Right Main Pulmonary Artery Thrombus after Type A Aortic Dissection Repair

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Type A aortic dissection involves the ascending thoracic aorta and needs emergent surgical repair since these patients are at increased risk of complications such as aortic rupture, aortic regurgitation, myocardial infarction, and cardiac tamponade. We describe two cases of right main pulmonary artery thrombus after Type A aortic dissection repair with graft. The right main pulmonary artery thrombus is a very rare complication of Type A aortic dissection repair and has never been reported up to the present time. The preferred location of thrombus after ascending aortic dissection repair is the right main pulmonary artery due to its close approximation. The possible mechanism of right main pulmonary artery thrombus is the compression of the right main pulmonary artery by distorted aortic structure after the surgery and altered blood flow dynamics in the pulmonary artery.

Keywords: aortic dissection, repair, pulmonary artery, thrombus

Introduction

Aortic dissection is a life-threatening condition that requires emergent medical and surgical treatment with an estimated annual incidence of approximately 5 to 30 per million. The mortality rate of aortic dissection is very high with 1% to 2% per hour for the first several hours. Based on Stanford classification system, it can be categorized into Type A and Type B. Type A aortic dissection involves the ascending thoracic aorta and needs emergent surgical repair since these patients are at increased risk of complications such as aortic rupture, aortic regurgitation, myocardial infarction, and cardiac tamponade. Type B aortic dissection involves the descending thoracic aorta and is usually managed medically unless complicated by end organ ischemia, aneurysmal dilatation or rupture. Surgical repair of a Type A aortic dissection has improved survival preventing disastrous complications. The major complications after Type A aortic dissection repair include recurrence of aortic dissection, aneurysm or pseudo-aneurysm formation, and leakage at the anastomosis site. We describe two cases of right main pulmonary artery thrombus after Type A aortic dissection repair with graft.

Case Report

Case 1

A 55-year-old female presented to her primary care physician for a fever of 7 days. Her past medical history was significant for hypertension, gastro-esophageal reflux disease, anxiety disorder, menopause, and Type A aortic dissection with graft repair 4 months ago. She developed a sore throat 10 days ago followed by a fever 7 days ago. Her sore throat resolved but she continued to have a fever, with a Tmax of 102°F. She denied a cough, sputum and shortness of breath. She denied lower extremity swelling and pain. She was taking metoprolol, omeprazole, sertraline, quetiapine, and conjugated...
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estrogen/progesterone. Her initial vital signs were blood pressure of 121/77 mmHg, pulse rate of 86 per minute, respiratory rate of 20 breaths per minute, temperature of 99.1°F, and oxygen saturation of 97% on room air. Lung exam revealed normal breath sounds without wheezing and crackles. Heart exam showed regular rate and rhythm without murmur, gallop and rubs. She was having chills and rigors at the clinic, and was transferred to the emergency department for further evaluation. At the emergency department, her complete blood count showed WBC of 3.87 with segment 65%. Basic metabolic panel was unremarkable. Her urinalysis was normal. Chest X-ray showed stable prominent ascending aorta and no acute infiltrates. Her blood cultures were growing Viridans streptococci and she was started with vancomycin. Transesophageal echocardiogram was done to rule out infective endocarditis which showed mild aortic regurgitation and mild mitral regurgitation but no vegetations. Her blood cultures were growing Viridans streptococci and she was started with vancomycin. Transesophageal echocardiogram was done to rule out infective endocarditis which showed mild aortic regurgitation and mild mitral regurgitation but no vegetations. A computed tomography (CT) chest with intravenous contrast showed a 1.5 × 0.7 cm thrombus in the right main pulmonary artery which was non-occlusive. The right main pulmonary artery was mildly compressed by the ascending aortic graft from the recent Type A aortic dissection repair (Fig. 1). Lower extremity venous duplex was negative for deep vein thrombosis. She was started with low-molecular weight heparin and warfarin. Her final diagnoses were bacteremia due to Viridans streptococci and right main pulmonary artery thrombosis. Looking back to her type A aortic dissection, she had ascending aortic dissection 4 months ago and it was repaired with #32 Dacron graft with Prolene sutures and glue.

