

Table 1. ESC/EACTS 2025 GL on valvular heart disease. Echocardiographic pitfalls, robust measures, and complementary multimodality imaging parameters in multiple or mixed valvular heart disease

		Valve lesion to be assessed			
		AS	AR	MS	MR
Concomitant valve lesion	AS	—	PHT unreliable LV volume increase less pronounced (hypertrophy, disproportionate diastolic LV pressure overload ⁷⁶³)	PHT unreliable (LV compliance ↓ ⁷⁶⁴) Low gradient due to low flow possible (low-flow state ⁶⁶⁹)	Regurgitant volume ↑ MR colour-flow jet area ↑ (increased afterload and transmitral systolic pressure gradient ⁴⁶)
	AR	Simplified Bernoulli equation overestimates gradient if LVOT velocity ↑ ⁷⁶⁵	—	PHT unreliable (gradient ↓, altered LV compliance ⁷⁶⁶) MVA by continuity equation using aortic forward flow unreliable ⁴⁶	Doppler volumetric method using net aortic forward flow invalid Mitral-to-aortic VTI ratio unreliable (increased transaortic flow ⁴⁶)
	MS	Low-flow low-gradient possible (low-flow state ⁷⁶¹)	LV volume increase less pronounced (reduced preload ⁷⁶¹)	—	Mitral-to-aortic VTI ratio unreliable (increased mitral VTI due to stenosis ⁷⁶⁷) Calcifications may shadow jet area
	MR	Low-flow low-gradient (MR-induced low-flow state ⁷⁶⁸) AS confused with MR jet	PHT unreliable (altered LV compliance ⁷⁶³) Doppler volumetric method using net mitral forward flow invalid (increased flow ⁴⁶)	PHT unreliable (altered LA and LV compliance ^{769,770}) Continuity equation unreliable (increased transmitral flow ⁷⁶¹)	—
	TR	Low-flow low-gradient possible (TR induced low-flow state ⁷⁷¹)	—	Low gradient possible (low-flow state ⁶⁶⁸) PHT may be less reliable (impaired LV filling due to ventricular interdependence ^{772,773})	Regurgitant volume ↓ in SMR possible (decreased preload ⁷⁷⁴)
Robust echocardiography measurements		AVA (continuity equation), DVI ⁷⁶¹ <i>In mixed AR and AS: V_{max} and mean gradient reflect combined burden⁷⁶⁵</i>	EROA (PISA), vena contracta ^{46,761}	Planimetry and 3D MVA (TOE) ^{529,775} <i>In mixed MR & MS: mean gradient reflects combined burden^{674,776}</i>	EROA (PISA), vena contracta ^{46,761}
Alternative imaging modalities		CT: AV calcium scoring ⁷⁷⁷	CMR: regurgitant volume and fraction ^{45,46}	—	CMR: regurgitant volume and fraction ^{45,46}

Measures reported refer to assessment of the valve lesions listed in the columns.

3D, three-dimensional; AR, aortic regurgitation; AS, aortic stenosis; AV, aortic valve; AVA, aortic valve area; CMR, cardiac magnetic resonance; CT, computed tomography; DVI, Doppler velocity index; EROA, effective regurgitant orifice area; LA, left atrium/left atrial; LV, left ventricle/left ventricular; LVOT, left ventricular outflow tract; MR, mitral regurgitation; MS, mitral stenosis; MVA, mitral valve area; PHT, pressure half-time; PISA, proximal isovelocity surface area; SMR, secondary mitral regurgitation; TOE, transoesophageal echocardiography; TR, tricuspid

regurgitation; VHD, valvular heart disease; Vmax, peak transvalvular velocity; VTI, velocity time integral; ↑, increase; ↓, decrease; —, none.

Table 2. ESC/EACTS 2025 GL on valvular heart disease Recommendations on indications for surgery of concomitant left-sided valvular heart disease^a

Concomitant aortic stenosis		
SAVR is recommended in patients with severe AS undergoing surgery for another valve.	I	C
SAVR should be considered in patients with moderate AS ^d undergoing surgery for another valve.	IIa	C
Concomitant aortic regurgitation		
AV surgery is recommended in patients with severe AR undergoing surgery for another valve.	I	C
Concomitant mitral regurgitation		
MV surgery is recommended in patients with severe MR undergoing surgery for another valve.	I	C

AR, aortic regurgitation; AS, aortic stenosis; AV, aortic valve; AVA, aortic valve area; MR, mitral regurgitation; MV, mitral valve; SAVR, surgical aortic valve replacement; TV, tricuspid valve.

^a Recommendations for surgery of concomitant TV disease are listed in the relevant chapters.

^d Defined as an AVA of 1.0–1.5 cm² (or mean aortic gradient of 25–40 mmHg) in normal-flow conditions. Clinical assessment is essential to determine whether SAVR is appropriate for an individual patient.

Table 3. ESC/EACTS 2025 GL on valvular heart disease Recommendations on indications for intervention in patients with mixed moderate aortic stenosis and moderate aortic regurgitation

Intervention is recommended in symptomatic patients with mixed moderate AV stenosis ^c and moderate regurgitation, and a mean gradient ≥ 40 mmHg or V _{max} ≥ 4.0 m/s. ^{790–793}	I	B
Intervention is recommended in asymptomatic patients with mixed moderate AV stenosis ^c and moderate regurgitation with V _{max} ≥ 4.0 m/s, and LVEF $< 50\%$ not attributable to other cardiac disease. ⁷⁹¹	I	C

AV, aortic valve; AVA, aortic valve area; LVEF, left ventricular ejection fraction; Vmax, peak transvalvular velocity.

^cAVA > 1 cm².