2025 STS Coronary Conference
Accepted Abstracts

Thursday, June 12 | Friday, June 13 | Saturday, June 14 | Scientific Posters

Thursday, June 12, 2025

Abstract Session (1:00 PM – 2:00 PM)

1:00 PM
Case Presentation: Challenging Case: Coronary Artery Bypass Grafting for ST Elevation Myocardial Infarction in a Patient with Bilateral Deep Inferior Epigastric Perforator Flaps for Breast Reconstruction

Author List: AlleaBelle Bradshaw, MD, Jessica B. Briscoe, MD, Jace C. Bradshaw, MD, Jennifer S. Lawton, MD

Full Case Scenario: A 51-year-old female activated emergency medical services due to sudden-onset, crushing, left-sided chest pain. She had a history of breast cancer treated with chemotherapy and bilateral mastectomy with deep inferior epigastric perforator flaps (DIEP). She worked full time and was a current smoker.

On arrival to the emergency department (ED), she had ongoing chest pain, and while in pre-registration in the ED, she suffered a cardiac arrest. On rhythm check, she was found to be in ventricular fibrillation. She was defibrillated twice with 200 joules, leading to return of spontaneous circulation (ROSC). After ROSC, she was then talking and neurologically intact. Her post-ROSC ECG showed atrial fibrillation with rapid ventricular response with tombstoning ST segment elevation in leads V1-4 and reciprocal depression in II, III, and aVF. She was loaded with ticagrelor and taken for left heart catheterization. She was found to have significant left anterior descending (LAD) artery disease with proximal thrombus and TIMI II flow (Figure). A ventriculogram showed minimal apical motion. There was hesitation to stent because of concern for high risk of embolization. A balloon pump was placed, and cardiac surgery was consulted. She was then taken for emergent coronary artery bypass grafting (CABG). During dissection of the left internal mammary artery (LIMA), this vessel was found to be scarred down and clipped distally, presumably from the patient's prior breast reconstruction surgery, so its

use was abandoned. The RIMA was assumed to be unusable, as well, and use of a radial artery would have required increased operative time for harvesting in this critically ill patient. Therefore, saphenous vein was harvested and anastomosed to the LAD distally and aorta proximally. The patient had no complications postoperatively. She was discharged to home on postoperative day 4 on dual anti-platelet therapy.

Pre-Operative Imaging

Figure: Coronary catheterization performed after arrest and resuscitation

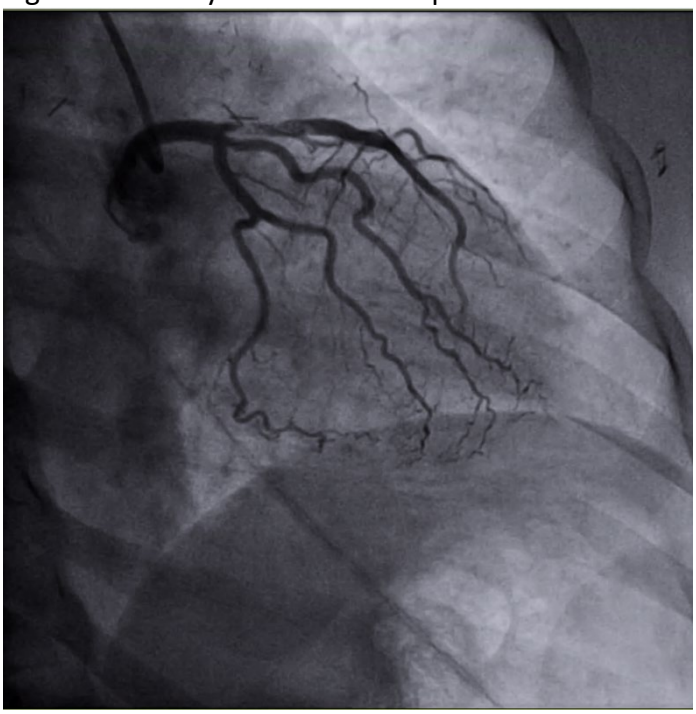

Figure legend: Post-arrest left heart catheterization with injection of the left main demonstrates proximal left anterior descending artery calcification and thrombus.

Postoperative discussion points/questions: Patients presenting with STEMI who are found to have intracoronary thrombus may benefit from surgical revascularization to decrease risk of embolization associated with stenting. In addition, a thorough history and physical are vital to conduit planning, which can be particularly challenging in patients with prior breast reconstruction. Use of an IMA graft is impossible or contraindicated in patients with breast reconstruction with a DIEP flap (arterial inflow and venous outflow via the IMA and IMV) or rectus abdominus flaps (based on the inferior epigastric artery), respectively.

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Abstract: Coronary Artery Bypass Grafting in Nonagenarians Undergoing Aortic valve replacement: Insights into Survival and Quality of Life

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Purpose: In contemporary practice, extreme age is often considered a contraindication to open cardiac surgery. However, data on concomitant CABG in nonagenarians undergoing SAVR remain scarce. This study evaluates survival and quality of life in these high-risk patients, providing insight into the feasibility and durability of surgical approach in nonagenarians.

Methods: Between 1993 and 2025, we identified 45 consecutive patients aged ≥90 who underwent CABG+SAVR at our institution. A control group of 45 patients who underwent isolated SAVR was selected for comparison. Survival was assessed using Kaplan-Meier analysis and compared to an age- and sex-matched U.S. population. The cumulative incidence of heart failure-related readmission was estimated using competing risk analysis, with death treated as a competing event. Quality-of-life surveys administered at 3 and 5 years postoperatively included structured, self-reported assessments of physical activity, in which patients rated their functional capacity relative to individuals of the same age group.

Results: Median age was 91.9 years (IQR: 90-93); 47.8% (n=43) were female. All patients received bioprosthetic valves; median STS PROM was 9.6% (IQR: 7%–13%). Perfusion and cross-clamp times were longer in the SAVR+CABG group compared to isolated SAVR (101 vs. 64 minutes and 75 vs. 45 minutes, respectively; P<0.001 for both). The left internal mammary artery (LIMA) was utilized in 57.8% (n=26) of CABG cases. Thirty-day mortality was 2.2% in SAVR+CABG vs. 6.7% in isolated SAVR (P=0.672). At 3 years, all survey respondents (n=26) reported physical activity levels equal to or greater than peers of the same age. At 5 years, findings remained consistent among respondents (n=25), with 78.9% reporting comparable or higher levels of activity. Overall survival rates were 84.4% (95% CI: 77–92) at 1 year and 43.1% (95% CI: 33–54) at 5 years. Heart failure–related readmissions were similar (17.8% vs. 22.5% at 5 years; P=0.66) (Figure1)

Conclusion: In selected nonagenarians undergoing SAVR, concomitant CABG can be performed with acceptable morbidity and mortality, challenging the notion of isolated extreme age as a surgical contraindication. These findings provide insights into the acceptability of cardiac surgery in select nonagenarians with favorable biological age.

Figure: Survival, Heart Failure Readmissions, and Quality-of-Life Outcomes

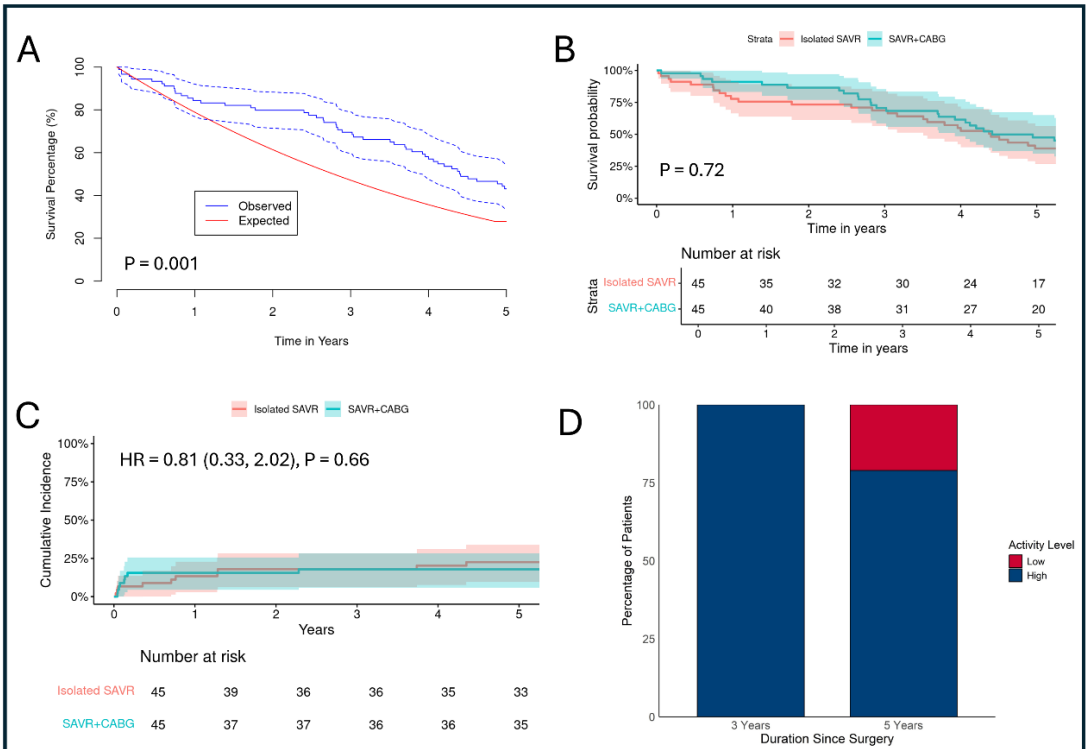

FIGURE 1 (A) Overall survival rate compared to an age- and sex-matched U.S. population **(B)** Kaplan-Meier survival curves stratified by procedure type **(C)** Cumulative incidence of heart failure readmissions with death as a competing risk **(D)** Self-reported physical activity at 3- and 5-years postoperatively.

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Abstract: Effect of Mechanical Circulatory Support on Outcomes in Patients with Cardiogenic Shock Secondary to Acute Myocardial Infarction

Author List*:* Amin Daoulah, MD, Amr A. Arafat, MD, Ahmed Jamjoom, MD, Hanin Alashi, CCP, Ahmed Elmahrouk, MD

Purpose: This study evaluated data from the Gulf Cardiogenic Shock (G-CS) registry 9 to compare the difference in outcomes between patients with Cardiogenic Shock after acute myocardial infarction who were treated with mechanical circulatory support and those who were not.

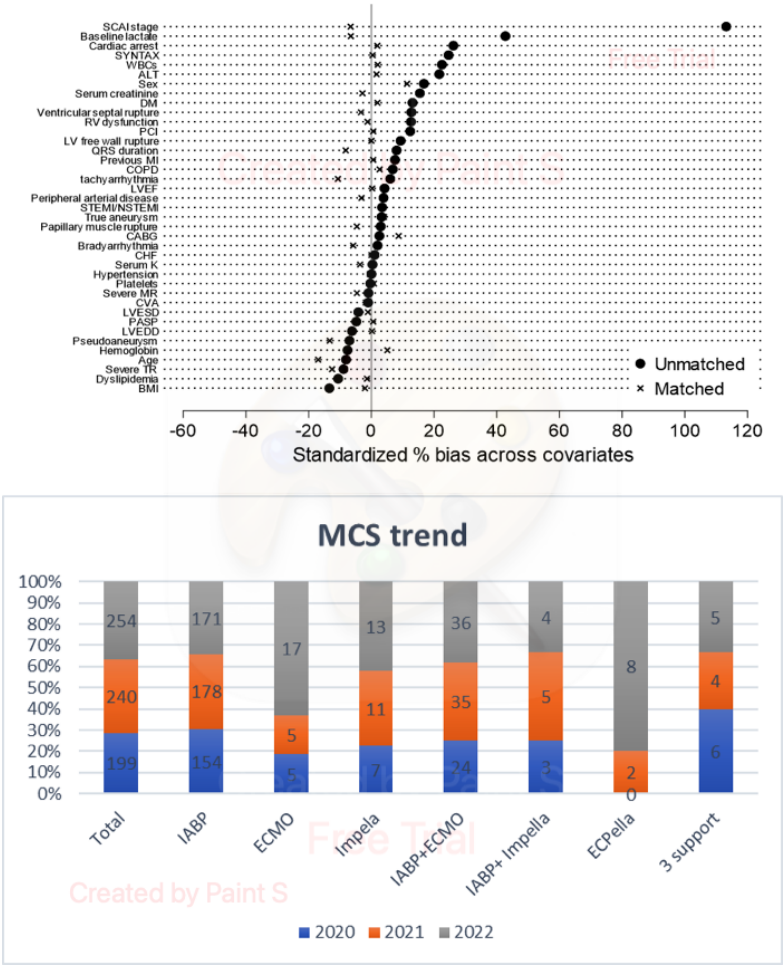
Methods: This study is a substudy of the Gulf Cardiogenic Shock (G-CS) registry. We performed a retrospective observational study conducted at multiple centers, including 1513 patients with acute myocardial infarction complicated by cardiogenic shock (AMI-CS) across 13 centers in 6 Gulf countries.9 This study included adults admitted with AMI-CS who received MCS (n = 693), and those who were managed without MCS (n = 820). Patients excluded from the study were those with causes of cardiogenic shock other than AMI, as well as patients with COVID-19 infection.9 The G-CS registry included patients admitted between January 2020 and December 2022.

Results: There was an increasing trend toward using MCS during the study period. In the no-MCS group, 46.9% were classified as SCAI stages D and E, and 41.6% were classified as stage C. In contrast, 95% of the MCS group was in Stages D and E. All-cause mortality was significantly greater in the MCS group (61%) than in the non-MCS group (32.2%). Predictors of MCS use were male, lower BMI, history of PCI, cardiac arrest, ventricular septal rupture, high WBCs, ALT and baseline lactate. In a propensity score-matched subgroup of 430 patients, there were no differences in the outcomes between MCS and non-MCS groups in patients who received medical therapy. Mortality was higher in patients who had MCS and CABG. Survival at 1 and 2 years was comparable between patients with and without MCS. Mortality was not related to the time of MCS initiation.

Conclusion: Among patients with SCAI Shock classification (D&E), using MCS wasn't associated with better outcomes irrespective of the initiation time. While MCS is critical for hemodynamic-support in severe cases, the survival benefit remains limited, emphasizing the need for ongoing assessment of patient selection and timing of MCS implementation to optimize outcomes.

Figure 1: Mechanical circulatory support (MCS) trend from 2020 to 2022

Figure 2: Comparison of the baseline data between patients with and without mechanical circulatory support pre and post-matching



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Abstract: A Novel Minimally Invasive Approach Facilitating Concomitant Coronary Artery Bypass and Multiple Valve Surgery

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Purpose: Despite the reported advantages, minimally invasive cardiac surgery (MICS) approaches are underutilized for coronary artery bypass grafting (CABG) patients requiring concomitant procedures. This study explored a novel minimally invasive axillary access to facilitate CABG along with multiple valve procedures, which is intended to reduce the technical challenge of these procedures.

Methods: The feasibility of this approach was evaluated using a cadaver model. The bilateral axillary access was created using 5 cm incisions through the 3rd intercostal spaces. These incisions were used to introduce an endoscope, surgical instruments, and an intercostal retractor. Additional working space in the anterior mediastinum was developed by elevating the sternum with a custom table-mounted retrosternal retractor placed through a small subxiphoid incision. Internal mammary artery harvest, single-vessel bypass, aortic valve replacement (AVR), and mitral valve replacement (MVR) procedures were performed using this novel access.

Results: This bilateral axillary approach was demonstrated to be feasible for conducting minimally invasive CABG along with valve replacement procedures, providing encouraging exposure and visualization while reducing the challenges commonly associated with performing multiple procedures through MICS access. Using novel surgical devices and retractors customized for use through small incisions, along with high-definition endoscopic equipment, there was adequate working space and visualization to conduct these procedures. Importantly, this access allows for bilateral internal mammary artery to left anterior descending artery CABG, providing a proven durable all-arterial revascularization through MICS access. Using current techniques, patients requiring CABG with concomitant cardiac procedures can be precluded from MICS approaches due to the difficulty of performing multiple procedures through a thoracotomy. With this novel approach, the surgeon's ability to perform multiple procedures through small access incisions represents a major advancement, potentially improving patient outcomes and expanding eligibility for less invasive options.

Conclusion: This first feasibility study suggests that a novel axillary access for CABG with concomitant procedures has the potential to expand MICS accessibility for patients by reducing the difficulty of the approach. Promising early evaluations indicate that further investigation is warranted to continue developing this technique.

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Abstract: The Impact of GLP-1 Inhibitors on Patients Undergoing Isolated Coronary Artery Bypass Surgery: Results from over 4000 Patients

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Purpose: The use of glucagon-like peptide-1 (GLP-1) inhibitors has increased among patients with cardiovascular disease. However, the impact on these medications on perioperative outcomes after coronary artery bypass grafting (CABG) has not extensively studied.

Methods: A retrospective review of a prospectively maintained cardiac surgery database was conducted. Patients undergoing isolated CABG from 2010-2024 were stratified into two groups: GLP-1 users and non-users. Patients undergoing emergent CABG or concomitant procedures, except for left atrial appendage ligation, were excluded from the analysis. Univariate and multivariable analysis was performed using Cox proportional hazards regression models to assess risk of all-cause mortality, major adverse cardiovascular and cerebral events (MACCE) and 30-day mortality. Variables for multivariable adjustment were selected by variable importance of random forest models.

Results: A total of 11,389 patients underwent isolated CABG, of whom 4170 had complete medication data. Among these, 165 (3.9%) patients used GLP-1 inhibitors for a median of 353 days. GLP-1 users were younger, more likely to be women, diabetic, hypertensive and had a higher body mass index (BMI). There was no difference in prior heart failure, ejection fraction or STS PROM. GLP-1 users had a longer intensive care unit length of stay, although the overall length of stay was similar. In unadjusted analysis, GLP-1 use was associated with a higher all-cause mortality over a median follow up of 6.2 years. No significant difference was found in 30-day mortality or 30-day MACCE. Baseline characteristics significantly associated with increased risk of MACCE included age, HbA1c, peripheral vascular disease, cerebrovascular disease, hypertension, and atrial fibrillation. In multivariable adjusted analysis, GLP-1 use was not found to be associated with increased overall mortality or MACCE.

Conclusion: Perioperative GLP-1 use is associated with longer intensive care unit length of stay and all-cause mortality after CABG compared with GLP-1 non-users. However, after risk adjustment, there was no significant difference remained, indicating perhaps a higher baseline risk profile of GLP-1 users.

Figure:

Table. Postoperative outcomes after coronary artery bypass grafting between GLP-1 non-users and GLP-users

Variable	Total	GLP-1 non-users	GLP-1 users	P value
Stroke	24 (0.6%)	23 (0.6%)	1 (0.6%)	0.96
New onset atrial fibrillation	892 (21.4%)	869 (21.7%)	23 (13.9%)	0.02
Renal failure	19 (0.5%)	19 (0.5%)	0 (0.0%)	1.00
Prolonged ventilation (>24 hours)	107 (2.6%)	104 (2.6%)	3 (1.8%)	0.54
Pneumonia	38 (0.9%)	37 (0.9%)	1 (0.6%)	0.67
Deep sternal infection	7 (0.2%)	6 (0.1%)	1 (0.6%)	0.76
Pacemaker implantation	7 (0.2%)	7 (0.2%)	0 (0.0%)	0.59
Reoperation for bleeding	52 (1.2%)	52 (1.3%)	0 (0.0%)	0.27
Length of stay				
Median (Q1-3)	6.0 (5.0-8.0)	6.0 (5.0-8.0)	6.0 (5.0-8.0)	0.01
Mean ± Std	7.15 ± 3.30	7.15 ± 3.26	6.96 ± 4.11	0.47
Intensive care unit (hours)				
Median (Q1-3)	34.0 (24.7-67.4)	33.8 (24.7-66.6)	45.3 (24.9-81.6)	0.02
Mean ± Std	52.7 ± 49.3	52.2 ± 48.9	63.1 ± 57.8	0.01
Follow-up (years)				
Median (Q1-3)	6.2 (3.0-9.5)	6.4 (3.2-9.7)	2.1 (1.0-4.2)	<.001
Mean ± Std	6.41 ± 3.92	6.55 ± 3.90	2.89 ± 2.49	<.001
Total all-cause mortality	332 (8.0%)	326 (8.1%)	6 (3.6%)	0.04
30-day or operative mortality	20 (0.5%)	18 (0.4%)	2 (1.2%)	0.17
30-day readmission	236 (5.7%)	225 (5.6%)	11 (6.7%)	0.57
MACCE*	1210 (29.0%)	1175 (29.3%)	35 (21.2%)	0.02
30-day MACCE*	141 (3.4%)	135 (3.4%)	6 (3.6%)	0.85

*MACCE: composite events of all-cause death, nonfatal MI, nonfatal stroke, readmission for cardiovascular cause

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Abstract: Sequential Grafting of the Skeletonized Left Internal Mammary Artery to the Left Coronary Artery System

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Purpose: Sequential grafting of the left internal mammary artery (LIMA) may enhance conduit utilization in coronary artery bypass grafting (CABG), yet its long-term benefits remain debated. This study evaluates the in-hospital and mid-term outcomes of skeletonized in situ LIMA sequential grafting to the left coronary system in patients undergoing primary CABG.

Methods: Between 2018 and 2024, 3,996 patients underwent primary CABG for multivessel coronary artery disease at our institution. A skeletonized LIMA was systematically used as an in situ graft to the left anterior descending artery (LAD). In 276 patients (6.9%), sequential LIMA grafting (LIMA-S) was performed, including anastomoses to diagonal branches. These patients were propensity-matched with an equal number of patients who received a single LIMA-to-LAD graft. The primary endpoints included major adverse cardiac and cerebrovascular events (MACCE), 30-day postoperative mortality, and long-term survival**.**

Results: There was no significant difference in 30-day mortality between groups (p=NS). No perioperative myocardial infarctions or cerebrovascular events occurred. At a mean follow-up of 3.7 ± 0.6 years, survival rates were comparable (p=NS).

Conclusion: Skeletonized sequential LIMA grafting is a safe and effective strategy for CABG, offering increased graft length, improved visualization, and reduced chest wall trauma. Our findings suggest that traditional concerns about this technique may be overstated, supporting its broader adoption for left coronary system revascularization in selected patients.

Table: Comparative results between sequential LIMA grafting (LIMA-S) and single LIMA-to-LAD grafting group.

Parameter	LIMA-S (n=276)	LAD-LIMA (n=276)	p
Total mortality	2(0,72%)	2(0,72%)	ns
MACCE			
Death, stroke or MI	4(1,45%)	5(1.87%)	ns
Stroke	1(0.36%)	2(0,72%)	ns
MI	3(1.08%)	2(0.72%)	ns
Repeat revascularization	0(0.0%)	0(0.0%)	ns
Average length of stay	7.8±3.9 days	8±2.51 days	ns

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Abstract: Utility of Preoperative P2Y12 Levels in Isolated Coronary Artery Bypass Surgery on Bleeding Risk

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Purpose: Preoperative assessment of platelet function, particularly P2Y12 receptor inhibition, has gained attention for its potential to predict bleeding complications. However, its utility remains debated, especially in the context of coronary artery bypass (CABG) surgery where antiplatelet therapy management is crucial for balancing thrombotic and bleeding risks.

