

Sex-specific Outcomes And Predictors Of Repair Failure In Minimally Invasive Mitral Valve Surgery



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Background

Sex differences in mitral valve disease outcomes are increasingly reported, but few studies have examined differences in operative outcomes between men and women undergoing minimally invasive mitral valve surgery. This study aimed to analyse sex-specific differences and risk factors for mitral valve repair or failure in endoscopic mitral valve surgery for degenerative disease.

Baseline Characteristics by Sex				
Characteristic	Overall N = 512 ¹	Sex		p-value ²
		Female N = 167 ¹	Male N = 345 ¹	
Age, years	63 ± 12	65 ± 12	62 ± 12	<0.001
Age group				<0.001
<60 years	199 (39%)	47 (28%)	152 (44%)	
60-69 years	159 (31%)	55 (33%)	104 (30%)	
≥70 years	154 (30%)	65 (39%)	89 (26%)	
BMI, kg/m²	24.9 ± 3.2	24.8 ± 3.2	25.0 ± 3.2	0.9
BMI category				>0.9
Normal (<25)	282 (55%)	92 (55%)	190 (55%)	
Overweight (25-29.9)	193 (38%)	63 (38%)	130 (38%)	
Obese (≥30)	37 (7.2%)	12 (7.2%)	25 (7.2%)	
LVEF, %	61 ± 7	61 ± 7	61 ± 7	0.5
LVEF category				0.8
<50%	15 (2.9%)	6 (3.6%)	9 (2.6%)	
50-59%	117 (23%)	37 (22%)	80 (23%)	
≥60%	380 (74%)	124 (74%)	256 (74%)	
MAPSE, mm	20.0 ± 5.5	17.0 ± 4.2	21.5 ± 5.7	0.074
Indexed LVEDID, mm/m²	29.5 ± 4.6	27.4 ± 3.7	30.5 ± 4.6	<0.001
LV size category				<0.001
Normal (<25 mm/m²)	73 (15%)	41 (26%)	32 (9.9%)	
Mild dilatation (25-29.9)	208 (43%)	80 (50%)	128 (40%)	
Moderate-severe (≥30)	202 (42%)	38 (24%)	164 (51%)	
Indexed LVESID, mm/m²	18.6 ± 6.5	17.1 ± 3.5	19.4 ± 7.4	<0.001
LA volume index, ml/m²	58 ± 31	60 ± 36	58 ± 28	>0.9
PA systolic pressure, mmHg	38 ± 11	39 ± 11	38 ± 11	0.10
PA pressure category				0.006
Normal (≤35 mmHg)	238 (52%)	64 (43%)	174 (57%)	
Mild elevation (36-50)	158 (35%)	67 (45%)	91 (30%)	
Moderate-severe (>50)	58 (13%)	19 (13%)	39 (13%)	
Carpentier classification				<0.001
Class 1	57 (11%)	32 (19%)	25 (7.2%)	
Class 2	415 (81%)	110 (66%)	305 (88%)	
Class 3a	30 (5.9%)	20 (12%)	10 (2.9%)	
Class 3b	10 (2.0%)	5 (3.0%)	5 (1.4%)	
Other	0 (0%)	0 (0%)	0 (0%)	
Prolapse pattern				<0.001
Anterior	38 (7.4%)	13 (7.8%)	25 (7.2%)	
Posterior	313 (61%)	74 (44%)	239 (69%)	
Both leaflets	107 (21%)	47 (28%)	60 (17%)	
Other/None	54 (11%)	33 (20%)	21 (6.1%)	
Repair outcome				0.015
Failed	40 (7.8%)	20 (12%)	20 (5.8%)	
Successful	472 (92%)	147 (88%)	325 (94%)	

