

Appendix

Supplementary Table 1. Demographic characteristics of the participants with and without POAF.

Variable	Overall	No POAF	POAF	P value	ASD
n	402	303	99		
Age, years (median [IQR])	61 [53, 70]	59 [50, 67]	70 [59, 73]	<0.001	0.799
Female sex (%)	99 (24.6)	77 (25.4)	22 (22.2)	0.613	0.075
Race (%)				0.350	0.225
Asian	17 (4.2)	14 (4.6)	3 (3.0)		
Black or African American	25 (6.2)	22 (7.3)	3 (3.0)		
Others	51 (12.7)	36 (11.9)	15 (15.2)		
White	309 (76.9)	231 (76.2)	78 (78.8)		
Body mass index (Kg/m ²)	27.7 [24.6, 30.4]	27.3 [24.5, 30.3]	28.3 [24.9, 31.0]	0.166	0.131
BSA (median [IQR])	2.0 [1.9, 2.2]	2.0 [1.9, 2.2]	2.0 [1.9, 2.2]	0.320	0.078
Hypertension	277 (68.9)	201 (66.3)	76 (76.8)	0.069	0.233
Diabetes mellitus	84 (20.9)	62 (20.5)	22 (22.2)	0.817	0.043
Smoking				0.457	0.137
• Never	221 (55.0)	167 (55.1)	54 (54.5)		
• Current	26 (6.5)	17 (5.6)	9 (9.1)		
• Previous	155 (38.6)	119 (39.3)	36 (36.4)		
New York Heart Association class (III-IV)	31 (7.7)	23 (7.6)	8 (8.1)	0.999	0.018
Chronic lung disease	12 (3.0)	8 (2.6)	4 (4.0)	0.711	0.078
Previous myocardial infarction	53 (13.2)	39 (12.9)	14 (14.1)	0.878	0.037
Previous stroke	13 (3.2)	9 (3.0)	4 (4.0)	0.845	0.058
Preoperative hematocrit	39.7 [35.9, 43.1]	39.9 [36.3, 43.1]	39.2 [35.0, 43.1]	0.314	0.157
Beta blockers (%)	177 (44.0)	130 (42.9)	47 (47.5)	0.497	0.092
CHA ₂ DS ₂ -VAsc score	2.0 [1.0, 3.0]	2.0 [1.0, 3.0]	2.0 [1.0, 3.5]	<0.001	0.428
EuroSCORE II	1.4 [0.9, 2.2]	1.3 [0.9, 2.2]	1.6 [1.1, 3.0]	0.003	0.242
Left atrial length* (cm)	4.0 [3.6, 4.0]	4.0 [3.5, 4.0]	4.0 [3.7, 4.2]	0.066	0.260
Left ventricular ejection fraction (median [IQR])	60 [55, 65]	60.00 [55, 65]	60 [54., 65]	0.198	0.148
Type of surgery					
Coronary artery bypass grafting	180 (44.8)	141 (46.5)	39 (39.4)	0.261	0.145
Aortic valve procedures	213 (53.0)	154 (50.8)	59 (59.6)	0.161	0.177
Aortic procedures	175 (43.5)	131 (43.2)	44 (44.4)	0.925	0.024
Posterior pericardiotomy	199 (49.5)	163 (53.8)	36 (36.4)	0.004	0.356
Cross-clamp time (minutes)	79 [62, 100]	79[63, 99]	82 [60, 102]	0.485	0.082
Cardiopulmonary bypass time (minutes)	102 [83, 125]	102 [82, 123]	104 [86, 130]	0.191	0.129
Operative time (minutes)	299 [257, 357]	302 [260, 357]	296 [250, 358]	0.442	0.171

Table legend: ASD, absolute standardized differences; CHA₂DS₂-VAsc, congestive heart failure, hypertension, age, diabetes mellitus, prior stroke or TIA or thromboembolism, vascular disease, age, sex category; IQR, interquartile range; POAF, postoperative atrial fibrillation.

