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Ruptured type B aortic dissection presenting with right hemothorax

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ABSTRACT

We report a patient with type B aortic dissection which ruptured into the right hemithorax to call attention to this infrequent presentation and to accentuate the value of computed tomography angiography (CTA) with multiplanar reformatting in localizing the dissection and demonstrating the rupture site. CTA in combination with 2- and 3-dimensional reformatting is crucial for surgical planning because of the low specificity of transesophageal echocardiography in the ascending aorta.

Key words: • *ruptured aortic dissection* • *computed tomography* • *hemothorax*

Acute dissection of the thoracic aorta, one of the most common causes of aortic emergencies, requires prompt diagnosis and treatment (1). The presence of dissection, the dissection type and its complications can be determined with a sensitivity and specificity of nearly 100% via computed tomography angiography (CTA) (2). Aortic rupture is a common and fatal complication of type B aortic dissection. A ruptured dissection usually causes left hemothorax (3). Herein we present a case of ruptured Stanford type B aortic dissection which caused right hemothorax. Additionally, CTA findings of the ruptured aneurysm and false-positive findings of transesophageal echocardiography in the dissection evaluation are presented.

Case report

A 36-year-old man with a history of hypertension was admitted to the local primary care center due to the sudden onset of pain in the interscapular region. With suspicion of aortic rupture, a non-contrast CT scan was obtained, which demonstrated aneurysmal dilatation of the descending aorta without pleural effusion (Fig. 1). The patient was then referred to our center for further evaluation. Upon presentation his blood pressure was 140/90 mm Hg and his heart rate was 100 beats/min. His peripheral pulses were palpable in both extremities. Laboratory studies revealed a hemoglobin level of 11.9 g/L and a leukocyte count of 17,000/mm^3. Four hours later follow-up revealed that his hemoglobin level declined to 7.3 g/l and control chest X-ray demonstrated a new massive right-sided pleural effusion (Fig. 2). We then performed CTA, which revealed an aortic dissection that began just distal to the origin of the left subclavian artery and extended into the abdominal aorta until the level of the origin of the celiac truncus. Additionally, a high-attenuating true lumen was found to be smaller than the false lumen. CTA confirmed the massive right hemothorax and mediastinal hemorrhage. There was no hemothorax on the left side (Fig. 3). Multiplanar and 3-dimensional reconstructions showed a possible rupture site in the descending aorta (Fig. 4). The patient was immediately taken to the operating room. A right chest tube was placed and 1000 ml of blood was drained. Intraoperative transesophageal echocardiography (TEE) revealed an intimal flap in the ascending aorta; therefore, a midline split sternotomy was performed. There was minimal hemorrhagic fluid in the pericardial sac. Following the vertical aortotomy, no dissection was seen at the ascending aorta. There was a 1 × 3 cm periaortic hematoma at the anterior wall of the aorta. The right pleural space was opened and widespread hematoma was evacuated. No active bleeding site was detected. The left pleural space was explored, but no hematoma or hemorrhagic fluid was seen. The right hemithorax and mediastinum were drained with chest tubes and ster-

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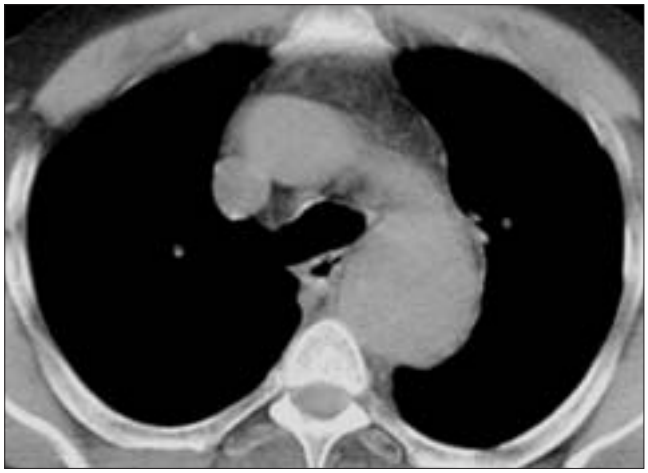

Figure 1. Unenhanced axial CT scan depicts aneurysmal dilatation of the descending aorta, though no pleural effusion was detected in both hemithoraxes.

