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CASE 2—2014
Aortic Dissection: Real or Artifact?

Megan J. Lanigan, MD,* Mark A. Chaney, MD,* Edward Gologorsky, MD, FASE,† Oliver Chavanon, MD, PhD,‡ and John G. Augoustides, MD, FASE, FAHA§

ACUTE ASCENDING AORTIC DISSECTION is a serious condition with significant mortality requiring prompt diagnosis and surgical treatment as mortality rates increase hourly without intervention.[1,2] There are a number of modalities currently used to diagnose aortic dissection, including computed tomography (CT), magnetic resonance imaging (MRI), and transesophageal echocardiography (TEE), each with different strengths and weaknesses in regard to speed, accuracy, and ease of performance. There exists a balance between rapid diagnosis with comprehensive information regarding anatomic detail, vascular branch involvement, false lumen identification, and speed with which the diagnosis can be made to expedite potential surgical treatment. The optimal diagnostic mode for identifying ascending aortic dissection remains controversial. Additionally, the various methods of imaging used to evaluate for aortic dissection all carry potential disadvantages of artifact within the image, complicating the diagnostic process and at times leading to false-positive diagnoses. Managing this balance represents some of the difficulties in identification and treatment of these patients. The authors present a patient who was anesthetized for repair of a suspected ascending aortic dissection based on CT findings, yet subsequent TEE revealed normal anatomy.

*From the *Department of Anesthesia and Critical Care, University of Chicago Medical Center, Chicago, IL; †University of Miami, Miller School of Medicine, Jackson Memorial Hospital, Miami, FL; ‡Cardiovascular and Thoracic Department, Cardiac Surgery Clinic, Grenoble University Hospital, Grenoble, France; and the §Cardiothoracic and Vascular Section, Anesthesiology and Critical Care, Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA.*

M.J.L. is a cardiac anesthesia fellow.

Address reprint requests to Mark A. Chaney, MD, University of Chicago Medical Center, Department of Anesthesia and Critical Care, 5841 S. Maryland Avenue, MC 4028, Chicago, IL 60637. E-mail: mchaney@dacc.uchicago.edu

1053-0770/2602-0033$36.00/0

http://dx.doi.org/10.1053/j.jvca.2013.05.024

Key words: aortic disease, aorta, aortic dissection, complications, artifacts, transesophageal echocardiography, ascending aortic dissection, CT artifacts

CASE PRESENTATION

A 47-year-old African American male (170 cm/79 kg) was transferred to the authors' institution for surgical management of an acute type-A aortic dissection noted on CT scan after presenting to an outside hospital with initial symptoms of shortness of breath, chest pain, and nausea. He had a past medical history of hypertension, type II diabetes, and gastroesophageal reflux disease. His past surgical history was significant for a right rotator cuff repair. Daily home medications included oral lisinopril-hydrochlorothiazide (20/25 mg daily), metformin (500 mg twice daily), and rabeprazole (20 mg daily). He had undergone esophagogastroduodenoscopy 3 days prior to the date of presentation following complaints of epigastric/abdominal pain as well as difficulty swallowing solid foods and was diagnosed at that time with a gastric ulcer for which he was started on the rabeprazole. He awoke on the morning of presentation with shortness of breath, chest pain radiating to his right upper quadrant, and hot flashes, and he had an episode of nausea and vomiting. At work, he had another episode of nausea and vomiting and called an ambulance to transport him to the nearest hospital. En route in the ambulance, he continued to complain of chest pain and was given sublingual nitroglycerin, which failed to relieve the pain. He was not treated with aspirin at that time given a concern for the recently diagnosed gastric ulcer. On admission to the outside hospital emergency room, his vital signs were stable. Electrocardiogram revealed normal sinus rhythm without evidence of ischemia. He subsequently underwent a CT scan, which demonstrated a type-A aortic dissection 2.0 cm distal to the aortic valve extending approximately 15 mm (Fig 1). He continued to be managed with intravenous morphine for pain and intravenous boluses of labetalol to maintain a systolic blood pressure below 125 mmHg and was transferred directly to the operating room for surgical repair of the dissection.

Preoperative vital signs demonstrated a blood pressure of 156/89 mmHg, heart rate 65 beats-per-minute, temperature 35.8ºC, respiratory rate of 17 breaths per minute, and oxygen saturation of 99% on 2.0 L nasal cannula. Following left radial arterial catheter insertion, uneventful anesthetic induction was performed with 500 μg of fentanyl, 8 mg of midazolam, 50 mg of propofol, and 10 mg of vecuronium. He was intubated uneventfully with an 8.0 endotracheal tube and placed on inhaled isoflurane for maintenance. A TEE probe was inserted easily without hemodynamic changes. Upon evaluation of the ascending aorta, a questionable artifact was noted, but no obvious dissection was seen (Fig 2). A curvilinear object was noted in the ascending aorta that initially appeared to be a dissection flap located in the same position as the prior CT evidence of dissection. However, on further evaluation the suspected dissection line extended outside the anatomic boundary of the aortic wall with no difference in color-flow Doppler on either side. No other evidence of dissection, such as aortic insufficiency or pericardial effusion was noted (Fig 3). The midesophageal aortic

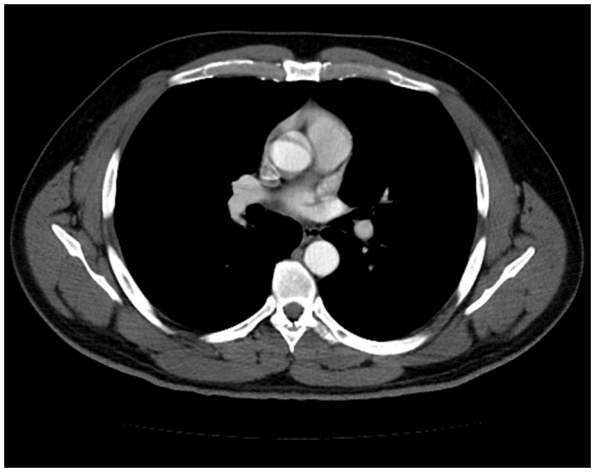

Fig 1. Computed tomographic image from outside hospital demonstrating ascending aortic dissection 2.0 cm distal to aortic valve.

