

Aortic Regurgitation^{1,2}

Narrative Section

HISTORICAL VIGNETTE - WHY IS THIS PHOTO OF ABRAHAM LINCOLN CONTROVERSIAL?

Take a close look at his left foot. It has been suggested since the 1960's that Lincoln had Marfan Syndrome and associated Aortic Insufficiency / Aortic Regurgitation (AR). This diagnosis of AR stems in part from a blurred left foot in this photo, thought to be due to popliteal pulsation from a hyperdynamic pulse, as found in aortic insufficiency; hence, Lincoln's Sign. But does modern understanding of the pathophysiology of AR and the physical manifestations of this allow us to use Lincoln's Sign in clinical practice? If not, what physical exam findings provide diagnostic value in the bedside assessment of AR?



CONTEXT AND USEFULNESS - A 2006 review cite 31 eponyms in the medical literature describing the physical findings of aortic regurgitation. Many describe similar pathophysiologic signs and pulse characteristic in vascular beds throughout the body. Remembering the underlying cause of these signs explains their usefulness: aortic insufficiency causes a regurgitant column of blood in the aorta. Pathologic conditions resulting in incompetent aortic leaflets can cause it (*ie.* bicuspid valve, aortopathy, calcific disease, rheumatic heart disease, syphilis, and endocarditis).

¹ Chi J *et. al.* "The Five Minute Moment." *Am J Med.* 2016 Aug; 129 (8): 792-795.

² Babu *et. al.* "Eponyms and the Diagnosis of Aortic Regurgitation: What Says the Evidence?" *Ann Intern Med.* 2003; 138: 736-742.

Physical Manuever

Model Proper (And Improper) Technique - The first step in recognizing abnormal signs of AR is to practice normal technique. When listening for diastolic murmurs—the absence of silence—sit the patient forward, listen in end-expiration, and time diastole by palpating a central pulse (*ie.* a carotid). Train your ears on the normal to prepare them for the abnormal. Also, examining for collapsing pulses of AR is best done through the brachial artery, feeling for rapid drop-off. If listening for femoral arteries, position the patient supine, compress the artery with two fingers, and keep the stethoscope's diaphragm flat on the skin.

A 2003 review¹ found these four signs have the most diagnostic value:

- 1) **Corrigan's pulse** —the "water hammer" or "collapsing" is characterized by a rapidly swelling an falling arterial pulse.
- 2) **Duroziez's sign** —a systolic *and* diastolic bruit heard when the femoral artery is partially compressed.
- 3) **Hill's sign** —lower extremity (foot) systolic pressure exceeding upper extremity (brachial) by more than 20 mmHg in the recumbent position. This test has a **LR=17.3** if the foot-arm systolic gradient >60 mmHg.³
- 4) **Austin Flint murmur** —a low-pitched, mid-to-late diastolic rumble heard at the apex. This murmur has been attributed to the effects of competing antegrade turbulent diastolic flow from the left atrium and the retrograde regurgitant flow from the aorta.

INTERPRETATION - Hill's sign has the strongest specificity (71-100%) and is more frequent with more severe AR. Of course, it must be taken in the context of other coexisting co-morbidities such as atherosclerosis. Rather than commit each eponym to memory, remember the principle that a column of blood is reversing. Some signs that directly reflect this (Duroziez's) are more reliable and accurate than indirect measures.

CAVEAT AND COMMON ERRORS - Know that these signs apply to *chronic* aortic regurgitation. Acute aortic regurgitation signs are less well described.

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³ McGee, Steven. *Evidence-Based Physical Diagnosis, 4th ed.* Philadelphia, PA: Elsevier; 2018.