Single-Center Retrospective Review of Patients Undergoing Robotic Minimally Invasive Direct Coronary Artery Bypass As A Cardiac Reoperation

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Background

- Coronary artery bypass grafting (CABG) patients are considered high-risk if they have undergone prior cardiac surgery. Compared to first-time cardiac surgery patients, reoperative patients have higher mortality rates and higher rates of complications such as blood transfusion and prolonged ventilation.[1,2]
- Most reoperative CABG studies have focused on traditional sternotomy coronary artery bypass (TRAD-CAB). While robotic, minimally invasive approaches are not always excluded, they account for <1% of annual CABG volume in the Society of Thoracic Surgeons Adult Cardiac Surgery Database (STS ACSD).[3]
- This study's objective is to evaluate the safety and feasibility of robotic minimally invasive direct coronary artery bypass (MIDCAB) in the reoperative setting.

Methods

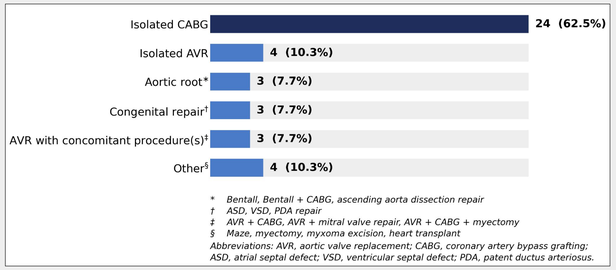
- Single-center retrospective review of reoperative robotic MIDCABs performed between 01/1/2020 and 08/31/2025.
- Patients were included if they underwent isolated robotic MIDCAB after prior cardiac surgery.
  - Robotic-assisted internal thoracic artery harvest.
  - 1-2 distal anastomoses via mini-thoracotomy.
  - Off-pump (beating heart).
- Data was extracted from the STS ACSD and patient charts.
- Categorical variables are presented as counts and percentages. Continuous variables are presented as mean ± standard deviation.

Results

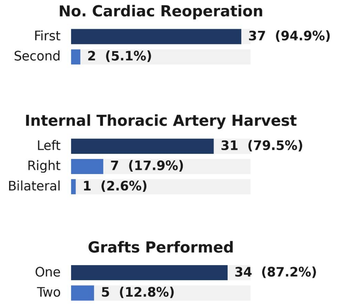
FINAL COHORT:

39 reoperative patients (2.4% of 1,627 total robotic MIDCABs)

PRIOR CARDIAC SURGERIES (N = 39):



OPERATIVE CHARACTERISTICS (N = 39):



4.7 ± 0.9 hours
Operating Room Time

0% (0/39)
Conversion to Sternotomy

BASELINE CHARACTERISTICS:

Variable	Patients (N = 39)
Age (years)	66 ± 11
Male	28 (71.8%)
White	36 (92.3%)
Body Mass Index (kg/m^2)	30.8 ± 5.9
Diabetes	21 (53.8%)
On Dialysis	0 (0%)
Current/Former Smoker	23 (59.0%)
Peripheral Artery Disease	9 (23.1%)
Cerebrovascular Disease	11 (28.2%)
Prior Myocardial Infarction	20 (51.3%)
Atrial Fibrillation	6 (15.4%)
Ejection Fraction <30%	5 (12.8%)
Multivessel Disease	35 (89.7%)
STS-PROM (%)	3.4 ± 3.5

COMPLICATIONS:

Variable	Patients (N = 39)
Surgical Site (30-day)	1 (2.6%)
Stroke	0 (0%)
Cardiac Arrest	0 (0%)
Renal Failure	0 (0%)
Sepsis	0 (0%)
Reoperation	2 (5.1%)
Prolonged Ventilation	1 (2.6%)
Pneumonia	2 (5.1%)
Pleural Effusion Requiring Drainage	3 (7.7%)
Blood Transfusion	5 (12.8%)
New Atrial Fibrillation	5 (12.8%)
Deep Vein Thrombosis	1 (2.6%)

POSTOPERATIVE OUTCOMES:

0% (0/39)
30-day Mortality

2.6% (1/39)
30-day Readmission

100% (39/39)
Discharged Home

6 ± 5 days
Postoperative LOS

65.5 ± 83.5
Total ICU Hours

Abbreviations: ICU, intensive care unit; LOS, length of stay; STS-PROM, Society of Thoracic Surgeons Predicted Risk of Mortality.

Discussion & Conclusions

- To our knowledge, this is the first case series on reoperative patients undergoing robotic MIDCAB.
- The cohort demonstrated excellent postoperative outcomes in mortality and morbidity despite elevated operative risk.
- Reoperative coronary surgery may have a better risk profile when performed with a minimally invasive, robotic-assisted approach in select patients, particularly if the left internal thoracic artery is preserved.
  - Minimally invasive approach helps avoid repeat sternotomy and limit surgical dissection.
  - Robotic assistance enhances visualization, reduces operative time, and improves efficiency of adhesiolysis.
- Robotic MIDCAB may fill a gap in treatment options for patients deemed too high-risk for redo sternotomy.
- Future studies should address multicenter and long-term outcomes, as well as comparative analysis with reoperative TRAD-CAB cohorts.

References

(1) Bianco V, Kilic A, Gleason TG, et al. Reoperative Cardiac Surgery Is a Risk Factor for Long-Term Mortality. *Ann Thorac Surg* 2020; 110: 1235–1242.

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(3) Wyler von Ballmoos MC, Kaneko T, Iribarne A, et al. The Society of Thoracic Surgeons Adult Cardiac Surgery Database: 2023 Update on Procedure Data and Research. *Ann Thorac Surg* 2024; 117: 260–270.