

Background

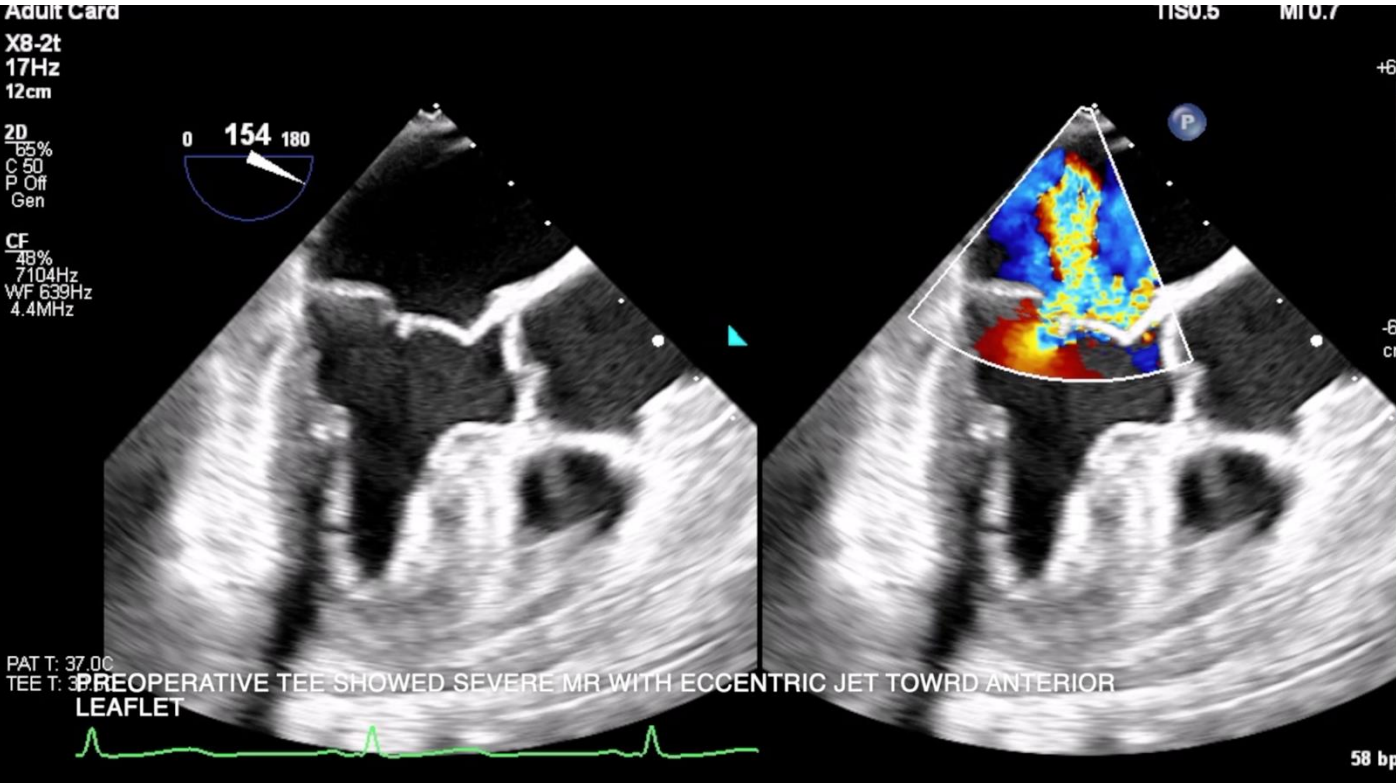
Triangular/Quadrangular resection is the standard technique for degenerative mitral regurgitation (MR). However, this technique requires leaflet cutting and reapproximation with several interrupted sutures. These maneuvers require instrument changes and robotic instrumental ties in the robotic surgery setting. Simplicity is a key to enhancing reproducibility for robotic mitral valve repair. Folding mitral valve repair (FMVR) is a non-resectional technique with one suture tie alone and provides the same quality as leaflet resection. This video demonstrates the efficiency of FMVR for degenerative MR in the robotic surgery setting.

