Imaging and intervention

Strengthening aortic stenosis (AS) diagnoses and enabling timely intervention through echocardiography

Severe symptomatic AS is progressive and can quickly become life-threatening

Once mild, average hemodynamic rates worsen per year[1]

+ 0.3 m/s
Increase in velocity

+ 7 mmHg
Increase in mean pressure gradient

- 0.1cm²
Decrease in valve area

Considering hemodynamic parameters is essential for accurate evaluations and timely aortic valve replacement (AVR)

Severe, symptomatic patients face an increasing probability of death while waiting for treatment[2]

11.6% at 6 months post recommendation for AVR[3]

Hemodynamic parameters defined by AHA/ACC guidelines[2]

Stage	Definition	Valve hemodynamics			Hemodynamic consequences
		Aortic valve area	Aortic V_{max}	Mean pressure gradient	
C1	Asymptomatic severe AS	**Typically AVA ≤ 1.0 cm²** (or AVAi ≤ 0.6 cm²/m²)	≥ 4 m/s or	≥ 40 mm Hg	• LV diastolic dysfunction • Mild LV hypertrophy • Normal LVEF
C2	Asymptomatic severe AS with LV dysfunction				• LVEF < 50%
D1	Symptomatic severe high gradient AS				• LV diastolic dysfunction • LV hypertrophy • Pulmonary hypertension may be present
D2	Symptomatic severe low-flow/ low-gradient with reduced LVEF	**AVA ≤ 1.0 cm²**	< 4 m/s or	< 40 mm Hg	• LV diastolic dysfunction • LV hypertrophy • LVEF < 50%
D3	Symptomatic severe low-gradient with normal LVEF or paradoxical low-flow	**AVA ≤ 1.0 cm²** (AVAi ≤ 0.6 cm²/m²) **and stroke volume index < 35 ml/m² measured when patient is normotensive***			• Increased LV relative wall thickness • Small LV chamber with low stroke volume • Restrictive diastolic filling • LVEF ≥ 50%

*systolic blood pressure < 140 mmHg

Optimal imaging is crucial to determine timing of intervention for severe AS which, once symptomatic, is critical for survival.

Optimizing assessments

Severe aortic stenosis (SAS) can pose unique challenges that require special considerations during work-up and imaging

As many as 35% of SAS patients may be in a low-flow state (SVi<35 ml/m^2) and require careful hemodynamic evaluation[4]

Avoid the underestimation of LVOT area and thus underestimation of flow rate[5]

Patients with lower than expected gradients despite preserved LVEF can lead to an underestimation of severity, which may delay aortic valve replacement[6]

Use baseline and low-dose dobutamine stress echocardiography to differentiate between true and pseudo SAS in those with reduced LVEF[2]

Symptoms may not be caused by old age. If you suspect aortic stenosis, ask your patients about experiencing any of the following:

Once severe, the rate of progression to symptoms is high	
• Shortness of breath • Syncope or presyncope • Angina • Fatigue	• Difficulty when exercising • Swollen ankles and feet • Rapid or irregular heartbeat

Early and accurate detection is crucial to saving lives. One out of every 2 patients with SAS do not receive a timely diagnosis, delaying life-saving treatment.[7]

References:

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