in coordination of the study, and helped to draft the manuscript. All authors read and approved the final manuscript.

Disclosure statement

None.

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