*obtained from the preoperative transthoracic echo

Supplementary Table 2. Characteristics and complications in patients with and without POAF.

Variable	Overall	No POAF	POAF	p-value
Postoperative atrial flutter	8 (2.0)	2 (0.7)	6 (6.1)	0.003
Postoperative SVT	13 (3.2)	8 (2.6)	5 (5.1)	0.40
Any postoperative atrial arrhythmias	109 (27.1)	10 (3.3)	99 (100.0)	<0.001
Median time in atrial fibrillation (hours)	24.07 [11.91, 38.98]	----	24.07 [11.91, 38.98]	----
Need for postoperative antiarrhythmic medications	96 (23.9)	0 (0.0)	96 (97.0)	<0.001
Need for postoperative electrical cardioversion	22 (5.5)	0 (0.0)	22 (22.2)	<0.001
Need for systemic anticoagulation	40 (10.0)	0 (0.0)	40 (40.4)	<0.001
Median length of in-hospital stay (hours)	180.84 (94.75)	174.57 (90.75)	200.00 (104.22)	0.02
Median length of in-hospital stay (days)	6.00 [6.00, 8.00]	6.00 [6.00, 8.00]	7.00 [6.00, 9.00]	<0.001
Median length of Postoperative hospitalization (days)	5.00 [5.00, 7.00]	5.00 [5.00, 6.00]	6.00 [5.00, 8.00]	<0.001
Cross-clamp time (minutes)	79.00 [62.00, 100.00]	78.50 [63.00, 99.00]	82.00 [60.00, 102.00]	0.48
Cardiopulmonary bypass time (minutes)	102.00 [83.00, 125.00]	102.00 [82.25, 122.75]	103.50 [86.00, 130.00]	0.19
Operative time (minutes)	298.50 [257.25, 357.25]	301.50 [260.00, 357.25]	295.50 [250.00, 358.25]	0.44
Cross-over (%)	3 (0.7)	3 (1.0)	0 (0.0)	1
Hospital mortality (%)	2 (0.5)	1 (0.3)	1 (1.0)	0.43
Postoperative MAE (%)	9 (2.2)	8 (2.6)	1 (1.0)	0.57
Postoperative CVA (%)	4 (1.0)	4 (1.3)	0 (0.0)	0.58
Postoperative MI (%)	3 (0.7)	3 (1.0)	0 (0.0)	1
Pulmonary complications (%)	11 (2.7)	8 (2.6)	3 (3.0)	0.74
Bleeding revision (%)	8 (2.0)	6 (2.0)	2 (2.0)	1
IABP (%)	6 (1.5)	5 (1.7)	1 (1.0)	1
Reintubation (%)	3 (0.7)	3 (1.0)	0 (0.0)	1
Blood-transfusion (%)	109 (27.1)	81 (26.7)	28 (28.3)	0.86
Sternal dehiscence (%)	2 (0.5)	2 (0.7)	0 (0.0)	1
Pericardial effusion (%)	70 (17.4)	51 (16.8)	19 (19.2)	0.7
Tamponade (%)	2 (0.5)	2 (0.7)	0 (0.0)	1
Need for postoperative pericardial drain (%)	2 (0.5)	2 (0.7)	0 (0.0)	1

Pleural effusion (%)	125 (31.1)	94 (31.0)	31 (31.3)	1
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Table legend: IABP, intra-aortic balloon pump; MAE, major adverse events; MI, myocardial infarction; SVT, supraventricular tachycardia; CVA, cerebrovascular accident.

Supplementary Table 3. Diastolic dysfunction classes among patients without and with postoperative atrial fibrillation.

