

Point-of-care ultrasound (POCUS) for the early detection of thoracic aortic dissection.

Early use of POCUS helps early detection of a life threatening condition.

**A Case Study by:
Peter Weimersheimer, MD**

“A case for POCUS to be the standard of care as the next diagnostic step after history and physical exam”

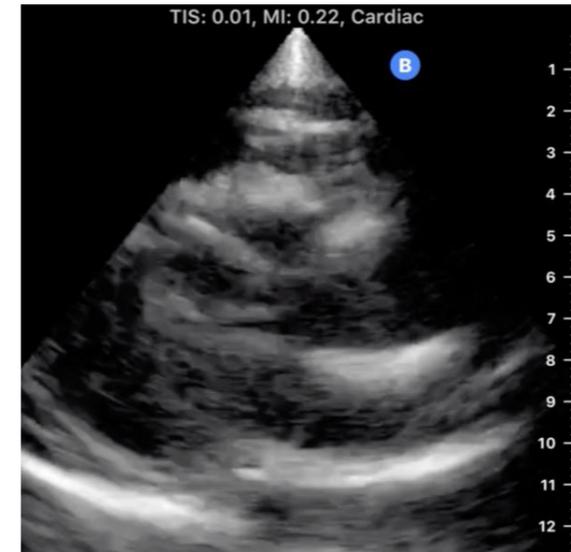
Introduction

Thoracic aortic dissection (TAD) is a rare condition which occurs with a frequency of 4 per 100,000. While it is a much less common cause of acute chest pain than myocardial infarction or pulmonary embolism, it is far more lethal with 50% mortality within 48h. While classic teaching suggests that these patients present with severe chest pain radiating to the back, retrospective data documents that most patients have much more cryptic symptoms, including 10% who are pain free on presentation. Most patients have no clinical exam or basic diagnostic findings suggestive of TAD. The frequently cited accepted “standard of care” is for this diagnosis to be missed on initial presentation.

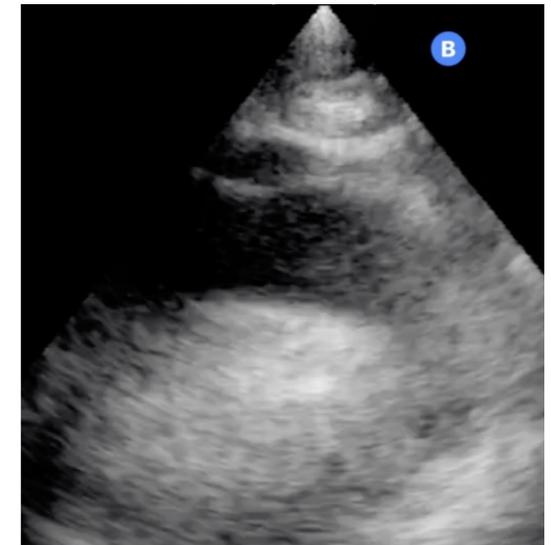
Case Study

A 57 year old woman with a history of hypertension and chronic pain presents via EMS for altered mentation. She is vague as to why she is in the ED, noting a month of low grade chest pain and one week of increased chronic right shoulder pain. Review of her medical records reveals multiple calls over the past week to her PCP about her worsening shoulder pain with resultant prescriptions for a muscle relaxant and a benzodiazepine. Her vital signs, exam, and EKG are normal except for a blood pressure of 123/62 mmHg, likely low for a patient with chronic hypertension. She also seems somewhat wan in appearance. Given her recent prescriptions for the medications listed above, the initial working diagnosis was of a possible medication reaction. However, because of her relatively low blood pressure and her appearance, the provider performed a bedside ECHO with visualization of a pericardial effusion containing clotted blood and a dissection flap within the thoracic aorta. A CT scan, intravenous esmolol infusion, and blood products were ordered, CT surgery was notified, and an arterial line was placed using real-time ultrasound guidance. The patient underwent surgery within the hour.

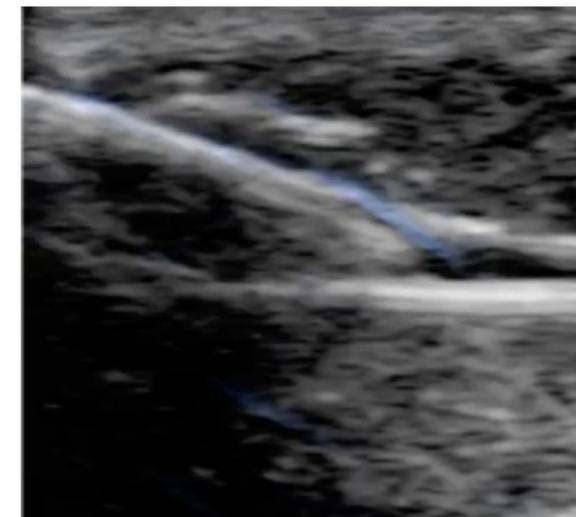
Sample Imaging Exam



Parasternal long axis view with effusion and clotted blood



Aortic arch view with dissection flap in upper left



Arterial line placed with ultrasound guidance

What Does This Teach Us?

Clinical medicine has evolved from relying solely on the history and physical exam for diagnosis to also include the use of other adjuncts such as EKGs, labs, and imaging to increase diagnostic accuracy. Basic tests, however, are often insufficiently sensitive for many critical conditions and more advanced imaging is expensive, time consuming, and may expose patients to significant radiation. POCUS is a diagnostic tool that can be used at the bedside early in patient assessment to increase diagnostic accuracy. It's timely use can rapidly frame specific likely diagnoses and appropriate management strategies. In this case, rapid imaging with a hand held ultrasound system dramatically changed the course of management for a patient with vague complaints and a highly lethal condition.

References

Hagan PG, Nienaber CA, Isselbacher EM, et al. The International Registry of Acute Aortic Dissection (IRAD): new insights into an old disease. *JAMA*.2000;283:897-903.

Shokoohi H, Boniface KS, Pourmand A, et al. Bedside Ultrasound Reduces Diagnostic Uncertainty and Guides Resuscitation in Patients With Undifferentiated Hypotension. *Crit Care Med*. 2015. 43(12) 2562-2569.

Author



Peter Weimersheimer

Peter Weimersheimer is a Professor of Surgery (EM) at the University of Vermont (UVM) and an emergency physician. He is the founder and Director of the UVM Emergency Ultrasound Section.