

Robotic endoscopic cardiac surgery in patients with previous coronary artery bypass grafting: A safer alternative?

Sarah Nisivaco¹, Hiroto Kitahara¹, Kaitlin Grady¹, Won Hee Oh¹, Husam H Balkhy¹,
¹Department of Robotic Cardiac Surgery, University of Chicago Medicine, Chicago, IL, USA

BACKGROUND

Redo heart surgery after prior coronary bypass (CABG) can be complicated by cardiac and/or graft injury during re-sternotomy. A robotic approach has the potential to eliminate the risks of re-sternotomy. We present a series of patients undergoing robotic totally-endoscopic cardiac surgical procedures after prior CABG.

PATIENTS AND METHODS

- 1,924 total patients underwent robotic cardiac procedures at a single institution by a single experienced robotic team (7/2013-5/2025)
- Retrospective cohort study of 51 patients of this cohort who had undergone prior CABG before robotic surgery, and are the subject of this review
- Demographics, intraoperative, and postoperative data were collected

RESULTS

Group Characteristics	N=51	Perioperative Characteristics	N=51
Age (years), mean $\pm$ SD	68 $\pm$ 9	Injury to prior grafts, n (%)	0 (0.0)
Female Gender, n (%)	12 (24)	Conversion to sternotomy, n (%)	1 (2.0)
Atrial Fibrillation, n (%)	10 (20)	Extubation in OR, n (%)	9 (18)
BMI >30, n (%)	13 (25)	Extubation in 24 hrs, n (%)	46 (90)
Hypertension, n (%)	47 (92)	Hospital LOS (days), mean $\pm$ SD	2.9 $\pm$ 3.1
IDDM, n (%)	8 (16)	ICU LOS (days), mean $\pm$ SD	1.5 $\pm$ 1.7
Prior CVA, n (%)	4 (7.8)	Postoperative Blood Transfusion, n (%)	9 (18)
ESRD on Dialysis, n (%)	3 (5.9)	Atrial Fibrillation, n (%)	9 (18)
EF <40%, n (%)	15 (29)	Postoperative Bleeding, n (%)	1 (4)
CHF, n (%)	21 (41)	Readmission, n (%)	0 (0.0)
STS Risk score	4.3 $\pm$ 5.0	Mortality, n (%)	1 (2.0)

Table 1. Baseline Characteristics

Table 2: Intraoperative Characteristics

SD: standard deviation; BMI: body mass index; IDDM: insulin-dependent diabetes; CVA: cerebrovascular accident; ESRD: end stage renal disease; EF: ejection fraction; CHF: congestive heart failure; STS: Society of Thoracic Surgeons; OR: operating room; LOS: length of stay