Methods: We conducted a retrospective comparative analysis of patients who underwent isolated CABG from 2017-2023 at a single center. Patients were included if they were on clopidogrel or ticagrelor pre-operatively and had a pre-operative P2Y12 receptor inhibition level drawn. Patients were stratified by a level <200 or ≥200. The primary outcome was perioperative blood transfusion requirements. Secondary outcomes included chest tube output and postoperative complications. A subgroup analysis was conducted with clopidogrel and ticagrelor separately.

Results: 189 patients were included in the study. Patients with a P2Y12 level ≥200 were of similar age and comorbidities to those with a P2Y12 <200, however more were female. More patients in the P2Y12 <200 group were emergent (3 vs 0, p=0.01). In the P2Y12 <200 group, 28.6% (n=18) received ticagrelor similar to 23.8% (n=30) in the P2Y12 ≥200 group. Both groups had a similar mean duration of days since last P2Y12 inhibitor dose prior to surgery. There was a higher rate of intraoperative platelet transfusion in the P2Y12<200 group (mean 0.7 vs 0.3 units, p=0.001). Intraoperative red blood cell and plasma transfusion was similar between the groups. In subgroup analysis, this held true for patients on ticagrelor with higher platelet transfusion in the P2Y12<200 group (mean 0.9 vs 0.2 units, p=0.04). Post-operative transfusion rates, 24-hour chest tube output, and re-exploration for bleeding were similar between groups.

Conclusion: Our findings suggest that preoperative assessment of P2Y12 levels may have limited clinical utility at a cutoff of 200 in predicting bleeding in patients undergoing CABG. Patients with levels <200 received higher rates of platelet transfusion, without differences in other blood products nor chest tube output or re-exploration for bleeding.

Table: Demographics and Results

	P2Y12 < 200 (n=63)	P2Y12 > 200 (n=126)	p-value
Patient Characteristics and Comorbidities			
Age (y)	66.0 ± 9.0	63.4 ± 10.8	0.10
Sex (Female)	8 (13%)	39 (31%)	**0.005**
BMI (kg/m^2)	29.0 ± 6.1	29.5 ± 6.2	0.54
Active smoking	15 (24%)	26 (20%)	0.61
HTN	50 (80%)	103 (82%)	0.69
Diabetes	27 (43%)	68 (54%)	0.14
CKD	5 (8%)	14 (11%)	0.46
Lung Disease (COPD)	8 (13%)	10 (8%)	0.29
PVD	4 (6%)	5 (4%)	0.48
Outpatient Case	14 (22%)	18 (14%)	0.17
Emergent Case	3 (5%)	0 (0%)	**0.01**
Days since last dose of Antiplatelet	3.7 ± 3.2	4.2 ± 3.2	0.32
Intraoperative Transfusions			
pRBC (u)	0.40 ± 0.95	0.58 ± 1.14	0.27
Platelets (u)	0.67 ± 0.94	0.35 ± 0.71	**0.01**
FFP (u)	0.11 ± 0.52	0.10 ± 0.48	0.83
Cell-Saver (mL)	335 ± 220	324 ± 212	0.75
Postoperative Transfusions			
pRBC (u)	0.92 ± 1.55	1.44 ± 3.66	0.29
Platelets (u)	0.26 ± 0.56	0.30 ± 1.16	0.80
FFP (u)	0.25 ± 0.96	0.33 ± 1.39	0.68
Postoperative Complications and Chest Tube (CT) Output			
CT Output 6h (mL)	400 ± 296	357 ± 330	0.39
CT Output 24h (mL)	845 ± 442	784 ± 647	0.46
AKI	12 (19%)	21 (17%)	0.68
CVA	0 (0%)	5 (4%)	0.11
MI	1 (2%)	2 (2%)	0.74
IABP	19 (30%)	30 (24%)	0.35
Extubation Time (h)	11.83 ± 15.03	10.95 ± 16.34	0.72
Delayed Closure	1 (2%)	3 (2%)	1.00
Re-exploration	2 (3%)	8 (6%)	0.50

BMI = Body Mass Index, HTN = Hypertension, CKD = Chronic Kidney Disease, COPD = Chronic Obstructive Pulmonary Disease, PVD = Peripheral Vascular Disease, pRBC = Packed Red Blood Cells, FFP = Fresh Frozen Plasma, CT = Chest Tube, AKI = Acute Kidney Injury, CVA = Cerebrovascular Accident, MI = Myocardial Infarction, IABP = Intra-Aortic Balloon Pump,

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Abstract: Off-Pump No-Touch Versus On-Pump CABG in Obese Patients with Multivessel Coronary Artery Disease

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Purpose: Obesity is associated with increased perioperative risk in coronary artery bypass grafting (CABG), including higher rates of stroke and bleeding. Off-pump no-touch CABG- avoiding both cardiopulmonary bypass and aortic manipulation- may mitigate these risks. We evaluated outcomes of off-pump no-touch versus on-pump CABG in obese patients with three-vessel disease.

Methods: We conducted a restrospective review of 1390 patients (BMI>30) undergoing isolated CABG for three-vessel coronary artery disease between 2014 and 2024 at a single institution. Patients were stratified by surgical technique: off-pump no-touch (n=320) vs. on-pump (n=1070) . Primary outocme was 30-day death or stroke. Secondary outcomes included transfusion, operative time, and major complications.

Results: Despite a higher mean age (68.3 vs. 64.6 years, $p<0.001$) and STS-PROM (3.02% vs. 2.42%, $p=0.035$), the off-pump no-touch group had lower rates of 30-day death or stroke (0.9% vs 3.0%, $p=0.040$) and required fewer intraoperative transfusions (8.2% vs. 23.9%, $p<0.001$). Total operative time was significantly shorter in the off-pump group (293 vs. 351 minutes, $p<0.001$). Other postoperative complications including pneumonia, renal failure, and reoperation for bleeding were similar between groups.

Conclusion: In obese patients with multivessel coronary artery disease, off-pump no-touch CABG was associated with reduced rates of early stroke or death, fewer transfusions, and shorter operative times, despite higher preoperative risk. These findings support the use of the no-touch technique in selected high-risk patients.

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Abstract: Coronary Endarterectomy Outcomes In Patients Undergoing CABG: Single Center Experience Over The Last Decade

Author List*:* Samim Azizi, MD, Tamer Abdalghafoor, MD, Ahsan Ehtesham, MD, Mohammad El Kahlout, MD, Mohd Lateef Wani, MD, Ali Kindawi, MD, FRCS

Purpose: With the advent of Percutaneous Coronary Intervention, majority of the patients referred for surgical re-vascularization have diffusely diseased coronary vessels with complex anatomy, often requiring additional surgical maneuvers for optimal distal runoff. The purpose of this study is to evaluate outcomes of performing coronary endarterectomy in patients undergoing isolated CABG

Methods: We retrospectively analyzed patients who underwent isolated CABG at our center from July 2013 to December 2023. Of 3,013 patients, 71 patients received coronary endarterectomy (CE Group). Another group of 140 patients who had undergone only CABG without endarterectomy (Non-CE Group) were 2:1 propensity matched based on Logistic EUROSCORE II. Univariate analysis was used to compare preoperative, intraoperative and postoperative variables between these two groups.

Results: Both groups had similar preoperative risk profiles. Cross-clamp time was longer in the CE Group (69±31 min) versus the Non-CE Group (57±23 min; P=0.005), though intraoperative complications were comparable. Postoperative mortality was similar (CE: 1.5%, Non-CE: 0.75%; P=0.595) among both groups. Infective complications were higher in the CE Group (6.6% vs. 0.8%, P=0.020), likely due to longer operative times. After one-year of followup, outcomes for chest pain, need for re-angiography, readmission rate, and postoperative myocardial infarction were similar in both groups.

Conclusion: Coronary endarterectomy, though associated with increased cross-clamp time, did not contribute to additional adverse outcomes in terms of mortality or one-year follow-up outcomes. Hence, it can be considered an acceptable and safe tool in the armamentarium of cardiac surgeons to establish complete re-vascularization

Table: Intraoperative and postoperative outcomes among CE and Non-CE groups.

	CE Group	Non-CE Group	Chi Square Value	P Value
Cross Clamp Time	69.05 ± 31.767	57.89 ± 23.700	6.696	**.005**
30 days Mortality	1 (1.5 %)	1 (0.7 %)	.282	1.000
Overall Complication	11 (18 %)	22 (16.5 %)	0.66	.829
Readmission to ICU	1 (1.6%)	2 (1.5 %)	0.001	1.000
Need for reoperation	3 (4.8 %)	5 (3.8 %)	2.177	.427
Infective complication	4 (6.6 %)	1 (0.8 %)	5.142	**.020**
Postoperative Hospital stay	7.98 ± 5.695	6.81 ± 5.222	2.043	.176
Chest pain complain	8 (12.7 %)	23 (17 %)	.612	.573
Post-Operative MI	3 (4.8%)	4 (3.0%)	.382	.693
ECG Changes	7 (5.2 %)	1 (1.6 %)	1.455	.322
EF in 1 year	47.82 ± 10.336	50.71 ± 10.956	46.832	.357
Need for re-angiography	6 (9.4 %)	9 (6.7 %)	.457	.568
Need for readmission	11 (17.2 %)	11 (8.1%)	3.608	.121

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Abstract: Coronary Artery Bypass Grafting with Perioperative Surgically Implanted Microaxial Pumps for High-Risk Patients with Ischemic Cardiomyopathy: A Single-Center STS Analysis

Author List*:* Fatima Qamar, MD, MPH, Marvin Atkins, MD, Michael Reardon, MD, Mahesh Ramchandani, MD, Fernando Ramirez Del Val, MD, MPH

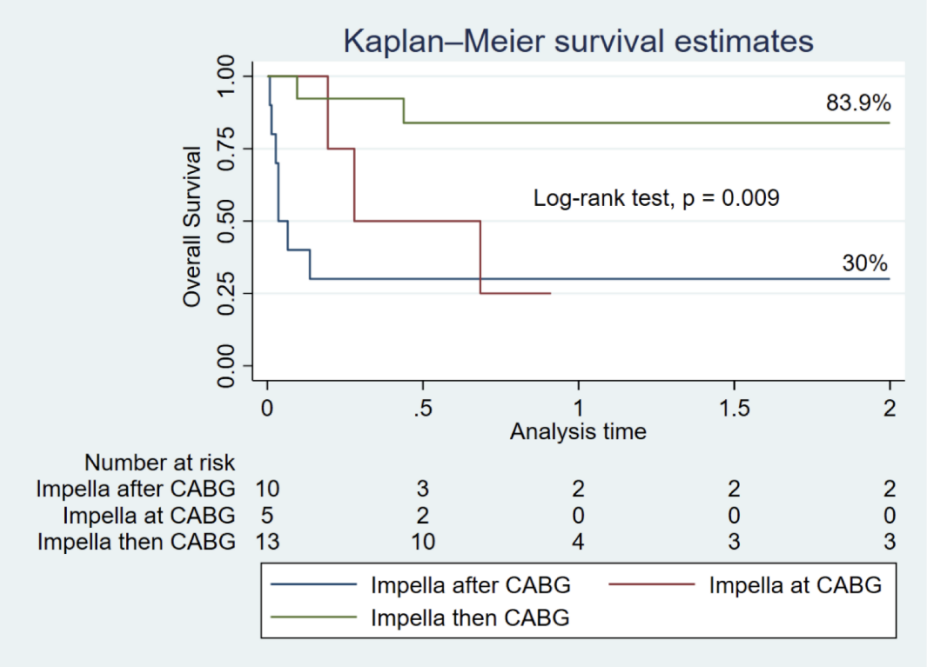
Purpose: Left microaxial pump mechanical devices (Impella) have been used in high-risk cardiac surgery patients with mixed outcomes. We evaluated the association of Impella use among patients undergoing coronary artery bypass grafting (CABG) with operative morbidity, mortality and survival at our institution.

Methods: We conducted a retrospective analysis of our institutional STS database from August 2007 to January 2025. Patients who underwent CABG with perioperative Impella support (Impella-before, Impella-during, and Impella-after CABG) were identified. The primary outcomes of interest were 30-day mortality and overall survival. Secondary outcomes included rates of postoperative complications, including major bleeding, stroke, renal failure, prolonged respiratory failure, and length of stay.

Results: Our cohort included 28 patients(mean age 36±15 years), predominantly male(71%). Of these, 13 patients received Impella-before, 5 Impella-during, and 10 Impella-after CABG. Mean preoperative left ventricular ejection fraction(LVEF) was lowest among Impella-before patients(27.7±10.2%) compared to Impella-during(39.8±14.7%) and Impella-after(44.2±16.8%),(p=0.03). Six patients(21.4%) died within 30 days, all from the Impella-after CABG group(p=0.001). Overall mortality was lowest in Impella-before(15.4%) compared to Impella-during(60%) and Impella-after(80%) groups(p=0.007). Adjusting for BMI, LVEF and number of diseased vessels, Cox regression analysis showed a significant reduction in the risk of mortality risk in the Impella-before CABG group(HR=0.15, 95% CI: 0.03-0.86, p=0.034) compared to Impella-during and Impella-after groups. Total ICU length of stay(hours) was shortest in Impella-before patients(358.7±491.8), followed by Impella-after(447.8±352.9), and Impella-during (1133.5±964.2), (p=0.04). At the median follow-up time of 0.6 years, estimated survival was 83.9% in the Impella-before group, 25% in the Impella-during, and 40% in the Impella-after group. Other postoperative complication rates were comparable across groups.

Conclusion: Among high-risk CABG patients receiving perioperative Impella support, early device implantation was significantly associated with improved operative outcomes. Preoperative placement was associated with lower 30-day mortality, lower ICU LOS, and improved survival despite having the lowest preoperative LVEF. Large data analysis of these high-risk patient populations is needed.

Table: Kaplan Meier Survival Analysis between patients with variable Impella insertion timings.


Kaplan–Meier survival estimates
Overall Survival
0.00
0.25
0.50
0.75
1.00
83.9%
Log-rank test, p = 0.009
30%
0
.5
1
1.5
2
Analysis time
Number at risk
Impella after CABG 10 3 2 2 2
Impella at CABG 5 2 0 0 0
Impella then CABG 13 10 4 3 3
Impella after CABG
Impella at CABG
Impella then CABG

Abstract Session (2:00 PM – 3:00 PM)

2:00 PM

Abstract: Robotic assisted CABG, left atrial appendage clip and convergent procedure: A minimally invasive approach for combined disease.

Author List*:* Pablo F. Ruda Vega, MD, Kelsey Gray, MD, Gregory D. Rushing, MD

Purpose: The convergent procedure is a minimally invasive surgical treatment for atrial fibrillation. When combined with minimally invasive surgical coronary revascularization (MIDCAB) patients receive treatment for their coronary disease as well as atrial fibrillation, without sternotomy. The objective of this study is to describe our initial experience with these combined procedures.

Methods: During this series, we evolved from direct MIDCAB to Robotic assisted via a left mini-thoracotomy and concomitant left atrial appendage ligation; ablation was performed via subxiphoid pericardiostomy. Primary outcomes measures were 30-day mortality, stroke, renal failure, and freedom from atrial fibrillation. Secondary outcome measures were need for antiarrhythmic medications, need for anticoagulation, freedom from chest pain, length of intensive care unit (ICU) stay, and hospital length of stay (LOS). Descriptive statistics were performed.

Results: Eleven patients were operated, 10 (91%) were male. Median age was 73 (57 -82 years). Six (55%) cases were elective and 5 (45%) urgent. LAA ligation was performed in all. Six of the MIDCAB cases were performed via left mini thoracotomy with 5 cases performed using a robotically assisted approach. There was one mortality, no strokes, and no renal failure. One year follow-up was available for 9 (82%) patients. Eight of 9 patients (89%) remained free from AF. All 9 patients were able to discontinue amiodarone therapy and 7 (78%) anticoagulation therapy. Six month follow-up was available for 2 patients. Both were able to discontinue amiodarone therapy but continued anticoagulation therapy. All patients had resolution of angina symptoms and 100% of patients were adequately revascularized, with one patient requiring planned hybrid revascularization with staged PCI. Mean LOS was 7.1 days and mean stay in the ICU was 2.75 days.

Conclusion: The combined convergent and Robotic CABG procedure approach demonstrated a high rate of freedom from atrial fibrillation and successful revascularization This hybrid technique appears to be a safe and effective strategy for addressing both coronary artery disease and arrhythmias via a truly minimally invasive approach.

Table: One year follow up

Outcome	Number	Percent
Freedom from AF at One Year	8	89%
Discontinuation of anticoagulation	7	78%
Discontinuation of Amiodarone	9	100%
Resolution of Angina	11	100%
Evidence of MI	0	0%
Need for renal replacement	0	0%
Stroke rate at One Year	0	0%

Figure:

2:06 PM

Abstract: Evaluating the Role of Gender in Coronary Artery Bypass Graft Surgery Outcomes

Author List*:* Lauryn E. Spinetta BA, Micah Thornton PhD, Richard Whitlock MD, Suzy Yeganeh MD, Joel N. Murala BS, Andrea Crow MBA, Matthias Peltz MD, Ki Park MD, Michael Jessen MD, W. Steves Ring MD, Christopher A. Heid MD

Purpose: Cardiovascular disease is the leading cause of death in women, yet they are grossly underrepresented in the existing literature of coronary artery disease. The aim of this study was to assess the impact of gender on 30-day outcomes after coronary artery bypass grafting (CABG).

Methods: A retrospective analysis of all adult patients undergoing first-time, isolated on-pump CABG from January 2013 to December 2023 was performed in the prospectively maintained single-center US academic institution's STS Adult Cardiac Surgery registry. Patients were stratified by gender. The primary outcome was 30-day major adverse cardiovascular events (MACE), defined as a composite of death, cardiac arrest, stroke, myocardial infarction (MI), and unplanned coronary re-interventions. Baseline, intraoperative, and post-operative variables were analyzed by Wilcoxon Rank Sum test for continuous variables and Pearson's Chi-Squared test for categorical variables. A backwards selection multivariable analysis to assess for independent predictors of MACE was performed.

Results: The cohort consisted of 1359 patients; 286 (21%) females and 1073 (79%) males. MACE incidence was 83/286 (29%) for females compared to 119/954 (12.5%) for males ($p<0.001$). Females were more likely to be Black (29% vs 14%) and less likely to be White (62% vs 74%) and Asian (5.6% vs 7.6%) ($p<0.001$). The other statistically significant differences between baseline, intraoperative, and post-operative variables on univariate analysis can be seen in Table 1. On multivariable regression, female gender (OR 5.18, 95% CI 2.44-11.1, $p<0.001$), emergent case status (OR 8.75, 95% CI 1.77-39.9, $p=0.005$), and the number of initial hours spent in the ICU (OR 1.01, 95% CI 1.00-1.01, $p=0.001$) were independently associated with MACE status.

Conclusion: Female gender, emergent case status, and initial hours spent in the ICU were independently associated with MACE after isolated CABG. Dedicated randomized controlled trials designed to examine the mechanisms behind the inferiority of CABG in women are warranted.

Table: Significant Differences on Univariate Analysis

Table 1	Male (N=1,073)[1]	Female (N=286)[1]	P-Value[2]
PRE-OPERATIVE VARIABLES			
BMI	28.2 (25.4, 31.4)	29.9 (26.1, 35.3)	<0.001
Hypertension	994 (93%)	276 (97%)	0.019
Current Tobacco Use	215 (20%)	41 (14%)	0.029
Former Tobacco Use	671 (63%)	128 (45%)	<0.001
Prior MI	610 (57%)	181 (64%)	0.043
Cardiac Arrhythmia	134 (12%)	20 (7.0%)	0.009
Ejection Fraction (%)	53 (40, 60)	55 (43, 61)	0.013
Last Hemoglobin	13.30 (11.00, 14.60)	11.60 (10.10, 12.80)	<0.001
Platelet Count (in thousands)	217 (178, 258)	250 (205, 295)	<0.001
Total Albumin	4.10 (3.70, 4.30)	3.90 (3.60, 4.20)	<0.001
Creatinine	1.06 (0.89, 1.32)	0.91 (0.72, 1.21)	<0.001
INTRA-OPERATIVE VARIABLES			
Cardiopulmonary Bypass Time (min)	114 (95, 136)	106 (86, 131)	0.001
Cross Clamp Time (min)	76 (61, 93)	70 (56, 85)	<0.001
Number of Bypass Grafts:			<0.001
1-2	241 (22%)	84 (29%)	
3-4	759 (71%)	198 (69%)	
5+	73 (6.8%)	4 (1.4%)	
Use of Radial Artery	91 (8.5%)	10 (3.5%)	0.004
Use of Right Internal Mammary Artery	264 (25%)	49 (17%)	0.008
POST-OPERATIVE VARIABLES			
MACE:			<0.001
MACE	119 (11%)	83 (29%)	
No MACE	954 (89%)	203 (71%)	
Initial ICU Hours	56 (41, 92)	69 (46, 112)	<0.001
Length of Stay from Surgery to Discharge (days)	6.0 (5.0, 8.0)	7.0 (6.0, 9.0)	<0.001
MI (CKMB x10 the Upper Limit of Normal)	78 (7.4%)	73 (26%)	<0.001
Discharge Location:			0.008
Dead	13 (1.2%)	8 (2.8%)	
Extended care/transitional care unit/rehab	108 (10%)	47 (16%)	
Home	909 (85%)	221 (77%)	
Nursing Home	19 (1.8%)	6 (2.1%)	
Other	24 (2.2%)	4 (1.4%)	

[1] Median (Q1, Q3); n (%)
[2] Wilcoxon rank sum test; Pearson's Chi-squared test

2:12 PM

Abstract: Clinical Outcomes of the Sushi Technique in Off-Pump Coronary Artery Bypass Grafting for Patients with Aortic Disease: A Propensity Score-Matched Analysis

Author List*:* Nuttapon Arayawudhikul, MD, Hideki Isa, MD, Dit Yoongtong, MD, Boonsap Sakboon, MD, Jaroen Cheewinmethasiri, MD, Hiroyuki Kamiya, MD,PhD

Purpose: Typically, the SVG is directly anastomosed to the aorta using a side-clamp in OPCAB. However, in patients with aortic disease, an anastomosis assist device is used, and in some cases, an additional vein graft is anastomosed onto the primary SVG, a technique we refer to as the Sushi technique.

Methods: From April 2011 to July 2024, 433 OPCAB patients undergoing LITA-LAD with aorta-SVG bypass were retrospectively analyzed. Patients were divided into the Sushi group (n=56) and the Ao-SVG group (n=377). The Sushi group was propensity score-matched (PSM) with Ao-SVG group at a 1:1 ratio (Sushi n=56; Ao-SVG n=56), and matching was performed based on 9 covariates with preoperative clinical characteristics. The Sushi technique was performed in patients with ascending aortic disease identified on preoperative CT or intraoperative echocardiography, while multiple Ao-SVG anastomoses using a side clamp were performed in those with healthy aortic conditions.