Patients’ demographics	n=8
Age (years)	70.0 ± 6.4 (69-79)
Gender	7 male (87.5%)
Height (cm)	170.3 ± 8.8 (155-180)
Weight (kg)	81.5 ± 20.2 (55.6-107)
Body surface area (m²)	1.92 ± 0.27 (1.54-2.26)
STS score, Mortality (%)	2.2 ± 1.1 (0.881-3.56)
Hypertension	7 (87.5%)
Dyslipidemia	8 (100%)
Diabetes	2 (25.0%)
Chronic kidney disease	0
Chronic obstructive pulmonary disease	0
Cerebrovascular accident	0
Atrial fibrillation	Persistent: 1 (12.5%) Long-standing: 1 (12.5%)

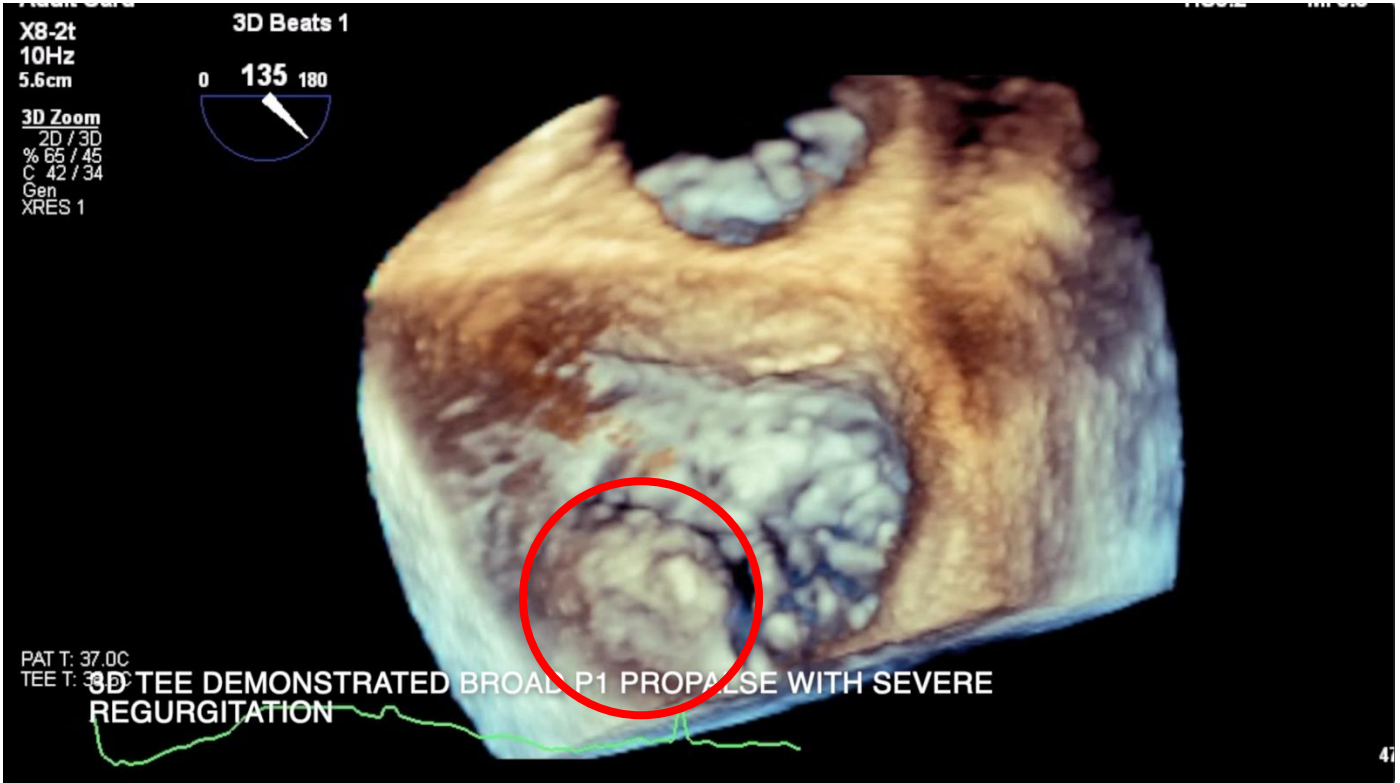
Preoperative echocardiogram	
LVDd (mm)	53.4 ± 8.2 (41-68)
LVDs (mm)	35.0 ± 6.5 (23-46)
LAD (mm)	44.9 ± 7.1 (37-57)
LVEF (%)	57.5 ± 4.3 (50-65)
Severe MR	8 (100%)
TR ≥ moderate	1 (12.5%)
LVDd: left ventricular diameter in diastole, LVDs: left ventricular diameter in systole, LAD: left atrial diameter, LVEF: left ventricular ejection fraction, MR: mitral regurgitation, TR: tricuspid regurgitation	