	Overall	No POAF	POAF
<i>Diastolic dysfunction categories</i>	402	303	99
• Normal diastolic function	142 (41.8)	119 (46.7)	23 (27.0)
• Grade I diastolic dysfunction	107 (31.5)	73 (28.6)	34 (40.0)
• Grade II diastolic dysfunction	77 (22.6)	51 (20.0)	26 (30.6)
• Grade III diastolic dysfunction	14 (4.1)	12 (4.7)	2 (2.4)
• Indeterminate diastolic dysfunction	32 (8.6)	25 (8.9)	7 (7.6)

Table legend: POAF, postoperative atrial fibrillation.

Supplementary Table 4. Bland-Altman bias and limits of agreement for left atrial length and left atrial area on preoperative transthoracic echocardiography (TTE) vs preoperative transesophageal echocardiography (TEE), with TTE as reference.

	Median (IQR)	Median (IQR)	Bias	Standard error of bias	Upper Limit of agreement (95%CI)	Lower limit of agreement (95%CI)	Pearson's correlation R (95%CI)
	TTE*	TEE					
LA length (cm)	5.05 (4.68, 5.45)	4.45 (4.18, 4.98)	0.50	0.03	1.29 (1.16, 1.43)	-0.29 (-0.16, -0.42)	0.77 (0.68, 0.84)
LA area (cm ²)	19.68 (16.46, 22.57)	16.00 (12.95, 19.39)	3.50	0.24	8.21 (7.39, 9.03)	-1.27 (-0.45, -2.09)	0.83 (0.76, 0.88)

Table legend: CI, confidence interval; IQR, interquartile range; LA, left atrium; TEE, transesophageal echocardiography; TTE, transthoracic echocardiography

*reference

Supplementary Table 5. Inter-observer reproducibility for left atrium (LA) length and area assessed at preoperative transesophageal echocardiography (TEE) in 20 patients.

	ICC	95%CI
LA length (4-chamber view)	0.99	0.97, 0.99
LA length (2-chamber view)	0.99	0.98, 0.99
LA area (4-chamber view)	0.99	0.97, 0.99
LA area (2-chamber view)	0.96	0.90, 0.98

Table legend: ICC, interclass correlation; CI, confidence interval; LA, left atrium; TEE transesophageal echocardiography

Supplementary Table 6. Intra-observer reproducibility for left atrium (LA) length and area assessed at preoperative transesophageal echocardiography (TEE) in 20 patients.

		ICC	95%CI
Rater 1	LA length (4-chamber view)	0.99	0.98-0.99
	LA length (2-chamber view)	0.99	0.98-0.99
	LA area (4-chamber view)	0.99	0.99-1.00
	LA area (2-chamber view)	0.94	0.80-0.99
Rater 2	LA length (4-chamber view)	0.99	0.97-0.99
	LA length (2-chamber view)	0.99	0.96-0.99
	LA area (4-chamber view)	0.99	0.98-0.99
	LA area (2-chamber view)	0.99	0.96-0.99

Table legend: ICC, interclass correlation; CI, confidence interval; LA, left atrium; TEE transesophageal echocardiography.

Supplementary Table 7. Inter-rater reproducibility for the assessment of lateral e' and mitral E-wave at baseline transesophageal echocardiography in 20 patients.

