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Case Report

Successful management of four unusual cases of acute aortic thrombus induced by chemotherapy☆

Jun Ho Kim, Yong Sun Jeon *, Soon Gu Cho

Department of Radiology, Inha University Hospital, Inha University School of Medicine, Inhang-ro 27, Jung-gu, Incheon, Korea 400-711

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ABSTRACT

An acute aortic thrombus is an unusual finding, and this is a source of distal arterial embolism, which has a poor prognosis. Chemotherapeutics have been reported as possible rare causes of acute arterial thrombus. We report four cases of acute aortic thrombus after chemotherapy, which were effectively treated with systemic anticoagulation or endovascular management.

1. Introduction

An aortic thrombus is an unusual finding, and this can be potential source of cerebral, visceral, or lower extremity emboli, which requires early diagnosis and prompt treatment. Treatment methods are not yet standardized because of its rarity [1,2]. Chemotherapeutics have been reported as risk factors for arterial thrombosis [3,4], but an aortic thrombus induced by chemotherapy is rare. We report four cases of acute thrombus after chemotherapy, which were successfully treated with systemic anticoagulation or endovascular management.

2. Clinical cases

2.1. Case 1

A 55-year-old man was diagnosed with pancreatic adenocarcinoma, for which Whipple's operation was performed. The patient was treated postoperatively with radiation therapy and 4 cycles of intravenous cisplatin and 5-fluorouracil. After concurrent chemoradiotherapy, he was additionally administered 5 cycles of gemcitabine (1600 mg for 3 days). Three days after the last gemcitabine cycle, the patient presented with sudden-onset abdominal pain. Computed tomography (CT) of the abdomen and pelvis was performed. A large thrombus was identified in the infrarenal abdominal aorta (Fig. 1A). A CT scan prior to chemotherapy had revealed a normal infrarenal abdominal aorta. Initial laboratory findings were within normal limits: platelet count, 196,000 cells/μl; prothrombin time-international normalized ratio (PT-INR), 1.20; and activated partial thromboplastin time (aPTT), 34.5 s. There was no evidence of atherosclerosis or abdominal aortic aneurysm on CT images. The patient was conservatively treated with heparin (25,000 units per day for 3 days), and his symptoms resolved. A follow-up CT scan 1 month later revealed that the infrarenal aortic thrombus had disappeared (Fig. 1B).

2.2. Case 2

A 72-year-old man with poorly differentiated pancreatic carcinoma was treated with 2 cycles of intravenous gemcitabine (1700 mg for 1 day) and oral erlotinib (100 mg daily). Three weeks after the last cycle, routine-enhanced thoracic CT imaging revealed a large acute thrombus in the descending thoracic aorta (Fig. 2A). A CT scan prior to chemotherapy had shown a normal thoracic aorta. Initial laboratory findings were within normal limits: platelet count, 293,000 cells/μl; PT-INR, 0.93; and aPTT, 30.9 s. Intravenous unfractionated heparin (25,000 units per day for 3 days) was administered, and the patient was closely observed for the development of distal emboli. There was no imaging evidence of atherosclerosis or abdominal aortic aneurysm. Follow-up CT imaging 2 weeks later demonstrated that the thoracic aortic thrombus had markedly decreased in size (Fig. 2B). The patient remained asymptomatic.

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* Corresponding author. Department of Radiology, Inha University Hospital, Inha University School of Medicine, Inhang-ro 27, Jung-gu, Incheon, Korea 400-711. Tel.: +82-32-890-2769; fax: +82-32-890-2743.
E-mail address: radjeon@inha.ac.kr (Y.S. Jeon).

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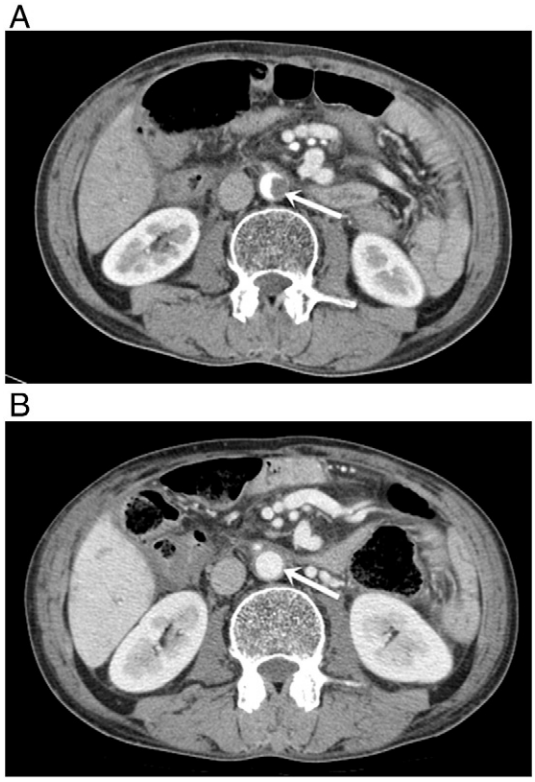

Fig. 1. A 55-year-old man with abdominal aortic thrombosis after cisplatin-based chemotherapy. (A) Abdominal CT image shows an infrarenal intraluminal abdominal aortic thrombus (arrow). (B) One month after systemic heparinization, the abdominal CT image reveals the disappearance of the infrarenal thrombus (arrow).