70 years old, Female, Severe MR with P1 prolapse

Preoperative TEE

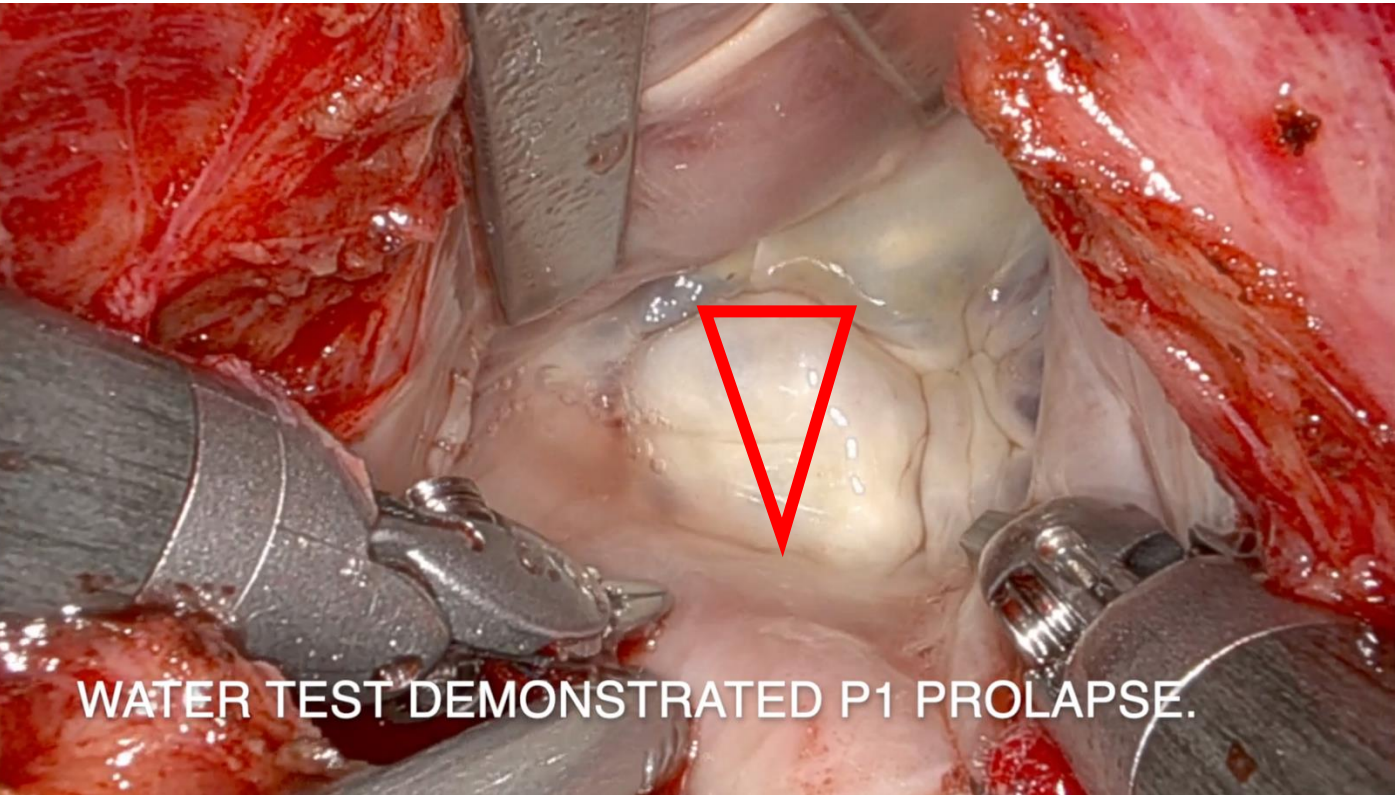


Preoperative TEE showed severe MR with eccentric jet toward anterior leaflet.

