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Acute Type-A Aortic Dissection with Obstruction of the Right Coronary Artery

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ABSTRACT

Occlusion of a coronary artery by an acute type A aortic dissection presents a life-threatening emergency that is rarely seen and easy to misdiagnose. We present the case of a 75-year-old male who experienced sudden onset of severe left-sided chest pain due to an acute type A aortic dissection that obstructed the right coronary artery. Following an initial misdiagnosis of acute coronary syndrome, imaging revealed the presence of an aortic dissection. An emergency modified Bentall procedure was performed, in which the damaged aorta and aortic valve were replaced.

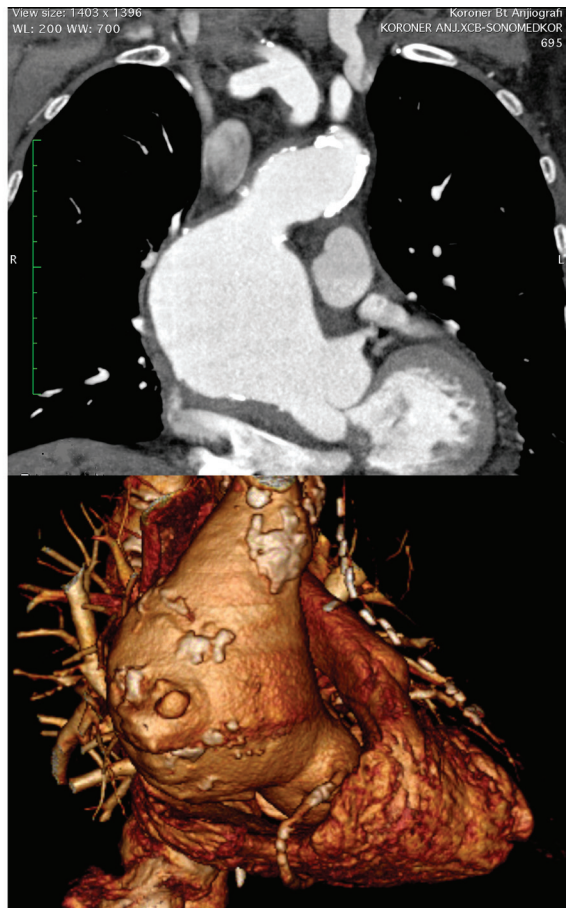
INTRODUCTION

Acute type A aortic dissections present a life-threatening surgical emergency. Patients most frequently present with acute onset of sharp anterior chest pain. Only 6% of patients report experiencing no painful symptoms [Prisant 2005]. The incidence of aortic dissection is 3.5 in 100,000 people and is twice as common in men [Clouse 2004]. Common risk factors include age, hypertension, atherosclerosis, and connective tissue disorders such as Marfan syndrome [Collins 2004]. Following the onset of symptoms, the mortality rate for those who suffer from an acute type A aortic dissection increases hourly by 1%, reaching as high as 50% after 48 hours [Hines 2011]. Rapid diagnosis and treatment of acute type A aortic dissections is critical. While most patients present with the classic symptoms discussed above, obscure symptoms may lead to delayed diagnosis and treatment, which rapidly increases the risk of morbidity and mortality. Dissections involving the coronary arteries result in higher risk of death and frequently present with nontraditional symptoms. We present a rare case of a 75-year-old male with an aortic dissection including the right coronary artery ostium.

CASE REPORT

A 75-year-old male presented to our institution complaining of left-sided chest pain and was initially diagnosed with acute coronary syndrome. The patient reported a 15-year history of hypertension managed with medication. He reported an extensive cardiac history, having undergone coronary artery bypass graft (CABG) surgery six years prior and percutaneous coronary intervention (PCI) with stent placement on two prior occasions occurring four years earlier and again one year earlier. The original target in the past CABG surgery was the left anterior descending (LAD) coronary artery. In past PCIs, stents were deployed in the body of the left circumflex and first marginal coronary.

Upon physical examination, the patient complained of a tearing pain radiating to his abdomen and back. Vital signs were normal. Electrocardiography revealed ST-segment



A, Computerized tomography (CT) showing aortic dissection and left main coronary artery ostium. B, 3D-rendered image of aortic dissection showing involvement and compression of right coronary artery ostium.