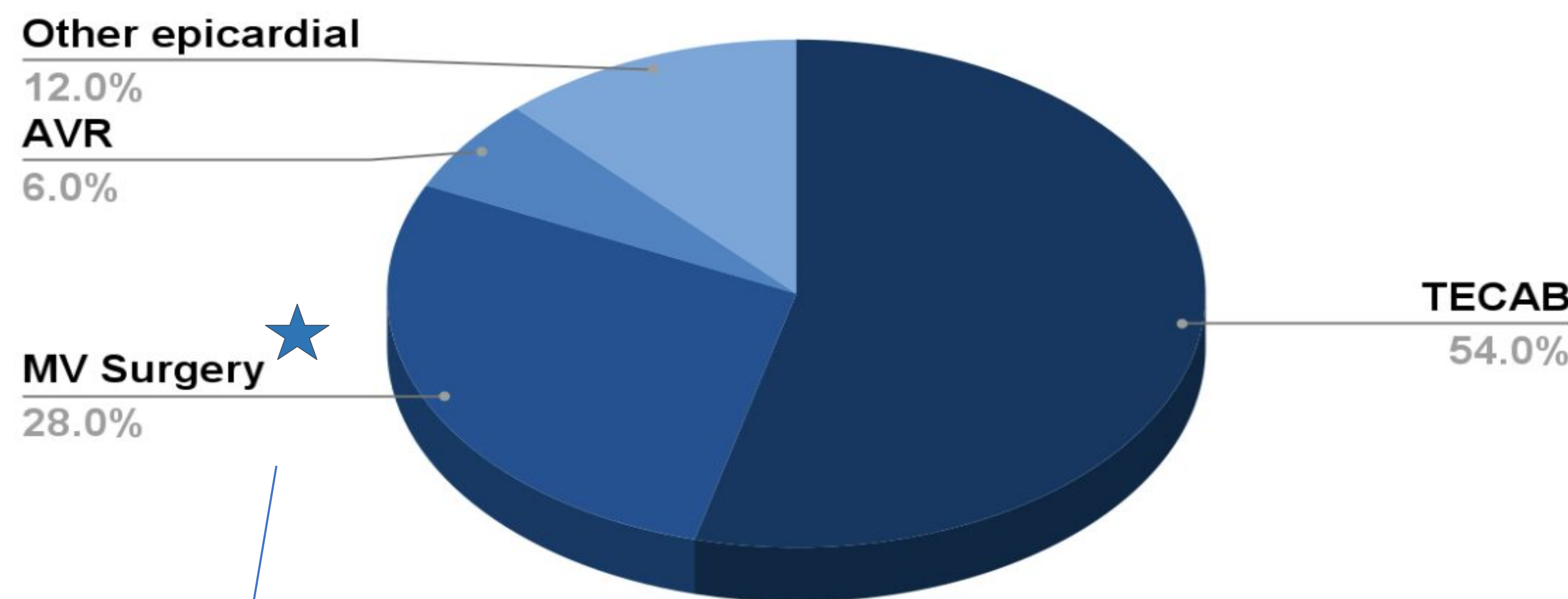
OPERATIVE RESULTS

51 patients s/p CABG undergoing redo robotic cardiac surgery

***90%: $\geq$ 1 prior sternotomy**
***15%: 2 prior sternotomies)**

***10%: prior robotic TECAB**

Robotic Redo Procedure after prior CABG



★ **14 redo MV cases:**
-9 repair
-5 replacement

★ **Concomitant Procedures:**
-2 TVr
-5 LA cryo
-4 LAAL

MIDTERM RESULTS

41 MV or TECAB patients contacted
Mean follow-up time: 39 $\pm$ 28 months

Mid-Term Outcomes	N = 41
Overall Mortality, n (%)	11 (27)
Cardiac-related Mortality, n (%)	5 (12)
Repeat Cardiac Surgery, n (%)	0 (0.0)
Repeat Revascularization, n (%)	2* (4.9) *2 PCI

TECAB: totally endoscopic coronary bypass; AVR: aortic valve replacement; MVR: mitral valve repair; MVR: mitral valve replacement; TVr: tricuspid valve replacement; LA: left atrium; LAAL: left atrial appendage ligation; PCI: percutaneous coronary intervention

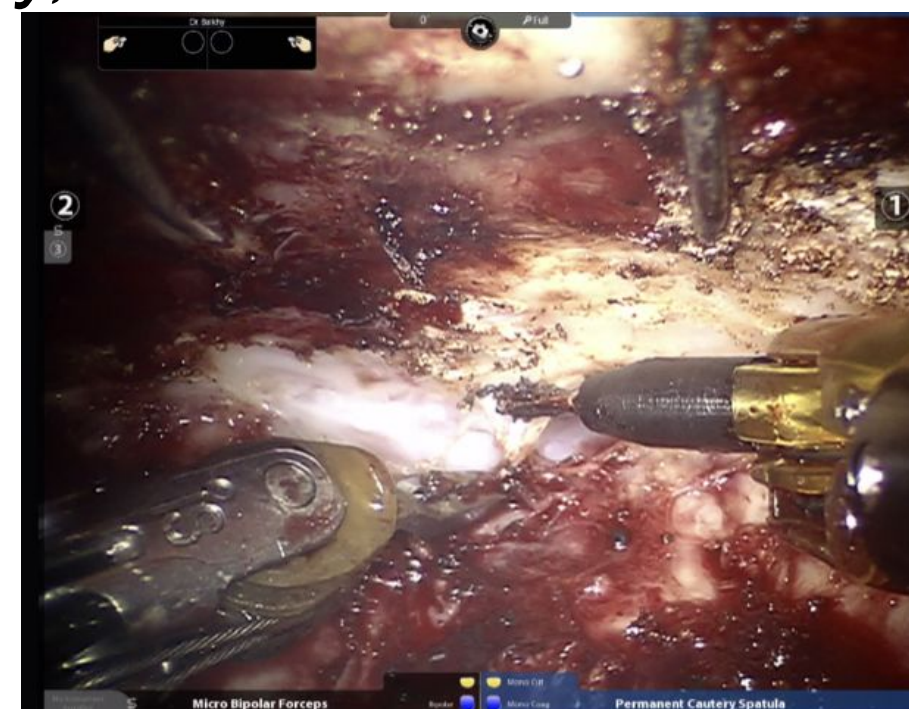
SURGICAL TECHNIQUE

Epicardial

-Totally endoscopic with the da Vinci Si robot & use of the epicardial stabilizer
-Left chest ports
-All cases performed off-pump, on a beating-heart
-Case types: TECAB, pericardiectomy, or LV lead placement