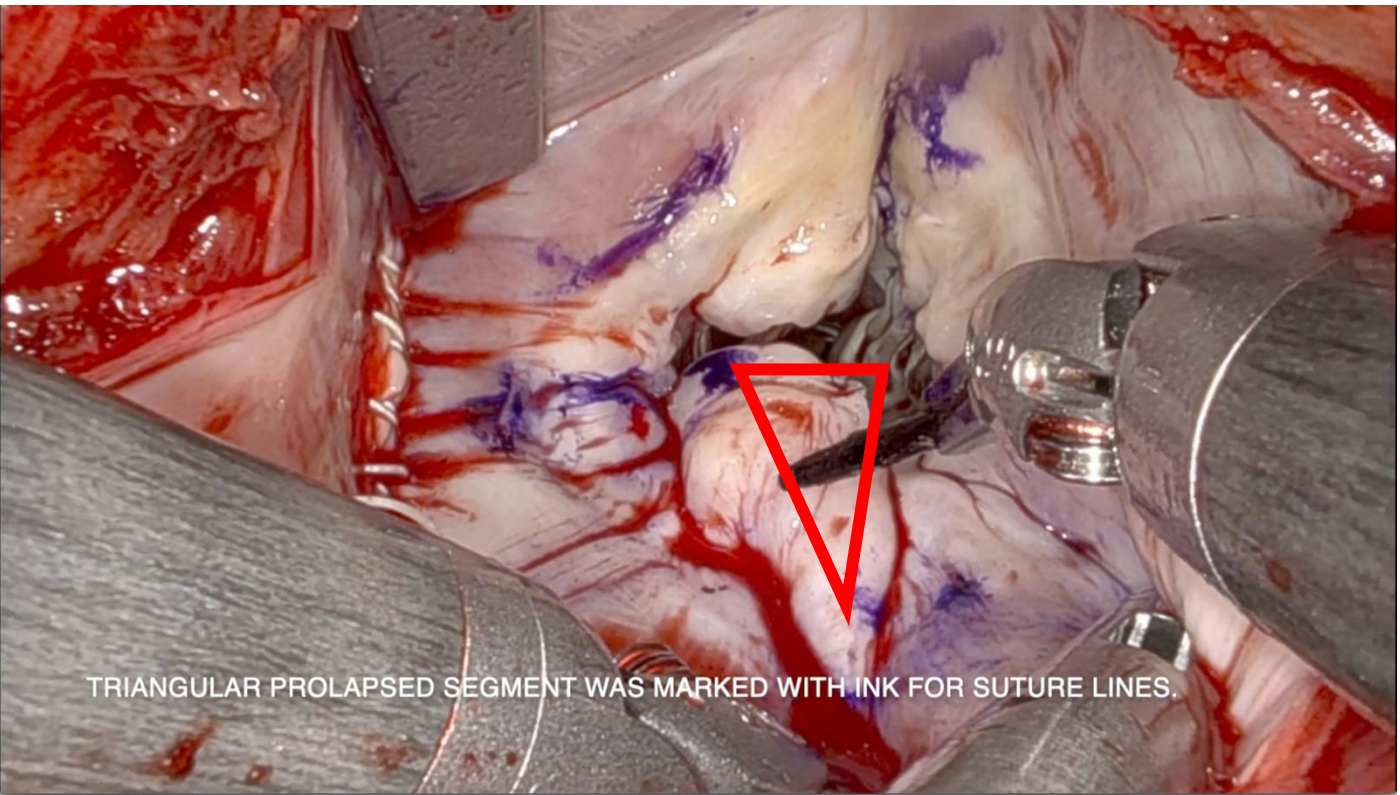


3D TEE demonstrated broad P1 prolapse.