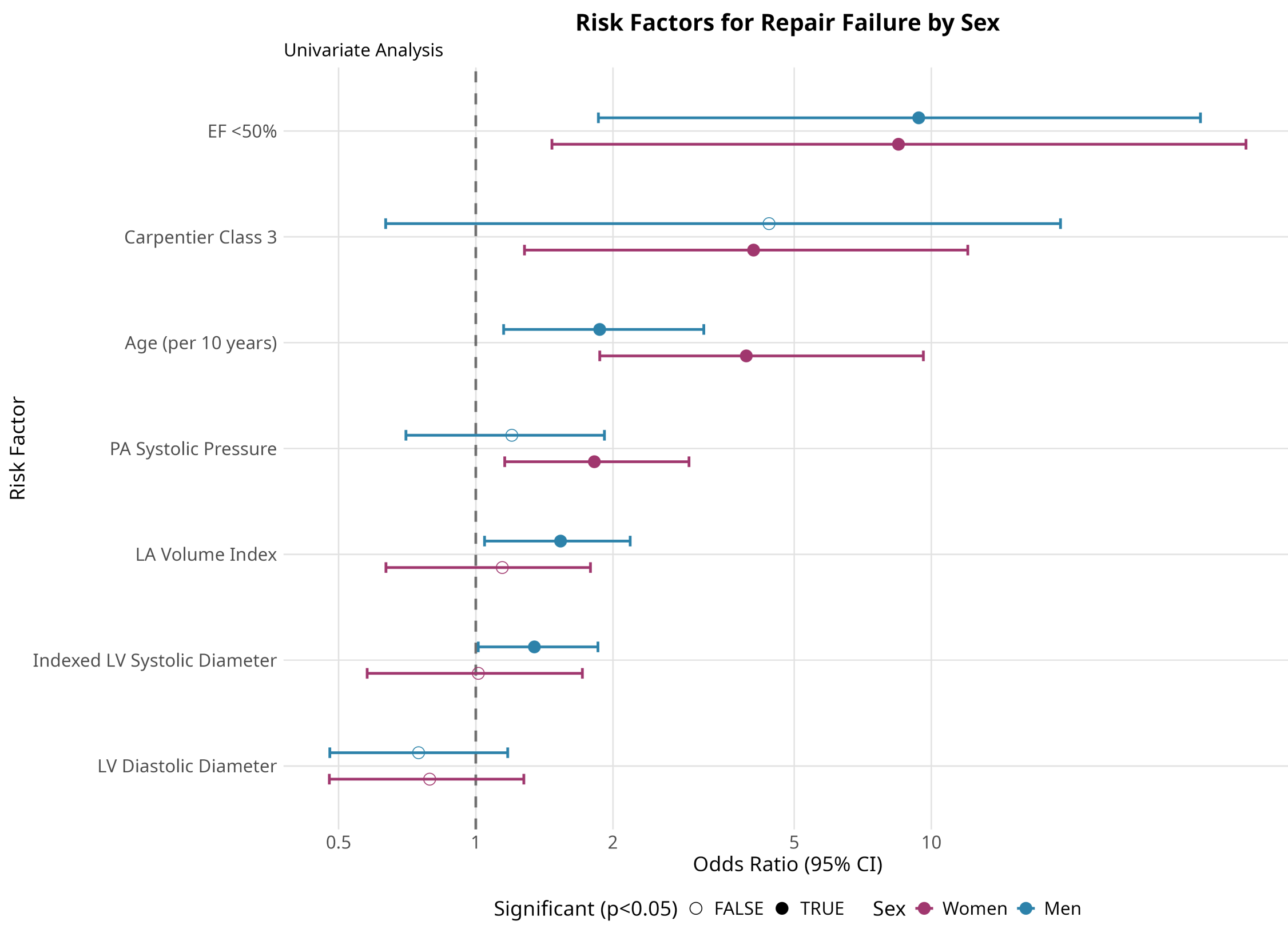
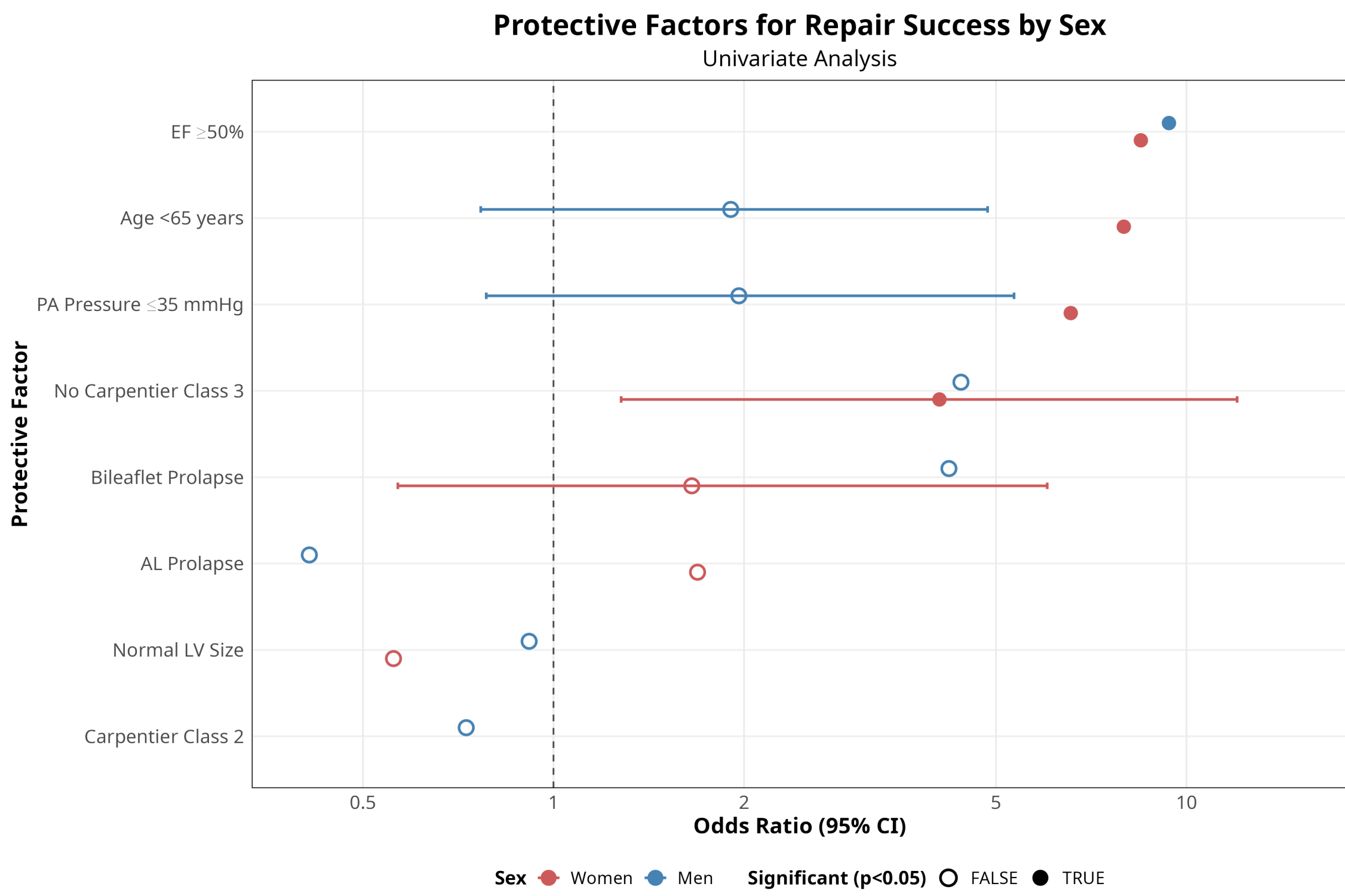
¹ Continuous variables: mean ± SD; Categorical variables: n (%)