	ICC	95% CI
TDI Lateral e'	0.99	0.97-0.99
TDI Mitral E-wave	0.96	0.94-0.97

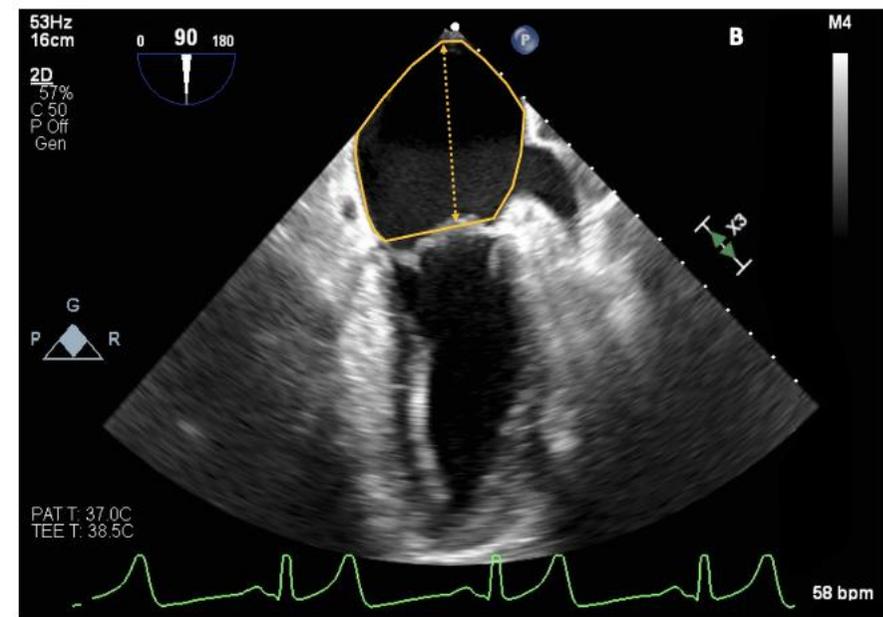
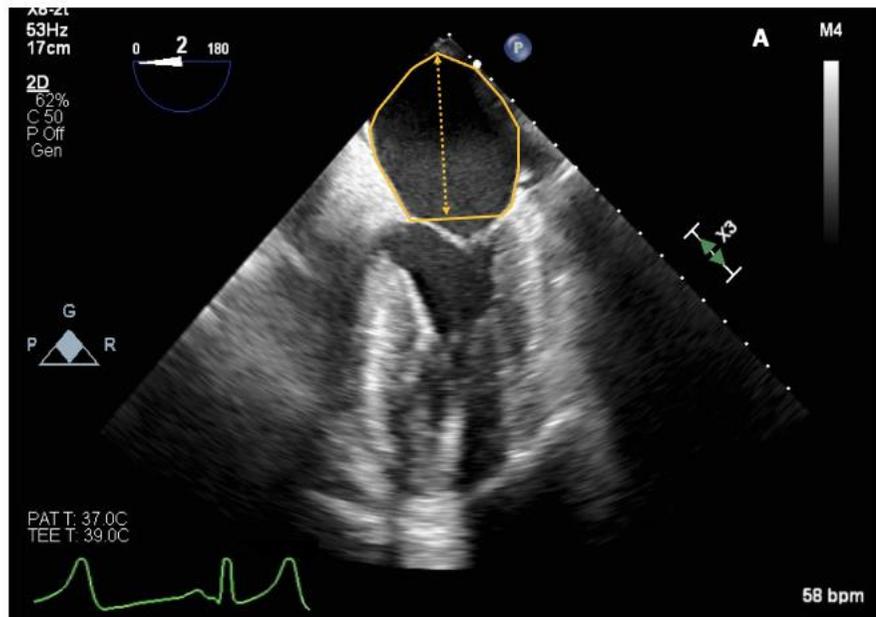
Table legend: ICC, interclass correlation coefficient; CI, confidence interval; TDI, tissue Doppler imaging.

Supplementary Table 8. Intra-rater reproducibility for the assessment of lateral e' and mitral E-wave at baseline transesophageal echocardiography in 20 patients.