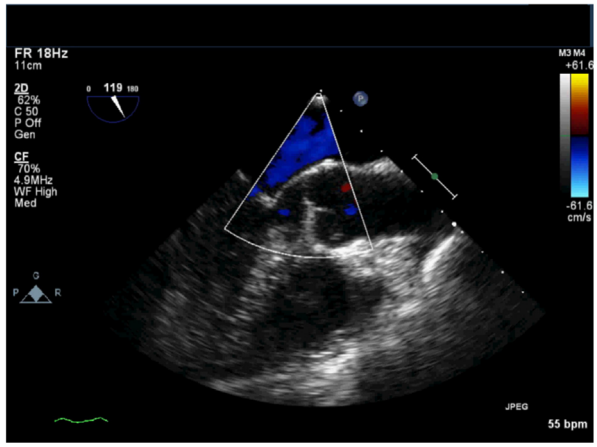

Fig 3. Midesophageal aortic valve long-axis view demonstrating lack of aortic insufficiency. (Color version of figure is available online.)

valve long-axis view demonstrated normal anatomy (Fig 4). Following consultation with the cardiac surgeon and a cardiologist as well as a re-review of the outside CT scan, it was determined that the CT and TEE findings likely were artifacts, and the decision was made to cancel the case at that point and repeat the CT scan. No central venous or pulmonary artery catheter had been placed at this time, and no incision ever was made. Per radiology recommendations, the patient underwent followup CT angiogram, which confirmed the lack of a dissection. He was observed overnight in the intensive care unit. Cardiac enzymes were evaluated and remained negative for signs of ischemia. He was transferred to the medical floor for further management of continued right upper quadrant pain and was discharged home in stable condition on postoperative day 3.

DISCUSSION

Acute type-A aortic dissection is a life-threatening condition requiring urgent detection given the significant morbidity and mortality associated with it. The true incidence of acute aortic dissection is difficult to determine, but population studies estimate it to be around 0.5 to 4.0 cases per 100,000 people per year. This number has been increasing over the years, possibly secondary to improved diagnosis with advances in imaging technology.[2] Medical management of type-A aortic dissection is associated with significant mortality: 20% at 24 hours after presentation, 30% at 48 hours, 40% at 1 week, and 50% at 1 month. Even with surgical treatment, mortality remains high for type-A dissection, with rates ranging from 10% after 24 hours to 20% after one month.[2] Given the substantial mortality of this disease, it is considered a true surgical emergency, and rapid diagnosis is a necessity. This is possible with several different modes of imaging.

The overall process of diagnosing type-A aortic dissection involves a series of decisions regarding the optimal imaging modality for rapid diagnosis with the highest accuracy possible. There exists a balance between precise diagnosis and excessive delays in diagnosis that prolong initiation of surgical management. A number of variables are used to determine the optimal diagnostic modality, including probability of disease, the risks

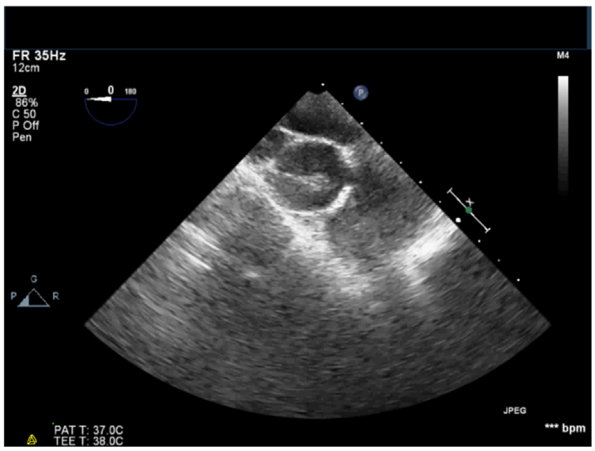

Fig 2. Transesophageal echocardiography image of ascending aorta (short-axis view) demonstrating curvilinear artifact.

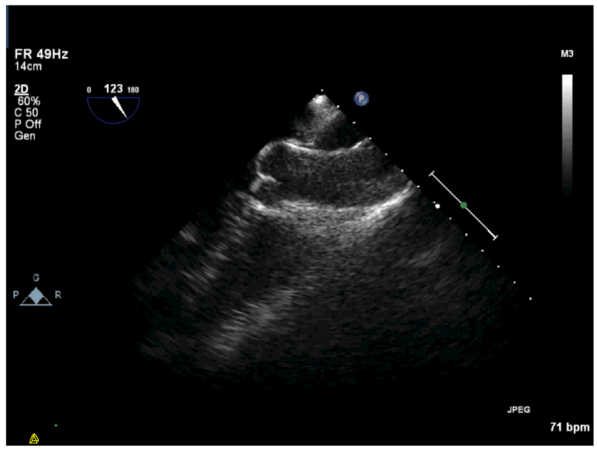

Fig 4. Midesophageal aortic valve long-axis view demonstrating normal anatomy without evidence of dissection flap.