Aortic Dissection:
Subtle Symptoms

Anita W. Asgar, MD, FRCPC and Bruce Josephson, MD, FRCPC

CardioCase presentation

Aaron's Discomfort

Aaron, 33, presents to his local emergency room with a several-hour history of persistent mid-back discomfort that began at 6 a.m., shortly after waking. His discomfort was severe with no radiation, shortness of breath or chest discomfort.

Aaron was treated with sublingual nitroglycerin and morphine. His electrocardiogram (ECG) (Figure 1) showed nonspecific inferolateral T wave changes and he was referred to a tertiary care centre for further assessment. His blood pressure (BP) was 220/110 mmHg (Table 1) and he complained of severe back discomfort.

His past medical history was unremarkable and he was on no medications. His family history is positive for hypertension.

For more about Aaron, see page 22.

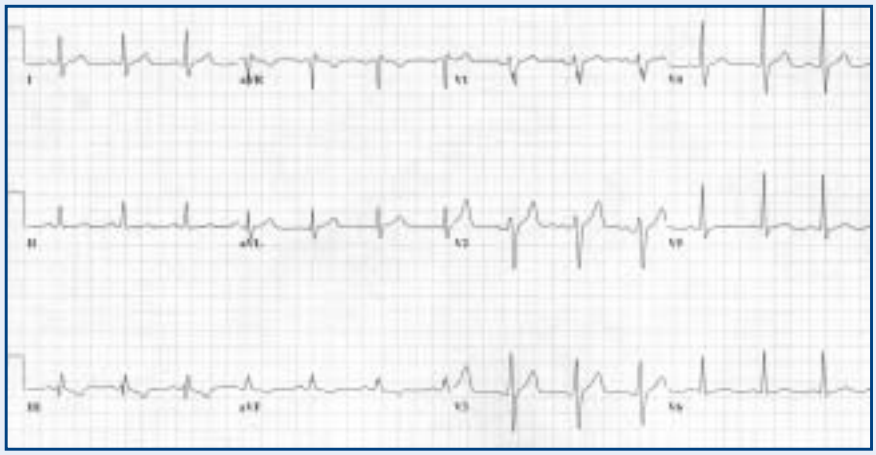


Figure 1. Aaron's ECG.

What's your CardioCase diagnosis?

CardioCase discussion

What's wrong with Aaron?

Aortic dissection is a relatively uncommon, potentially catastrophic, condition that often presents with chest and/or back pain and may be confused with acute coronary syndrome (ACS). Early diagnosis and treatment are crucial for patient survival, particularly if thrombolytic therapy is being considered because of the potentially disastrous results.

The incidence of aortic dissection is estimated to be 2.6 to 3.5 per 100,000 patients. The average age of patients with aortic dissection is 63 for males and 67 for females.[1]

The primary event in aortic dissection is a tear in the aortic intima. Blood passes through the tear, into the aortic media, separating the intima from the surrounding media and/or adventitia creating a false lumen. The dissection can spread from diseased segments of the aortic wall in an antegrade or retrograde fashion, involving side branches and resulting in complications of ischemia for the affected areas. Propagation of the dissection can also result in aortic insufficiency or tamponade if the pericardial space is involved.

Predisposing factors

Perhaps the most important predisposing factor is systemic hypertension. Other important conditions that increase the risk of aortic dissection include:[2]

- connective tissue disorders (*e.g.*, Marfan's syndrome and Ehlers-Danlos);
- hereditary vascular diseases (*e.g.*, bicuspid aortic valve and coarctation);
- vasculitis (*e.g.*, Takayasu arteritis and syphillis);
- deceleration trauma;
- iatrogenic factors (*e.g.*, previous coronary artery bypass grafting valve surgery) and
- Turner's syndrome.