Case 2
A 50-year-old male was referred to the emergency department after acute pulmonary thrombus was found on CT chest after type A aortic dissection repair 7 months ago. His past medical history includes hypertension, COPD, obstructive sleep apnea, gastro-esophageal reflux disease, Barrett’s esophagus, supra-ventricular tachycardia status post ablation, osteoarthritis, hyperlipidemia, stroke, and heparin-induced thrombocytopenia. He denied chest pain, shortness of breath and syncope. His medications were metoprolol, albuterol inhaler, omeprazole, morphine, simvastatin and warfarin. His vital signs were blood pressure of 145/88 mmHg, pulse rate of 90 beats per minute, respiratory rate of 16 breaths per minute, temperature of 98.1°F, and oxygen saturation of 96% on ambient air. Physical examination revealed clear breath sounds without wheezing and crackles, and regular rate and rhythm without murmur. Complete blood count was unremarkable. Complete metabolic panel were within normal limits. He was taking warfarin and the INR was 2.2. His CT chest with intravenous contrast showed 2.6 × 1.5 cm thrombus in the right main pulmonary artery. Of note, the right main pulmonary artery was compressed by the ascending aortic graft (Fig. 2). Lower extremity venous duplex was negative for deep vein thrombosis. He was started with argatroban due to past history of heparin-induced thrombocytopenia and his INR target was increased between 2.5 and 3.5. When he had type A aortic dissection 7 months ago, he was repaired with 25 mm Carbomedics aortic valve conduit with Teflon valve stitches and Bio-Glue.
Discussion

Pulmonary artery thrombus is an extremely rare finding and has never been reported after ascending aortic dissection repair until now. After the aortic dissection repair, close monitoring is required for the possible complications such as recurrence of aortic dissection, aneurysm or pseudo-aneurysm formation, and leakage at the anastomosis site. Our first patient was discovered to have a right main pulmonary artery thrombus 4 months after Type A aortic dissection repair with graft. Infective endocarditis was ruled out with negative transesophageal echocardiogram and deep venous thrombosis was ruled out with normal lower extremity venous duplex. Although the patient had bacteremia, this right main pulmonary artery thrombus was an incidental finding. Our second patient had a finding of right pulmonary artery thrombus 7 months after Type A aortic dissection repair with graft. Although he had a history of heparin induced thrombocytopenia, his platelet count was normal and his INR was 2.2. Deep venous thrombosis was ruled out with normal lower extremity venous duplex. The mechanism of right main pulmonary artery thrombus after Type A aortic dissection repair is unknown because there have been no reported cases. However, we can postulate possible mechanisms based on similar findings reported in the past. Pulmonary artery stenosis after acute dissecting aneurysm of the ascending aorta was first described by Buja, et al. in 1972.3 Following this case report, there have been a few more case reports of pulmonary artery stenosis or occlusion caused by aortic dissection, aneurysm or pseudoaneurysm.4–7 Sometimes, these pulmonary artery stenosis or occlusion can lead to pulmonary artery thrombus.5 The mechanism of this pulmonary artery thrombus is the compression of pulmonary artery by dilated ascending aortic dissection, hematoma or aneurysm. This compression is possible because the pulmonary artery and ascending aorta share the common adventitia.5 The preferred location of thrombus after ascending aortic dissection is the right main pulmonary artery due to its close approximation.4–5 Right main pulmonary artery thrombus after Type A aortic dissection repair can be attributed to the similar mechanism. The possible mechanism of right main pulmonary artery thrombus after Type A aortic dissection repair is the compression of the right main pulmonary artery by distorted aortic structure after the surgery and altered blood flow dynamics in the pulmonary artery. As seen in Figs. 1 and 2, there were compressions of the right main pulmonary artery by the ascending aortic graft. The use of surgical glue as a possible implicating factor which may expand or alter the adjacent vessel needs future investigation.

Conclusion

The right main pulmonary artery thrombus is a very rare complication of Type A aortic dissection repair. The preferred location of thrombus is the right main pulmonary artery and the possible mechanism is the compression of the right main pulmonary artery by distorted aortic structure and altered blood flow dynamics in the pulmonary artery.

Disclosure Statement

Jae Hyung Cho and Kimberly Brockenbrough have no conflict of interest.

References