

Quality of Life Following Robotic Cardiac Surgery: Return to Baseline Within 4 Weeks

Martin Winter¹, Thomas E. Rubino Jr.¹, Manuel Grueso-Giraldo¹, Jeffrey Ding¹, Andrea Amabile¹, Kei Kobayashi¹, Irsa Hasan¹, David Kaczorowski¹, Ibrahim Sultan¹, Johannes Bonatti¹

1. Cardiac Surgery Department, University of Pittsburgh Medical Center, Pittsburgh, PA.

INTRODUCTION

- Quality of life (QoL) is an increasingly important outcome after cardiac surgery because it reflects patient-centered recovery, functional status, and overall well-being.
- Traditional median sternotomy is associated with greater surgical trauma, postoperative pain, and delayed recovery, whereas minimally invasive and robotic techniques may accelerate return to normal activities and improve QoL.
- Previous studies have shown QoL recovery around 3 months after minimally invasive or robotic cardiac procedures, but evidence remains inconsistent and predictors of early recovery are not well defined.
- The study aimed to evaluate short-term postoperative QoL recovery after robotic cardiac surgery, determine how many patients return to baseline QoL within 4 weeks, and identify factors associated with recovery.

METHODS

- Prospective observational study conducted at a single institution between July 2021 and December 2024.
 - Included 168 patients who underwent:
 - Robotic mitral valve repair (n = 96)
 - Minimally invasive direct coronary artery bypass (MIDCAB, n = 21)
 - Totally endoscopic coronary artery bypass (TECAB, n = 51)
- Quality of life was measured preoperatively and 4 weeks postoperatively using:
- EQ-5D-5L questionnaire (utility score)
 - Best Imaginable Health visual analog scale (0–100)

Return to baseline QoL was defined as a decline in EQ-5D utility score of no more than 0.05 points ($\Delta\text{EQ-5D} \geq -0.05$), based on the minimal clinically important difference (MCID).

CONCLUSIONS

In this mixed robotic cardiac surgery cohort, most patients returned to their preoperative quality of life baseline within 4 weeks. Higher NYHA class and lower baseline EQ-5D scores were associated with achieving return to baseline, whereas diabetes and higher preoperative EQ-5D scores were associated with lower odds.

RESULTS

- The cohort had a median age of 62 years, and 73.1% were male.
- Median EQ-5D utility scores remained stable from baseline to 4 weeks (0.943 vs. 0.940; p = 0.061), indicating preservation of overall QoL
- Self-rated health significantly improved, with Best Imaginable Health scores increasing from 80 to 85 (p < 0.001).
- Overall, 70.8% of patients returned to baseline QoL within 4 weeks. Recovery rates by procedure type were:
 - Mitral valve repair: 67%
 - MIDCAB: 81%
 - TECAB: 75%
- Patients who returned to baseline were more likely to have higher preoperative symptom burden (NYHA III/IV), whereas those who did not recover had a higher prevalence of sleep apnea.
- Intraoperative factors such as cardiopulmonary bypass time, procedure duration, and conversion to sternotomy were not significantly associated with QoL recovery.
- Multivariable analysis showed:
 - Higher NYHA class (III/IV) increased the likelihood of returning to baseline QoL (OR 4.14; p = 0.025).
 - Diabetes reduced the likelihood of recovery (OR 0.20; p = 0.004).
 - Higher preoperative EQ-5D scores were strongly associated with lower odds of returning to baseline, likely due to a ceiling effect.

Postoperative Outcomes across patients with/without Return to Baseline Quality of Life at 4 weeks after Robotic Cardiac Surgery (determined by EQ5D score)				
Variable	No Return to Baseline (n = 49)	Return to Baseline (n = 119)	All Patients (n=168)	p-value
Extubation in OR	34 (69.4%)	63 (52.9%)	96 (57.5%)	0.05
Postop ventilation time (h)	0.00 (0.00-2.78)	0.00 (0.00-3.42)	0.00 (0.00-3.28)	0.33
ICU stay (hours)	45.3 (23.2-73.8)	45.3 (23.2-73.8)	46.0 (24.4-65.6)	0.86
New postop atrial fibrillation	12 (24.5%)	39 (32.8%)	50 (29.9%)	0.289
Postop renal failure	0 (0.0%)	0 (0.0%)	0 (0%)	n/a
RBC transfusion	9 (18.4%)	12 (10.1%)	20 (11.9%)	0.14
Revision for bleeding	2 (4.1%)	1 (0.8%)	3 (1.8%)	0.149
Stroke	0 (0.0%)	0 (0.0%)	0 (0%)	n/a
Mortality (30-day)	0 (0.0%)	0 (0.0%)	0 (0%)	n/a
Hospital length of stay (days)	4.0 (3.5-6.0)	4.0 (4.0-6.0)	4 (4-6)	0.752
Values are presented as mean ± standard deviation, median (interquartile range), or number (percentage).				

