



Case Report

Aortic intramural hematoma and hepatic artery pseudoaneurysm: unusual complication following resuscitation

Abstract

We present a case of a 71-year-old woman with an unusual complication of aortic intramural hematoma and hepatic artery pseudoaneurysm following cardiopulmonary resuscitation and thrombolysis done for sudden cardiopulmonary arrest and pulmonary embolism. Patient was on Warfarin treatment for a prior history of pulmonary embolism and experienced recurrent cardiac arrests, which finally resolved after intravenous administration of thrombolytic agents. However, follow-up computed tomographic angiography revealed descending aortic intramural hematoma with intramural blood pool and concomitant liver laceration with hepatic artery pseudoaneurysm. The patient received transcatheter embolization for the hepatic injury with careful follow-up for the aortic injury and was later discharged in a stable condition. Follow-up with subsequent computed tomographic angiography at a regular interval over 1 month shows near complete resolution of the intramural hematoma. The purpose of this report is to describe the rare complication of cardiopulmonary resuscitation and thrombolysis in the form of concomitant injuries of the aorta and liver. Although the use of thrombolytic agents in patients with pulmonary embolism and cardiac arrest is still a matter of debate, this case report supports the concept that thrombolysis has a role in restoring cardiopulmonary circulation, especially in recurrent cardiac arrests resulting from pulmonary embolism. On the other hand, this case also highlights the increased association of the bleeding-related complication as a result of vigorous efforts of cardiopulmonary resuscitation. Aggressive management with interventional radiology for hepatic pseudoaneurysm and conservative management of the aortic intramural hematoma resulted in favorable outcome for our patient.

A 71-year-old woman experienced sudden collapse at home due to cardiac arrest. Patient received initial cardiopulmonary resuscitation (CPR) by her daughter and regained consciousness with the complaint of severe shortness of breath. She suffered another episode of cardiac arrest with pulseless electrical activity while being transported to the hospital, and CPR was re-initiated. She was known to be on Warfarin for the prior history (2 years ago) of right-sided pulmonary embolism. Upon arrival to the emergency department (ED), she was intubated with CPR assisted by an automated chest compression device. Her admission electrocardiography showed sinus tachycardia with a heart rate of 115 beats per minute and new right bundle-branch block, while bedside transthoracic echocardiography revealed right ventricular dilatation due to right heart strain. Laboratory workup revealed pH of 6.84, $p\text{CO}_2$ of 88, and $p\text{O}_2$ of 88. In light of her clinical history of prior pulmonary embolism, she was clinically suspected to have acute pulmonary embolism and

was treated in the ED with thrombolytic therapy in the form of 50 mg bolus of alteplase administered over 5 minutes, followed by a continuous drip of 50 mg over 90 minutes. Computed tomographic angiography (CTA) was performed 2 hours after thrombolysis, which revealed multiple bilateral pulmonary emboli involving the segmental and subsegmental pulmonary arteries (Fig. 1A), with resultant right ventricular strain. Aorta appeared normal at that time (Fig. 1B). However, she was thought to be not a suitable candidate for either catheter-based thrombolysis or surgical embolectomy owing to the distal location of the pulmonary emboli.

The patient developed hypotension with chest pain on the next day with progressive reduction of hematocrit levels. Repeat CTA was performed, which revealed intramural hematoma (IMH; Fig. 2A–C) extending from the level of left subclavian artery down to the level of aortic hiatus, with accompanying small intramural blood pool (IBP) along the anteromedial wall of mid descending thoracic aorta connected to intercostal artery (Fig. 2C). Multiple liver lacerations along with intrahepatic and subcapsular hematomas were found in the subcostal part of liver, along with a small hepatic artery pseudoaneurysm in segment 8 and hemoperitoneum (Fig. 3A). Patient also sustained several rib fractures in the lower chest. Doppler sonography of the left femoral vein showed a mobile clot, which was thought to be a potential cause of the pulmonary embolism.

Patient underwent catheter angiography, in which a hepatic pseudoaneurysm was confirmed (Fig. 3B) and was successfully embolized using gelform particles. Conservative treatment with close observation was opted for IMH and IBP. Due to the presence of IMH and hepatic lacerations with pseudoaneurysm, anticoagulation therapy was withheld, and an inferior vena cava filter was implanted to prevent further emboli.

The IMH, IBP, and hepatic pseudoaneurysm were all stationary in the 2 subsequent in-hospital CTAs. She was then discharged in stable condition. Another follow-up CT about 1 month later showed near total regression of the IMH (Fig. 4).

