

# Emergency Bedside Ultrasound in Chest Pain: A Case of Extensive Aortic Dissection

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## Abstract

There are reports on the utility of bedside ultrasound in diagnosis of Aortic Dissection (AD). We reported a 60-year-old man that was presented with clinical features of right ventricular myocardial infarction, but further investigations raised the possibility of AD. Immediate bedside ultrasound in acute care room revealed an intimal flap along the descending Aorta. Emergency bedside ultrasound expedited decision making and prevented any delay in the management of this patient.

**Keywords:** Aortic dissection; Chest pain; Emergency

## Background

Dissection is a separation in the layers of an artery. It creates a false lumen for blood flow between the intima and adventitia layers of the artery. This lumen is prone to thrombosis and rupture [1].

In the United States, Aortic dissection (AD) occurs in one out of every 10,000 patients, admitted to the hospital; approximately 2000 new cases are reported each year. Although uncommon, Aortic Dissection (AD) is still fatal [2]. The mortality rate of AD is 27.5% overall [from 29% to 34% for type A Stanford classification (Ascending Aorta involved) and 15% to 25% for type B (Ascending Aorta is not involved)] [3].

Abrupt, sharp, inter-scapular, dissecting pain is present in 85% of patients. But presentation may have many variations including cardiac complications (extension of the dissection into a coronary artery or coronary occlusion from the dissection flap, often affecting the RCA [4,5], Aortic valve regurgitation and tamponad), neurologic symptoms (paraplegia due to spinal arterial ischemia and stroke due to carotid artery involvement) and syncope [3].

Although there is currently strong emphasis on rapid primary percutaneous coronary intervention and saving door-to-balloon

time, AD is an important differential diagnosis that astute emergency physicians should bear in mind [4].

There are several imaging modalities for diagnosing AD. CT angiography, magnetic resonance imaging, and trans-esophageal echocardiography can accurately detect AD (sensitivities of 100%, 98% and 98% and specificities of 98%, 98%, and 95%, respectively). But they require the patients to be transferred out of the acute treatment room. Besides angiography requires radiopaque solution injection and is time consuming. There are also reports about the value of bedside ultrasound in diagnosis of AD [3].

## Case Presentation

A 60-year-old man was brought to our emergency department (ED) by his son, complaining of Chest pain and nausea. The pain had initiated 30 minutes ago in his epigastrium. It was radiating to the back and left shoulder. He had hypertension and hypercholesterolemia, but there was no history of prior coronary artery disease and diabetes. He denied smoking, alcohol or drug abuse. He was taking 12.5 mg captopril and 5 mg amlodipine daily. On arrival, the patient was agitated and seemed to be uncomfortable, his blood pressure was 80/50 mmHg (left arm), 90/60 mmHg (Right arm), heart rate was 55 beats/min, respirations were 20 breaths/min, oxygen saturation was 95% (room air), and his temperature was 36.8°C axillary.

Cardiac auscultation was unremarkable, there was no tenderness, rebound, or guarding in his abdominal examination. Pulses in both lower and upper extremities were weak but symmetric. His preliminary clinical feature was consistent with right ventricular myocardial infarction. But there was something suspicious in his history. Following more detail history his son mentioned that "before the onset of the chest pain my father had pain and discomfort in his left thigh, the pain relieved with massage and topical piroxicam gel, but about an hour later, he suddenly developed severe chest pain". This clue raised our suspicion to vascular events. The patient was under cardiac monitoring and pulse oximetry; the infusion of intravenous normal saline was started by the nurse. He was received 10 mg metoclopramide for his nausea. Although he denied any

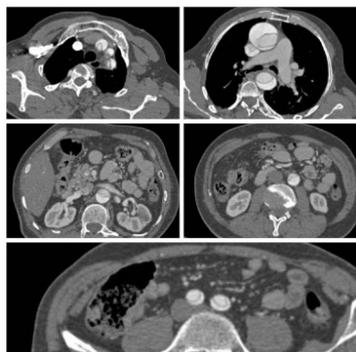
abdominal pain, but the history and physical exam raised our suspicion to the abdominal aortic dissection. Since our bedside ultrasound machine (Samsung, SonoAce X8 Ultrasound System) just had one curvilinear probe we used it to scan Abdominal Aorta. Ultrasound demonstrated a 4 cm abdominal Aorta with an intimal flap (Figure 1).

Cardiac ultrasound by cardiologist also revealed a dilated aortic root (5 cm). Complete blood counts, electrolytes, renal function tests, blood sugar, liver function tests, were within normal limits. Creatine kinase MB (CKMB Normal limit <24 u/l) and Cardiac Troponin I levels (Normal limit <0.1 ng/L) at presentation and at 6 hours after admission were 40 U/L, 2.5 ng/L, and 100 U/L, 4.5 ng/L, respectively.



**Figure 1:** Bedside emergency abdominal ultrasound shows transverse view of the abdominal aorta which contains an intimal flap (arrow).

Electrocardiogram (ECG) revealed sinus rhythm plus Right bundle branch block (RBBB). Portable Chest radiograph showed a dilated mediastinum (10 cm in tracheal bifurcation). Following these findings, we consulted our cardiac surgeon. He recommended ICU admission and Aortic CT angiography. CT Angiogram showed an extensive dissection in ascending and descending Aorta and all the branches of the Aortic arch, renal arteries and femoral arteries (Figure 2). The patient was transferred to the operating room. Unfortunately, he developed hemodynamic collapse during operation, resuscitation was unsuccessful and the patient expired.



**Figure 2:** CT angiography revealed Type A dissection, extending into all branches of the Ascending and descending Aorta.

## Discussion

Bedside ultrasound is a valuable tool for detecting AD. Previous reports have described its application in successful diagnosis of AD in the thorax and abdomen [6-8].

E-FAST (Extended Focused Assessment with Sonography for Trauma), RUSH exam (Rapid Ultrasound in Shock) and bedside emergency echocardiography, are essential skills which any emergency physician should be familiar with. Emergency physicians routinely use bedside ultrasound to evaluate the abdominal Aorta for aneurysm. Visualization of AD by the ultrasound is reported to carry a sensitivity of 67-80% and specificity of 99-100% [8].

We just had a curved ultrasound probe in hand and we successfully utilized it to detect dissection in the abdominal aorta. Although emergency bedside ultrasound may be influenced by some conditions like patient's body weight, the hair and thickness of fat and the skills of the sonographer, it is a rapid lifesaving diagnostic modality that promotes the ability of emergency physicians in the diagnosis and management of cardiovascular problems.

## Conclusion

It seems emergency bedside ultrasound can facilitate decision making, when cardiovascular events are likely.

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