Table 1

Aaron's physical exam

Heart rate:	92 beats per minute
Blood pressure:	220/110 mmHg (in both arms)
General:	Young overweight male in obvious discomfort
Chest:	Clear to bases
CVS:	• JVP at 3 cm above sternal angle • Normal S1, S2 • Ejection click, 2/6 early-systolic murmur • Peripheral pulses palpable • R femoral stronger than L femoral
ECG:	• Normal sinus rhythm • Inferior T wave changes
CXR:	Normal cardiac silhouette

CVS: Cardiovascular system
ECG: Electrocardiogram
JVP: Jugular venous pressure
CXR: Chest X-ray

The biggest aortic dissection challenge is appropriate clinical suspicion and diagnosis in order to pursue proper management.

Clinical presentation

Clinical presentation of aortic dissection is characterized by:[3]

- acute onset of chest pain and/or back pain that is severe, blunt and sometimes radiating;
- hypertension, typically seen in Type B dissections;
- hypotension, particularly in the setting of tamponade;
- syncope, which is associated with worse outcomes;
- pulse deficits, BP difference between arms;
- aortic insufficiency and
- acute myocardial ischemia or myodcardial infarction due to coronary occlusion (the right

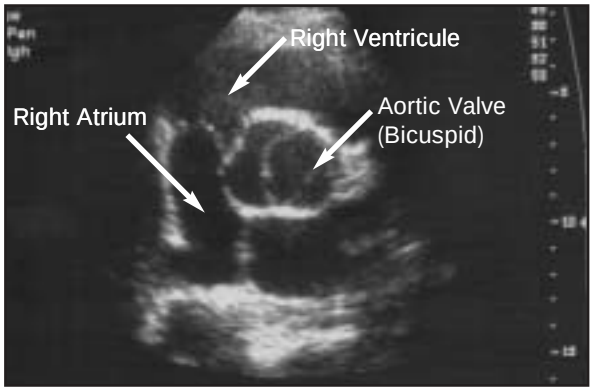


Figure 2. Transthoracic echocardiogram.

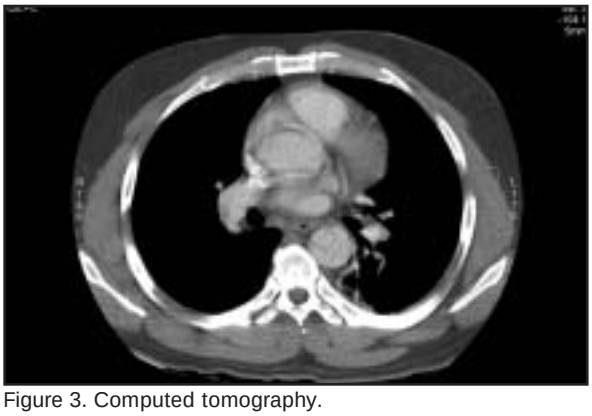


Figure 3. Computed tomography.

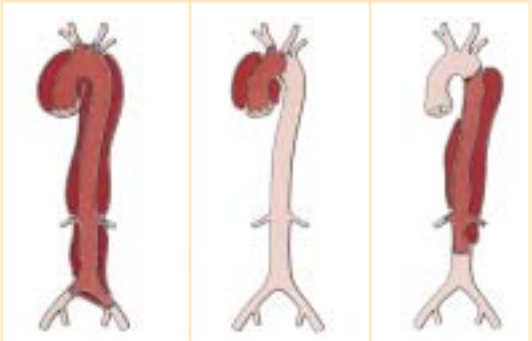
Stanford	Type A		Type B
De Bakey	Type I	Type II	Type III
			
Type I:	Originates in the ascending aorta, propagates at least to the aortic arch and often beyond it distally.		
Type II:	Originates in and is confined to the ascending aorta.		
Type III:	Originates in the descending aorta and extends distally down the aorta or, rarely, retrograde into the aortic arch and ascending aorta.		
Type A:	All dissections involving the ascending aorta, regardless of the site of origin.		
Type B:	All dissections not involving the ascending aorta.		

Figure 4. Anatomic systems of aortic dissection.

Routine chest X-rays are abnormal in 60% to 90% of aortic dissection cases, however, a normal X-ray does not dismiss the diagnosis.

coronary artery is most commonly involved and rarely leads to complete heart block).