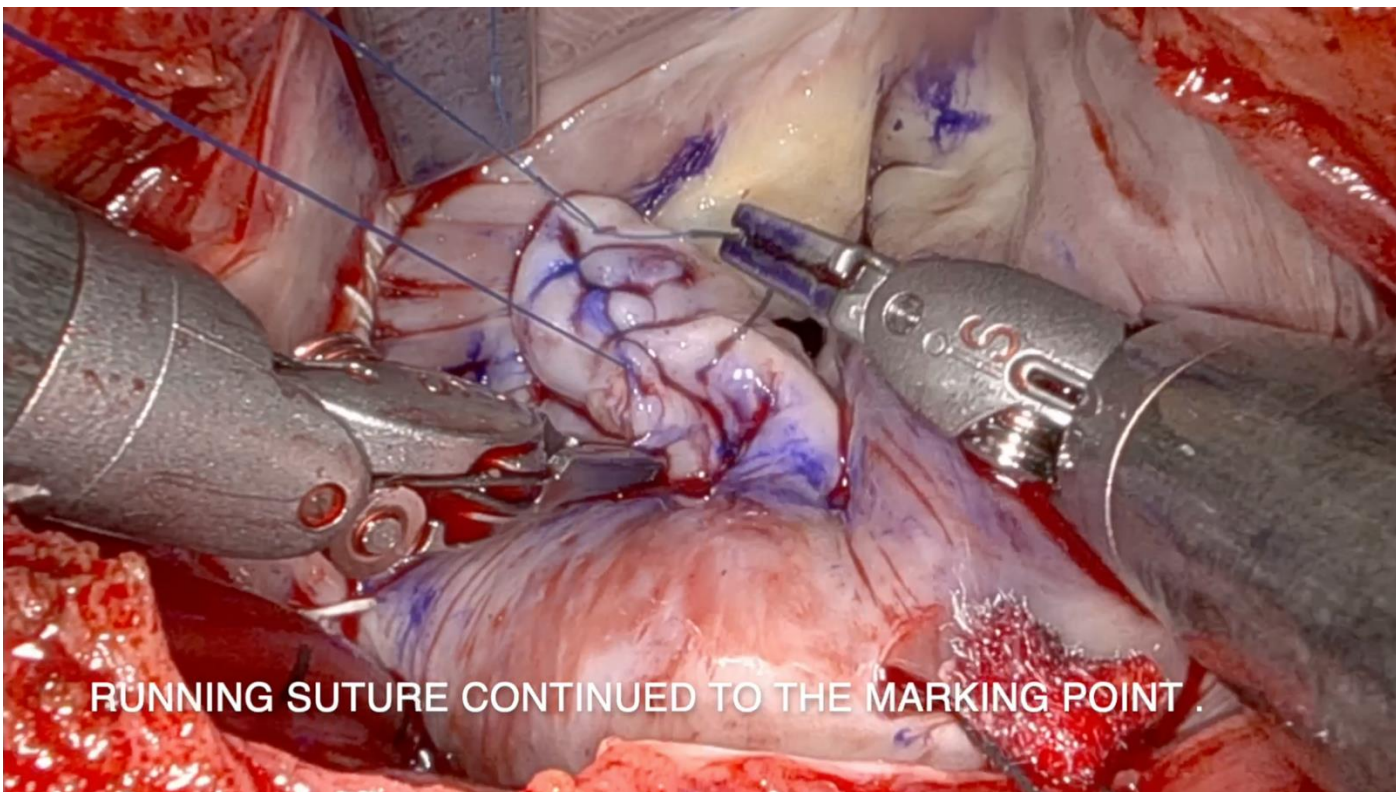
Surgical Technique (Please watch video)



