Supplementary material

Garbacz J, Priadka A, Lemek T, et al. Factors influencing dyspnea occurrence in patients with moderate and severe aortic stenosis. Pol Heart J. 2025.

Table S1. Echocardiographic measurements

Echocardiographic parameter	Measurement method description
AVA, cm^2	Derived from the continuity equation by using the velocity-time integral, which requires a measurement of the aortic valve jet velocity using continuous wave (CW) doppler, left ventricular outflow tract (LVOT) diameter acquired from the parasternal long axis view in 2D Mode, and LVOT velocity assessed with pulsed wave Doppler
AVPGmean and AVPGmax, mmHg	Chosen from CW doppler measurements taken in multiple acoustic windows. Using the velocity measurement, the transaortic pressure gradient used to acquire AVPGmean and AVPGmax is derived from the simplified Bernoulli equation
Vmax, m/s	Chosen from CW doppler measurements taken in multiple acoustic windows
LVEF, %	Obtained by measuring the left ventricle volume in a biplane projection during systole and diastole in the apical chamber views

SV, ml	Obtained by measuring the left ventricle volume in a biplane projection during systole and diastole in the apical chamber views
Each echocardiographic examination was performed using either the GE Vivid E9 or GE Vivid E95 ultrasound machine (General Electric, Boston, Massachusetts, US)	

Abbreviations: AVA – aortic valve area; Vmax – peak aortic valve velocity; AVPGmean – mean aortic valve pressure gradient; AVPGmax – maximal aortic valve pressure gradient; LVEF – left ventricular ejection fraction; SV – stroke volume; LVIDd – left ventricular internal dimension at end-diastole; LVPWd – left ventricular posterior wall thickness at end-diastole; LA – left atrium; IVSd – interventricular septum thickness at end-diastole; CO – cardiac output; E – peak velocity of early diastolic transmitral flow; E' – peak velocity of early diastolic mitral annular motion

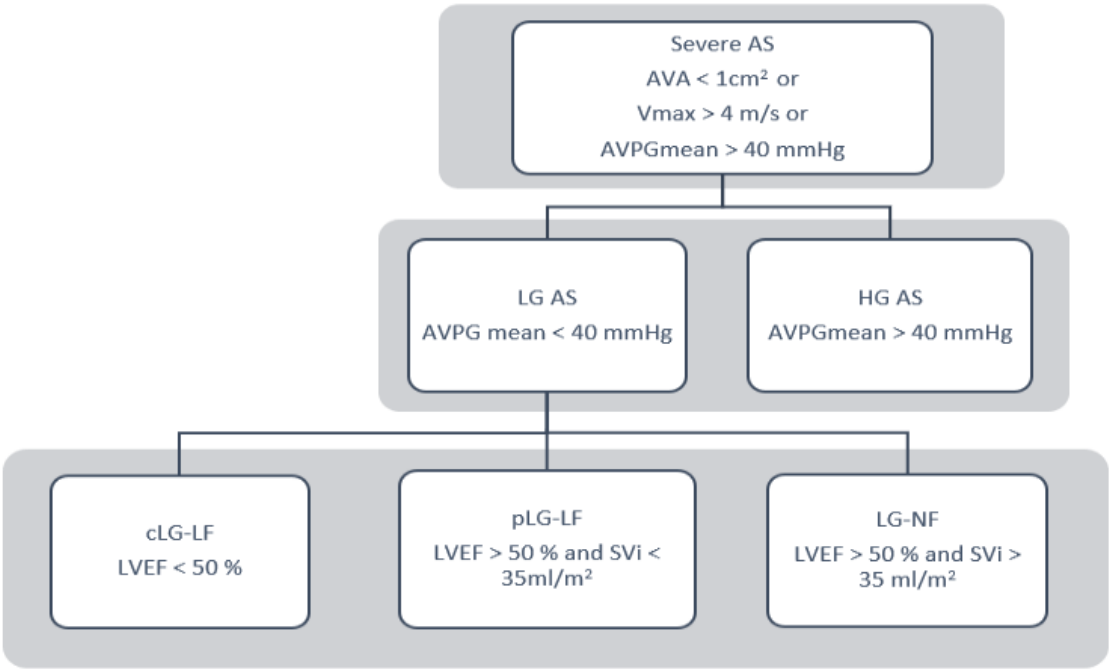

Figure S1. Aortic stenosis categories

Abbreviations: LG – low gradient; HG – high gradient; cLG-LF – classical Low-Gradient Low-Flow; pLG-LF – paradoxical Low-Gradient Low-Flow; LG-NF – Low-Gradient Normal-Flow