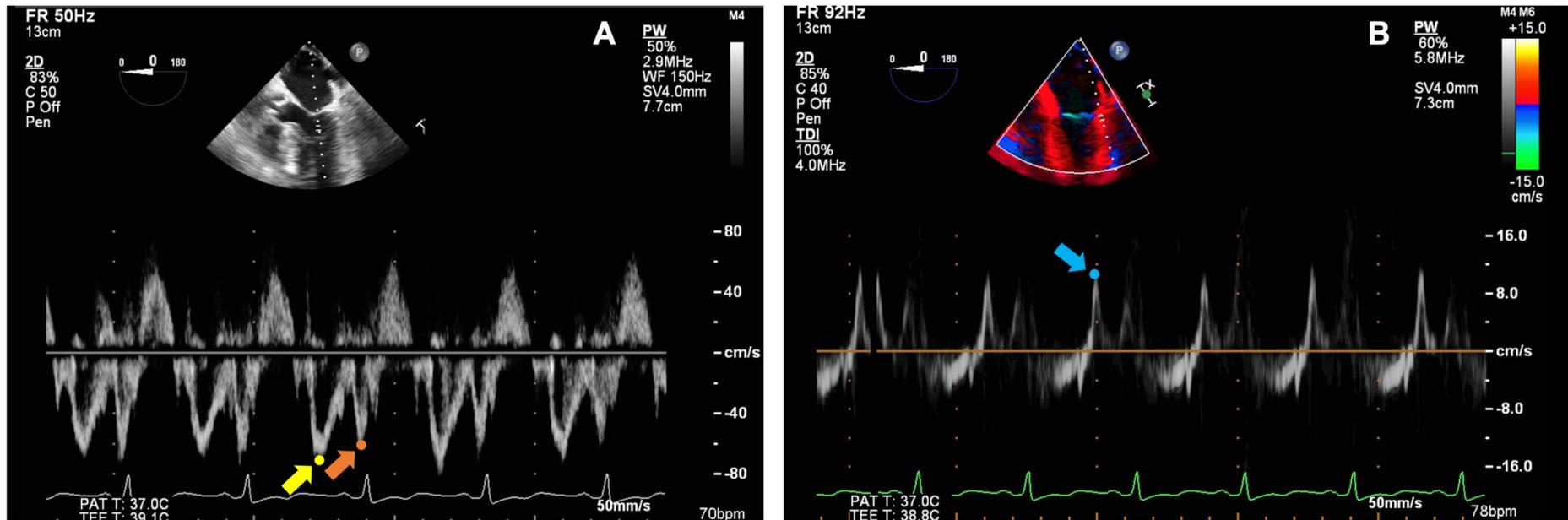
		ICC	95% CI
Rater 1	TDI Lateral e'	0.99	0.95-0.99
	TDI Mitral E-wave	0.99	0.99-0.99
Rater 2	TDI Lateral e'	0.98	0.96-0.99
	TDI Mitral E-wave	0.99	0.98-0.99

Table legend: ICC, interclass correlation coefficient; CI, confidence interval; TDI, tissue Doppler imaging.