Figure 1. RIMA Harvesting

Wires from prior sternotomy seen

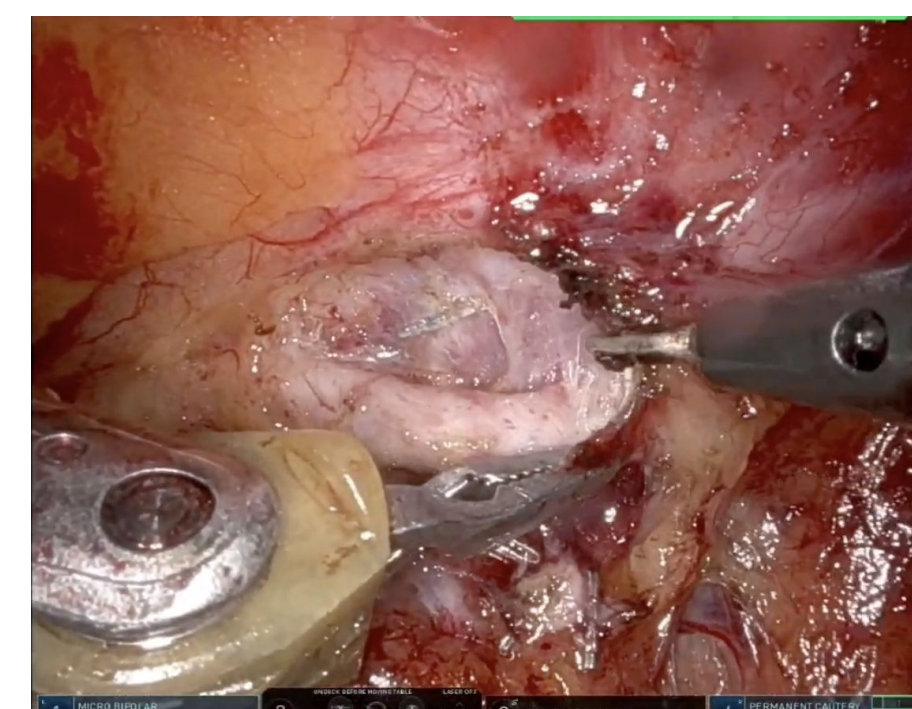


Intracardiac

-Totally endoscopic with the da Vinci Xi or Si robot
-Right chest ports
-CPB via femoral cannulation
-Arrest via Endoballoon, Chitwood clamp, or fibrillatory arrest
-Case types: MV repair, MV replacement, AVR

Figure 2. Prior graft identification

Prior bilateral ITA grafts identified and protected during redo robotic endoscopic AVR



CONCLUSIONS

A robotic endoscopic approach for patients undergoing redo cardiac surgery after prior CABG is a safe alternative. There is decreased risk of injury to old grafts utilizing this approach given avoidance of redo sternotomy and its associated risks.

DISCLOSURES

Husam H Balkhy is a proctor for Intuitive Surgical.

REFERENCES

- Nisivaco S, McCrorey M, Krienbring D, Patel B, Srivastava S, Balkhy HH. Redo Robotic Endoscopic Beating Heart Coronary Bypass (TECAB) After Previous TECAB. *Ann Thorac Surg*. 2017;104(6):e417-e419. doi:10.1016/j.athoracsur.2017.06.067
- Kitahara H, Grady K, Balkhy H. Robotic redo totally endoscopic coronary artery bypass to the right coronary artery in a patient with prior coronary bypass surgery. *Multimed Man Cardiothorac Surg*. 2023;2023:10.1510/mmcts.2023.012. Published 2023 Apr 17. doi:10.1510/mmcts.2023.012
- Yamashita Y, Torregrossa G, Sicouri S, et al. Robotic-Assisted Redo Coronary Artery Bypass Grafting: A Single-Center Experience. *Ann Thorac Cardiovasc Surg*. 2025;31(1):25-00026. doi:10.5761/atcs.0a.25-00026