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depression on the inferior leads. Thoracic computed tomography (CT) with intravenous contrast was performed to visualize the coronary arteries. This scan revealed an acute aortic dissection originating from the aortic root (Figure, A).

The patient was indicated for emergent surgery and was taken to the operating room to undergo a modified Bentall procedure as previously described by Yakut [Yakut 2001]. Right axillary artery cannulation was performed due to extensive atherosclerosis encountered in the right femoral artery. The right femoral vein was then cannulated and cardiopulmonary bypass was initiated with deep hypothermia to 22°C. Median sternotomy performed during the prior CABG surgery had left extensive adhesions in the tissue. A careful approach to the heart was taken to protect the previous grafts. Once the heart was exposed, aortotomy was performed and the dissection was visualized. At this point, it was noted that the dissection lane included the right coronary artery ostium, which was moreover a questionable finding in CT (Figure, B).

The dissected aorta and the aortic valve were resected and excised, and a composite graft was prepared using a 21-mm bioprosthetic aortic valve (St. Jude, Little Canada, MN, USA) and a 26-mm Vaskutek tubular graft (Terumo, Ann Arbor, MI, USA). The composite graft was then implanted into the patient with a left coronary artery button. The left coronary artery ostium could not be implanted as a button within the graft due to erosion created by the dissection. Instead, a #6 tubular graft (Terumo, Ann Arbor, MI, USA) was anastomosed to the composite graft at the aortic root. The saphenous vein was anastomosed end-to-end with the #6 tubular graft in order to bypass the right coronary artery.

Anterograde cerebral perfusion was then initiated and the distal end of the large tubular graft was anastomosed to the descending thoracic aorta. The brachiocephalic trunk, left common carotid artery, and left subclavian arteries were implanted to the graft as a single island.

The patient's body temperature was then raised, the heart was de-aired, and the cross-clamp was removed. Following a bleeding hemostasis consult, the patient was decannulated and the sternum was wired closed. Mild inotropic support was required as the patient was weaned from cardiopulmonary bypass.

Following completion of the surgery, the patient was taken to the intensive care unit and remained intubated for 2 days. The patient's electrocardiogram (ECG) normalized during the initial hours post-operatively. Following extubation, the patient became dyspneic and was reintubated for an additional 2 days. Continuous positive airway pressure ventilation was required to assist with respiratory difficulty. On post-operative day 5, the patient was transferred to the floor and was discharged 10 days later. Post-operative transthoracic echocardiography revealed normal functioning of the implanted aortic valve. Ejection fraction was 55%. All other measures of cardiac function revealed no further complications.

CONCLUSION

Rapid diagnosis and treatment of acute type A aortic dissections are critical for patient survival. A variety of factors can make identification difficult. Patients suffering from an aortic dissection are often initially suspected of having a myocardial infarction (MI) and are treated without success. ECGs and chest X-rays generally do not provide sufficient evidence to detect the presence of a false lumen within the aorta [Hines 2011]. CT with contrast and transesophageal echocardiogram (TEE) are the most common diagnostic tools used to confirm a suspected dissection. However, their sensitivity in identifying a type A dissection is 93% and 90% respectively [Prisant 2005]. These imaging techniques may still provide a false negative result in a small percentage of cases due to a variety of imaging failures. Poor technique of contrast injection and other uncontrollable factors, such as streak artifacts or cardiac motion, may complicate identification of a dissection in CT imaging [Batra 2000]. Although magnetic resonance imaging (MRI) offers the highest degree of sensitivity, it is infrequently used in such scenarios.

Immediate surgical intervention remains the primary course of action in treating type A aortic dissections. Nevertheless, recent studies have questioned the benefits of urgent surgery for elderly patients. Repair of type A dissections in octogenarians is associated with an intraoperative mortality rate of 40%, compared with only 18% for those younger than 80 years old [Vanhuyse 2012].

Ultimately, it is important to recognize the possibility of an acute type A aortic dissection, even when an ECG suggests the presence of an acute MI. Making this distinction is particularly important because the treatment of a suspected MI with thrombolytics only increases the already astronomically high risk of mortality [Kamp 1994]. In addition, physicians must recognize the importance of combined CT and TEE imaging in cases when one study is ambiguous, as false-negative results remain possible for each.

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