Results: After matching, all categories showed a standardized mean difference below 0.1. There were 39(69.6%) and 195(51.7%) males, and the mean age was 66.9±8.7 and 66.4±8.4 years in the unmatched cohort, and 39(69.6%) and 38(67.9%) males and 66.9± 8.7 and 67.3±8.5 years in the matched cohort in the Sushi and Ao-SVG groups, respectively. The sequential technique of SVG was used in 39.3% (n=22) and 35.5% (n=134), p=0.69 in the unmatched cohort and 39.3% (n=22) and 32.1% (n=18), p=0.55 in the matched cohort in the Sushi and Ao-SVG groups, respectively. There was no difference in new stroke rates: 3.6% vs 1.6% (p=0.28) in un-matched cohort and 3.6% vs 1.8% (p=1.00) in the matched cohort in the Sushi and Ao-SVG groups, respectively. There were no significant differences in each item between the two groups (free from MACCE rate, p=0.228; survival rate, p=0.783).

Conclusion: The new stroke rates did not differ between the groups, suggesting that the Sushi technique could be a viable strategy for patients with aortic disease. Additionally, there was no significant difference between the two groups at 5-year free of MACCE or survival rates.

Figure: Design of Sushi Techniques

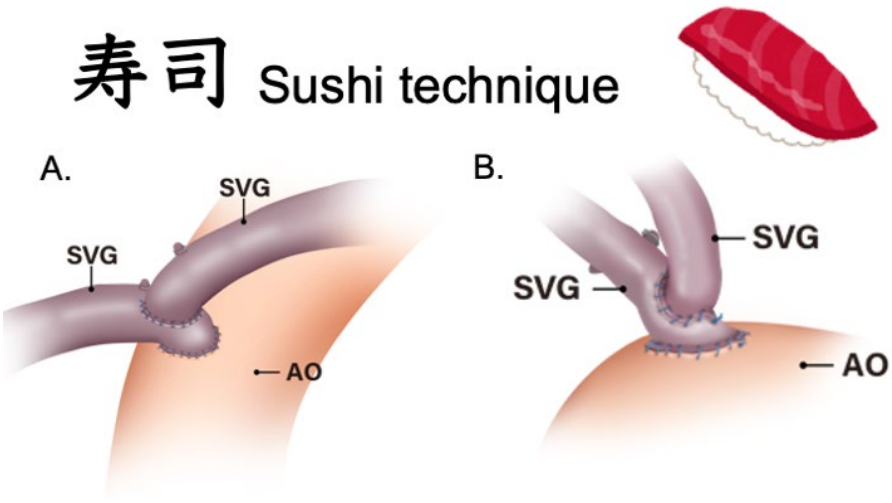
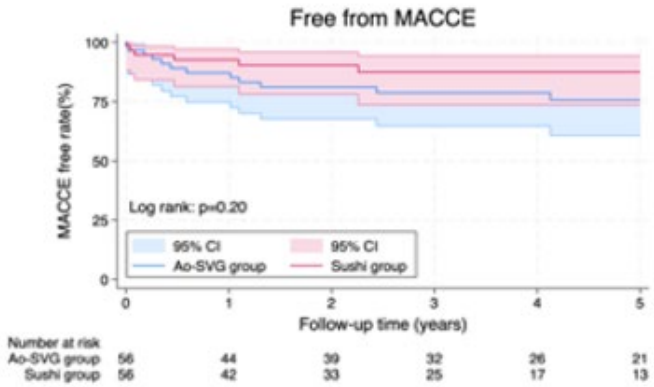
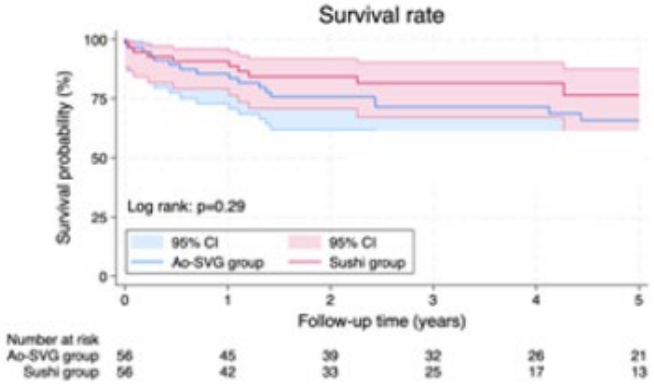
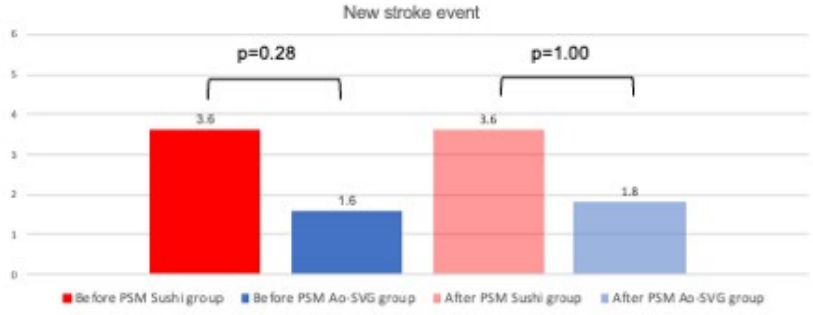

寿司 Sushi technique
A.
SVG
SVG
AO
B.
SVG
SVG
AO

Table:


Free from MACCE
MACCE free rate(%)
100
75
50
25
0
Log rank: p=0.20
95% CI
Ao-SVG group
95% CI
Sushi group
0
1
2
3
4
5
Follow-up time (years)
Number at risk
Ao-SVG group 56 44 39 32 26 21
Sushi group 56 42 33 25 17 13


Survival rate
Survival probability (%)
100
75
50
25
0
Log rank: p=0.29
95% CI
Ao-SVG group
95% CI
Sushi group
0
1
2
3
4
5
Follow-up time (years)
Number at risk
Ao-SVG group 56 45 39 32 26 21
Sushi group 56 42 33 25 17 13


New stroke event
p=0.28
p=1.00
3.6
1.6
3.6
1.8
Before PSM Sushi group
Before PSM Ao-SVG group
After PSM Sushi group
After PSM Ao-SVG group

2:18 PM

Abstract: Long term outcomes of coronary artery bypass grafting using the pure internal thoracic artery technique

Author List*:* Hong Jun Yong BHSc, Peter Lang FRCS (C-Th), Imran Hussain MRCS, Robyn Smith FRCA, Stephen Moise FRCA, David Young PhD, Nawwar Al-Attar FRCS (C-Th)

Purpose: Long-term results of CABG utilizing bilateral internal thoracic arteries (BITA) continue to generate debate, with limited evidence on outcomes and survival of patients undergoing purely internal thoracic artery (PITA) CABG. This study aims to assess the long-term outcomes and survival of patients undergoing PITA-CABG in multi-vessel myocardial revascularisation.

Methods: PITA-CABG technique involves multi-vessel myocardial revascularization by connecting the RITA end-to-side to in-situ LITA in a Y-graft with sequential coronary anastamoses. BITA are harvested via extra-pleural skeletonised harvesting with a bespoke surgical site infection (SSI) bundle to prevent post-operative sternal infection. A cohort of 924 patients admitted from April 2012 to July 2024 who underwent isolated PITA-CABG was analysed. Survival analysis explored the relationship between Euroscore, left ventricular (LV) function, body mass index, pulmonary disease, extracardiac arteriopathy, and survival. Univariate analysis preceded Cox regression with stepwise variable selection for independent predictors, all at a 5% significance level.

Results: Mean age is 64 years, and 83.4% (771/924) were male. On average patients received 3.4 anastomoses/patient (2-grafts(105), 3-grafts(425), 4-grafts(334), 5-grafts(52), 6-grafts(8)). Mean CPB and ACX times were 70.1 & 57.1mins respectively. Rates of SSIs was 2.1%(20/924) total (1.6%(15/924)superficial wound infection, 0.5%(5/924)deep wound infection). 0.4%(4/924) required new onset haemofiltration due to acute-renal-failure, and 0.2%(2/924) developed a post-operative neurological deficit. The 30-day mortality rate was 0.04%(arrhythmia,n=1; mesenteric ischaemia,n=1; multiorgan failure,n=1). Survival rates at one, five, and ten years were 98.8%, 93.3%, and 74.4%, respectively(Figure 1). Notably, LV function (Figure 2), pulmonary disease, and extracardiac arteriopathy were identified as independent predictors of survival ($p<0.001$ for all variables). Patients with poor LV function experienced a 2.9-fold higher mortality risk, while those with moderate LV function had a 2.1-fold higher risk. Additionally, the presence of pulmonary disease increased the risk of death by 1.7 times, and extracardiac-arteriopathy was associated with a 2.2-fold higher risk.

Conclusion: The study reveals a low operative mortality rate for PITA-CABG with a excellent 10-year survival. Patients with compromised LV function, pulmonary diseases, or extracardiac-arteriopathy had a notably increased mortality risk. PITA-CABG is a feasible and safe technique of total arterial revascularization that projects excellent long-term outcomes.

Figure 1 & 2:

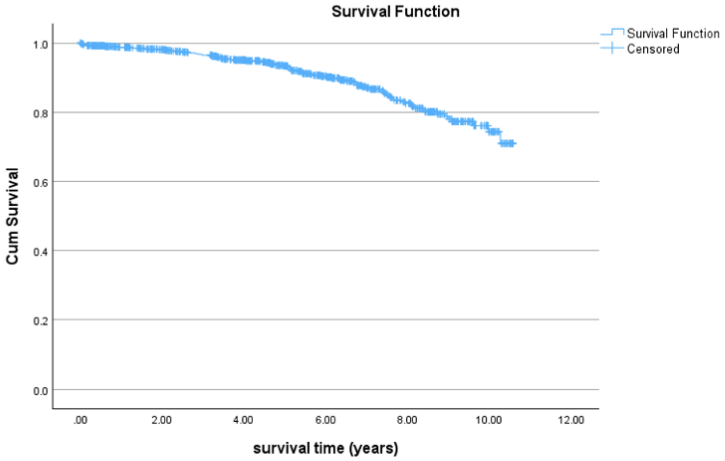


Figure 1. Kaplan Meier Survival Curve of survival in patients undergoing PITA-CABG (n = 924)

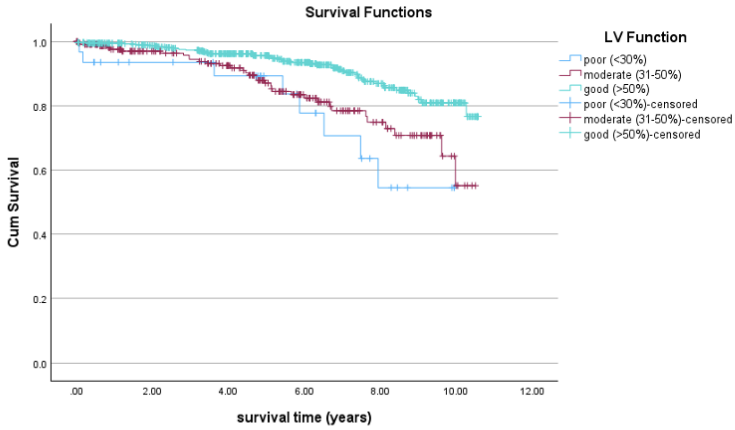


Figure 2. Comparison of survival between patients with varying degrees of LV Function (LV ejection fraction (%)). There was a significant association between LV function and survival ($p < 0.001$)

2:24 PM

Abstract: Mid Term Outcomes and Graft Patency for Coronary Artery Bypass Surgery with Proximal Inflow from Descending Aorta

Author List*:* Zhandong Zhou, MD, PhD, Karikehalli A Dilip, MD, Anna Gleboff, MS, MPH, Ahmad Nazem, MD, Anton Cherney, MD, Charles J Lutz, MD

Purpose: Patients requiring surgical revascularization of lateral or inferolateral wall can be treated using grafts from descending aorta. Current literature lacks mid- and long-term data on this approach. This study evaluates midterm outcomes and graft patency for Coronary Artery Grafting (CABG) with proximal inflow from descending aorta, addressing a quality gap.

Methods: A retrospective analysis of CABG procedures with proximal inflow from the descending aorta was conducted using data from 2012 to present. Surgeries were performed via left thoracotomy at the fifth or sixth intercostal space with the patient in lateral decubitus position. The pericardium was opened above or below the phrenic nerve. Distal anastomoses were completed first, followed by division of the inferior pulmonary ligament and proximal anastomoses to the descending aorta with partial clamping. Outcomes assessed included survival, complications, and graft patency over follow-up periods, with one patient followed beyond 12 years.

Results: Twenty-eight patients (ages 62–84, mean: 71) underwent CABG with proximal inflow from descending aorta. 82.14% were male, mean BMI was 31, and Mean STS predicted mortality risk was 3.1%. Procedures were elective (60.71%) or urgent (39.29%), with distal targets to OM branches (92.86%) and to Postero-Lateral Branch of the Circumflex (PLB) (7.14%). The Ramus Intermedius was a distal target in 2 patients (7.14%) as a sequential anastomosis. All patients survived surgery without operative mortality, post-op bleeding, infections, vascular complications, or conversion to sternotomy. Most received one graft (82.14%), while 17.86% received two grafts done in a sequential manner. Post-op complications included transient renal failure (7.14%) and atrial fibrillation (7.14%). Mean hospital stay was 8 days. One-year survival was 100%, five-year survival was 81.25% (13/16), and graft patency was 80% at six years among 10 patients who had post operative coronary angiograms. One patient was alive 12.5 years after his surgery.

Conclusion: CABG with descending aorta grafts demonstrate favorable safety and efficacy, with excellent graft patency, low complication rates, and promising mid- to long-term survival. This technique is beneficial for redo CABG patients requiring one or two grafts to lateral or inferolateral wall. Larger cohort studies are needed to validate these findings.

Table:

CORONARY ARTERY BYPASS GRAFT OPERATIONS WITH PROXIMAL INFLOW FROM DESCENDING AORTA

Total number of patients	28
Age Mean: Years	71
Gender: Male	23 (82.14%)
BMI; Mean	31
STS Predicted Risk of Mortality: Mean	3.1%
Diabetes Mellitus	16 (57.14%)
Previous CABG	13 (46.43%)
Previous PCI	20 (71.43%)
Pre-Op Atrial Fibrillation	6(21.43%)
Pre-Op LVEF: Mean%	53
Redo Operations	12 (42.86%)
Procedure Time: Mean Hours	3.64
OPCAB	26(92.86%)
OM Distal Anastomosis (OM1 and OM2)	26(92.86%)
PLB Cx Distal Anastomosis	2(7.14%)
Ramus Intermedius (sequential 2nd Graft)	2(7.14%)
CABGx 1	23 (82.14%)
CABG x 2	5 (17.86%)
Post op Rebleed	0
Post op Surgical site infection	0
Post op need for PCI/Repeat CABG	0
Post op Renal Failure	2 (7.14%)
Post op new A. Fib	2 (7.14%)
Post op Length of Stay: Mean Days	8
Post op Cath Findings	8 out of 10 widely patent
Short term Survival: 1 year post op	28 (100%)
Survival: 5 years	13 out of 16 (81.25%)
Survival >10 years	1out of 1 with >10 year follow up
Deaths:	3 from 1.75 to 4.9 years post op
Alive:	25 (89.3%) from 1 month-12.5 years post op

2:30 PM

Abstract: Outcomes of Bloodless Coronary Artery Bypass Grafting: A Five-Year Single-Center Experience

Author List*:* Ahmed E. Hozain, MD, Lotoyus M Bly, MSHI, BSN, RN, Catherine Staub, PA, Maureen Wilson, MSN-NI, RN, CCM, PACS, Valluvan Jeevanandam, MD

Purpose: This study evaluated clinical outcomes in patients undergoing coronary artery bypass grafting (CABG) procedures in Jehovah's Witness patients who declined blood transfusions due to religious beliefs. The study examined isolated and combined CABG procedures to determine the safety and efficacy of this specialized approach in the absence of blood administration.

Methods: A retrospective chart review was conducted on 82 consecutive patients who underwent bloodless cardiac procedures at our institution from 2020 to early 2025. All patients specifically refused blood product transfusions (packed RBC, whole blood, FFP and platelets). Demographic data, preoperative comorbidities, procedural details, and postoperative outcomes were collected. Patients were categorized as isolated CABG (n=58) or combined procedures (n=24). Survival analysis was performed using Kaplan-Meier methodology. A specialized perioperative bloodless cardiac surgery protocol focusing on preoperative hemoglobin optimization and perioperative blood conservation strategies was developed to enable this approach for patients.

Results: The bloodless cardiac surgery cohort presented with high rates of hypertension (92.6%), diabetes (55.6%), and CKD (25.8%). Procedural distribution included isolated CABG (70.7%), CABG/valve (14.6%), CABG/aortic (1.2%), and other combined procedures (6.1%). All patients received at least one arterial graft (79.3%), and 20.7% received two or more arterial conduits. No patients received any perioperative blood transfusions. Three patients underwent reoperative sternotomy. Mean cardiopulmonary bypass time was 114.2±37.2 minutes with cross-clamp time of 96.0±28.1 minutes. Overall median hospital stay was 9 days and the majority of patients were discharged directly home (79.2%). No patients experienced postoperative strokes or myocardial infarction, and 30-day mortality was 2.4%. Isolated CABG patients demonstrated survival rates of 94.3% at 6 months, 92.9% at 12 months, and 91.7% at 36 months. Combined procedures showed survival rates of 91.3% at 6 months, 90.9% at 12 months, and 94.1% at 36 months.

Conclusion: Bloodless cardiac surgery at our center achieved excellent outcomes with high survival rates in both isolated CABG and complex combined procedures, despite the absence of blood transfusions. The low 30-day stroke and mortality rate indicate its effectiveness in serving high-risk, underserved patients while maintaining high safety standards.

Figure:

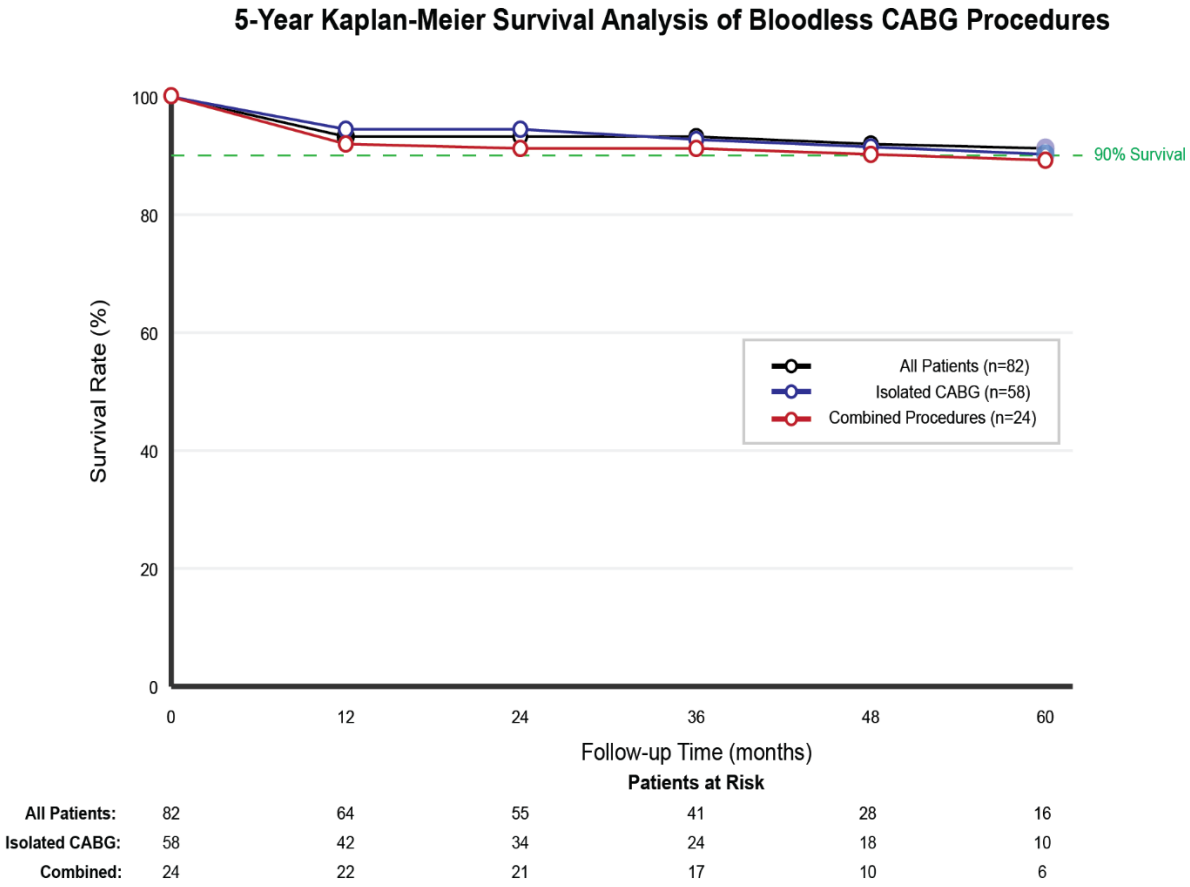

5-Year Kaplan-Meier Survival Analysis of Bloodless CABG Procedures
Survival Rate (%)
100
80
60
40
20
0
90% Survival
All Patients (n=82)
Isolated CABG (n=58)
Combined Procedures (n=24)
0
12
24
36
48
60
Follow-up Time (months)
Patients at Risk
All Patients: 82 64 55 41 28 16
Isolated CABG: 58 42 34 24 18 10
Combined: 24 22 21 17 10 6

Table:

Characteristic	Overall	Isolated CABG	Combined CABG Procedure
Baseline demographics			
Male	49 (59.8%)	35(60.3%)	14 (58.3%)
Hypertension	75/81(92.6%)	53/57(93.0%)	22/24(91.7%)
Diabetes	45/81(55.6%)	31/57(54.4%)	14/24(58.3%)
CKD	21/82(25.6%)	14/58(24.1%)	7/24 (29.2%)
Hemodialysis	5/82 (6.1%)	3/58 (5.2%)	2/24 (8.3%)
CVD	16/81(19.8%)	10/57(17.5%)	6/24 (25.0%)
Tobacco Use	28/82(34.1%)	20/58(34.5%)	8/24 (33.3%)
Preoperative EF	51.2 ± 12.3	52.8 ± 11.1	47.5 ± 14.6
Procedure Characteristics			
Isolated CABG		58 (100%)	
CABG + Valve			12 (50.0%)
CABG + Aortic			1 (4.2%)
CABG + Other			11 (45.8%)
1 Arterial	65 (79.3%)	45(77.6%)	20 (83.3%)
2 or more arterial conduits	17 (20.7%)	13(22.4%)	4 (16.7%)
Cross-Clamp Time (min)	96.0 ± 28.1	87.5 ± 24.2	116.2 ± 29.5
IABP Use	8/82 (9.8%)	5/58 (8.6%)	3/24 (12.5%)
Postoperative Data and Outcomes			
Perioperative Transfusions	0 (0%)	0 (0%)	0 (0%)
Atrial Fibrillation	13/81 (16.0%)	8/57 (14.0%)	5/24 (20.8%)
Stroke	0/82 (0.0%)	0/58 (0.0%)	0/24 (0.0%)
MI (30 days)	0/82 (0.0%)	0/58 (0.0%)	0/24 (0.0%)
Length of Stay	9.3 ± 6.7	8.1 ± 5.9	12.4 ± 7.5
Overall Survival			
30-day	80/82(97.6%)	57/58(98.3%)	23/24(95.8%)
12 months	92.2%	92.9%	90.9%
36 months	92.2%	91.7%	90.5%

2:36 PM

Abstract: Platelet Counts Following Cardiac Surgery: Patterns and Clinical Implications

Author List*:* Joanna Lin, B.S., Ivan Gambardella, MD, Bracha Gluck, B.S., Berhane Worku, MD, Sandhya Balaram, MD

Purpose: The post-COVID era raised awareness of the inflammatory response and the complex role of platelets. Cardiopulmonary bypass (CPB) results in platelet activation, but their role as inflammatory markers after surgery is not well understood. This study examines platelets and systemic immune-inflammation index (SII) after coronary artery bypass grafting (CABG).