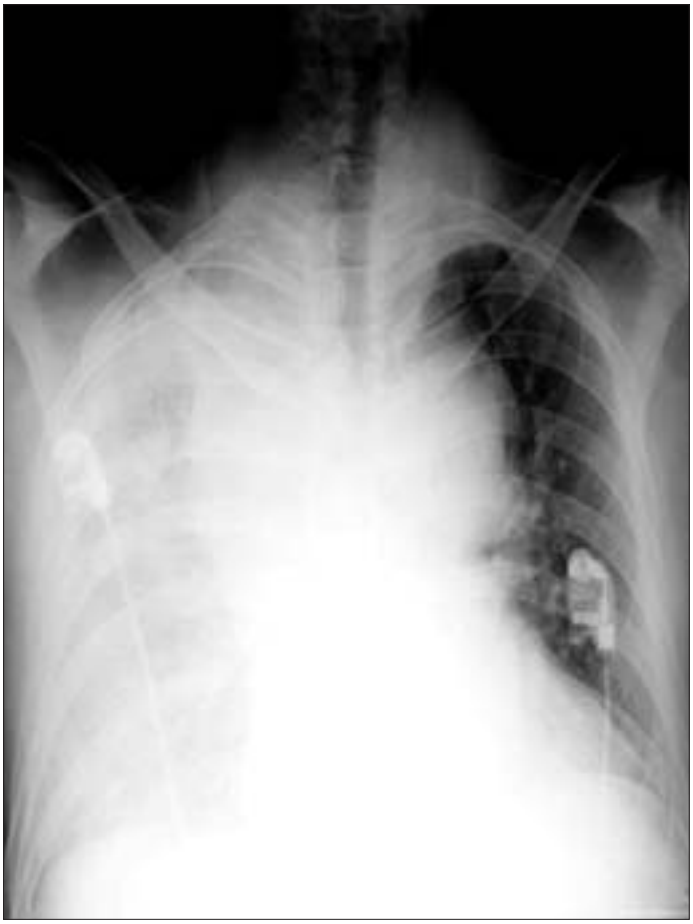

Figure 2. Follow-up anteroposterior chest X-ray shows opacification of the right hemithorax with widening of the aortic contour and mediastinum.

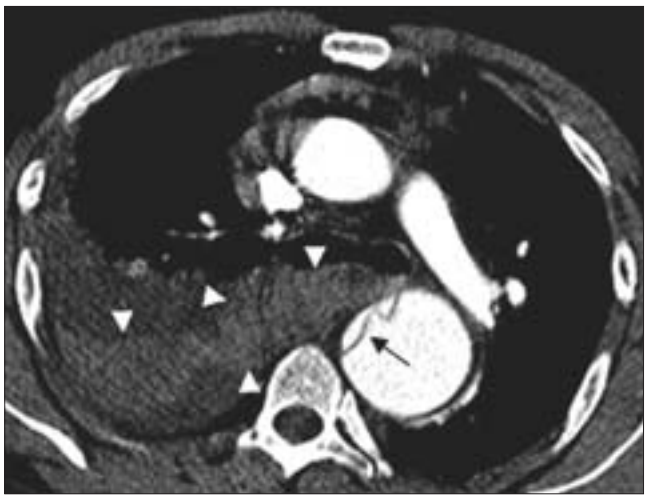

Figure 3. Contrast enhanced axial CT scan shows the hyperattenuating right pleural effusion, hyperattenuating mediastinal hemorrhage *(arrowheads)*, and type B aortic dissection *(arrow)*.

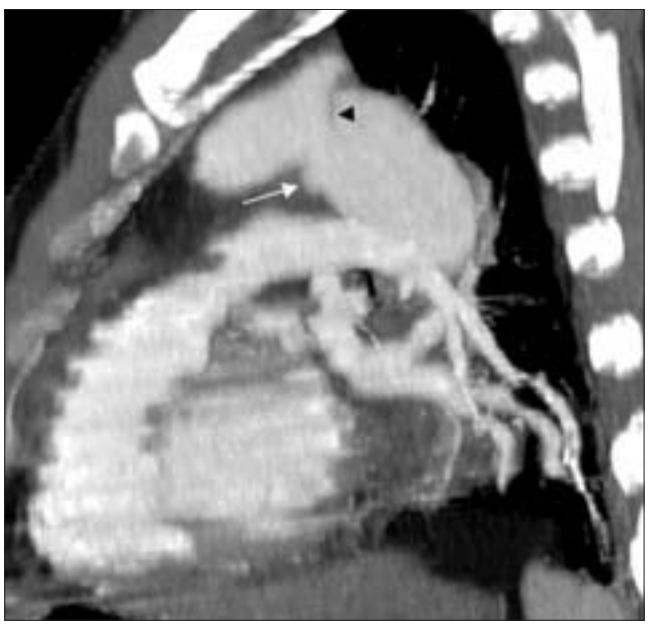

Figure 4. Oblique-sagittal reformatted CT image shows a saccular outpouching at the junction of arcus aorta and descending aorta *(arrow)* and intimal flap *(arrowhead)*.