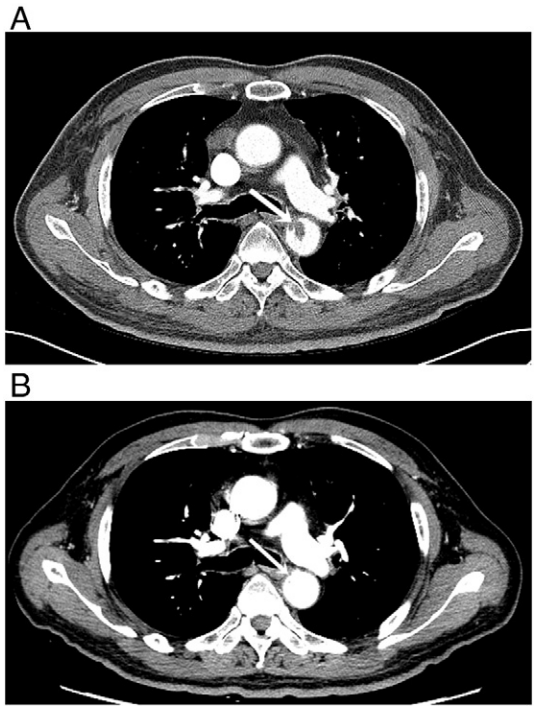

Fig. 2. A 72-year-old male with an acute thrombus of the descending thoracic aorta after gemcitabine-based chemotherapy. (A) Thoracic CT reveals a large thrombus at the level of the descending thoracic aorta. (B) Two weeks after systemic heparinization, follow-up CT shows the decreased size of the thrombus (arrow).

2.3. Case 3

A 44-year-old woman was diagnosed with advanced gastric adenocarcinoma for which total gastrectomy was performed. Adjuvant chemotherapy was initiated 12 days postoperatively with a combination of cisplatin (92 mg for 1 day) and 5-fluorouracil (1530 mg per day for 4 days). Two days after completion of the first cycle, the patient presented with sudden-onset right flank pain and dizziness. Emergency CT of the abdomen and pelvis revealed a large abdominal aortic thrombus at the origin of the renal arteries, with right renal artery involvement causing renal infarction (Fig. 3A). CT imaging prior to chemotherapy had demonstrated a normal aorta at the origin of the renal artery. Initial laboratory findings were within normal limits: platelet count, 338,000 cells/μl; PT-INR, 1.01; and aPTT, 33.7 s. Intravenous infusion of unfractionated heparin was initiated. To minimize the surgical burden for the patient, who was on her 17th day of hospitalization after major surgery, hybrid management was chosen. Under general anesthesia, we performed a cut-down of the right femoral artery. A 10×40 mm balloon (ev3, Plymouth, MN, USA) was placed to occlude the left iliac artery to prevent contralateral embolization. Then, a 5×20 mm balloon (Cordis Co., Miami Lakes, FL, USA) was used to occlude the left renal artery to prevent renal embolization (Fig. 3B). Wire-directed balloon catheter thrombectomy was attempted via right femoral access using a 5F Fogarty catheter (LeMaitre Vascular Inc., Burlington, MA, USA) but was ineffective. Thrombectomy was performed using a Trerotola mechanical thrombectomy device (Arrow International Inc., Reading, PA, USA) and a 27-mm Equalizer balloon catheter (Boston Scientific, Cork, Ireland). A complete angiogram demonstrated no residual thrombus and no embolus in the left renal artery or both lower extremity arterial systems (Fig. 3C). After thrombectomy, the patient underwent continuous systemic heparinization for 1 week. Follow-up CT imaging revealed complete resolution of the thrombus. The patient remained asymptomatic.

2.4. Case 4

A 60-year-old woman with invasive carcinoma of the breast was treated with 4 cycles of intravenous doxorubicin (90 mg for 1 day) and cyclophosphamide (900 mg for 1 day). Three weeks after the last cycle, thoracic CT performed for restaging showed a thrombus in the descending thoracic aorta (Fig. 4A). Initial laboratory findings were within normal limits: platelet count, 249,000 cells/μl; PT-INR, 1.27; and aPTT, 35.4 s. The patient was treated with unfractionated heparin. Follow-up CT imaging 2 weeks later demonstrated disappearance of the thoracic aorta thrombus but a newly developed left kidney infarction and total occlusion of the left proximal run-off vessels (Fig. 4B). The patient presented with pain and swelling of the left lower leg. Subsequent angiography of the left lower extremity for thrombolysis demonstrated complete occlusion of the left tibioperoneal trunk, the proximal tibial artery, and peroneal artery. A 15-cm multiside-hole catheter (Cook Incorporated, Bloomington, USA) was placed at the proximal tibioperoneal trunk and catheter-directed thrombolysis was performed with continuous infusion of urokinase. Follow-up angiography 1 day later showed recanalization of the tibioperoneal trunk, the proximal and middle portion of the posterior tibial artery, and the peroneal artery but remnant segmental occlusion of the distal posterior tibial artery (Fig. 4C). The patient's leg swelling improved.

3. Discussion

Aortic thrombus is a rare condition resulting in embolization from an aortic source [1,2,5]. Recurrent embolization can have serious consequences, including limb loss, renal and splenic infarcts, and cerebrovascular insufficiency [5]. The etiology of aortic thrombi includes atherosclerotic diseases, aneurysms, endothelial disorders, and hypercoagulable states [2]. Increased risk of thrombosis has been documented