Methods: This IRB-approved retrospective cohort study used de-identified patient records of 209 consecutive patients who underwent CABG with CPB from 2022-2024 in a single center. Platelet, neutrophil, and lymphocyte counts were collected preoperatively, immediately after surgery, and at postoperative days (POD) 1, 2, 3, and 7. Patients were divided into groups based on lowest postoperative platelet counts: Group 1: <100K, Group 2: 100-139K and Group 3 (normal): >140K. Risk factors, demographics, and postoperative complications were collected. SII was calculated as (platelet x neutrophil)/lymphocyte. Descriptive statistics assessed platelet patterns and t-tests evaluated for differences in complication rates.

Results: Groups 1 and 2 included 97 (46.4%) and 75 (35.9%) patients, respectively. Group 3 was composed of 37 (17.7%) patients. Platelet counts dropped significantly after surgery, with lowest values on POD 2 and 3 and recovery to normal levels noted by POD 7 in 200 (95.7%) patients. No independent predictors of severe thrombocytopenia were found in multivariate regression. The mortality rate for the cohort was 0.96% (2/209), with both mortalities in Group 1. Patients in Group 1 also had a statistically significant rate of prolonged ventilation (>24 hours) (p=0.03). There were no significant differences in rates of deep vein thrombosis (p=1) or stroke (p=0.71) across the three groups. In 180 patients for whom data was available, SII increased significantly after CABG. 135 of 205 (65.9%) patients had significantly elevated SII after CABG.

Conclusion: In our population, 82.3% of patients experienced thrombocytopenia and 65.9% had an elevated SII after CABG, both markers of inflammation. Patients with postoperative thrombocytopenia experienced longer ventilation. Our thrombocytopenia incidence is higher than established literature and may be specific to our patient cohort, warranting further exploration

Table 1: Summary Statistics

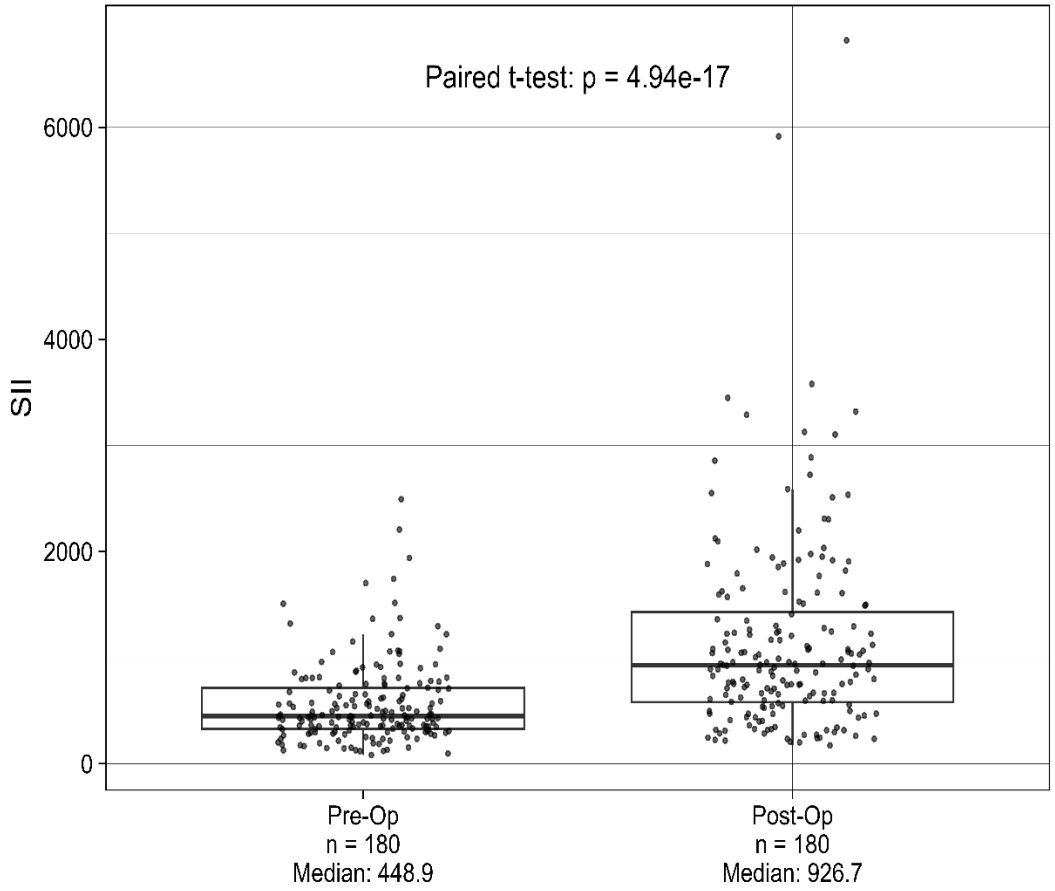
Table 1. Summary Statistics Stratified to Platelet Nadir Groups

Characteristic	Platelet Nadir Groups			p-value[2]
	<100 N = 97[1]	100-139 N = 75[1]	≥140 N = 37[1]	
Age (years)	65.0 (61.0, 72.0)	64.0 (59.0, 72.0)	63.0 (56.0, 67.0)	0.067
Sex				0.4
Male	64 (66%)	53 (71%)	29 (78%)	
Female	33 (34%)	22 (29%)	8 (22%)	
Body Mass Index (kg/m^2)	26.2 (23.4, 30.0)	28.2 (25.4, 32.8)	27.5 (24.5, 32.7)	0.048
Race				
White	25 (26%)	23 (31%)	8 (22%)	
Black	27 (28%)	18 (24%)	8 (22%)	
Asian	16 (16%)	12 (16%)	8 (22%)	
Native Hawaiian/Pacific Islander	0 (0%)	1 (1.3%)	0 (0%)	
American Indian/Alaskan Native	1 (1.0%)	1 (1.3%)	0 (0%)	
Other	15 (15%)	17 (23%)	5 (14%)	
Declined	13 (13%)	3 (4.0%)	8 (22%)	
Ethnicity				0.7
Not Hispanic	73 (75%)	56 (75%)	24 (65%)	
Hispanic	12 (12%)	11 (15%)	6 (16%)	
Declined	12 (12%)	8 (11%)	7 (19%)	
Preoperative Platelet Count (10^3/uL)				0.009
<100	4 (4.2%)	0 (0%)	0 (0%)	
100-139	9 (9.5%)	1 (1.3%)	0 (0%)	
≥140	82 (86%)	74 (99%)	37 (100%)	
Hypertension	91 (94%)	73 (97%)	36 (97%)	0.6
Diabetes	67 (69%)	45 (60%)	25 (68%)	0.4
Cross Clamp Time (min)	97.0 (88.0, 111.0)	94.0 (75.0, 111.0)	90.0 (72.0, 114.0)	0.3
CPB Time (min)	128.0 (117.0, 154.0)	130.0 (116.0, 150.0)	125.0 (106.0, 150.0)	0.3

[1] Median (Q1, Q3); n (%)

[2] Kruskal-Wallis rank sum test; Pearson's Chi-squared test; Fisher's exact test

Table 2:


Paired t-test: p = 4.94e-17
SII
6000
4000
2000
0
Pre-Op
n = 180
Median: 448.9
Post-Op
n = 180
Median: 926.7

2:42 PM

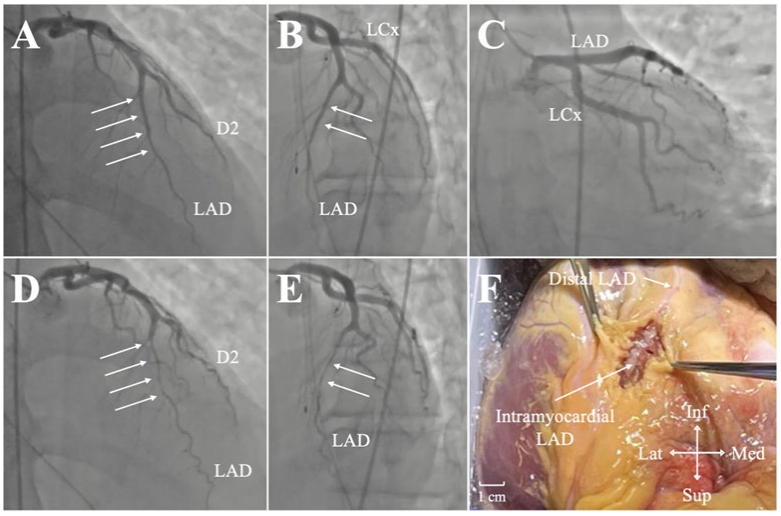
Case Presentation: Surgical Unroofing and Transplantation of a Heart with Left Anterior Descending Coronary Artery Bridge

Author List: Aditya Sengupta, MD, MPH, Shinobu Itagaki, MD, MSc, Anelechi C. Anyanwu, MD, FRCS

Full Case Scenario: Donor myocardial bridging is considered to be a relative contraindication to transplantation given the risk of allograft ischemia. We herein report successful transplantation of a heart with angiographically-confirmed left anterior descending coronary artery bridge that was surgically unroofed prior to implantation**.**

A 55-year-old male with end-stage non-ischemic cardiomyopathy requiring left ventricular assist device support was listed for heart transplantation and a suitable donor was identified. Donor coronary angiography revealed a long myocardial bridge on the left anterior descending (LAD) artery with systolic compression (Figure 1A-E). Echocardiography showed preserved ventricular function. Upon intraoperative confirmation of appropriate cardiac function, the donor heart was excised and transported using the SherpaPak system (Paragonix Technologies Inc, Waltham, MA). During back-table preparation, examination of the LAD artery revealed a 5-cm intramyocardial segment of the mid-portion of the vessel, compatible with the angiographic findings. Division of the myocardial bridge was performed till the entire intramyocardial vessel was unroofed (Figure 1F). At its deepest point, the LAD artery was within the interventricular septum, requiring dissection of the right ventricle off of the intramyocardial segment. The donor heart was then implanted in the orthotopic position using a bi-caval technique. The perioperative course was notable for moderate-to-severe primary graft dysfunction that was managed with a short duration of intra-aortic balloon counterpulsation and inotropic support. The patient was discharged in the fifth postoperative week following recovery of cardiac function. He was noted to be doing well at one-year follow-up, with no evidence of rejection and normal biventricular function.

Pre-Operative Imaging



Postoperative discussion points/questions: What are the potential concerns associated with transplanting donor hearts with myocardial bridging, and are these concerns adequately

addressed if surgical unroofing of the intramyocardial segment is performed prior to implantation?

Younger donors do not typically undergo pre-transplantation coronary angiography given the relatively lower prevalence of coronary artery disease, and conditions such as myocardial bridging may go unrecognized. Should the paradigm for pre-transplant angiography be amended to include younger donors, especially those with a history of drug use or suspicious mode of death?

There have now been several reports in the literature of successful transplantation of donor hearts with myocardial bridging, albeit generally in marginal recipients in whom more permissive criteria for accepting donor hearts were used. Should the criteria for accepting donor hearts with myocardial bridging be liberalized?

2:48 PM

Abstract: The Impact of Secondary Graft Choice on Intra-operative Resource Utilization During Multi-Vessel Coronary Artery Bypass Grafting

Author List*:* Ricky Patil MD, Matthew Kazaleh DO, China Green BS, Jeremy Wolverton MS, Gorav Ailawadi MD MBA, Robert B. Hawkins MD, MSc

Purpose: Use of multi-arterial grafting for multi-vessel coronary artery disease (MVCAD) has been associated with improved graft patency and likely improved survival. Yet, adoption remains low. We hypothesize that addition of arterial grafts to multi-vessel revascularization leads to increase intra-operative resource utilization.

Methods: From years 2012-2024, single institution data from a quaternary-care institution was reviewed for patients who underwent CABG for MVCAD (≥ 2 distal anastomoses). Patients were stratified by receipt of radial artery (RA), RIMA, RIMA+RA combination, or vein only for secondary conduits. Linear regression modeling compared the effects of conduit selection on operative time with isolated vein grafting as the reference, while adjusting for number of distal anastomoses. Characteristics of patient groups were compared using chi squared analysis and 1-way ANOVA for categorical and continuous variables respectively.

Results: In total, 1320 patients underwent MV-CABG. For secondary conduits, 962 (72.9%) received vein-only-grafts, 78 (5.9%) received RA-grafts, 258 (19.5%) received RIMA-grafts, and 4 (0.3%) underwent combined RIMA-RA-grafting.

Patients receiving secondary arterial grafts were significantly less often female ([39/358] 10.9% vs. [201/962] 20.8%), and less diabetic ([148/358] 41.3% vs. [589/962] 61.2%) compared to the vein-graft-only group. When stratified by distal anastomosis number, they demonstrated significantly lower major morbidity ([3/95] (3.2%) vs. [29/228] (12.7%)) amongst 2-vessel CABG patients, and significantly lower readmission ([4/90] (4.4%) vs. [27/196] (13.8%)) amongst 4-vessel CABGs.

Of the 19 operative mortalities, 18 received vein-only-grafts (4 two-vessel-CABG, 13 three-vessel-CABG, 1 four-vessel-CABG), and 1 received a secondary RA-graft (3-vessel-CABG).

On regression analysis of operative time, RA-plus-vein-grafting added 51 minutes ($p<0.001$), while RA-without-vein-grafting did not have significant effect. RIMA-grafting alone added 27.1 minutes ($p=0.004$) but only added 23.2 minutes when vein grafting was already being done ($p<0.001$). RIMA-RA-grafting added 125.7 minutes.

Conclusion: Increasing operative time and resource utilization remains a barrier to multi-arterial CABG, particularly for combined RIMA and RA cases. Further study into improving operative efficiency in multi-arterial CABG is warranted to decrease barriers and incentivize arterial graft utilization.

Table 1:

TABLE 1:				
Total Population (n =1320)	**Only Venous Secondary Grafts (n=962)**	**Radial Artery Grafting (n= 78)**	**RIMA Grafting (n=276)**	**RIMA & Radial Artery Grafting (n=4)**
Demographic Information:				
Median Age (years): 66.7	67.5	63.4	66.1	56.6
Female sex: 240 (18.2%)	201 (20.9%)	13 (16.7%)	26 (9.4%)	0 (0.0%)
Pre-Operative Metrics:				
Diabetes: 737 (55.8%)	589 (61.2%)	44 (56.4%)	104 (37.7%)	0 (0.0%)
Dyslipidemia: 441 (33.4%)	358 (37.2%)	29 (37.2%)	53 (19.2%)	1 (75%)
*Hypertension:*1196 (90.6%)	889 (92.4%)	72 (92.3%)	231 (83.7%)	4 (100.0%)
Chronic Liver Disease: 46 (3.5%)	37 (3.9%)	4 (5.1%)	5 (1.8%)	0 (0.0%)
Previous CVA: 136 (10.3%)	106 (11.0%)	6 (7.7%)	24 (8.7%)	0 (0.0%)
Previous CABG: 5 (0.4%)	4 (0.4%)	1 (1.3%)	0 (0.0%)	0 (0.0%)
Previous PCI: 409 (31.0%)	309 (32.1%)	26 (33.3%)	74 (26.8%)	0 (0.0%)
Heart Failure: 504 (38.2%)	409 (42.5%)	26 (33.3%)	69 (25.0%)	0 (0.0%)
Peri Operative Metrics:				
Operative Approach: Sternotomy: 1318 (99.9%) Partial Sternotomy: 2 (0.1%)	Sternotomy:961 Partial Sternotomy: 1	Sternotomy: 78	Sternotomy: 275 Partial Sternotomy: 1	Sternotomy: 4
Median Cardiopulmonary Bypass Time (minutes): 111	110	125.5	110	145.5
Median Cross Clamp Time (minutes): 91	90	105.5	91	125
Median Operation Time (minutes): 324	315	346	344.5	420
Post Operative Metrics:				
Median Total Ventilator Hours: 3.9	3.9	3.8	3.8	6.8
Median Total ICU Hours: 48.1	50.4	50.9	33.0	32.5
Median Post Operative Length of Stay (days): 6	6	5	5	5
Operative Mortality: 19 (1.4%)	18 (1.9%)	1 (1.3%)	0 (0.0%)	0 (0.0%)
Major Morbidity: 124 (9.4%)	106 (11.0%)	2 (2.6%)	16 (5.8%)	0 (0.0%)
60-Day Re-Admission: 139 (10.5%)	115 (12%)	4 (5.1%)	20 (7.3%)	0 (0.0%)

Table 2:

Regression Model:**							
Graft Selection:			**Added Minutes**	**Standard Error**	**P-value**	**Observations**	**R^2**
Vein	RA	RIMA					
N	Y	N	-2.5	22.3	0.9	1040	0.16
Y	Y	N	51.7	7.7	<0.001*	1040	0.16
N	N	Y	27.1	9.4	0.004*	1238	0.18
Y	N	Y	23.2	4.6	<0.001*	1238	0.18
Y/N	Y	Y	125.7	30.7	<0.001*	966	0.17
Y	N	N	*Reference Baseline Variable				

*Y= Yes, N= No

** Adjusted for Distal Anastomosis Number

Video Session: Your Cases, Your Skills: Coronary Surgery in Practice (4:30 PM – 5:30 PM)

4:30 PM

Surgical Video: Multi-Vessel Robot Assisted Minimally Invasive Direct Coronary Artery Revascularization with Radial Y-Graft

Author List: Connor Barrett, BA, Jason Han, MD, Chase Brown, MD

The educational/technical point that this video addresses: This video presents a novel technique for complete arterial revascularization using a minimally invasive, off-pump, multi-vessel, robot-assisted CABG via lateral thoracotomy—offering an alternative to midline sternotomy for patients with multi-vessel disease.

Summary of the Surgical Video: The patient is a functional 59-year-old male with hyperlipidemia and smoking history who presented with angina. Left heart catheterization demonstrated 70% occlusion of the mid left anterior descending (LAD), 50% left main disease, a diminutive left circumflex artery, and a prominent second diagonal proximal to mid LAD disease. Ejection fraction was 55% and valvular function was normal. The patient requested a minimally invasive option for faster recovery. We offered a robot-assisted multivessel bypass with left internal mammary (LIMA) to the LAD and a radial Y-graft off the LIMA to the diagonal artery.

A camera was placed in the left 5th intercostal space and instrument ports in the 3rd and 7th spaces along the left anterior axillary line. Left intercostal nerves from T3 to T7 were cryoablated. Using the robot, a pericardiotomy inferior to the left phrenic was made for drainage into the pleural space. The LIMA was harvested in a skeletonized fashion, and the robot was undocked.

We performed a 5cm left anterior thoracotomy incorporating the 5th intercostal port site. A coronary stabilizer covered by a cut glove created a sewing platform inside the thorax. An end-to-side radial artery to LIMA anastomosis was performed. End-to-side LIMA-LAD and radial-diagonal anastomoses followed.
Graft transit time was excellent. The patient tolerated the procedure well, was extubated in the OR, and discharged on postoperative day 2.

4:42 PM

Surgical Video: Robotic Off-Pump TECAB to the RCA Using RITA: A Totally Endoscopic Approach

Author List: Yazan AlJamal, MD, Husam H. Balkhy, MD

The educational/technical point that this video addresses: Demonstrates robotic off-pump TECAB to the RCA using RITA via a right-chest approach.

Highlights key steps: right-sided port placement, RITA harvesting, and beating-heart target exposure.

Offers technical guidance for extending robotic CABG to right-sided targets.

Summary of the Surgical Video: This surgical video demonstrates a totally endoscopic, robotic-assisted, off-pump coronary artery bypass (TECAB) procedure utilizing the right internal thoracic artery (RITA) to revascularize the right coronary artery (RCA). While left coronary targets are more commonly approached with TECAB, revascularization of the RCA presents additional anatomical and technical challenges. This video highlights a successful one-vessel robotic off-pump bypass to the RCA via a right-chest port approach, using da Vinci Si.
The video begins with patient positioning and detailed right chest port placement, mirroring the left-sided configuration but adapted for optimal exposure of the RCA. The RITA is harvested in a skeletonized fashion. With the assistance of the endowrist stabilizer, precise localization and preparation of the target vessel, mid-RCA, is achieved. The RITA is then anastomosed to the RCA using a running 7-0 suture technique, entirely endoscopically.

Critical intraoperative steps are demonstrated in real-time, emphasizing port ergonomics, target exposure, and graft patency assessment using transit-time flow measurements. In this case, flow was excellent with a low pulsatility index, and no cardiopulmonary bypass or conversion was required.

This case illustrates that with appropriate technique and patient selection, robotic beating-heart TECAB with RITA to RCA is a feasible and reproducible approach for isolated right-sided disease, expanding the scope of minimally invasive coronary surgery. The video is intended to serve as a technical guide and promote wider adoption of this advanced approach.

4:54 PM

Surgical Video: Revascularization of Patent Left Internal Mammary Artery Graft in the Setting of Subclavian Stenosis

Author List: Connor Barrett, BA, Jason Han, MD, Chase Brown, MD

The educational/technical point that this video addresses: This case involves a patient needing revascularization of a left internal mammary artery (LIMA) to left anterior descending (LAD) coronary artery graft due to severe left subclavian artery stenosis. Although typically managed with a subclavian stent or a left subclavian-carotid bypass, these options were not feasible for this patient. This case highlights the viability of using a saphenous vein graft (SVG) from the aorta to bypass the LIMA without arresting the heart.

Summary of the Surgical Video: The patient is an 82-year-old male with hypertension, diabetes, congestive heart failure, and severe peripheral arterial disease. He underwent CABG 16 years ago with a LIMA-LAD graft, a radial artery Y-graft to the ramus intermedius and obtuse marginal arteries, and an SVG to the RCA. Over time, he developed severe peripheral artery disease, requiring right femoral-popliteal and right carotid-subclavian bypass. He now presents with severe unstable angina.