Table S2. Intergroup comparisons between NYHA classes

Variable	NYHA class				ANOVA or Kruskal–Wallis test p-value	Spearman's correlation co efficient (*p*-value)
	I	II	III	IV		
Age, years old	73 (65.5 - 79.5)*/**	77 (69 - 83)	77 (72.5 - 84)*	79 (76 - 88.3)**	0.002	0.24 (<0.001)
BMI, kg/m^2	27.8 (25.2-30.5)	27.7 (24.3-30.8)	28.6 (25.5-33.2)	26.2 (23.9-31.4)	0.22	0.05 (0.49)
LVEF, %	55 (49-63.5)	60 (50-60)	55 (50-60)	47.5 (27.3-60)	0.05	-0.14 (0.04)
AVA, cm^2	0.8 (0.6-1.1)	0.7 (0.6-0.9)	0.7 (0.6-0.8)	0.6 (0.5-0.8)	0.03	-0.19 (0.003)
AVAi, cm^2/m^2	0.41 (0.35-0.57)	0.40 (0.33-0.47)	0.38 (0.32-0.43)	0.35 (0.27-0.43)	0.046	-0.19 (0.005)
AVPGmean, mmHg	42.4 (29.6-52.0)	46.7 (38.8-57.7)	47.3 (33.0-59.9)	41.7 (32.2-54.9)	0.21	0.05 (0.49)
AVPGmax, mmHg	68.7 (50.3-86.0)	77.9 (63.4-92.8)	73.8 (59.6-97.6)	65.0 (52.3-89.1)	0.15	0.04 (0.58)
Vmax, m/s	4.1 (3.6-4.6)	4.3 (3.8-4.8)	4.3 (3.7-4.9)	4.0 (3.6-4.7)	0.37	0.05 (0.42)
LA Area, cm^2	26.0 (22.4-	25.4 (22.1-	26.0 (22.7-	26.4 (22.8-	0.95	0.03 (0.62)

	29.8)	31.9)	31.0)	29.4)		
LVIDd, cm	4.7 (4.3-5.1)	4.8 (4.4-5.3)	4.9 (4.5-5.2)	5.0 (4.5-5.5)	0.39	0.10 (0.13)
LVPWd, cm	1.1 (1.0-1.2)	1.1 (1.0-1.2)	1.1 (1.0-1.2)	1.2 (1.0-1.3)	0.59	0.06 (0.38)
IVSd, cm	1.2 (1.1-1.4)	1.3 (1.2-1.5)	1.3 (1.2-1.4)	1.3 (1.2-1.5)	0.34	0.05 (0.46)
SV, ml	78.6 (26.5)	71.5 (23.01)	71.9 (24.1)	62 (26.0)	0.07	-0.14 (0.04)
SVi, ml/m^2	42.0 (13.2)	38.6 (12.0)	38.9 (12.9)	33.9 (13.5)	0,01	-0.15 (0.03)
NT- proBNP, pg/ml	1154* (315.8-2299)	1397** (452.5-2871.2)	1613 (509.5-4227.5)	3762*/** (1971-6286)	0.004	0.24 (0.001)
E, m/s (n = 182)	0.83 (0.64-0.96)	0.88 (0.68-1.03)	0.88 (0.62-1.06)	0.87 (0.72-1.05)	0.80	0.06 (0.43)
E', cm/s (n = 181)	6.3* (5.4-7)	6 (5-7)	5.3 (5-7)	4* (2.8-5.3)	0.02	-0.18 (0.01)
CO, l/min (n = 222)	5.25 (4.86-6.34)	5.49 (4.20-6.62)	5.06 (4.22-5.90)	4.75 (4.01-6.03)	0.23	-0.12 (0.06)

Continuous data are presented as mean (SD) or median (Q1-Q3) depending on normality. Dunn's or Tukey's test was used for the post hoc pairwise comparisons with the Bonferroni correction applied. Each significant post hoc pairwise comparison between NYHA classes for a given parameter is denoted with asterisks (*/**).

The values of NYHA classes were treated as ordinal parameters for comparisons and correlations with quantitative variables via Spearman's rank correlation

Table S3. Uni- and multivariable analysis of dyspnea occurrence

Variable	Univariable			Multivariable		
	OR	95% CI	*p*-value	OR	95% CI	*p*-value
Age, years old	1.08	1.05-1.12	< 0.001	1.07	1.03-1.10	<0.001
BMI, kg/m^2	1.01	0.95-1.07	0.73	1.05	0.98-1.13	0.14
AVPGmean, mmHg	1.01	0.99-1.03	0.09	1.28	1.06-1.57	0.01
AVA, cm^2	1.15	1.03-1.27	0.01		-	
LA Area, cm^2	0.99	0.95-1.04	0.76	0.95	0.97-1.00	0.06
SV, ml	1.01	1.00-1.03	0.04	0.99	1.00-1.03	0.06
LVEF, %	0.98	0.96-1.00	0.18		-	
LVIDd, cm	1.27	0.85-1.89	0.25	1.65	1.16-3,06	0.01
IVSd, cm	1.83	0.51-6.60	0.36		-	
LVPWd, cm	1.89	0.46-7.78	0.38		-	
Sex	0.93	0.51-1.71	0.81		-	
E, m/s (n = 182)	1.54	0.49-5.19	0.47		-	
E' , cm/s (n = 181)	0.86	0.70-1.04	0.12		-	
CO, l/min (n = 222)	0.89	0.76-1.06	0.19		-	
Critical CS (n = 180)	0.86	0.41-1.87	0.70		-	
NT-proBNP, pg/ml (n = 169)	1.33	1.03-1.74	0.03		-	

Multivariable logistic regression model was specified by creating a subset of all echocardiographic and demographic parameters with the maximum number of elements, which altogether fulfilled the

necessary statistical assumptions of independence of errors, logit linearity, absence of parameter multicollinearity and the lack of strongly influential outliers.

To ensure the non-multicollinearity of the multivariable model, non-indexed echocardiographic parameters and BMI were chosen over the corresponding indexed parameters, and the AVPGmean parameter was chosen over the AVPGmax and Vmax.

Variables with incomplete counts were not included in the multivariable model.

Univariate regression models were compiled to compare the results.

OR and 95% CI were calculated from parameter values: log-transformed for NT-proBNP values; rescaled by a factor of 0,1 for AVPGmean (change per 10mmHg), LVEF (change per 5%) and AVA (change per 0.1 cm2) values; rescaled by a factor of -1 for SV and AVA values.