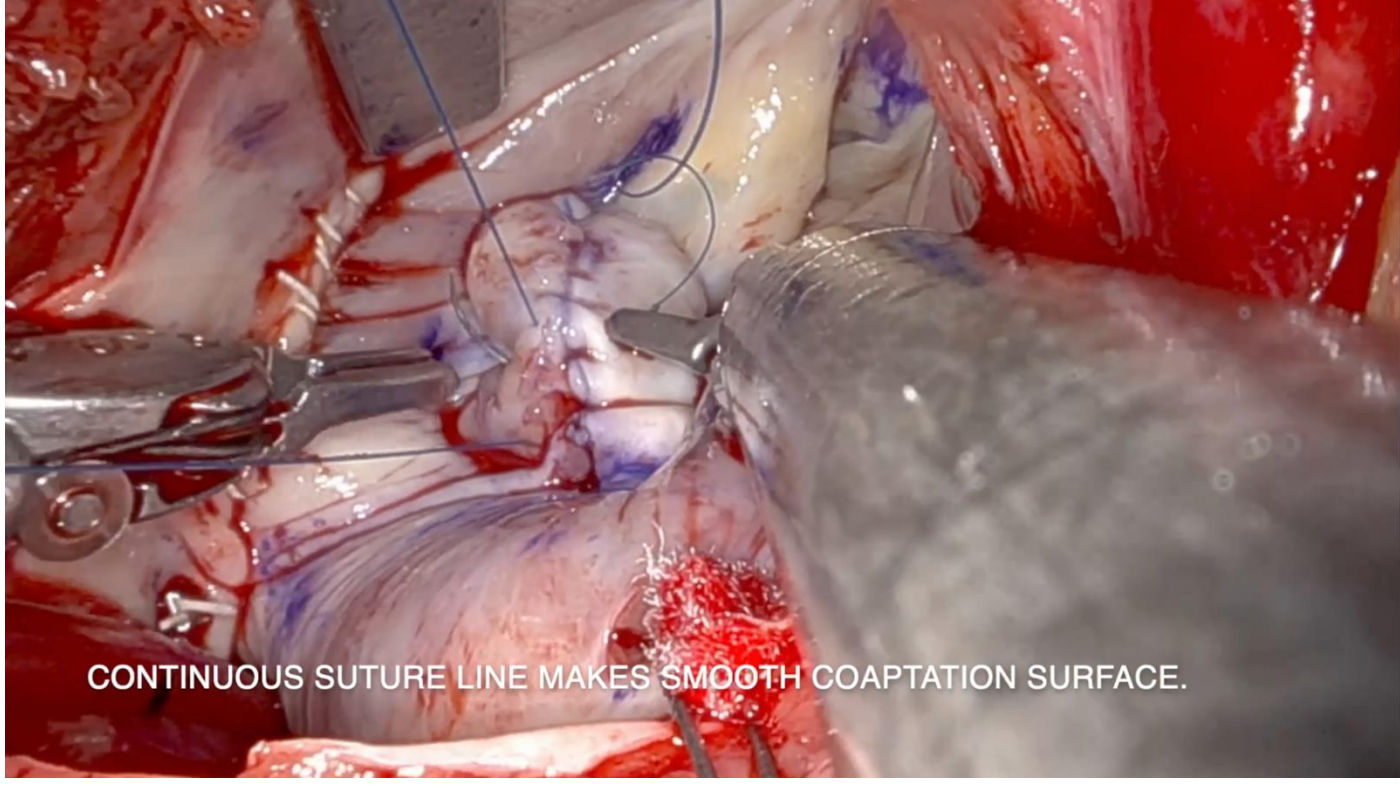
1. The prolapsed segment was identified with a water test. Imagine triangular resection line (red triangle).