notomy was closed. Thoracotomy was not performed at the time because of the severity of the patient's condition. After approximately 8 h, a left thoracotomy and left paramedian incision were performed in order to place a graft. After the aorta was incised longitudinally, an intimal tear was detected in the posterior wall of the aorta, just distal to the subclavian artery. The site of rupture was located at the junction of the arcus aorta and descending aorta, as seen with CTA. A 20 mm × 25 cm Gelweave gelatin impregnated woven graft (Vascutek, Terumo Scotland) was anastomosed to the true lumen. Postoperatively the patient suffered from acute renal failure and pneumonia, and he died on the 16th postoperative day due to sepsis.

Discussion

Aortic dissection, especially when complicated, is fatal if left undiagnosed or untreated. Patients with suspected dissection of the thoracic aorta re-

quire prompt diagnostic evaluation so that urgent therapeutic interventions can begin. Aortic rupture, which is a frequent complication of dissections, causes massive hemorrhaging and has been associated with a mortality rate > 50%. Hemothorax is seen in 10% of descending aorta ruptures mostly after distal dissections and is usually located on left side. A right hemothorax secondary to rupture of an aortic dissection is rare. To the best of our knowledge, to date, only 5 cases (excluding cases of a ruptured non-dissecting aortic aneurysm) have been reported in the literature (4). Right hemothorax has been reported in the majority of cases to arise from a medial tear in the aorta at the level of the mid-thoracic spine, which bleeds into the posterior mediastinum and crosses the midline to rupture into the right pleural space (4, 5).

Several imaging modalities, including chest X-ray, TEE, CT, magnetic resonance imaging, and conventional angiography can be used in the emergency room. Each of these diagnostic modalities has certain advantages and limitations (6).

Chest X-ray can be valuable for the initial prediction of an aortic dissection when used in combination with past medical history and physical examination findings. The most important sign is widening of the mediastinum. Mediastinal hemorrhage or hematoma results in a widened mediastinum. Chest X-rays are also valuable for follow-up imaging, as they were in the presented case.

TEE is a widely used imaging technique for evaluating unstable patients with suspected aortic pathologies since it can be performed quickly and easily at the patient's bedside. Moreover, it does not require any contrast material. Although in various studies the range of specificity reported for TEE was 97%–100% (6), the specificity of TEE is suboptimal in the evaluation of the ascending aorta when there is extensive plaque formation or echo reverberations in an ectatic vessel (7). Furthermore, fat-shift artifacts originating from the mediastinum, motion artifacts, calcified atheromatous plaques, and periaortic hematoma (as in our case) can lead to a false-positive type A dissection diagnosis. Saletta et al. stated that TEE is user-dependent and that there is a shallow learning curve involved in its use (8). A false-positive diagnosis of type A dissection not only requires an urgent surgical intervention that includes cardiopulmonary bypass and hypothermic circulatory arrest, but also precludes the proper and urgent treatment of the disease, as happened in the presented case.

Helical CT is the most common initial diagnostic test performed when acute aortic dissection is suspected because it is commonly available in emergency departments and can be performed readily. CT enables the diagnosis of acute aortic dissection with a sensitivity and specificity of nearly 100%. In 70% of cases with acute dissection, CT depicts an intimal flap. The signs of aortic rupture include hyperattenuating mediastinal, pericardial, or pleural fluid collection on unenhanced CT scans, and irregularity of the aortic wall and extravasation of vascular contrast material on contrast-enhanced CT scans. CTA with multiplanar reformatting and 3-dimensionally reconstructed images can be used to evaluate the origins of major vascular branches and coronary arteries, as well as the extent of dissection. Moreover, reconstructions also help to predict the rupture site in patients with mediastinal hemorrhage and/or hemothorax, as in the presented case. In addition, CT images provide information about all structures in the thoracic cavity, making it easy to exclude the other pathologies that cause acute chest pain, such as pulmonary thromboemboli.

In conclusion, type B aortic dissection with rupture is a fatal condition that may, on rare occasions, cause right hemothorax. This unusual presentation should always be considered in patients with acute chest pain. As identification of the rupture site and accompanying complications are crucial for planning surgery and TEE can result in a false-positive diagnosis of type A dissection, CT should be the first diagnostic test performed. This report also stresses that despite the fact that the anatomic location of the descending aorta is close to the left pleural cavity, aortic rupture can lead to right sided hemothorax and CTA with reconstructions can help to predict the rupture site.

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