CT angiography reveals an occluded left carotid and left subclavian artery with calcification into the proximal LIMA. Left heart catheterization shows patent prior grafts with no new coronary disease. The calcified proximal LIMA is the primary cause of reduced coronary flow. The risk of complete LIMA occlusion prohibited left subclavian stenting and left carotid stenosis prohibited carotid-subclavian bypass, requiring surgical revascularization of the LIMA-LAD.

A redo-sternotomy was performed with concurrent endoscopic SVG harvest. The LIMA was dissected and measured 3mm in diameter. Cardiopulmonary bypass was initiated without arresting the heart. A 4mm aortotomy was made lateral to the prior SVG-RCA graft, and an anastomotic seal device was deployed. The SVG was anastomosed to the aorta using a running 6-0 polypropylene suture. A 6mm arteriotomy was created in the mid-LIMA, and a 2.5mm shunt maintained continuous flow. An end-to-side anastomosis was completed with 7-0 polypropylene suture. Transit time flow through the new graft was 140ml/min.

The patient was weaned from bypass and transferred to the ICU. He was discharged on postoperative day 12 after transient acute kidney injury recovery and remains angina-free.

5:06 PM
Surgical Video: RIMA made easy in Minimally invasive cabg

Author List: Gustavo A. Orellana-Sampedro, MD, Luis Roberto Palma Dallan, MD, Francisco Montalvo, MD, Cesar A. Burgos-Villamil1, MD, Mario FL Gaudino, MD, PhD, MSCE, FEBCTS, FACC, FAHA

The educational/technical point that this video addresses: This is for minimally invasive cabg, for all arterial no touch aorta off pump cabg, the purpose of the video is to share our solution to very complex problem, the use of in situ rima in mics cabg is limited because of its length and the "I" graft configuration can be very challenging to do it inside the chest, so we wanted to share our simple and effective approach to do the RIMA "I" graft extension with a radial artery outside of the chest in a simple end to end anastomosis.

Summary of the Surgical Video: The technique starts by marking bima with ultrasound, after skin marking we do a 5th left intercostal space medial lateral thoracotomy, with double lumen endotracheal intubation, we colapse the left lung and prepare our rima harvest (we use the Medtronic octopus nuvo stabilization to put the right lung down to get better exposure of the rima). With Harmonic energy we skeletonize the rima, then we go for lima the same way. after all conduits are harvested and dilated with loca papaverine we do systemic heparin. we use a 10mm trocar very medial avoiding the mamary veins (previously marked), Clamp the RIMA, clip distal portion and cut, inside of the trocar we use a delicate mics forceps to pass with my dominant hand inside the chest the rima to my non dominant hand inside the trocar the tip of the rima, once is secure, my non dominant hand will gently pull out the rima and later the trocar, once RIMA is outside the chest a end to end anastomosis is preformed with a 8-0 prolene. check the flow and pull back inside the chest with two delicate mics forceps and with the assistant helping not to get twisted. Once inside the chest we check for flow and its ready to use in any way possible, as a single or sequential o Y or T graft, it all depends on what the patient needs.

5:18 PM

Surgical Video: Totally Endoscopic Myocardial Bridge Unroofing: A Robotic Solution to a Coronary Challenge

Author List: Andrea Amabile MD, Nicholas R. Hess MD, Bryant Fisher MD, Faaz Ashraf MD, Ariana Jackson BS, Rafik Margaryan MD, Alexandra K. Nicholas MD, Jeffrey A. Fowler DO, Catalin Toma MD, Ibrahim Sultan MD, Victor O. Morell MD, Johannes Bonatti MD

The educational/technical point that this video addresses: This video demonstrates a step-by-step technique for totally endoscopic, robotically-assisted unroofing of a myocardial bridge, a minimally invasive alternative to the traditional sternotomy approach. It highlights key technical elements including optimal patient selection, robotic port placement, peripheral cannulation, and endoaortic balloon occlusion management. It also emphasizes the importance of careful dissection to fully unroof the bridge while avoiding injury to the left anterior descending artery or the right ventricle. This video aims to provide a high-yield educational tool for trainees and surgeons interested in adopting robotic techniques for coronary surgery.

Summary of the Surgical Video: Myocardial bridging, a congenital anomaly in which a coronary artery—typically the LAD—courses intramyocardially, may lead to symptomatic ischemia in a subset of patients. For those unresponsive to medical management, surgical unroofing is a definitive treatment. While traditionally performed through a median sternotomy, minimally invasive and robotic techniques offer the potential for reduced morbidity and improved recovery. This video presents our institutional technique for totally endoscopic, robotically-assisted myocardial bridge unroofing.

Preoperative assessment includes coronary CT angiography, invasive physiological testing, and peripheral vessel imaging to confirm suitability for femoral cannulation and endoaortic balloon occlusion. The procedure is conducted on cardiopulmonary bypass using the Da Vinci Xi platform. Key technical steps include precise robotic port placement, safe endoballoon positioning, and meticulous division of myocardial fibers overlying the LAD using robotic scissors. We emphasize tips for achieving optimal exposure, managing bleeding, and preventing right ventricular injury.

Postoperatively, patients are typically extubated in the operating room and experience rapid recovery, with early mobilization and favorable cosmetic outcomes.

Friday, June 13, 2025

Abstract Session: Strategies and Outcomes in Coronary Surgery (3:30 PM – 4:30 PM)

3:30 PM

Abstract: Weekend Effect in Cardiac Surgery: A National Analysis of CABG Outcomes by Operative Day

Author List*:* Omar Abdel Kerim, MPH, Rohit Gandubiona, M.B.B.S, Maya Shah, Tomas Salerno, MD

Purpose: Coronary artery bypass grafting (CABG) is vital for treating acute coronary syndrome (ACS). Prior studies suggest a "weekend effect," with worse outcomes for weekend hospital care. However, its impact on CABG outcomes is underexplored. This study evaluates differences in outcomes for weekend versus weekday CABG in a large national cohort.

Methods: The NIS dataset (2016-2021) was used. 63,456 ACS adults underwent CABG identified using ICD-10 codes. Cohort was dichotomised into: Weekday group (WD, n = 48,833) and Weekend group (WE, n = 14,623). Demographics and clinical characteristics were evaluated. Standard statistical tests were used to conduct the analysis, with major adverse cardiac events (MACE) as the primary outcome.

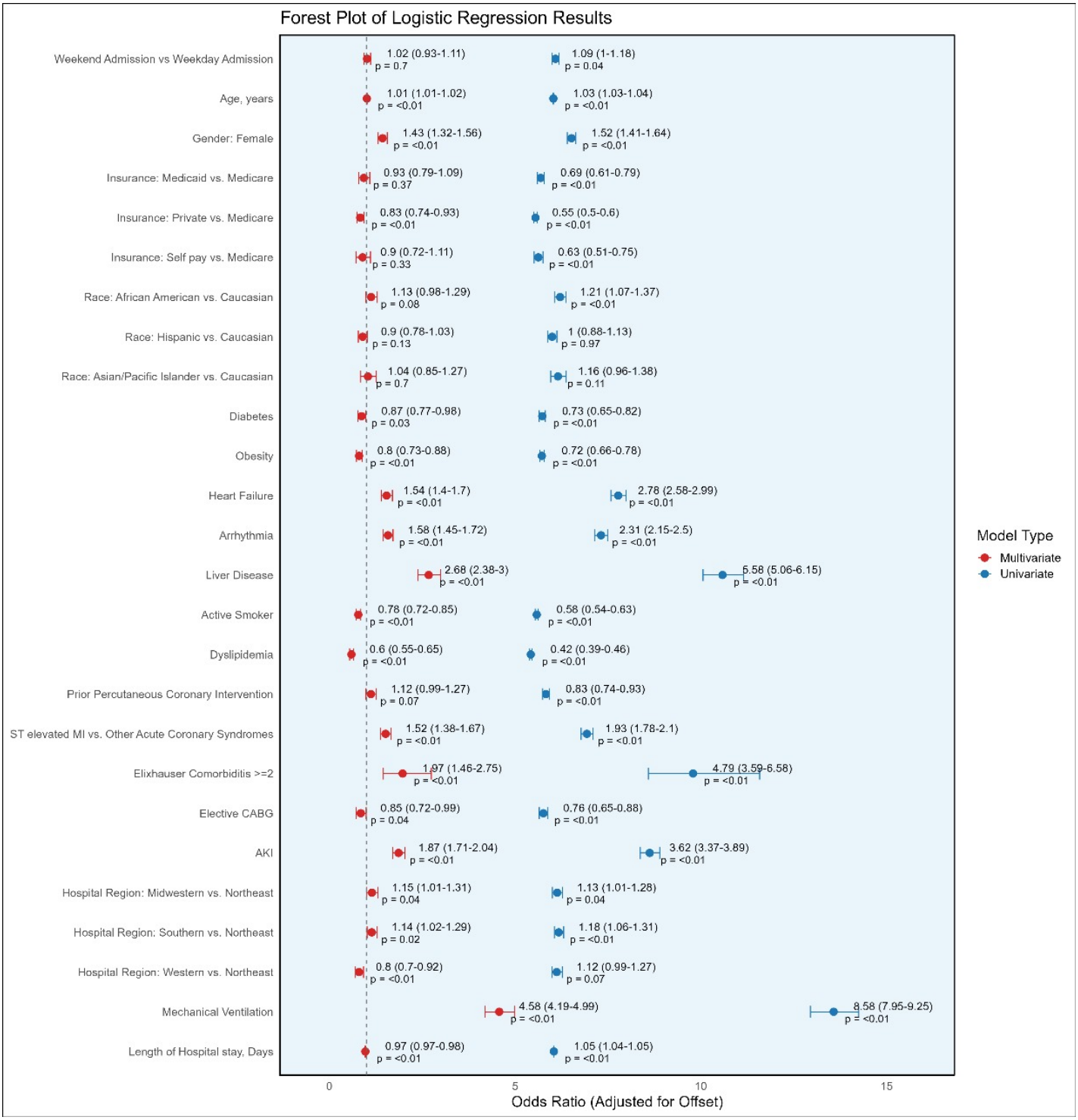
Results: Less than 25% of admissions occurred on weekends. No significant differences were observed in age, sex, race, or overall comorbidities. WE group had higher rates of heart failure, ST Elevation Myocardial Infarction, prior MI, and electrolyte imbalance, but lower alcohol use and hypertension. WE were more frequent in non-teaching hospitals, incurred higher charges, and showed increased MACE, AKI, and mechanical ventilation needs (Table 1).
MACE predictions were analysed via univariate and multivariate logistic regression. WE was associated with increased odds of the MACE (OR 1.09, 95% CI 1.00–1.18, p = 0.045). However, adjusting for demographics, insurance, and clinical factors in multivariate logistic regression, weekend surgery was not associated with increased risk of mortality or MACE (OR 1.02, 95% CI 0.93–1.11, p = 0.70) (Figure 1).

Conclusion: Unadjusted analyses showed increased adverse outcomes for weekend CABG, but this association disappeared after adjustment. Admission day alone does not significantly impact morbidity risk. Standardizing perioperative care across all days may help ensure consistent outcomes regardless of surgical timing especially for higher risk groups.

Table 1. Significant Baseline Demographics and Post Op Outcomes of Patients Undergoing CABG based on Weekday vs Weekend Admissions.

	Weekday Admission	Weekend Admission	P value
n	48833	14623	
Congestive Heart Failure (%)	18358 (37.6)	5650 (38.6)	0.023
Hypertension Uncomplicated (%)	21977 (45.0)	6395 (43.7)	0.007
Fluid and Electrolyte Disorders (%)	20447 (41.9)	6431 (44.0)	<0.001
Blood Loss Anemia (%)	519 (1.1)	178 (1.2)	0.127
Deficiency Anemia (%)	1421 (2.9)	441 (3.0)	0.524
Alcohol Abuse (%)	2257 (4.6)	586 (4.0)	0.002
Prior Myocardial Infarction (%)	7147 (14.6)	2270 (15.5)	0.008
STEMI (%)	7249 (14.8)	2625 (18.0)	<0.001
NSTEMI (%)	41764 (85.5)	12055 (82.4)	<0.001
Hospital Setting (%)			0.006
Rural	1357 (2.8)	432 (3.0)	
Urban Nonteaching	6908 (14.1)	2210 (15.1)	
Urban Teaching	40568 (83.1)	11981 (81.9)	
Hospitaal Region (%)			<0.001
Northeast	8026 (16.4)	2241 (15.3)	
Midwest	10872 (22.3)	3265 (22.3)	
South	20892 (42.8)	6155 (42.1)	
West	9043 (18.5)	2962 (20.3)	
Hospitalization Cost (median [IQR])	228865.17 [163326.30, 344827.10]	240048.18 [171862.36, 356194.03]	<0.001
MACE (%)	2441 (5.0)	796 (5.4)	0.034
Post Op Cardiogenic Shock (%)	5491 (11.2)	1850 (12.7)	<0.001
Post Op Mechanical Ventilation (%)	4706 (9.6)	1540 (10.5)	0.002
Post Op Acute Kidney Injury (%)	12800 (26.2)	4066 (27.8)	<0.001

Figure 1:


Forest Plot of Logistic Regression Results
Weekend Admission vs Weekday Admission
1.02 (0.93-1.11) p = 0.7
1.09 (1-1.18) p = 0.04
Age, years
1.01 (1.01-1.02) p = <0.01
1.03 (1.03-1.04) p = <0.01
Gender: Female
1.43 (1.32-1.56) p = <0.01
1.52 (1.41-1.64) p = <0.01
Insurance: Medicaid vs. Medicare
0.93 (0.79-1.09) p = 0.37
0.69 (0.61-0.79) p = <0.01
Insurance: Private vs. Medicare
0.83 (0.74-0.93) p = <0.01
0.55 (0.5-0.6) p = <0.01
Insurance: Self pay vs. Medicare
0.9 (0.72-1.11) p = 0.33
0.63 (0.51-0.75) p = <0.01
Race: African American vs. Caucasian
1.13 (0.98-1.29) p = 0.08
1.21 (1.07-1.37) p = <0.01
Race: Hispanic vs. Caucasian
0.9 (0.78-1.03) p = 0.13
1 (0.88-1.13) p = 0.97
Race: Asian/Pacific Islander vs. Caucasian
1.04 (0.85-1.27) p = 0.7
1.16 (0.96-1.38) p = 0.11
Diabetes
0.87 (0.77-0.98) p = 0.03
0.73 (0.65-0.82) p = <0.01
Obesity
0.8 (0.73-0.88) p = <0.01
0.72 (0.66-0.78) p = <0.01
Heart Failure
1.54 (1.4-1.7) p = <0.01
2.78 (2.58-2.99) p = <0.01
Arrhythmia
1.58 (1.45-1.72) p = <0.01
2.31 (2.15-2.5) p = <0.01
Liver Disease
2.68 (2.38-3) p = <0.01
5.58 (5.06-6.15) p = <0.01
Active Smoker
0.78 (0.72-0.85) p = <0.01
0.58 (0.54-0.63) p = <0.01
Dyslipidemia
0.6 (0.55-0.65) p = <0.01
0.42 (0.39-0.46) p = <0.01
Prior Percutaneous Coronary Intervention
1.12 (0.99-1.27) p = 0.07
0.83 (0.74-0.93) p = <0.01
ST elevated MI vs. Other Acute Coronary Syndromes
1.52 (1.38-1.67) p = <0.01
1.93 (1.78-2.1) p = <0.01
Elixhauser Comorbiditis >=2
1.97 (1.46-2.75) p = <0.01
4.79 (3.59-6.58) p = <0.01
Elective CABG
0.85 (0.72-0.99) p = 0.04
0.76 (0.65-0.88) p = <0.01
AKI
1.87 (1.71-2.04) p = <0.01
3.62 (3.37-3.89) p = <0.01
Hospital Region: Midwestern vs. Northeast
1.15 (1.01-1.31) p = 0.04
1.13 (1.01-1.28) p = 0.04
Hospital Region: Southern vs. Northeast
1.14 (1.02-1.29) p = 0.02
1.18 (1.06-1.31) p = <0.01
Hospital Region: Western vs. Northeast
0.8 (0.7-0.92) p = <0.01
1.12 (0.99-1.27) p = 0.07
Mechanical Ventilation
4.58 (4.19-4.99) p = <0.01
8.58 (7.95-9.25) p = <0.01
Length of Hospital stay, Days
0.97 (0.97-0.98) p = <0.01
1.05 (1.04-1.05) p = <0.01
0
5
10
15
Odds Ratio (Adjusted for Offset)
Model Type
Multivariate
Univariate

3:40 PM

Abstract: Mid-Term follow-up (24 month) of concomitant non-atriotomy surgical ablation (GP-Maze) during coronary surgical revascularization.

Author List*:* Gregory D. Rushing, MD; Pablo F. Ruda Vega, MD

Purpose: Atrial fibrillation (AF) treatment during cardiac surgery is a Class I STS recommendation, yet AF undertreatment persists, particularly in non-MV surgeries. This study evaluates safety and efficacy of the concomitant bi-atrial GP-Maze procedure, which accomplishes the Cox-Maze IV lesion set without bi-caval cannulation or atriotomy, in patients undergoing CABG.

Methods: Patients who underwent GP-Maze during surgical coronary revascularization were included. The left atrial posterior wall and pulmonary veins were encircled with a bipolar radiofrequency energy clamp. A cryoprobe was inserted through the tip of the left atrial appendage (LAA) and lines were made to interrupt the mitral valve annular and LAA circuits. The LAA was excluded. Using retrograde coronary sinus catheter purse-string access, the tricuspid annular circuit was interrupted with cryoablation. Other right atrial and coronary sinus lesions were created with epicardial cryoablation. Electrocardiogram and 7-day Holter monitoring occurred prospectively at 3, 6,12 and 24 months.

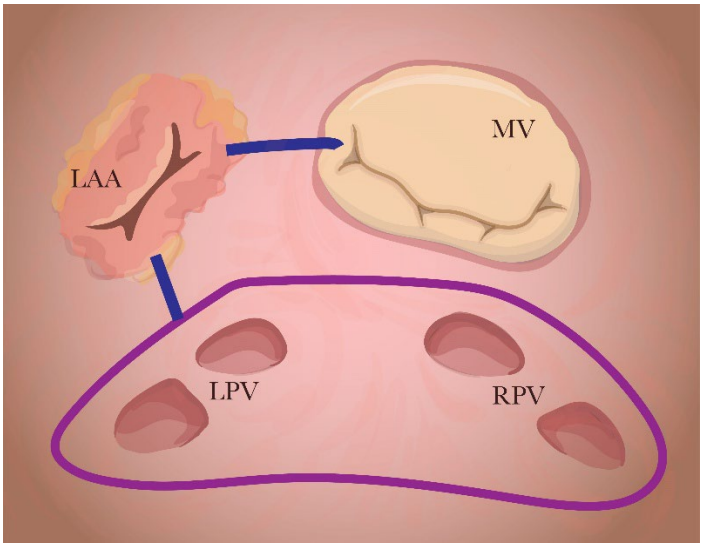
Results: Thirty-five patients with a median age of 68 years (58, 77) were included. Seventy-five percent (n=26) of patients were male, 47% (n=16) had paroxysmal AF, 53% (n= 19) had non-paroxysmal AF, and 21% (n= 7) had failed prior catheter ablations. All concomitant procedures were CABG. Median cardiopulmonary bypass time was 148 min (70, 210) and cross-clamp time was 89 min (75, 148). There were no intraoperative complications or deaths. The rate of postoperative stroke rate was 2% (n=1) and there were no pacemaker implantations. Two readmissions (4%) occurred due to GI bleed and heart failure exacerbation. Of 23 patients with 12-mo follow-up, freedom from AF/AT was 96% (n=22), with 96% (n=22) of patients not requiring anti-arrhythmic drugs and 74% (n=17) not requiring anticoagulation. Of 17 patients with 24-mo follow-up, freedom from AF/AT was 96% (n=16), with 96% (n=16) of patients not requiring anti-arrhythmic drugs and 80% (n=13) not requiring anticoagulation.

Conclusion: The GP Maze is effective at maintaining sinus rhythm without anti-arrhythmics in most patients followed through 2 years. The GP Maze can be safely performed without formal atriotomy or altered cannulation strategy and aims to reduce time and complexity of surgical ablation during CABG, where treating AF is still underperformed.

Table: Demographics, Events, Outcomes

Variable	All (n=35)
Demographics	
Age, y	68 (58, 77)
Male	26 (75)
Hypertension	32 (92)
Hyperlipidemia	29 (84)
Type 2 diabetes mellitus	17 (50)
Chronic obstructive pulmonary disease	4 (11)
Atrial fibrillation	
Paroxysmal	16 (47)
Persistent	5 (14)
Long-standing	14 (40)
Prior pacemaker	0 (0.0)
Prior ablation	7 (21)
CHA_2DS_2VASc	3 (3, 4)
HASBLED	2 (2, 3)
EVENTS:	
Cardiopulmonary bypass, min	148 (70, 110 min)
Cross-clamp time, min	89 (70, 148 min)
30 day Mortality	0
Stroke	1 (2%)
Pacemaker placement	0
OUTCOMES:	
Freedom from AF, 1 year (n=23)	22 (96)
Not requiring anti-arrhythmics	22 (96)
Not requiring anticoagulation	17 (74)
Freedom from AF 2 years (n=17)	16 (96)
Not requiring anti-arrhythmics	16 (96)
Not requiring anticoagulation	14 (80)

Figure 1:



3:50 PM

Abstract: Impact of Interhospital Transfer on Early and Late Outcomes after Urgent Coronary Artery Bypass Grafting

Author List*:* Sameer Singh MD, Paul Kurlansky MD, Maya Paul BS, Yu Hohri MD, Darina Kirilina PhD, Isaac George MD, Arnar Geirsson MD, Michael Argenziano MD, Hiroo Takayama MD, PhD, Koji Takeda MD, PhD

Purpose: Patients requiring urgent CABG represent a high-risk population, often resulting in referral to tertiary surgical centers. While interhospital transfer may optimize clinical expertise, it may also delay care. Though transfer has been previously associated with inferior outcomes after cardiac surgery, its impact on outcomes for urgent CABG remains unknown.

Methods: We identified all patients undergoing urgent or emergent CABG at a tertiary referral center between 2015-2022. Patients were divided based on interhospital transfer status. Propensity score matching was used to create two well-balanced cohorts of transfer and no-transfer patients based on baseline and operative characteristics. Time to revascularization from initial presentation, operative strategy, and postoperative outcomes were compared between groups. Long-term survival was compared using Kaplan-Meier analysis.