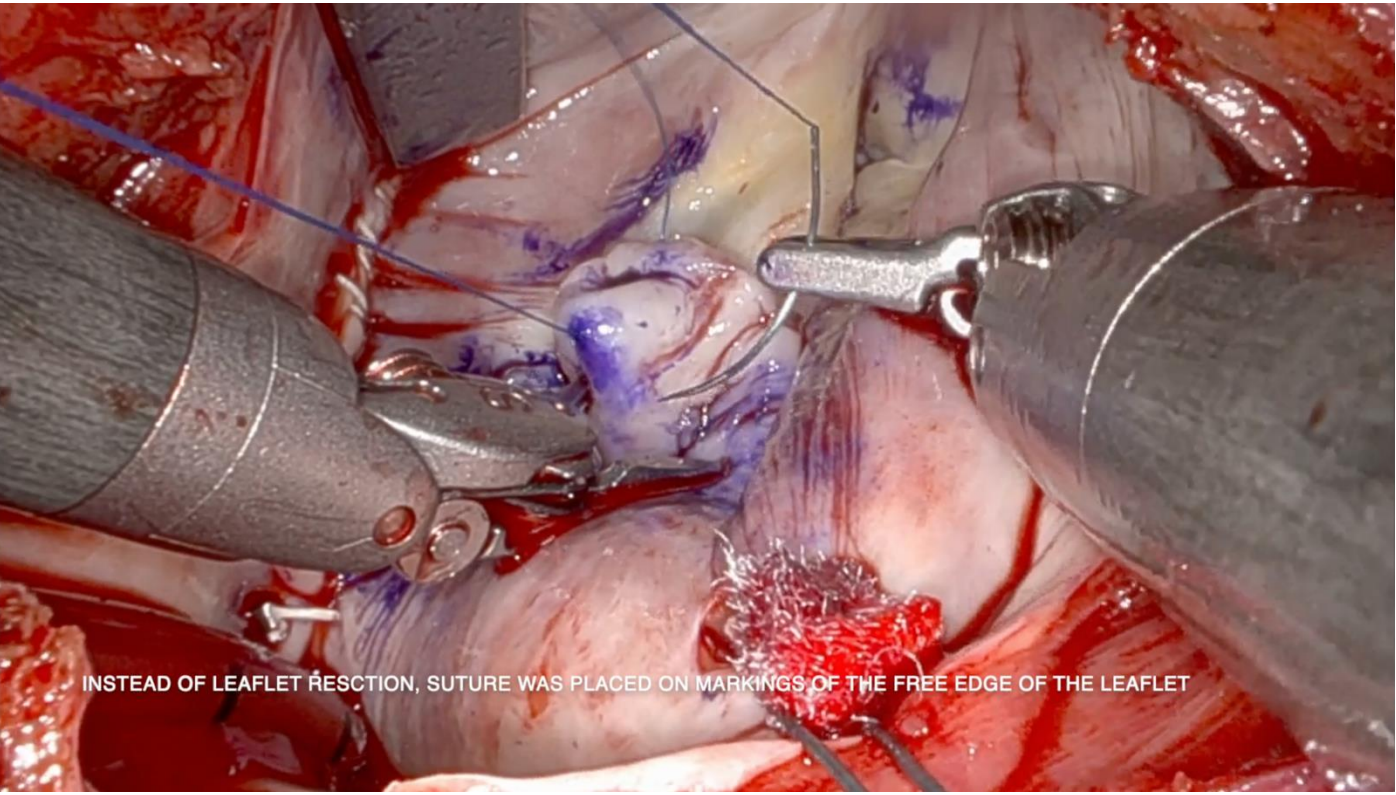
2. Triangular prolapsed segment was marked with ink for suture lines.