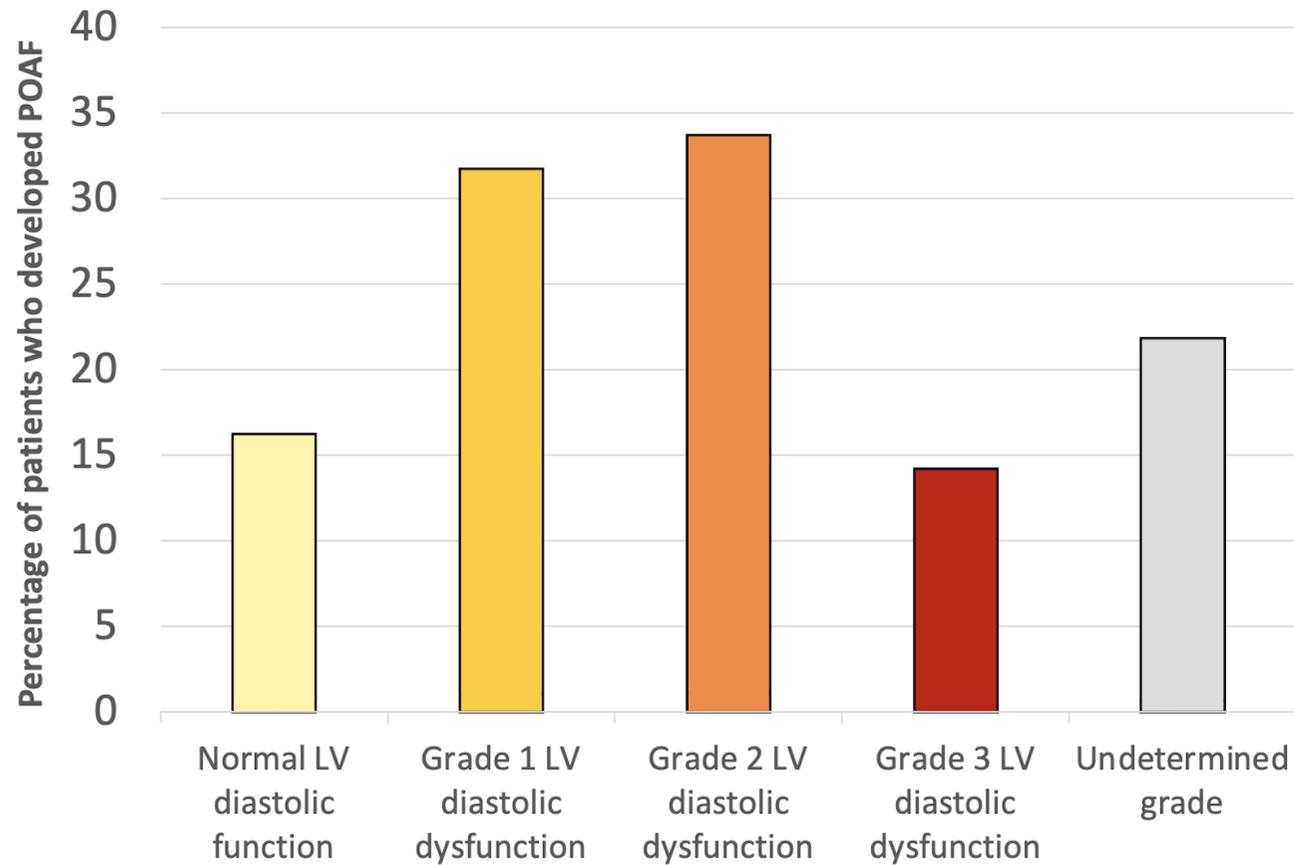
Supplementary Figure 1. Preoperative transesophageal echocardiography left atrial volume assessment. Left atrial (LA) maximum area was obtained by tracing the endocardium in LA-focused mid-esophageal 4-chamber (Panel A) and 2-chamber (Panel B) views in end-systole (continuous line). LA length was obtained by tracing the distance from the mitral annulus to the posterior LA wall in the LA-focused mid-esophageal 4-chamber (Panel A) and 2-chamber (Panel B) views in end-systole (dashed line). LA maximum area in the 4-chamber and 2-chamber views, and LA length in the 4-chamber and 2-chamber views were used to quantify the LA volume using the biplane area/length method (details in the text).