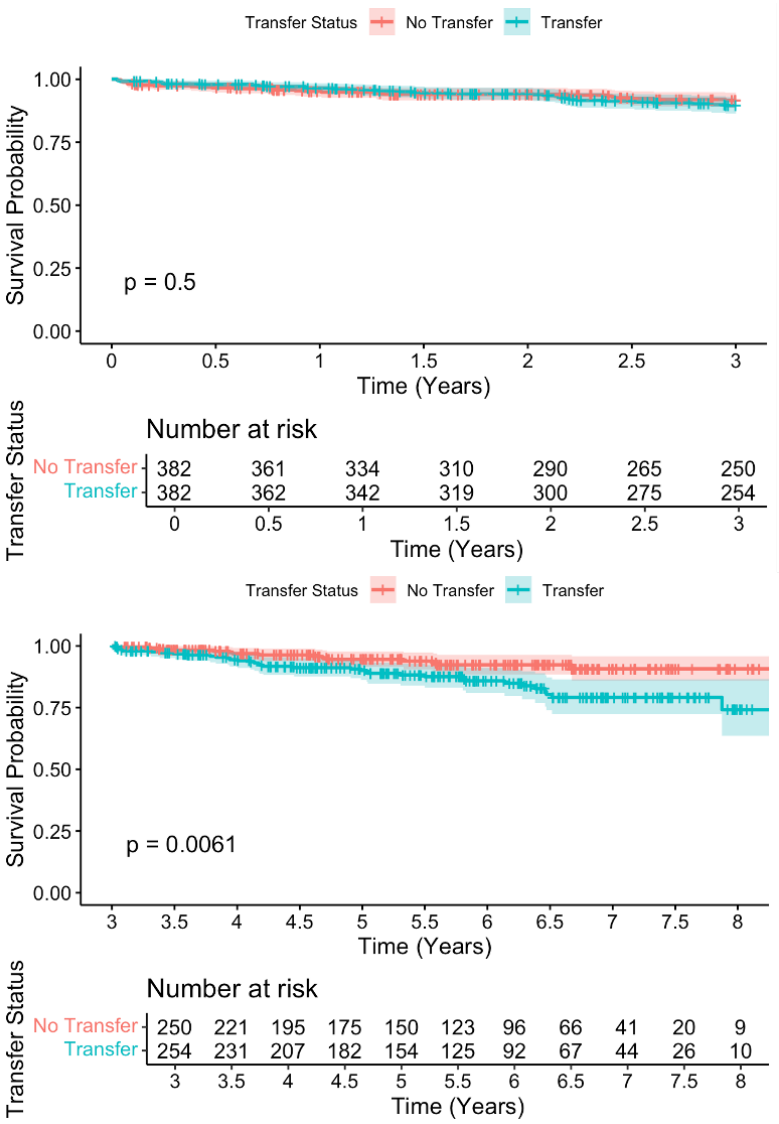
Results: A total of 1123 patients undergoing urgent CABG were identified, of which 499 (44.4%) had preoperative interhospital transfer. Among transfer patients, 12.8% (n=64) came from referring centers with cardiac surgery capability. Transfer patients experienced a longer period of time from initial presentation to surgical revascularization compared to no-transfer patients (5 days vs 4 days, p=0.004). Intraoperative data revealed similar use of cardiopulmonary bypass, number of grafts, and use of bilateral internal mammary artery. One-to-one matching resulted in 382 well balanced pairs of patients. Among matched cohorts of transfer and no-transfer patients, there were no significant differences in rates of postoperative morbidity, operative mortality (0.8% vs 2.4%, p=0.15) or length of stay (p=0.58) (Table 1). However, patients who were transferred had worse long-term survival, particularly after three years (HR 2.3, 95%CI 1.26-4.22, p=0.007, Figure 1).

Conclusion: Interhospital transfer for patients requiring urgent CABG was not associated with significant delay in treatment or early increased postoperative morbidity or mortality. Differences in long-term survival beyond three years may be more related to processes of local-regional care rather than index surgical intervention.

Table 1: Early postoperative outcomes compared between matched groups of transfer and no-transfer patients.

	All patients (n = 764)	No Transfer (n = 382)	Transfer (n = 382)	p
Operative mortality	12(1.6)	9(2.4)	3(0.8)	0.15
Postoperative bleed	14(1.8)	6(1.6)	8(2.1)	0.79
Postoperative stroke	16(2.1)	12(3.1)	4(1.0)	0.08
Prolonged ventilation	95(12.4)	44(11.5)	51(13.4)	0.51
Renal failure	12(1.6)	6(1.6)	6(1.6)	1.0
Postoperative Afib	222(29.1)	112(29.3)	110(28.8)	0.94
Deep sternal wound infection	6(0.8)	1(0.3)	5(1.3)	0.94
Length of stay, post op (days)	7(6-10)	7(6-10)	7(5-10)	0.58

Figure 1:



4:00 PM

Abstract: Propensity-Matched Comparison of Total and Non-Total Arterial Grafting in Patients with Low Ejection Fraction: Mid-Term Results

Author List*:* Francesco Cabrucci, MD; Dario Petrone, MD; Giulia Bessi, MD; Andrea Balderi, MS; Beatrice Bacchi, MD; and Massimo Bonacchi, MD

Purpose: Total arterial myocardial revascularization (TAMR) is debated in patients with reduced ejection fraction (EF). This study evaluates the long-term outcomes of TAMR versus non-total arterial CABG in patients with EF, using propensity score matching (PSM) to reduce bias and ensure comparability across surgical risk profiles and preoperative clinical characteristics.

Methods: We retrospectively analyzed 395 patients with left ventricular ejection fraction (LVEF) <50% who underwent CABG at our institution. The PSM yielded 101 patients receiving TAMR to 101 matched controls receiving non-TAMR. PSM was performed based on demographics, comorbidities, EF, and operative risk scores, resulting in a near perfect match. The primary outcome was long-term all-cause mortality. Secondary endpoints included stroke, postoperative myocardial infarction, and reintervention (PCI or CABG). Mean follow-up was 5.9 Â± 2.1 years, with data collected from institutional databases and verified through national registry sources when available.

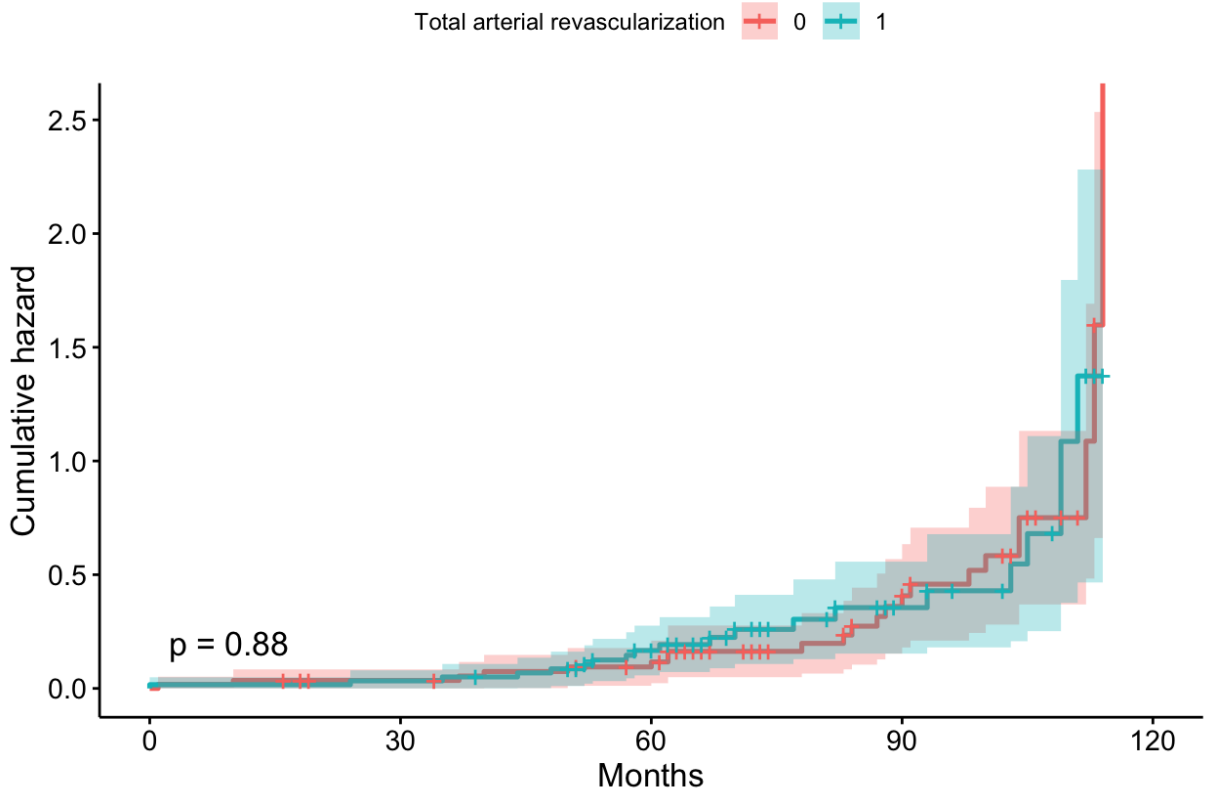
Results: After matching, baseline characteristics were balanced. Mean EF was slightly higher in the TAMR group (40.4% vs 39.2%, p=0.187), with no significant differences in comorbidities, coronary anatomy, or surgical urgency. Long-term all-cause mortality was comparable between groups (TAMR 36.6% vs non-TAMR 40.5%, p=0.753). Rates of stroke (1.9% vs 1.7%, p=1), postoperative myocardial infarction (8.9% vs 6.7%, p=0.914), and repeat revascularization (re-PCI: 7.4% vs 3.3%, p=0.581; re-CABG: 0% vs 1.7%, p=1) were similar. Use of pre- or post-operative IABP support did not differ significantly. Off-pump CABG was the predominant technique in both cohorts (>89%). These findings suggest that TAMR, even in patients with impaired LV function, yields non-inferior mid-term outcomes compared to conventional grafting.

Conclusion: In patients with reduced EF, TAMR is associated with similar long-term outcomes compared to non-TAMR. This approach appears safe and effective over mid-term follow-up. Further prospective studies are warranted to assess potential long-term benefits and subgroup-specific advantages of arterial-only strategies in this high-risk population.

Table: Table with unmatched and matched populations

Stratified by Total Arterial Revascularization (TAMR)						
	Unmatched			Matched		
	No TAMR	TAMR	P- Value	No TAMR	TAMR	P-Value
n	277	101		101	101	
Female (%)	36 (13.0)	14 (13.9)	0.962	7 (6.9)	14 (13.9)	0.167
STS PROM (mean (SD))	3.38 (5.60)	2.38 (2.59)	0.084	2.02 (1.94)	2.38 (2.59)	0.27
STS M&M (mean (SD))	9.90 (6.02)	7.99 (4.01)	0.003	8.09 (4.23)	7.99 (4.01)	0.867
Euroscore II (mean (SD))	5.42 (7.02)	3.63 (3.24)	0.014	3.74 (3.40)	3.63 (3.24)	0.829
Smoking (%)	146 (52.7)	57 (56.4)	0.598	61 (60.4)	57 (56.4)	0.668
Age (mean (SD))	70.95 (9.18)	68.41 (10.58)	0.023	68.22 (10.57)	68.41 (10.58)	0.9
BMI (mean (SD))	27.11 (4.15)	27.48 (4.27)	0.445	27.39 (4.18)	27.48 (4.27)	0.886
Dyslipidemia (%)	208 (75.4)	74 (73.3)	0.779	82 (81.2)	74 (73.3)	0.24
Hypertension (%)	226 (81.9)	85 (84.2)	0.718	84 (83.2)	85 (84.2)	1
Creatinine (mean (SD))	1.26 (0.81)	1.20 (0.66)	0.523	1.27 (0.88)	1.20 (0.66)	0.553
Chronic Dialysis (%)	6 (2.2)	2 (2.0)	1	3 (3.0)	2 (2.0)	1
COPD (%)	38 (13.7)	14 (13.9)	1	11 (10.9)	14 (13.9)	0.669
Diabetes (%)	122 (44.0)	43 (42.6)	0.891	44 (43.6)	43 (42.6)	1
Cerebrovascular accident(%)	81 (29.2)	26 (25.7)	0.59	22 (21.8)	26 (25.7)	0.62
Peripheral vascular disease (%)	81 (29.2)	22 (21.8)	0.19	27 (26.7)	22 (21.8)	0.511
Atrial Fibrillation (%)	36 (13.0)	12 (11.9)	0.91	10 (9.9)	12 (11.9)	0.821
Prior Myocardial Infarction (%)	74 (26.7)	37 (36.6)	0.081	34 (33.7)	37 (36.6)	0.768
Prior PCI (%)	67 (24.2)	38 (37.6)	0.014	39 (38.6)	38 (37.6)	1
EF (mean (SD))	38.51 (7.26)	40.41 (6.12)	0.02	39.20 (6.82)	40.41 (6.12)	0.187
EF less <35 (%)	96 (34.7)	19 (18.8)	0.005	27 (26.7)	19 (18.8)	0.24
36< EF<49 (%)	175 (63.2)	81 (80.2)	0.003	71 (70.3)	81 (80.2)	0.142
Tripel vessel disease	251 (90.6)	66 (65.3)	<0.001	76 (75.2)	66 (65.3)	0.166
Left Main > 50% (%)	130 (46.9)	50 (49.5)	0.744	38 (37.6)	50 (49.5)	0.119
Urgent Surgery (%)	215 (77.6)	78 (77.2)	1	81 (80.2)	78 (77.2)	0.731
Off-Pump (%)	243 (88.4)	93 (93.9)	0.167	90 (89.1)	93 (93.9)	0.331
On-pump (%)	25 (9.1)	5 (5.1)	0.292	9 (8.9)	5 (5.1)	0.428
On- Pump beating (%)	11 (4.0)	1 (1.0)	0.265	5 (5.0)	1 (1.0)	0.223
IABP pre (%)	28 (10.1)	9 (9.0)	0.894	5 (5.0)	9 (9.0)	0.395
IABP post (%)	17 (6.2)	4 (4.0)	0.563	2 (2.0)	4 (4.0)	0.679
Total Arterial CABG (%)	0 (0.0)	101 (100.0)	<0.001	0 (0.0)	101 (100.0)	<0.001
Stroke (%)	9 (6.2)	1 (1.9)	0.371	1 (1.7)	1 (1.9)	1
Long term FU Mortality (%)	84 (44.0)	26 (36.6)	0.351	30 (40.5)	26 (36.6)	0.753
Postop Myocardial Infarction (%)	10 (6.9)	5 (8.9)	0.848	4 (6.7)	5 (8.9)	0.914
re_PCI (%)	8 (5.5)	4 (7.4)	0.87	2 (3.3)	4 (7.4)	0.581
re_CABG (%)	1 (0.7)	0 (0.0)	1	1 (1.7)	0 (0.0)	1

Figure:



4:10 PM

Abstract: Coronary artery bypass grafting versus repeat percutaneous coronary intervention for management of in-stent restenosis – a national Medicare analysis

Author List*:* Michael A Catalano, MD; Yu Zhao, MS; Omar Toubat, MD, PhD; Alexandra Sperry, MD; Lauren Gillinov, BS; Waseem Lutfi, MD; Kendall M Lawrence, MD; Marisa Cevasco, MD, MPH; Mauer Biscotti, MD; Wilson Y Szeto, MD; Nimesh Desai, MD, PhD; Chase R Brown, MD

Purpose: In-stent restenosis following percutaneous coronary intervention (PCI) is a challenging problem; optimal management of this patient population is unclear. We aim to leverage national claims data to assess short and long-term outcomes of patients undergoing CABG versus PCI for treatment of in-stent restenosis following PCI for acute coronary syndrome (ACS).

Methods: Inpatient Medicare MedPAR files were reviewed to identify patients aged â‰¥65 years who underwent PCI for STEMI or NSTEMI from 10/2015-9/2020 and developed a new diagnosis of in-stent restenosis within one-year of intervention. Patients were stratified by management strategy within 3-months of diagnosis of in-stent restenosis, including CABG, repeat PCI, or neither. Propensity-score matching by demographic, comorbidity, and operative covariates was utilized to match cohorts of patients undergoing CABG versus repeat PCI. The primary outcomes were 30-day mortality and 5-year survival utilizing Kaplan-Meier analysis. Predictors of short and long-term mortality were assessed utilizing logistic regression and Cox proportional hazards, respectively.

Results: During the study period, 653,593 patients underwent PCI for STEMI or NSTEMI, without a pre-existing diagnosis of in-stent stenosis, and survived to hospital discharge. Of those, 11,003 (1.7%) developed in-stent restenosis within one-year. Within 3-months of diagnosis, CABG was performed on 1,225/11,003 (11.1%), repeat PCI was performed on 7,640/11,003 (69.4%), and neither intervention on 2,138/11,003 (19.4%). Patients undergoing CABG were younger, less likely to be female, more likely to be white, and had a lesser comorbidity burden than those undergoing repeat PCI (Table 1). Despite increased 30-day mortality among the matched CABG cohort (7.3% versus 5.2%, p=0.01), CABG was associated with significantly improved 5-year survival compared to repeat PCI in both unmatched (57.9% [95% CI 53.6-62.5], versus 36.6% [34.7-38.5], p <0.001) and matched cohorts (56.5%, [52.1-61.2] versus 43.3% [40.4-46.4], p <0.001, Figure 1). Notably, 5-year survival was 29.5% (26.3-33.0) in the group undergoing no intervention.

Conclusion: Among patients who develop in-stent restenosis within one-year of PCI for ACS, CABG is associated with increased short-term morbidity but significantly improved long-term survival compared to repeat PCI. In appropriately selected patients, CABG may be the optimal therapy for this challenging pathology.

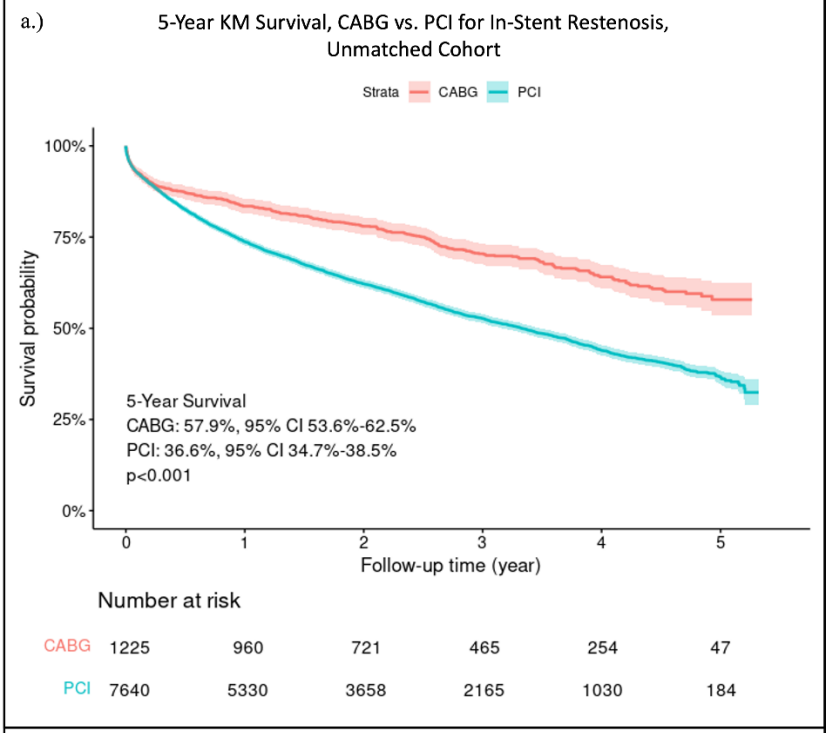
Table 1: Descriptive characteristics, CABG versus repeat PCI with an associated diagnosis of in-stent restenosis.

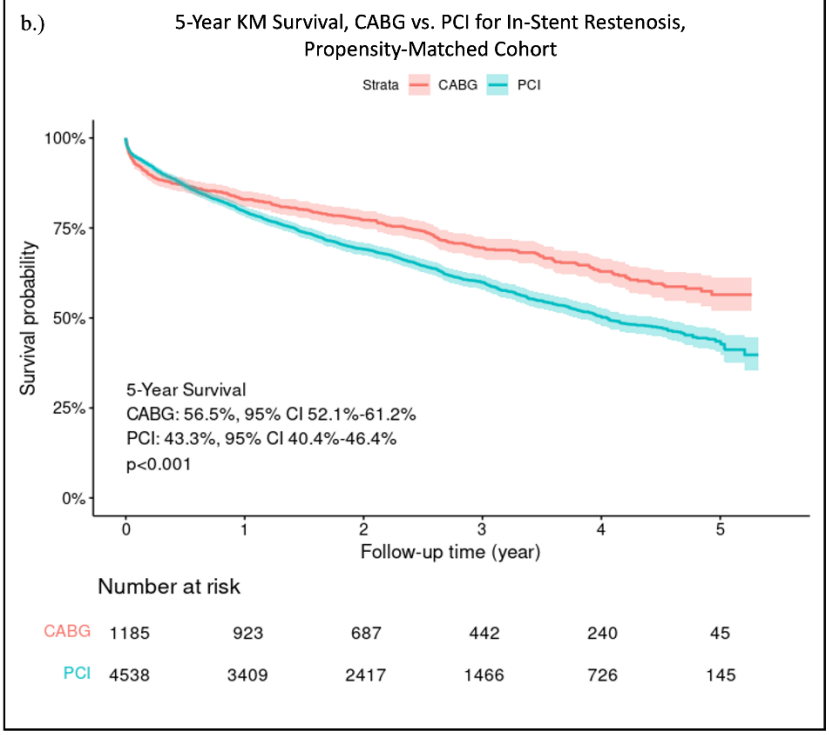
Table 1. Descriptive characteristics, CABG versus repeat PCI with an associated diagnosis of in-stent restenosis.

Variable	CABG N=1225	PCI N=7640	p-value
Age	72.5 ± 5.7	74.4 ± 7.3	<0.001
Female Sex	421 (34.4)	3147 (41.2)	<0.001
White Race	1034 (84.4)	6249 (81.8)	0.029
Region			0.998
Midwest	291 (23.8)	1815 (23.8)	
Northeast	226 (18.4)	1405 (18.4)	
South	487 (39.8)	3067 (40.1)	
West	217 (17.7)	1327 (17.4)	
Unknown	4 (0.3)	26 (0.3)	
Elixhauser Comorbidities			
Chronic Kidney Disease	419 (34.2)	3440 (45.0)	<0.001
Diabetes	745 (60.8)	4925 (64.5)	0.015
Chronic Lung Disease	296 (24.2)	2235 (29.3)	<0.001
Hypertension	1128 (92.1)	7235 (94.7)	<0.001
Cerebrovascular Disease	109 (8.9)	834 (10.9)	0.038
Congestive Heart Failure	520 (42.4)	4347 (56.9)	<0.001
Peripheral Vascular Disease	246 (20.1)	1963 (25.7)	<0.001
Obesity	299 (24.4)	1953 (25.6)	0.409
Chronic Liver Disease	51 (4.2)	275 (3.6)	0.373
STEMI on Initial Presentation	341 (27.8)	1627 (21.3)	<0.001
Admission Urgency of Repeat Intervention			<0.001
Elective	388 (31.7)	522 (6.8)	
Emergent/Urgent	837 (68.3)	7118 (93.2)	
Days from PCI to In-Stent Stenosis			<0.001
<=7 days	7 (0.6)	326 (4.3)	
8-14days	11 (0.9)	266 (3.5)	
15-30 days	21 (1.7)	236 (3.1)	
>30 days	1186 (96.8)	6812 (89.2)	

Figure 1:

Figure 1. Raw (a) and matched (b) Kaplan-Meier survival curves, CABG versus repeat PCI for in-stent restenosis.