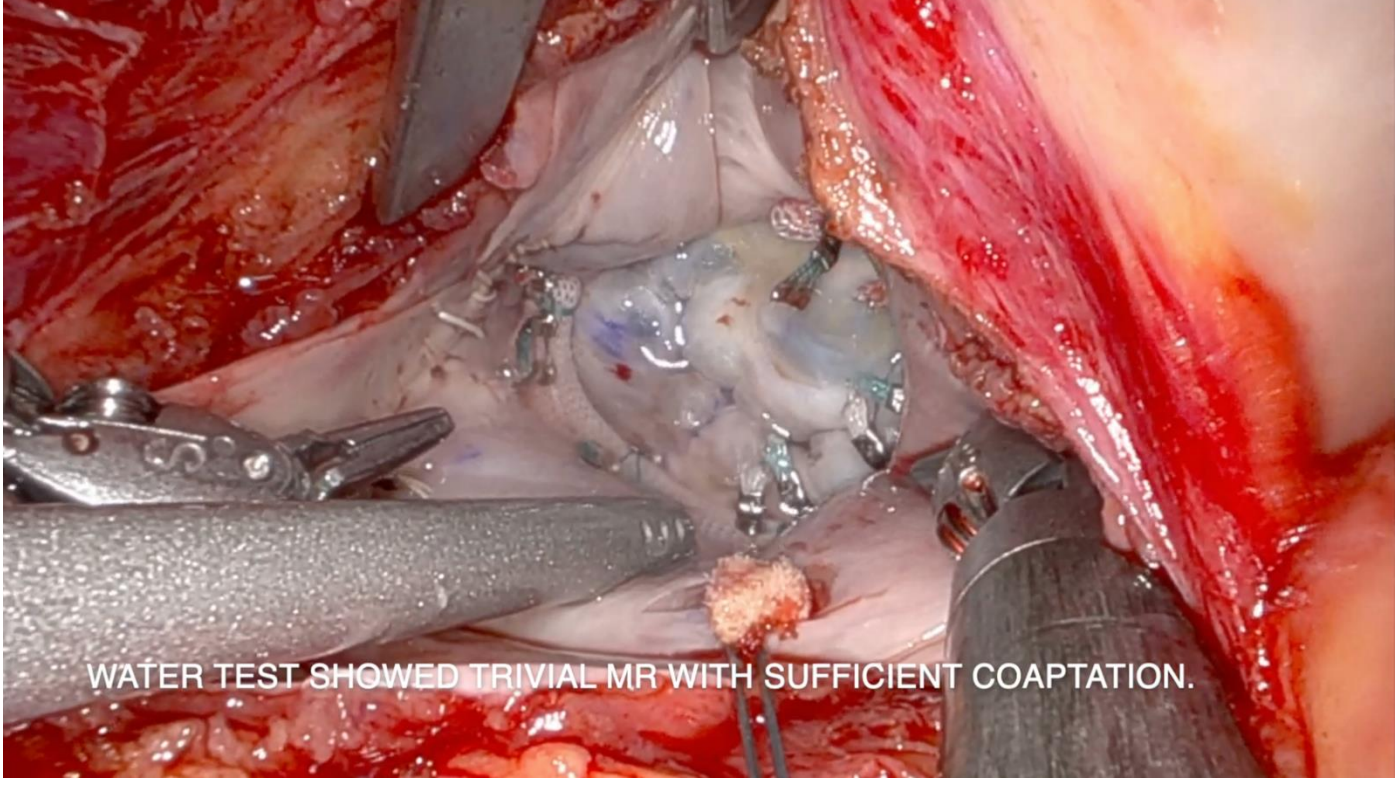
4. The prolapsed segment was inserted vertically into the left ventricle. In the first layer, the suture was placed to reduce the prolapsed leaflet roughly, not to make a curtain effect.



5. In the second layer, the leaflet height was meticulously adjusted by placing wider bites.



3. Instead of leaflet resection, 5-0 monofilament polypropylene was placed on markings of the free edge of leaflet.



6. Water test showed trivial MR with sufficient coaptation.

Results		
Operation time (minutes)		458 ± 63 (380-556)
Cardiopulmonary bypass time (minutes)		250.3 ± 55.1 (185-336)
Aortic cross-clamp time (minutes)		161.4 ± 28.0 (109-198)
Folding MV repair time (minutes’ seconds’)		14’11” ± 06’20” (8’30”-29’07”)
Annuloplasty ring type		PhysioFlex: 8 (100%)
Ring size	30mm	3 (37.5%)
	32mm	3 (37.5%)
	34mm	1 (12.5%)
	38mm	1 (12.5%)
Prolapsed area	P2	7 (87.5%)
	P3	1 (12.5%)
Artificial chorda		1 (12.5%)
Tricuspid valve repair		2 (25.0%)
Left atrial appendage closure		7 (87.5%)
Maze procedure		1 (12.5%)
Conversion to mitral valve replacement		0 (0%)
Systolic anterior motion		0 (0%)
Postoperative MR	None	3 (37.5%)
	Trivial	5 (62.5%)
	≥ Mild	0 (0%)
Pressure gradient (mmHg)		1.9 ± 0.8 (1-3)
Reoperation for recurrent MR		0 (0%)

Conclusions

FMVR is simple, requiring no leaflet cutting or reapproximation with interrupted sutures, and provides the same quality as triangular/quadrangular resection. Because of its simplicity, FMVR is efficient and reproducible technique in robotic mitral valve repair.