



## Case Report

Type A aortic dissection associated with tension pneumothorax<sup>☆</sup>Takashi Nihira, MD<sup>\*</sup>, Naoki Yamada, MD

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## ABSTRACT

Both aortic dissection and tension pneumothorax are conditions that require urgent treatments. However, the diagnosis of these emergencies is sometimes challenging because of various symptoms and difficulty obtaining their medical history due to severe conditions. Here, we present the case of a patient with type A aortic dissection associated with tension pneumothorax. This is the second report of such a case worldwide. A 61-year-old man presented to the emergency department with sudden-onset chest and back pain. Upon presentation, his blood pressure was 97/58 mmHg, oxygen saturation on room air was 96%, and respiratory rate was 28 breaths/min. His physical examination revealed no jugular venous distention; however, breath sounds over the left lung were diminished. Bedside chest radiography revealed left tension pneumothorax with mediastinal shift to the right. Needle and chest tube thoracostomies were performed; however, the patient's vital signs did not improve and reexpansion pulmonary edema developed following tube thoracostomy. Contrast-enhanced computed tomography revealed type A thrombosed aortic dissection with bullae in the upper lobe of the left lung. Therefore, the patient was admitted to the intensive care unit, conservatively treated, and discharged without any complications. In conclusion, type A aortic dissection may be associated with tension pneumothorax and should be considered if the patient's vital signs do not improve even after decompression of the tension pneumothorax.

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## 1. Case presentation

A 61-year-old man presented to the emergency department of the University of Fukui Hospital because of sudden-onset chest and back pain. Three days prior to presentation, he suddenly experienced back pain followed by dyspnea on exertion. He denied any traumatic episodes and significant medical history. He had never undergone clinical evaluation. He had a smoking history of 20 pack-years.

On presentation, he was atraumatic. His vital signs were as follows: heart rate, 56 beats/min; blood pressure, 97/58 mm Hg; oxygen saturation, 96% on room air; and respiratory rate, 28 breaths/min. His skin was cold without perspiration, and his radial pulse was weak but of equal volume bilaterally. No jugular venous distention or subcutaneous emphysema was observed, but breath sounds over the left lung were diminished.

Venous blood gas analysis showed a pH 7.311; pCO<sub>2</sub>, 17.8 mm Hg; pO<sub>2</sub>, 54.4 mm Hg; lactate, 19 mg/dl on room air. No atrioventricular

block and significant ST-T wave changes were observed during electrocardiography. A large-bore intravenous cannula was inserted during resuscitation.

Bedside echocardiography was performed; however, the patient's heart and great vessels could not be visualized owing to the presence of pleural air. Pleural movement was absent in the left hemithorax. Bedside chest radiography revealed a left tension pneumothorax (Fig. 1A); hence, needle decompression and chest tube thoracostomy were urgently performed, but the patient's vital signs did not improve. Bedside chest radiography performed the second time at 10 min after thoracotomy revealed infiltration in the left lung (Fig. 1B). Plain chest computed tomography (CT) performed to evaluate the infiltration revealed bullae in the upper lobe and consolidation of the left lung (Fig. 2A and B). Furthermore, a flap in the aortic arch was suspected (Fig. 2C). Bedside ultrasonography revealed right common carotid artery dissection, and type A aortic dissection was confirmed by contrast-enhanced CT (Fig. 3A, B, C, and D).

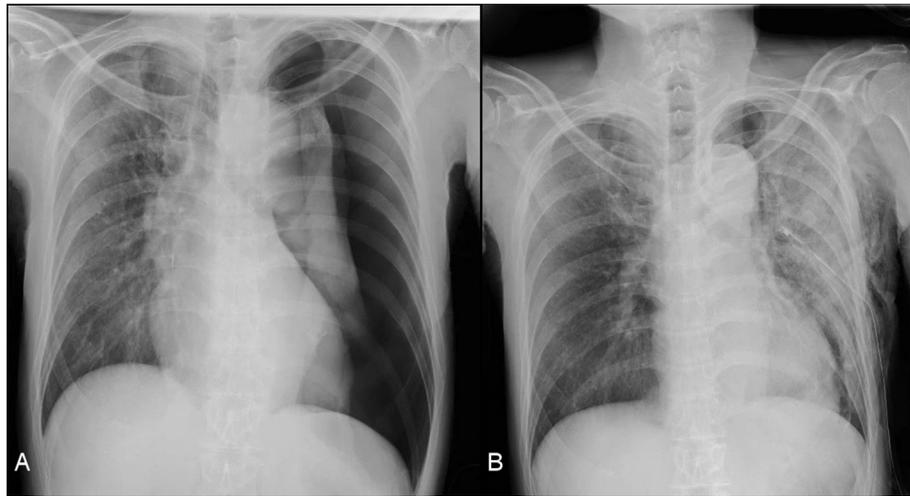
Cardiovascular surgeons decided to treat him conservatively owing to the respiratory risks attributed by reexpansion pulmonary edema, which was diagnosed by the second chest radiography.