² Wilcoxon rank sum test; Pearson's Chi-squared test; Fisher's exact test

Table: Surgical Details and Outcomes by Sex				
Surgical Detail	Overall N = 512 ¹	Sex		p-value ²
		Female N = 167 ¹	Male N = 345 ¹	
Annuloplasty	470 (92%)	145 (87%)	325 (94%)	0.004
Ring type				0.029
Closed Ring	285 (56%)	94 (56%)	191 (55%)	
Open Ring	187 (37%)	53 (32%)	134 (39%)	
Prosthesis	40 (7.8%)	20 (12%)	20 (5.8%)	
Ring design				0.12
Closed	325 (63%)	114 (68%)	211 (61%)	
Open	187 (37%)	53 (32%)	134 (39%)	
Ring size (mm)	31.8 ± 3.4 (25, 42)	30.5 ± 3.4 (25, 40)	32.5 ± 3.2 (26, 42)	<0.001
Ring size category				<0.001
<30mm	123 (24%)	68 (41%)	55 (16%)	
30-33mm	208 (41%)	54 (32%)	154 (45%)	
≥34mm	180 (35%)	44 (26%)	136 (39%)	
Unknown	1 (0.2%)	1 (0.6%)	0 (0%)	
Neochordae	324 (63%)	76 (46%)	248 (72%)	<0.001
Posterior neochordae	91 (31%)	23 (19%)	68 (39%)	<0.001
Anterior neochordae	16 (5.4%)	6 (5.0%)	10 (5.7%)	0.8
Alfieri technique	13 (2.5%)	6 (3.6%)	7 (2.0%)	0.4
Sliding annuloplasty	10 (2.0%)	2 (1.2%)	8 (2.3%)	0.5
Commissure closure	120 (23%)	41 (25%)	79 (23%)	0.7
Leaflet resection	43 (8.4%)	8 (4.8%)	35 (10%)	0.040
Complex procedure	289 (57%)	90 (54%)	199 (58%)	0.4
Repair complexity				<0.001
Simple	73 (14%)	42 (25%)	31 (9.0%)	
Standard	150 (29%)	35 (21%)	115 (33%)	
Complex	289 (56%)	90 (54%)	199 (58%)	
Repair outcome				0.015
Successful	472 (92%)	147 (88%)	325 (94%)	
Failed	40 (7.8%)	20 (12%)	20 (5.8%)	
Reoperation for bleeding	8 (1.6%)	4 (2.4%)	4 (1.2%)	0.4
Reoperation (other)	3 (2.9%)	1 (2.7%)	2 (2.9%)	>0.9
Reoperation for repair failure	3 (0.6%)	1 (0.6%)	2 (0.6%)	>0.9
Stroke				
0	351 (100%)	122 (100%)	229 (100%)	
Hospital mortality	1 (0.2%)	0 (0%)	1 (0.3%)	>0.9

¹ Continuous variables: mean ± SD (min, max); Categorical variables: n (%)

² Pearson's Chi-squared test; Wilcoxon rank sum test; Fisher's exact test



Multivariable Analysis: Independent Risk Factors						
Characteristic	Men			Women		
	OR	95% CI	p-value	OR	95% CI	p-value
Age	1.04	0.99, 1.09	0.095	1.11	1.04, 1.20	0.003
Carpentier 3	4.46	0.61, 21.4	0.084	1.65	0.41, 5.72	0.4
EF <50%						
EF ≥50%	—	—		—	—	
EF <50%	18.7	3.14, 113	<0.001	6.67	0.86, 50.6	0.060
Abbreviations: CI = Confidence Interval, OR = Odds Ratio						

Conclusions

Despite similar mortality outcomes, women demonstrated higher rates of unsuccessful valve repair. Ventricular parameters were stronger predictors of repair failure in men, while age and ventricular dysfunction may bias toward valve replacement in women following initial repair attempts. No clear preoperative factors emerged as predictors of successful valve repair in either group.