Diagnostic strategies

The diagnosis is often suspected from history and physical exam. Routine chest X-rays are abnormal in 60% to 90% of aortic dissection cases, however a normal X-ray does not dismiss the diagnosis.[2] Baseline ECG may also be normal or show evidence of ischemia related to involvement of the coronary arteries.

Transthoracic echocardiography (TTE) (Figure 2), chest computed tomography (CT) (Figure 3) and magnetic resonance imaging are thought to be superior to other imaging tests. However, availability may be limited and the accuracy is dependent upon the performance and interpretations of skilled individuals.[4] It is extremely important to quickly identify acute aortic dissection involving the ascending aorta, which is a surgical emergency.

An aortic dissection is classified by one of two anatomic systems (Figure 4):

- The De Bakey system–Type I dissection involves both the ascending and descending thoracic aorta, Type II is confined to the ascending aorta and Type III is confined to the descending aorta.
- The Daily or Stanford system classifies dissections involving the ascending aorta as Type A and all other dissections as Type B.[5]

More about Aaron

In light of Aaron's symptoms of severe back pain, hypertension and physical exam findings that suggested a bicuspid aortic valve, the diagnosis of aortic dissection was suspected. Aaron subsequently underwent computed tomography scanning, which revealed the presence of an extensive Type B dissection that extended to the iliacs.

Aaron's echocardiogram demonstrated a bicuspid aortic valve and a dilated left ventricle, but no evidence of aortic insufficiency or coarctation.

He was admitted to the coronary care unit and treated with intravenous beta-blockers and vasodilators with invasive BP monitoring. At discharge, he required three antihypertensives to achieve adequate BP control.

Management

An ascending aortic dissection occurs almost twice as often as a descending dissection and is highly lethal, with a mortality rate of 1% to 2% per hour after symptom onset. Acute Type A aortic dissection is a surgical emergency. Current surgical techniques focus on primary repair of the aortic root or replacement of the root and aortic valve apparatus, if involved.[6]

Patients with uncomplicated aortic dissection, confined to the descending thoracic aorta (Stanford Type B), are best treated with medical therapy.

Patients with uncomplicated Type B dissection have a 30-day mortality rate of 10%.[7] Medical therapy consists of aggressive BP-lowering using beta-blockers and other agents as required to achieve adequate BP control. PCard

About the authors...

Dr. Asgar is a Cardiology Fellow, Dalhousie University, Halifax, Nova Scotia.

Dr. Josephson is an Associate Professor, Department of Medicine, Division of Cardiology, Dalhousie University, Halifax, Nova Scotia.

Take-home message

- Early diagnosis and treatment of aortic dissection are crucial for patient survival.
- Non-invasive techniques such as TTE and CT are good initial tests for diagnosis.
- Type A dissections are a surgical emergency.
- Type B dissections are managed medically with aggressive BP-lowering.

References

1. Clouse WD, Hallett JW Jr, Schaff HV, et al: Acute aortic dissection: Population-based incidence compared with degenerative aortic aneurysm rupture. Mayo Clin Proc 2004; 79(2):176-80.
2. Nienaber CA, Eagle KA: Aortic dissection: New frontiers in diagnosis and management: Part I: from etiology to diagnostic strategies. Circulation 2003; 108(5):628.
3. Spittell PC, Spittell JA Jr, Joyce JW, et al: Clinical features and differential diagnosis of aortic dissection: Experience with 236 cases (1980 through 1990). Mayo Clin Proc 1993; 68(7):642-51.
4. Nienaber CA, von Kodolitsch Y, Nicolas V, et al: The diagnosis of thoracic aortic dissection by noninvasive imaging procedures. N Engl J Med 1993; 328(1):1-9.
5. Nienaber CA, Eagle KA: Aortic dissection: New frontiers in diagnosis and management: Part II: Therapeutic management and follow-up. Circulation 2003; 108(6):772-8.
6. DeSanctis RW, Doroghazi RM, Austen WG, et al: Aortic dissection. N Engl J Med 1987; 317(17):1060-7.
7. Hagan PG, Nienaber CA, Isselbacher EM, et al: The International Registry of Acute Aortic Dissection (IRAD). New insights into an old disease. JAMA 2000; 283(7):897-903.