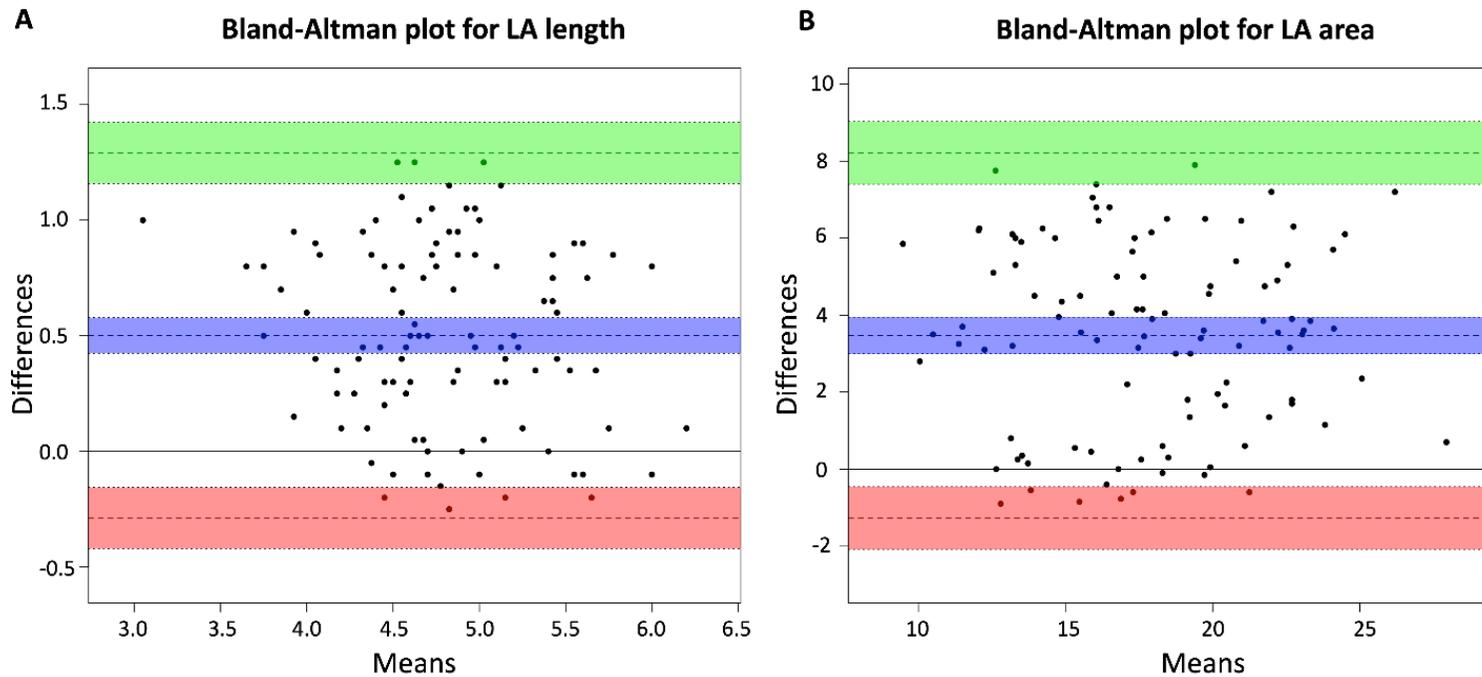
Supplementary Figure 2. Intraoperative transesophageal echocardiography diastolic function Doppler indices assessment. Spectral pulsed wave Doppler of mitral inflow at the tips of the mitral leaflets including the peak velocities during early filling (E) (Panel A, yellow dot), atrial contraction (A) (Panel A, orange dot), and spectral tissue Doppler of early (e') diastolic myocardial velocities at the lateral mitral annulus (Panel B, blue dot) were obtained in the 4-Chamber view, using the most representative spectral Doppler trace over 2-4 cycles.



Supplementary Figure 3. Distribution of left ventricular (LV) diastolic dysfunction severity among patients who developed postoperative atrial fibrillation. 16.2% (23/142) of patients with normal diastolic dysfunction, 31.7% (34/107) of patients with grade 1 dysfunction, 33.7% (26/77) with grade 2 dysfunction, 14.2% (2/14) with grade 3 dysfunction, and 21.8% (7/32) with undetermined grade dysfunction developed POAF.



Supplementary Figure 4. Bland–Altman plots for the mean differences between left atrial (LA) length (panel A) and LA area (panel B) at preoperative transesophageal echocardiography (TEE) vs preoperative transthoracic echocardiography (TTE) with TTE as reference (black dashed line with purple shading represents the mean difference, and dashed lines with the green and red shading represent the upper and lower limits of agreement [mean difference ± 2 standard deviations], respectively).



Supplementary Figure 5. Correlations between preoperative transesophageal echocardiography (TEE) and preoperative transthoracic echocardiography (TTE) for left atrial (LA) length (panel A) and area (panel B).