4:20 PM

Abstract: Redo Coronary Bypass Grafting using a Robotic Totally-Endoscopic Approach: Perioperative and Ten-Year Outcomes

Author List*:* Hiroto Kitahara MD, Gianluca Torregrossa MD, Husam H Balkhy MD

Purpose: Robotic-assisted coronary bypass surgery is an alternative to traditional open-heart surgery via sternotomy. Higher-risk patients can greatly benefit from this approach, including those undergoing re-operative cardiac surgery. We reviewed our robotic beating-heart totally endoscopic (TECAB) patients and compared patients who had undergone prior heart surgery to those who had not.

Methods: Between 7/2013-3/2025, 953 patients underwent robotic beating-heart TECAB at our institution of whom 31 had undergone at least 1 prior heart surgery. Perioperative and mid-term data were retrospectively analyzed and compared to 922 primary TECAB patients. Data from annual clinical follow-up were included. TECAB was performed using the DaVinci Si Robot with the endowrist stabilizer. In redo cases, preliminary endoscopic lysis of left lung adhesions was performed prior to harvesting one or both internal mammary arteries (IMA).

Results: Table-1. In the redo group, 25 patients (81%) underwent one prior cardiac operation, 6 (19%) underwent 2 prior cardiac operations. 23 patients underwent prior isolated CABG via sternotomy. 2 had prior robotic surgery.

There was no difference in age (68 vs 66 years in the redo group versus non-redo group, respectively; p=0.318), gender (19% female vs 23%, p=0.665), or coronary disease burden. In the redo group more patients had prior MI (45% vs 24%, p=0.006), PCI (77% vs 37%, p<0.001), and CHF (32% vs 15%, p=0.011). STS risk score was higher in the redo group (4.6+5.7 vs 1.4+1.8, p<0.001).

There was 1 conversion to sternotomy in the cohort (in the redo group; p=0.325). There was 1 postoperative MI and 3 strokes, all in the non-redo group (p=0.318, p=0.083 respectively).

Conclusion: In an experienced TECAB center, robotic off-pump TECAB can be successfully performed in patients with prior cardiac surgery. Good early and midterm outcomes can be achieved with the benefit of avoiding redo sternotomy. Further studies with larger patient volumes and longer follow-up are necessary.

Table 1: Results

Variable	**Group 1, Redo N = 31**	**Group 2, Non-redo N = 922**	**P-Value**
Multivessel TECAB, n (%)	8 (26)	503 (55)	0.002
Operative Time, min	301 ± 79	252 ± 86	0.011
CPB Use, n (%)	2 (6.5)	13 (1.4)	0.272
Extubation in OR, n (%)	6 (19)	411 (45)	0.005
Postop AF, n (%)	5 (16)	103 (11)	0.471
Hospital LOS, days	2.3 ± 1.1	2.3 ± 0.9	0.733
ICU LOS, days	1.3 ± 0.7	1.2 ± 0.6	0.306
Tack-Back for Bleeding, n (%)	0 (0.0)	7 (0.8)	0.008
Mortality, n (%)	1 (3.2)	6 (0.7)	0.433
Midterm Clinical Follow-up	31 (100%)	922 (100%)	n/a
Time to F/u, months	39 ± 28	47 ± 36	0.306
All-cause mortality, n(%)	9 (29)	147 (16)	0.052
Cardiac-related mortality, n (%)	3 (9.7)	16 (17)	0.331
Repeat cardiac surgery, n (%)	0 (0.0)	10 (11)	0.002
Repeat revascularization	2 (6.5)* *PCI x2	63 (6.8)* *PCI x62, CABG x3	0.986
Freedom from MACCE	27 (87)	859 (93)	0.193

Figure 1:

Saturday, June 14, 2025

Abstract Session (7:30 AM – 8:30 AM)

7:30 AM

Abstract: Applicability of the STS Risk-Adjusted Failure to Rescue Model in a Single UK Adult Cardiac Centre: A Step Toward Nationwide Implementation?

Author List*:* Miss Augusta Paulikaite, Mr Ahmed Shaheen, Dr Thomas Clewley, Mr Michael Lewis

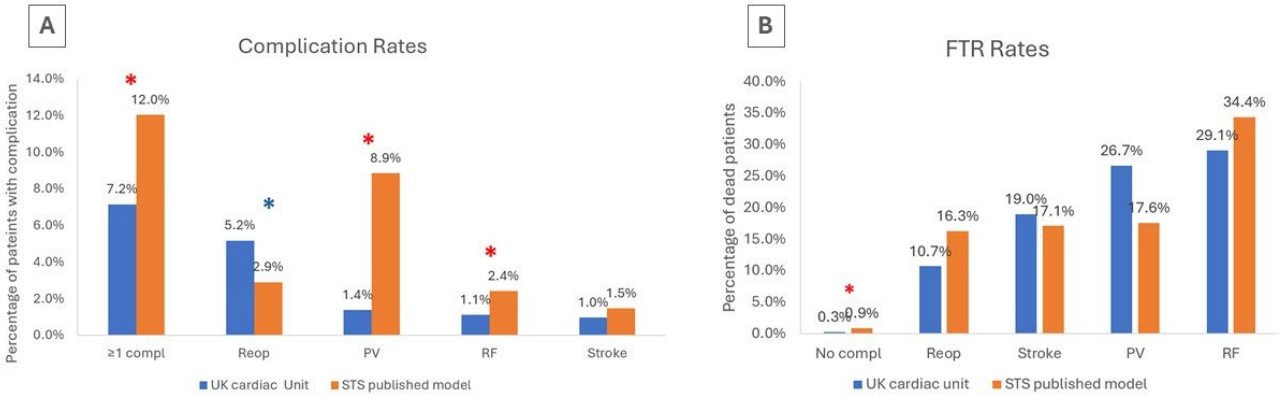
Purpose: Failure-to-rescue (FTR) assesses hospitals' ability to prevent mortality in patients with postoperative complications. The STS introduced a risk-adjusted FTR metric for adult cardiac surgery, highlighting outcome variations across units for patients with similar risk factors. This study aimed to evaluate FTR tool applicability at UK healthcare setting.

Methods: A retrospective analysis of 2,167 adult patient records from a single UK unit database was conducted, focusing on seven index procedures: coronary artery bypass grafting (CABG), aortic valve replacement (AVR), mitral valve replacement (MVR), and mitral valve repair (MVRe), with or without CABG, performed between 2017 and 2022. Patients were categorized based on the presence or absence of major complications, including reoperation, prolonged ventilation (PV)(>24hrs), renal failure (RF), and stroke. FTR rates for each complication and complication rates were calculated and compared to STS model predictions using Fisherâ€™s exact and Chi-square analysis. A statistically significant difference was defined as $p<0.05$.

Results: FTR rates for all four complications were comparable to STS model predictions. However, mortality in patients without complications was significantly lower than expected in the UK unit (0.3% vs. 0.9%, $p=0.004$). Reoperation had the lowest associated mortality in both the UK unit and STS dataset (10.7% vs. 16.3%, $p>0.05$). The UK unit had significantly higher reoperation rates (5.2% vs. 2.9%, $p<0.00001$); however, this did not translate to the expected increase in FTR. The PV rate in the UK unit was significantly lower than predicted by the STS model (1.4% vs. 8.9%,$p<0.00001$) but had higher associated mortality (26.7% vs. 17.6%, $p>0.05$). RF rates were also significantly lower than those in the STS model (1.1% vs. 2.4%, $p=0.00007$). FTR following RF had the highest mortality in both datasets (29.1% vs. 34.4%, $p>0.05$). Stroke was the least frequent complication in both (1.0% vs. 1.5%, $p>0.05$), with similar associated FTR (19.0% vs. 17.1%, $p>0.05$).

Conclusion: The UK cardiac unit's mortality outcomes aligned with STS FTR benchmarks. Higher reoperation rates did not increase FTR, suggesting effective management. Despite lower PV rates, FTR trends indicate higher mortality, warranting further study. Adopting FTR as a national metric could enhance patient safety. Multicentre validation of FTR is needed.

Table: The charts illustrate differences in complication incidence and subsequent mortality outcomes between the UK cardiac unit data and the STS published model. (A) Complications rates. (B) FTR rates.


A
Complication Rates
Percentage of pateints with complication
14.0%
12.0%
10.0%
8.0%
6.0%
4.0%
2.0%
0.0%
12.0%
7.2%
5.2%
2.9%
8.9%
1.4%
1.1%
2.4%
1.0%
1.5%
≥1 compl
Reop
PV
RF
Stroke
UK cardiac Unit
STS published model
B
FTR Rates
Percentage of dead patients
40.0%
35.0%
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%
0.3%
0.9%
10.7%
16.3%
19.0%
17.1%
26.7%
17.6%
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34.4%
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Reop
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PV
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UK cardiac unit
STS published model

7:36 AM

Abstract: Association Between Preoperative Non-Tobacco Nicotine Dependence And Postoperative Complication Outcomes In Coronary Artery Bypass Graft Surgery

Author List*:* Christina Rios, BA, Teerth Y. Patel, BS, Andre Y. Son, MD, Abe DeAnda, MD, FACS

Purpose: The negative impact of preoperative tobacco dependence on surgical outcomes following coronary artery bypass grafting (CABG) is well-established. However, the effects of preoperative non-tobacco nicotine-dependence (NTND) are less described. This study investigates the differences in surgical outcomes of CABG between patients with and without non-tobacco nicotine-dependence.

Methods: This retrospective cohort study used the TriNetX global health research network to analyze patients who underwent coronary artery bypass grafting with arterial or venous grafts. Two cohorts were defined using ICD-10 codes: one consisting of patients with non-tobacco nicotine dependence and the other without nicotine dependence. To balance the cohorts, one-to-one propensity score matching for age, sex, race, comorbidities, body mass index, diabetes, and hypertension was performed. Postoperative complications were assessed 30 days, 6 months, and 1 year after the procedure.

Results: Among 122,298 CABG patients, 106,466 were not nicotine dependent, and 15,832 were in the NTND cohort. After propensity matching, 12,947 patients remained in each. The non-tobacco nicotine group had significantly higher rates of postoperative complications. At 30 days, myocardial infarction, infection, influenza/pneumonia, and dyspnea were significantly more common ($P < 0.001$). At six months, acute kidney injury ($P = 0.004$) and mortality ($P = 0.002$) were also higher, along with previously noted complications ($P < 0.001$). At one year, stroke ($P = 0.008$) and pulmonary embolism ($P = 0.026$) remained significantly elevated, in addition to prior findings ($P < 0.001$). However, no significant differences were observed in deep vein thrombosis, wound dehiscence, or conduction disturbances at any time point.

Conclusion: There is a significant association between NTND and increased postoperative complications. Cessation of nicotine products preoperatively may improve surgical outcomes. With the growing use of non-tobacco nicotine products, our study shows the need for increased awareness of their negative impact on postoperative outcomes and the need for perioperative management reform.

7:42 AM

Abstract: Making the Most Out of the Internal Mammary Artery: Does Sequential Grafting on the Left Anterior Descending Artery Territory Provide Clinical Benefits in a Bilateral Internal Mammary Artery Grafting Strategy?

Author List*:* Nassim Bousmaha, MD, Ezequiel Wainscheinker, MD, Daniel Munoz, MD, Alexander Ponomarev, MD, Yasmine Babaki, Dimitri Kalavrouziotis, MD, PhD, Siamak Mohammadi, MD, PhD

Purpose: In coronary artery bypass grafting, using the bilateral in-situ internal mammary artery (BIMA) has a proven survival benefit. However, whether outcomes can be further improved or compromised by increasing the extent of the revascularized Left anterior Descending Artery territory with the in-situ LIMA using sequential anastomosis with diagonal remains unclear.

Methods: Between 1992 and 2020, 1064 consecutive patients underwent CABG using BIMA, with at least an in-situ LIMA to LAD and one graft to the diagonal arteries. In 171 patients (Group S), LIMA was used as a sequential graft to the diagonal branch, while in 893 patients (Group V), LIMA was used for LAD only, with a vein graft for the diagonal artery. Short- and long-term outcomes were compared between groups. A multivariable Cox regression analysis adjusted for potential differences, predicting in-hospital mortality, cumulative late death, and readmission due to cardiovascular causes. The mean follow-up was 13.5 years, with 100% completion.

Results: Both groups were similar in terms of age, gender, and major risk factors (e.g., diabetes, renal failure, stroke, COPD, PAD, EuroSCORE II, $p > 0.05$). Operative data, including mean distal anastomosis, CPB, and cross-clamp time, were also similar ($p > 0.05$). In-hospital mortality (0% vs 0.2%, $p = 1.0$), stroke (0% vs 0.5%, $p = 1.0$), acute kidney injury, myocardial infarction, and length of stay were statistically similar between groups. Multivariable Cox regression showed that group S had better long-term survival (HR: 0.62, 95% CI: 0.39-0.97, $p = 0.04$) and fewer cardiovascular hospital readmissions (HR: 0.59, 95% CI: 0.43-0.80, $p = 0.04$) compared to group V.

Conclusion: This study suggests that using in-situ LIMA for sequential bypass of the diagonal branch followed by the LAD is a safe and effective strategy for BIMA patients. The sequential LIMA-to-diagonal-to-LAD configuration was associated with improved long-term survival and fewer cardiovascular readmissions compared to using a vein graft.

Table: Independent risk factors for late mortality and hospital readmission for cardiac causes

Variables	Survival		CV Readmission	
	HR (95% CI)	P value	HR (95% CI)	P value
Sequential	0.62 (0.39-.097)	0.04	0.59 (0.43-0.80)	0.001
Age ≥ 70 years	5.23 (3.06-8.94)	<0.0001	2.31 (1.47-3.63)	0.0003
Male	non-significant		non-significant	
Stroke	2.77 (1.51-5.10)	0.001	2.18 (1.30-3.67)	0.003
Diabetes	non-significant		1.55 (1.18-2.02)	0.002
Hypertension	non-significant		non-significant	
Chronic kidney disease	non-significant		non-significant	
COPD	2.13 (1.34-3.40)	0.002	1.95 (1.36-2.77)	0.0002
History of MI	1.41 (1.03-1.92)	0.03	non-significant	
Atrial fibrillation	non-significant		1.90 (1.10-3.27)	0.02
PAD	2.58 (1.71-3.88)	<0.0001	1.86 (1.35-2.55)	0.0001
EF <40%	non-significant		1.54 (1.05-2.25)	0.03
Previous PCI	non-significant		1.44 (1.09-1.88)	0.01

7:48 AM
Abstract: Time From STEMI to CABG Impacts Survival Outcomes

Author List*:* Jaimin Trivedi, MD, MPH, Brian Ganzel, MD, Siddharth Pahwa, MD, Mark Slaughter, MD, Michele Gallo, MD

Purpose: STEMIs are treated with primary percutaneous coronary revascularization (PCI) and with surgical bypass (CABG) should complications arise. Guidelines suggest time to PCI of under 1.5 hours is critical for patient outcomes. We aim to identify a window in which time from STEMI to CABG provides acceptable morbidity and mortality outcomes.

Methods: A retrospective review of STS Registry data from a single academic cardiac surgery center with PCI capability was completed between January 2014 and December of 2024. Patients receiving a CABG after a STEMI were grouped by their time from STEMI to CABG: <24hours, 1-7 days, 8-21 days. Demographic, clinical, morbidity, and operative mortality data were compared by non-parametric test: continuous variables with Kruskal-Wallis test and categorical variables with Chi-squared test. Patients were then grouped by their PCI status: current hospitalization PCI, prior hospitalization PCI, no PCI. Operative mortality outcomes were compared.

Results: 114 patients presenting with a STEMI underwent CABG: 7 in <24 hours, 93 between 1-7 days, 14 between 8-21 days (Table 1). There was no difference in age, gender, race, rate of CKD, EF, and IABP use between patients (all p>.05). Patients with CABG <24 hours had significantly more cardiogenic shock (p=.04), higher STS Mortality Risk (p<.01), and lower rates of DM (p<.01). Mortality in patients with CABG <24 hours (14%) and with CABG 8-21 days (7%) was higher than patients with CABG 1-3 days (3%). Renal failure was higher in patients with CABG <24 hours (14%) and CABG 8-21 days (7%) than patients with CABG 1-7 days (5%). There were no mortalities in patients receiving PCI in this hospitalization, however 11.5% of those with prior PCI and 2.9% of those without PCI died. 94 (82.4%) of patients with STEMI never received primary PCI.

Conclusion: Timing of CABG from STEMI presentation should favor a window of 1-7 days after presentation. Patients outside of this window had greater mortality and renal failure risk.

Table:

Baseline Characteristics	<24h (n=7)	1-7days (n=93)	8-21days (n=14)	p-value
Age	69 (64-75)	61 (56-70)	62 (52-69)	0.39
Gender M	71%	78%	78%	0.90
Race AA	14%	11%	14%	0.92
BMI	28 (23-33)	29 (26-33)	25 (22-28)	0.02
Diabetes	28%	56%	50%	<.01
CKD	0%	2%	7%	0.50
CLD	0%	18%	21%	0.05
Creatinine (pre)	1.0 (0.8-1.4)	0.9 (0.8-1.1)	1.2 (1.0-1.5)	0.02
EF	44 (34-50)	48 (37-56)	43 (25-45)	0.11
Prev PCI	33%	58%	37%	0.49
Cardiogenic shock	71%	27%	15%	0.04
IABP	50%	40%	21%	0.33
TempDevice	0%	1%	7%	0.23
STS Mort Risk (%)	11 (4-16)	1.6 (1.0-3.4)	3.2 (2.0-5.4)	<.01
Dist Anastomosis	1 (1-3)	2 (2-2)	2 (1-2)	0.36
Outcomes				
Mortality	14%	3%	7%	0.33
AFib	14%	24%	21%	0.84
Stroke	0	2%	0	0.79
Renal Failure	14%	5%	7%	0.62
ICU LOS	42 (22-289)	47 (25-97)	70 (36-100)	<.01

7:54 AM

Abstract: Age-Based Survival Benefit of Radial Artery in Coronary Artery Bypass Grafting

Author List*:* Trent Sherman, BS, Takuya Ogami, MD, Francis D. Ferdinand, MD, Jeffrey Ding, BS, Stephen D. Waterford, MD, Danny Chu, MD, Johannes O. Bonatti, MD, David J. Kaczorowski, MD, Irsa S. Hasan, MD, Ibrahim Sultan, MD

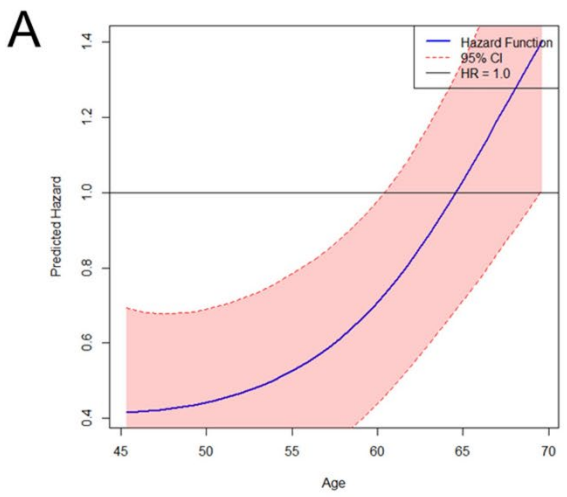
Purpose: Growing evidence supports the use of the radial artery (RA) for coronary artery bypass grafting (CABG). However, it remains unclear whether RA use provides better outcomes across all ages. We aimed to assess the survival benefit of RA use and determine if an age cut off for this benefit exists.

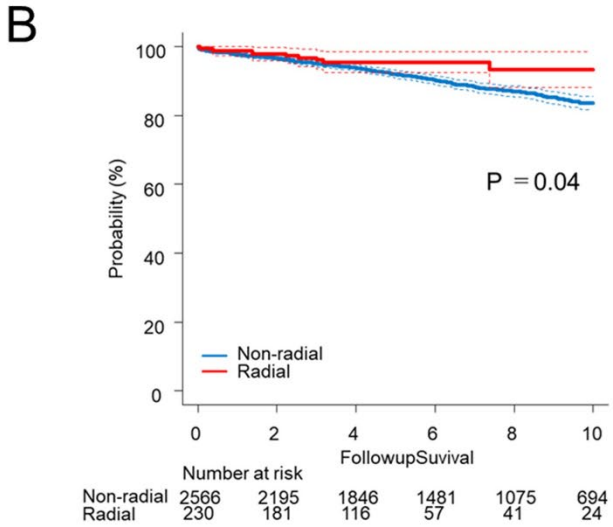
Methods: A retrospective, single-institution cohort study analyzed patients who underwent isolated multivessel CABG using RA (RA group) and those not using RA (non-RA group) between 2010 and 2024. Patients who did not receive left internal mammary artery to left anterior descending artery bypass were excluded. A hazard ratio curve was generated to evaluate the survival benefit of the RA group compared to the non-RA group across ages. Based on an age cut off, a risk- adjusted Kaplan-Meier survival was constructed between the two groups.

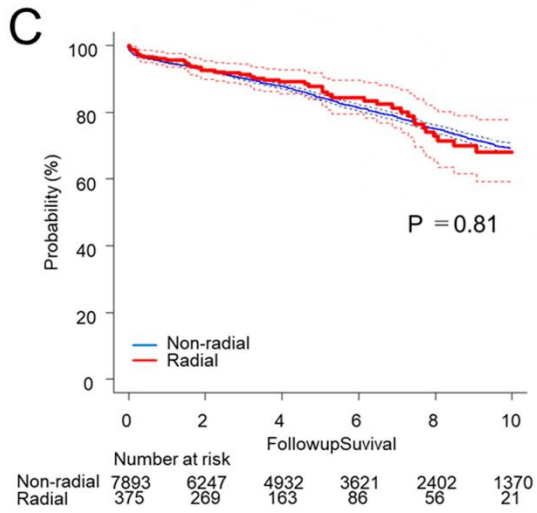
Results: Of 11,646 patients, 639 (5.5%) received RA graft (RA group) during CABG, while 11,007 (94.5%) did not receive RA graft (non-RA group). Overall, the predicted risk of mortality was 2.03%. The RA group was younger (61.6 years vs. 66.4 years old in the non-RA group, $P < 0.001$). Cerebrovascular accident and dialysis were more frequently observed in the non-RA group, while hypertension was more prevalent in the RA group. A hazard ratio curve demonstrated better survival with ages younger than 60 years old in the RA group compared to the non-RA group (Figure A). Risk-adjusted Kaplan-Meier curves showed significantly higher survival in the RA group compared to the non-RA group in patients younger than 60 years old ($P = 0.04$, Figure B). On the other hand, there was no survival difference between the two groups in patients aged 60 or older ($P = 0.81$, Figure C).

Conclusion: Radial artery use during isolated CABG was associated with improved long-term survival in patients younger than 60 years. Therefore, an age cutoff of 60 years may be considered to use RA graft in multivessel CABG.