The patient was discharged on the 56th day after presentation to the hospital and was asked to visit the cardiovascular surgery clinic for follow-up every 6 months during which CT would be performed.

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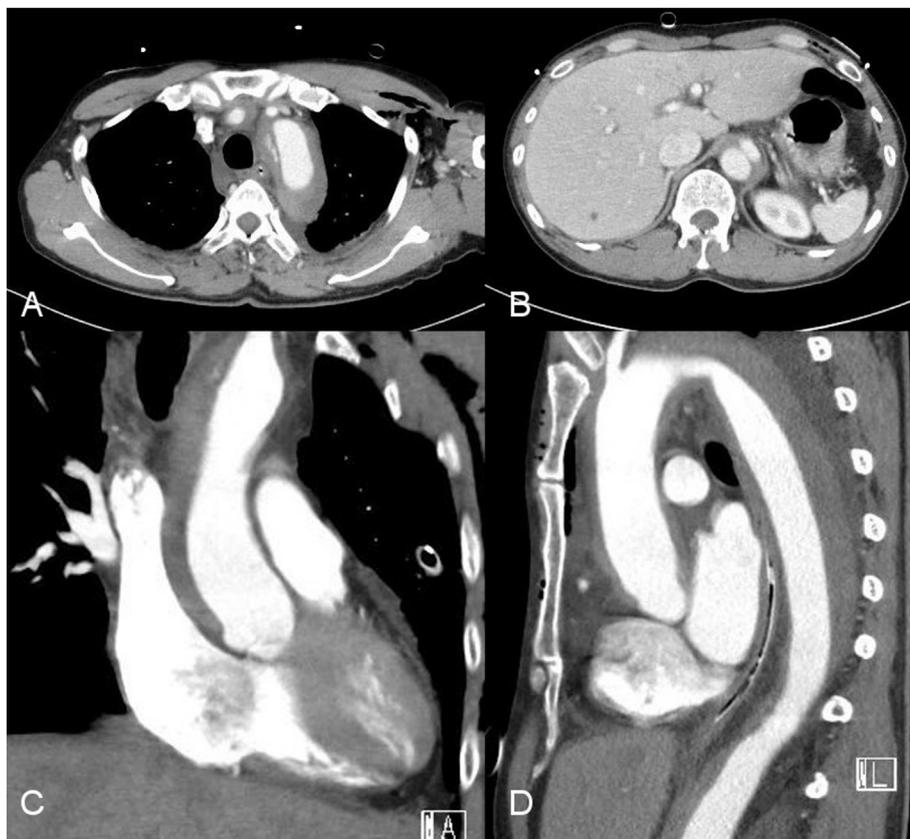
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**Fig. 1.** A: Initial chest radiography showing left pleural air and tracheal deviation to the right side. B: Chest radiography after emergent decompression showing a chest tube inserted through the fifth left intercostal space and subcutaneous emphysema; infiltration in the left lung.



**Fig. 2.** A and B: Plain chest computed tomography showing left upper bullae, pneumothorax, and reexpansion pulmonary edema. C: Plain chest computed tomography showing a linear hyper-dense area in the aortic arch.



**Fig. 3.** A, B, C, and D: Contrast-enhanced chest computed tomography showing type A aortic dissection.

## 2. Discussion

Based on the clinical findings of our study, we discovered that type A aortic dissection may be associated with tension pneumothorax and that ultrasonography may be useful in the diagnosis of chest and back pain associated with unstable vital signs.

The first case of type A aortic dissection associated with tension pneumothorax was reported in 2012 in Japan. In the present study, the patient exhibited symptoms associated with back pain and dyspnea, indicating that pneumothorax preceded type A aortic dissection. This speculation was supported by the presence of reexpansion pulmonary edema. A preceding pneumothorax was also suspected in the case reported in 2012, and both cases had left tension pneumothorax. An increase in the intrathoracic pressure due to progressive pneumothorax may lead to type A aortic dissection [1]. This combination of tension pneumothorax and aortic dissection is very rare. Moreover, both the cases encountered till date have been reported in Japan, indicating that there may be a racial factor influencing these cases.

It is necessary to check for life-threatening diseases of the chest, such as myocardial infarction, aortic dissection, cardiac tamponade, and tension pneumothorax, in patients with such conditions. Bedside ultrasonography is safer and more convenient than CT; however, its accuracy depends on the skill of the examining physician.

Common carotid artery dissection occurs in 15%–41% of type A aortic dissections [2,3]. Although the specificity of ultrasonography for detecting common carotid artery dissection is unknown, it can serve as a

practical option because it can contribute to the diagnosis of aortic dissection by detecting a double lumen, a change in flow velocity, and an intimal flap.

Type A aortic dissection may be associated with tension pneumothorax; therefore, it should be considered if the patient's vital signs do not improve even after decompression of tension pneumothorax.

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None.

### Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ajem.2019.04.010>.

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