Pulmonary embolism is one of the well-known causes of cardiac arrest, which can involve up to 200,000 annual deaths in the United States [1,2]. The utility of thrombolytic agents during the CPR in patients with pulmonary embolism had been a matter of debate [1,3]. The administration of thrombolytic agents had been reported to increase the chance of bleeding complications, especially in cases with prolonged CPR [3–8]. On the other hand, thrombolytic agents provided the benefits of facilitating rapid lysis of clots and the regaining of pulmonary circulation which were not achievable by anticoagulation alone [3,9]. Moreover, there were studies that supported the usage of thrombolytic agents, especially in cases with massive pulmonary embolism, cardiac arrest, or hemodynamic instability [1,3,4,9–17]. As

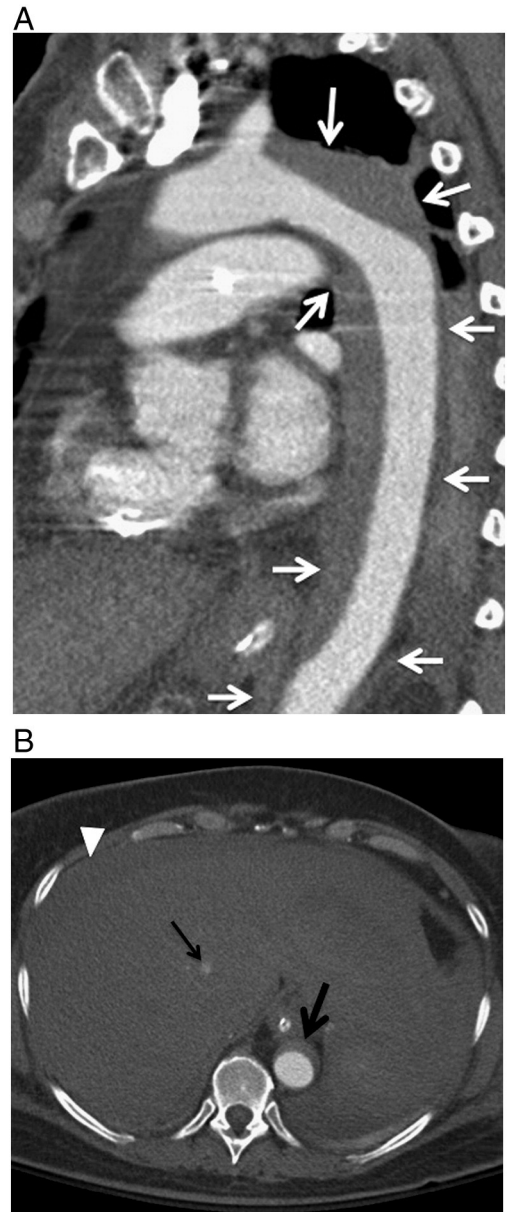
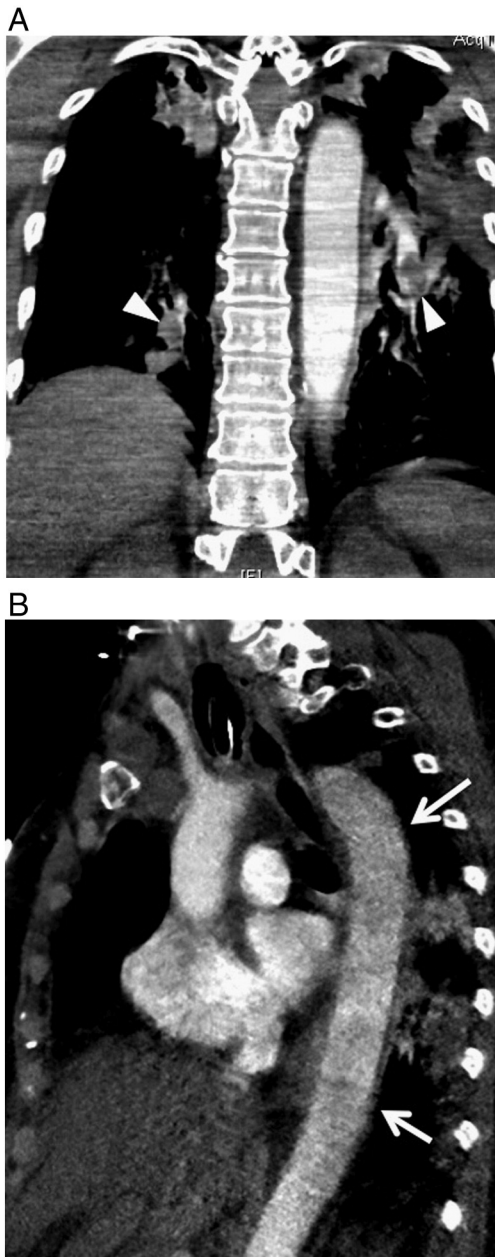


Fig. 1. Initial CTA performed at the time of admission reveals low attenuation filling defects within the bilateral subsegmental pulmonary arteries (A), consistent with subsegmental pulmonary embolism on the coronal pulmonary CTA reformatted image (arrowheads). B, Oblique sagittal candy-cane-view CTA image of the thoracic aorta did not reveal aortic injury at initial scan. Note peripheral consolidations in the bilateral lung, likely to be due to aspiration pneumonia.

Fig. 2. Computed tomographic angiography oblique sagittal candy-cane reformatted images (A). B, Axial image of the thoracic aorta performed on the next day following the repeated CPR and thrombolysis revealed a crescentic, non-enhancing thickening in the wall of the descending thoracic aorta, extending from the level of the left subclavian artery inferiorly to the level of aortic hiatus consistent with of IMH (arrows in A and thick arrow in B). Note also the hepatic pseudoaneurysm (thin arrow) and hemoperitoneum (arrowhead). C, Coronal reformatted CTA image reveals a small focal enhancing lesion within the mid-descending thoracic aortic IMH with visible connection to an intercostal artery compatible with an IBP (arrow). Also note the bilateral ascites (black arrowheads).



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