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Visual Case Discussion

Diagnosis of aortic stenosis using point-of-care ultrasonography

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A 94-year-old man arrived to the emergency department following a pre-syncopal episode. The patient had a past medical history of myelodysplastic syndrome with a recent diagnosis of leukemia and was at the infusion center for a blood transfusion when he experienced the pre-syncopal episode. On presentation to the emergency department, his vital signs were: temperature 97.7 F, pulse 98 bpm, blood pressure 112/67 mmHg, respiratory rate 16, and room air oxygen saturation 99%. Electrocardiogram showed normal sinus rhythm with a heart rate of 87 bpm and no ischemic changes. Physical examination revealed a cachectic, frail man in no acute distress. Laboratory studies showed hemoglobin 7.6 and hematocrit 23.8. Chest X-ray revealed mild pulmonary interstitial prominence with mild airway thickening, and head computed tomography showed no acute intracranial abnormality.

A beside ultrasound of the heart and lungs was performed using a low-frequency array probe. Parasternal long-axis echocardiographic view revealed hypokinesis and a moderately thickened aortic valve concerning for stenosis (Vid. 1 and Fig. 1). Diffuse B lines were seen on lung ultrasonography, consistent with diffuse alveolar interstitial syndrome. There was extensive discussions with the patient's designated surrogate decision-maker regarding goals of care, and formal echocardiography evaluation was declined given the patient's comfort-focused goals. Review of the patient's records from an outside hospital revealed that he had an echocardiogram 3 years prior. The imaging had shown mild to moderate fibrocalcific sclerosis of the aortic valve and evidence of mild aortic stenosis, consistent with our findings on point-of-care ultrasound. The patient received 1 unit of red blood cells prior to discharge.

Aortic stenosis is a serious valve disease problem with risks factor including older age, congenital heart disease (e.g., bicuspid aortic valve), hypertension, diabetes, chronic renal disease, and history of radiation therapy to the chest.[1] The severity of aortic stenosis is classified based on the degree of valvular narrowing, aortic velocity, and mean transaortic pressure gradient.[2] Complications of this disease include heart failure, pulmonary hypertension, and sudden death. Thus, early detection of aortic stenosis and treatment of cardiovascular risk factors is critical. Patients who have been diagnosed with aortic stenosis are recommended to have serial echocardiography to measure hemodynamic severity and monitor disease progression.

In the case presented here, the presence of aortic stenosis was found using point-of-care ultrasonography on the parasternal long-axis echocardiographic view. Imaging showed a thickened aortic valve and decreased valvular movement. Quantification of severity of valvular disease is beyond the scope of this limited examination. However, this case demonstrated that aortic valvular disease can be detected with point-of-care ultrasonography in the emergency department setting. Training physicians to determine the presence of valvular pathologies in this setting based on qualitative assessment may allow for earlier detection and management.

Questions

1 In adults, what is the normal effective area of valve opening for aortic valves?
  a 1.0 to 2.0 cm^2
  b 2.0 to 3.0 cm^2
  c 3.0 to 4.0 cm^2
  d 4.0 to 5.0 cm^2
2 What is the prevalence of aortic stenosis in individuals over 80 years

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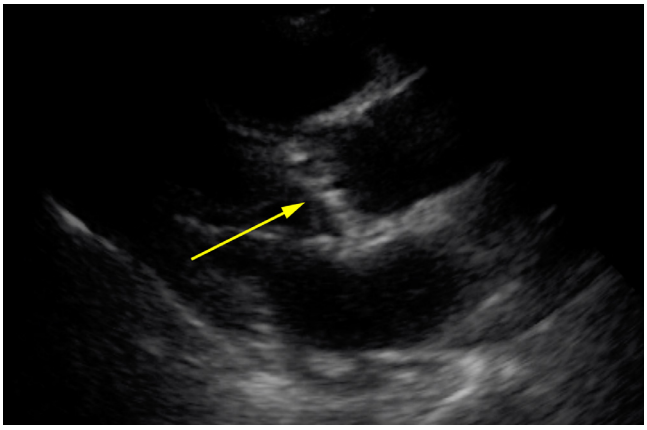

Fig. 1. Parasternal long view of the heart on bedside ultrasonography showed a moderately thickened aortic valve (yellow arrow) highly suggestive of aortic sclerosis and concerning for aortic stenosis. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article).

of age?
a 2%
b 5%
c 10%
d 15%

Answers

1 3.0 to 4.0 cm^2. For normal aortic valves, the effective area of valve opening is the crosssectional area of the left ventricular outflow tract and is 3.0 to 4.0 cm^2 in adults. Severe aortic stenosis is defined by valve area <1.0 cm^2.
2 10%. The Cardiovascular Health Study found that prevalence of aortic sclerosis in patients over 80 years of age approaches 10%. In patients over 65 years of age, the prevalence of aortic sclerosis is 2%.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.visj.2019.100605.

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