**Rising Stars Task Force CASE Editorial**

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In the December issue of CASE, Murayama et. al. describe a case of severe aortic regurgitation (AR) from Takayasu’s arteritis. (1) The case presentation is descriptive of severe chronic AR, including classic physical exam findings, and corroborates with the echocardiographic evaluation of AR severity. The authors utilize the integrative approach of grading AR with quantitative and semi-quantitative parameters as recommended by ASE guidelines, (2) to clearly demonstrate the profound severity of AR in this case.

Most notable, however, is their emphasis on how the hemodynamic consequences of severe AR can be revealed by echocardiography. Left ventricular (LV) remodeling due to chronic severe AR is demonstrated by the increased LV mass consistent with eccentric hypertrophy and the reduced global longitudinal strain (GLS). Recent studies have proposed using GLS as a more sensitive marker for myocardial damage due to chronic AR and an indicator for earlier surgical intervention. (3) Quantification of LV volumes, either by the biplane method of discs or three-dimensional echocardiography, was not reported in this case but are more accurate descriptors of LV geometry than linear dimensions. (4)

While premature closure of the mitral valve and diastolic mitral regurgitation are more commonly recognized consequences of elevated left ventricular end-diastolic pressure (LVEDP) due to severe AR, (5) the authors illustrate another, more unusual, finding. In this case, they show end-diastolic opening of the aortic valve, which they attribute to early equalization of LV and aortic pressures due to markedly elevated LVEDP. Supportive signs of LVEDP elevation are shown in the mitral inflow and pulmonary vein Doppler waveforms. Invasive hemodynamics are not reported, but the authors provide a calculation of LVEDP based on Doppler hemodynamics that is very plausible. Although the aortic valve is described as structurally normal, one wonders if the traumatic shear forces of chronically severe AR on the valve leaflets also plays some role in its opening prior to the end of diastole. Effects of shear stress and altered flow in the aortic root have been shown to alter the mechanics of aortic valve function in patients with LV assist devices. (6)

Another key component to the comprehensive assessment of AR by echocardiography highlighted by this case report is elucidating the mechanism of aortic valve dysfunction. Understanding the mechanism is important for diagnosis and treatment of the underlying etiology, which in this case was the rare entity of Takayasu’s arteritis. Furthermore, the surgical approach to aortic valve repair also depends on the mechanism of AR, as described by El Khoury classification (analogous to the Carpentier classification for mitral valve dysfunction). (7) Decisions on surgical intervention for severe AR due to Takayasu’s arteritis are complicated by the higher rates of post-operative valve or graft dehiscence related to continued arterial inflammation and recurrent aneurysms. (8) In this particular case report, Murayama et. al. do not provide clinical follow-up beyond the initiation of steroid therapy and leave us wondering whether the patient’s AR improved with treatment of aortitis or if he ultimately underwent surgical therapy.

In terms of imaging of aortitis due to Takayasu’s, proper measurement of aortic root dimensions by echocardiography has remained controversial. Current ASE guidelines recommend measuring with the leading edge-to-leading edge (L-L) technique for which reference values have been established, (4) as opposed to the inner edge-to-inner edge (I-I) convention used in computed tomography (CT) and magnetic resonance (MR) imaging. However, Murayama et. al. measure the aortic root with I-I method on echocardiography. Differences of 2-4 mm have been noted between the two conventions and may be amplified in the setting of arterial wall thickening due to aortitis. (4) Although echocardiography may be sufficient for assessing the luminal diameter of the aortic root, CT or MR angiography provides visualization of the arterial wall along the entire extent of the thoracic aorta. Additionally, MR can detect active mural inflammation, which is characterized by increased water content on T2-weighted sequences and contrast enhancement. (9) Thus, MR imaging can be used for monitoring response to anti-inflammatory therapy in Takayasu’s arteritis, without exposure to radiation.

In summary, this case report illustrates severe AR caused by a condition endemic to the authors’ geographic region and the hemodynamic effects of the associated LVEDP elevation. A fascinating example of how echocardiography can explain hemodynamics, this case should inspire us imagers to maintain a keen eye for hemodynamic lessons hidden in Doppler tracings.

**References:**

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