Figures:


A
Hazard Function
95% CI
HR = 1.0
Predicted Hazard
0.4
0.6
0.8
1.0
1.2
1.4
45
50
55
60
65
70
Age


B
Probability (%)
100
80
60
40
20
0
P =0.04
Non-radial
Radial
0
2
4
6
8
10
FollowupSuvival
Number at risk
Non-radial 2566 2195 1846 1481 1075 694
Radial 230 181 116 57 41 24


C
Probability (%)
100
80
60
40
20
0
P =0.81
Non-radial
Radial
0
2
4
6
8
10
FollowupSuvival
Number at risk
Non-radial 7893 6247 4932 3621 2402 1370
Radial 375 269 163 86 56 21

8:00 AM

Abstract: Coronary Artery Bypass Grafting with Impella 5.5 Assist Device Support in Reduced Ejection Fraction: A Case Series

Author List*:* Massimo Baudo, MD; Francesco Cabrucci, MD; Yoshiyuki Yamashita, MD, PhD; Amanda Yakobitis PA-C, Courtney Murray CRNP; Gianluca Torregrossa, MD

Purpose: Choosing the best surgical approach for coronary revascularization in patients with severe cardiac dysfunction is complex. The Impella 5.5 microaxial pump offers effective left ventricular support. This study aims to report a series of CABG performed with Impella assistance, highlighting its potential benefits in high-risk surgery cases.

Methods: Between January 2023 and December 2024, consecutive patients undergoing CABG with cardiopulmonary bypass, transitioning to central Impella 5.5 support via a 10 mm graft in the ascending aorta were included. This study focused on assessing perioperative outcomes in patients with reduced ventricular dysfunction (ejection fraction [EF] <40%) undergoing CABG with Impella-assisted support.

Results: Seven patients were included in the study, with a mean age of 65.8 ± 11.7 years, and 6 were male. Hypertension was present in all patients, diabetes in 6, COPD in 2, and 2 were in dialysis. The mean preoperative EF was 23.6% ± 8.7%, and the median STS PROM was 5.5 [IQR: 2.9-8.9]. One patient had preoperative IABP support. Four patients required intraoperative transfusions, but all remained hemodynamically stable upon OR exit. Median ventilation time post-surgery was 76 [IQR: 31-142] hours. The Impella was removed after an average of 5.6 ± 2.1 days. One patient underwent surgical revision for bleeding. No strokes, myocardial infarction, repeat revascularization, or mortality occurred postoperatively. The mean postoperative hospital stay was 19.7 ± 4.5 days, with a discharge EF of 39.4% ± 13.2%. One patient died 6 months after the procedure due to sepsis caused by a gangrenous diabetic leg.

Conclusion: This initial experience using Impella 5.5 support in CABG patients with reduced EF demonstrated its feasibility in selected cases. The Impella provided effective circulatory support, ensuring stable hemodynamics throughout the postoperative stay without complications.

8:06 AM

Abstract: Safety and Efficacy of Veno-Arterial ECMO Support in Robotic-Assisted Coronary Artery Bypass Grafting

Author List*:* Syed B. Peer, MD, Armin Farazdaghi, MD, Anh T. Nguyen, Kenneth K. Liao MD, PhD

Purpose: Robotic-assisted coronary artery bypass grafting (RCAB) with veno-arterial extracorporeal membrane oxygenation (VA-ECMO) support is a novel concept that has expanded RCAB indications in high-risk patients. However, there is limited experience regarding the safety and efficacy of VA-ECMO use in RCAB, and the optimal range for anti-coagulation.

Methods: Single-institution, retrospective analysis conducted at our institution. We reviewed patient records from June 5, 2019, to June 13, 2024, focusing on individuals who underwent robotic-assisted CABG with and without VA-ECMO support. 100 patients with VA-ECMO support (mean age, 67.9 years, Society of Thoracic Surgeons Predicted Morbidity and Mortality risk score 16.0 % ± 14.2; ejection fraction 45.2%±12.8) underwent RCAB with intra-operative peripheral VA-ECMO support for the following indications: inability to tolerate single-lung ventilation 21%, low ejection fraction (<35%) 40%, inadequate exposure due to cardiomegaly 30%, hemodynamic instability 9%. The target ACT for the VA-ECMO group was 200 seconds.

Results: 275 robotic CABG procedures were performed; 100 utilizing VA-ECMO intra-operative support and 175 without support. In the VA-ECMO group, no post-operative strokes were observed, the off-support group had one stroke. Both groups had a 0% incidence of pulmonary embolism. Re-operation for bleeding occurred in 1.1% of the VA-ECMO group and 2.0% of the without ECMO group ($p = 0.567$). VA-ECMO group requiring RBC transfusions in 33% of cases, the without ECMO group required RBC transfusions in 8.5% of cases ($p<0.001$). Prolonged ICU ventilation (>24 hours) was needed in 13% of the VA-ECMO group compared to 2.8% of the without ECMO group ($p<0.001$). The mean hospital length of stay for the VA-ECMO group 9.3±9.5 days, compared to 5.6±2.9 days for the without ECMO group ($p<0.001$). The mean ACT prior to initiating VA-ECMO was 240.6 ± 42.8.

Conclusion: VA-ECMO support during RCAB is safe and effective. An ACT goal of 200 seconds is not associated with significant thromboembolic events or bleeding. These findings suggest VA-ECMO support during RCAB is a viable treatment option, expanding surgical options for high-risk coronary artery disease patients.

Table: Comparison of Findings RCAB Patients with VA-ECMO and without VA-ECMO

	VA ECMO	Without VA-ECMO	P value
STS Predicted Morbidity and Mortality Risk Score	16.0 % ± 14.2	7.8 %± 6.7	p <0.001
Perioperative Stroke	1.4%	0.7%	p <0.001
RBC Transfusion	33%	8.5%	p <0.001
Re-operation for bleeding	1.14%	2.0%	p=0.567
Prolonged ventilation, >24 hours	13%	2.8%	p <0.001
Hospital length of stay, days	9.3±9.5	5.6±2.9	p<0.001

8:12 AM

Abstract: Does robotic TECAB mitigate the risks of BITA grafting in insulin dependent diabetic patients? Early and mid-term outcomes compared to a non-diabetic population

Author List*:* Riya Bhasin, BS, Sarah Nisivaco, MD, Hiroto Kitahara, MD, Yazan AlJamal, MD, Husam H. Balkhy, MD

Purpose: BITA grafting improves long-term outcomes in CABG but can be limited in diabetics due to concerns regarding sternal wound complications. Sternal-sparing robotic TECAB may mitigate these risks. We reviewed outcomes of insulin-dependent diabetic (IDDM) patients undergoing TECAB with BITA grafting and compared them to non-diabetic TECAB patients undergoing BITA grafting.

Methods: A total of 953 patients underwent robotic beating-heart TECAB at our institution between September 2013 and April 2025. 370 were diabetic, and 152 had IDDM. Of these, 63 received BITA grafts and are the subject of this review. Our technique involves full skeletonization of both ITA conduits and the use of mostly in-situ grafts to the LAD and Cx branches. IDDM patients' perioperative and midterm outcomes were compared to 271 non-diabetic patients undergoing TECAB with BITA grafts. Independent T-tests were conducted between the two groups for comparison.

Results: Mean age was 68±9 years with 27% female in the IDDM cohort (group-1) and 67±9 years with 14% female in the non-diabetic cohort (group-2). BMI was 30±6 (group-1) and 28±5 (group-2). Mean STS risk was 2.5±3.6 (group-1) and 1.1±1.3 (group-2). There were no conversions to sternotomy and no wound infections. No significant differences in operative time (316±52 minutes vs. 309±59 minutes, $p = 0.52$), new atrial fibrillation (13% vs. 14%, $p = 0.78$), or postoperative stroke (1.6% vs. 0.4%, $p = 0.46$) in group-1 vs group-2, respectively. Mid-term follow-up was complete in 95% at mean of 45±33 months (group-1) and 92% at 54±36 months (group-2). Freedom from MACCE was 90% and 93% in groups 1 and 2, respectively. All-cause and cardiac mortality were 28% and 5% (group-1) and 12% and 2% (group-2).

Conclusion: BITA grafting in patients with IDDM using a robotic beating-heart TECAB approach is safe and effective. It offers the known benefits of routine multi-arterial grafting with bilateral ITA grafts to this challenging group of patients, with zero risk of sternal infection. Further studies are warranted.

Figure 1: Bilateral internal thoracic arteries after robotic skeletonized harvesting during a TECAB procedure.

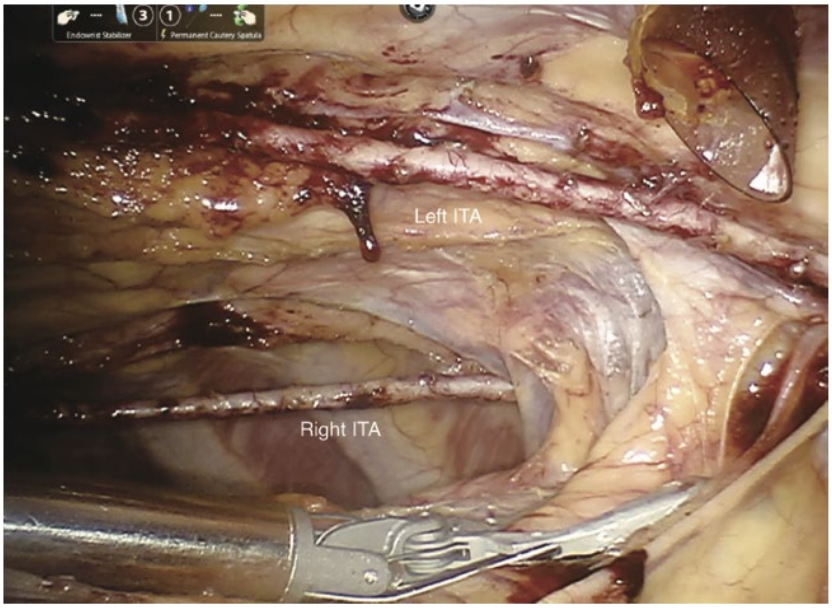


Table 1:

Table 1: Perioperative and Midterm Outcomes

Perioperative Outcomes			
	IDDM Cohort (n = 63)	Non-diabetic cohort (n = 271)	P-values
Operative time (mins)	316 ± 52	309 ± 59	0.52
Extubation within 6 hours	26 [41]	115 [42]	0.85
Hospital LOS (days)	2.70 ± 0.77	2.36 ± 0.82	0.01
ICU LOS (days)	1.39 ± 0.73	1.16 ± 0.52	0.02
New atrial fibrillation	8 [13]	38 [14]	0.78
Postoperative AKI	6 [10]	4 [1.5]	0.04
Postoperative stroke	1 [1.6]	1 [0.4]	0.46
Hospital Mortality	1 [1.6]	4 [1.5]	0.95
Discharge to home	56 [89]	259 [96]	0.09
Mid-term Outcomes			
	IDDM Cohort (n = 63)	Non-diabetic cohort (n = 271)	P-values
All-cause mortality	17 [28]	30 [12]	0.01
Cardiac mortality	3 [5]	5 [2]	0.17
Repeat revascularization with PCI	4 [7]	15 [6]	0.86
Repeat revascularization with CABG	0 [0]	1 [0.4]	0.62
Cardiac surgery	1 [1.7]	3 [1.2]	0.8
Freedom from MACCE	54 [90]	231 [93]	0.94

Data are presented as n [%], mean ± SD, or ratio. LOS, length of stay; AKI, acute kidney injury; PCI, percutaneous coronary intervention; CABG, coronary artery bypass graft; MACCE, major adverse cardiac and cerebrovascular events.

8:18 AM

Abstract: A Promising "Minimal-Volume" Cardioplegic Solution with Excellent Clinical Results

Author List*:* Thierry Carrel, Jürg Schmidli - Depts of Cardiac Surgery, University Hospital Basel and Bern, Switzerland

Purpose: Myocardial protection is an essential step during every surgical procedure requiring cardiac arrest. Surprisingly there has been little innovation in this field in the last decades. As a result, cardioplegic solutions and modes of application are extremely variable between institutions while "hospital-based" mixtures do often not fulfill quality criterias required for drugs and devices and do not have marking approval.

Methods: The new cardioplegic solution is a two-component low volume solution (100 ml) and is administered by the surgeon into the aortic root or directly into the coronary arteries. It can be used for any type of surgical procedure in adults and infants. It provides immediate cardiac arrest and adequate myocardial protection for a duration of 60-75 minutes and can be repeated several times according to the ischemic period.

Results: The solution has recently obtained CE-marking approval following two regulatory prospective randomized trials and demonstrated non-inferiority compared to Buckberg's solution following experimental studies and clinical use in more than 30'000 adult and pediatric patients. Compared with Buckberg, the new cardioplegia leads to significantly less hemodilution (higher intraoperative hematocrite (0.38 vs 0.24, $p<0.01$), less need for hemofiltration and/or blood transfusion or cell-saving, 8% vs 49%%, $p<0.001$), improved post-operative hemodynamic stability with less use of inotropic support. Patients return significantly more often in sinus rhythm and require less often electro-conversion (11 vs 55%).

Conclusion: This new cardioplegic solution showed a high efficacy and safety with no side-effects observed. Due to the low volume required, it may be particularly interesting for pediatric patients. The new solution fulfils today's standard of care requirements and makes standardization possible. More studies are necessary to confirm this experience and may focus not only on myocardial markers but also on clinical and economical endpoints.

Session 8: Featured Abstracts, Keynote, and Awards (8:30 AM – 10:00 AM)

8:30 AM

Abstract: The Assessing and Determining Optimal Targets for CABG (ADOPT-CABG) Study Methodology

Author List*:* Alexander Egoavil, James Choi, MD, Aina Hirofuji, MD, Bjorn Redfors, MD, PhD, Mario Gaudino, MD, PhD, Jacqueline Tamis-Holland, MD

Purpose: Coronary artery bypass grafting (CABG) requires collaboration between cardiothoracic surgeons (CS) and interventional cardiologists (IC). The choice of target vessels and conduits may influence short- and long-term outcomes. We hypothesize that CS and IC differ in their opinions regarding intended targets for CABG and the choice of conduit used.

Methods: Practicing CS and IC at the top 50 cardiology centers across the USA will be invited to participate in a survey-based study. The anonymous survey will include introductory questions related to physician demographics. Physicians will then be provided with ten hypothetical case scenarios and accompanying coronary angiograms. For each case, physicians will be asked to report the number of grafts intended for bypass (primary endpoint), rate in order of importance the coronary artery targets that they believe should be bypassed, and select the most appropriate conduit to use for each target.

Results: To achieve adequate power for our primary endpoint, we hope to obtain responses from 100 CS and 100 IC. We plan to examine whether there are differences in the number of grafts intended for bypass and explore differences by discipline in the top three preferred coronary targets, and the choice of conduits. We will examine how physician demographics and clinical experience as well as patient characteristics, influence graft selection. Findings will help identify patterns and inconsistencies in decision-making, providing insight into the factors guiding graft selection for patients referred for CABG.

Conclusion: This study will highlight differences in graft selection between CS and IC, potentially revealing variations that can lead to different revascularization strategies and patient outcomes. By identifying these discrepancies, our findings may contribute to optimizing CABG decision-making and informing standardized protocols to improve surgical planning and long-term results.

8:42 AM

Abstract: Socioeconomic Distress Associated with Increased Use of Percutaneous Coronary Intervention Over Coronary Artery Bypass Grafting

Author List*:* Robert B. Hawkins MD MSc, Raymond J. Strobel MD MSc, Jie Yang PhD, Yulia Tipograf MD, Michael Thompson PhD, Gorav Ailawadi MD MBA, Donald S. Likosky PhD, Barbara C.S. Hamilton MD MS

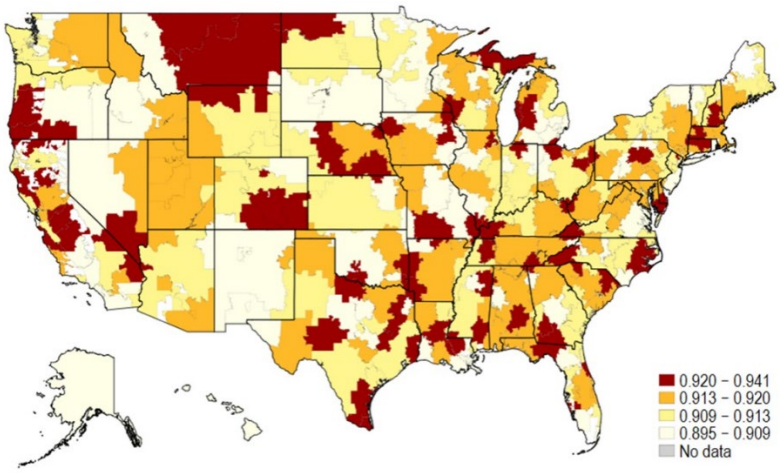
Purpose: Socioeconomic determinants of health may impact revascularization strategies for coronary artery disease. We hypothesized that socioeconomic distress would be associated with more frequent percutaneous coronary intervention (PCI) over coronary artery bypass grafting (CABG) with substantial interhospital variation.

Methods: Medicare beneficiaries admitted between 2015-2019 for non-ST elevation myocardial infarction (NSTEMI) or for unstable angina (UA) were assigned distressed communities index (DCI) scores (0 = no distress, 100 = severe distress) based on education level, poverty, unemployment, housing vacancies, median income, and business growth. Patients were excluded for ST-segment elevation myocardial infarction or emergent procedures. Initial revascularization strategy (none/CABG/PCI) within 3 months of admission was the primary outcome of interest. Patients were stratified by DCI quintiles. Hierarchical logistic regression analyzed the risk-adjusted association between DCI quintiles and revascularization strategy.

Results: A total of 327,701 patients were admitted for NSTEMI/UA, of whom 255,311 (78%) had no revascularization, 19,343 (6%) CABG, and 53,047 (16%) PCI. Hospitals performing CABG (53%; 2,218/4,160) admitted patients with lower median DCI scores (47.5 vs 58.4, $p<0.001$). Patients with low socioeconomic distress (DCI <20) patients were older, more commonly male and White, and had fewer comorbidities. After multivariable adjustment, highest DCI quintile (compared to lowest) was associated with lower odds of revascularization (PCI/CABG vs none; OR 0.96, $p=0.013$). Further, for patients undergoing revascularization, compared with DCI <20, all higher quintiles were associated with lower odds of undergoing CABG (ORadj 0.91-0.94, all $p<0.05$). Wide variation in odds of receiving CABG vs PCI was seen across the US (Figure).

Conclusion: For patients receiving revascularization after NSTEMI/UA, higher socioeconomic distress was associated with lower probability of receiving revascularization overall, and CABG in particular. This effect was highly variable by region. Patient access may impact surgical revascularization rates as less distressed patients were more likely to be admitted to hospitals performing CABG.

Figure: Odds ratio for 5th Quintile vs 1st Quintile DCI of probability of having CABG vs PCI in each healthcare referral region.


0.920 – 0.941
0.913 – 0.920
0.909 – 0.913
0.895 – 0.909
No data

8:54 AM

Abstract: Non-Atriotomy Surgical Ablation is Safe and Effective: A Multicenter Study

Author List*:* Armin Kiankhooy, MD, Gregory Rushing, MD, Marc Pelletier, MD, J. Hunter Mehaffey, MD, Manuel Gomez-Tschrnko, MD, Marc Gerdisch, MD, Andrew Barksdale, MD, Manesh Parikshak, MD, Joshua Chung, MD, Yingyot Arora, MD, Gianluca Torregrossa, MD, Massimo Baudo, MD, Isaac George, MD, Fady Soliman, MD, Joanna Chikwe, MD

Purpose: Less than 30% of patients with preoperative atrial fibrillation (AF) undergoing CABG receive concomitant surgical ablation. Left Atrial ablation classically requires atriotomy which increases ischemic time and surgical risk. We sought to evaluate a multi-institutional experience with non-atriotomy surgical ablation (NASA) of the left atrium using a radiofrequency clamp.

Methods: Consecutive cases with preoperative AF undergoing isolated CABG with concomitant NASA were evaluated. Cases where NASA was combined with additional ablations were excluded. The primary outcome was freedom from atrial fibrillation (FFAF) beyond a 2-month blanking period as assessed by EKG or continuous ambulatory monitoring (CAM). Additional outcomes included FFAF beyond 12-months with CAM and NASA related intra-operative complications. Data are reported as mean (range).

Results: A total of 83 patients had concomitant NASA and isolated CABG with follow-up beyond the 2-month blanking period. The average age was 71 years (49-84), CHA2DS2Vasc 4.0 (0-7), ejection fraction 52% (13-73), Left atrial diameter 4.2 cm (3.0-6.4), and most patients had paroxysmal AF (86%,71/83). The primary outcome of FFAF occurred in 95% (79/83) of patients with an average follow-up of 12.5 months (2-36). Forty-one patients (41/83, 49%) had continuous monitoring and 98% (40/41) demonstrated FFAF. Thirty-three patients had greater than 12-months follow-up (mean 19, range 12-36) with CAM and FFAF was 97% (32/33). Institutional utilization of anti-arrhythmic drugs (AAD) and oral anticoagulation (OAC) on hospital discharge varied widely, with 61% (51/83) of patients discharged on Class I or III AADs and 48% (40/83) discharged on OAC. No intraoperative complications attributed to NASA were observed.

Conclusion: In patients with mostly paroxysmal preoperative AF undergoing CABG surgery, concomitant NASA with bipolar radiofrequency clamp to isolate the left atrium is associated with significant restoration of normal sinus rhythm and safety.

Table: Rhythm Outcomes of Non-Atriotomy Surgical Ablation in Isolated CABG patients with Pre-Operative Atrial Fibrillation

	CAM and EKG Rhythm follow-up >2-months	CAM only Rhythm follow-up >2-months	CAM only Rhythm follow-up > 12-months
	N=83	N=41	N=33
Freedom from Atrial Fibrillation	79 (95%)	40 (97%)	32 (97%)

CAM=continuous ambulatory monitor

9:06 AM

Abstract: Racial Disparities in End Stage Renal Disease Patients Undergoing Coronary Artery Bypass Grafting with Arterial Grafting

Author List*:* Christine Yang, BS, Sameer Singh, MD, Takuya Ogami, MD, Darina Kirilina, MS, Jacob Stevens, MD, Koji Takeda, MD, Paul Kurlansky, MD

Purpose: End-stage renal disease (ESRD) patients undergoing coronary artery bypass grafting (CABG) have increased morbidity and mortality. Though black patients have worse survival after CABG compared to white patients (1), it is unknown whether these disparities persist in ESRD patients. We therefore compared survival by race in ESRD patients undergoing CABG.

Methods: Using United States Renal Data System (USRDS), data were collected on all ESRD patients undergoing CABG, along with subsequent kidney transplant status from 2015 to 2021. Patients undergoing CABG with at least one arterial graft were included. After dividing the cohort by race, inverse probability of treatment weighting (IPTW) was used to adjust for baseline differences and long-term survival was compared between adjusted groups. As kidney transplantation after CABG greatly impacts survival, groups were further stratified into non-transplanted and transplanted cohorts.

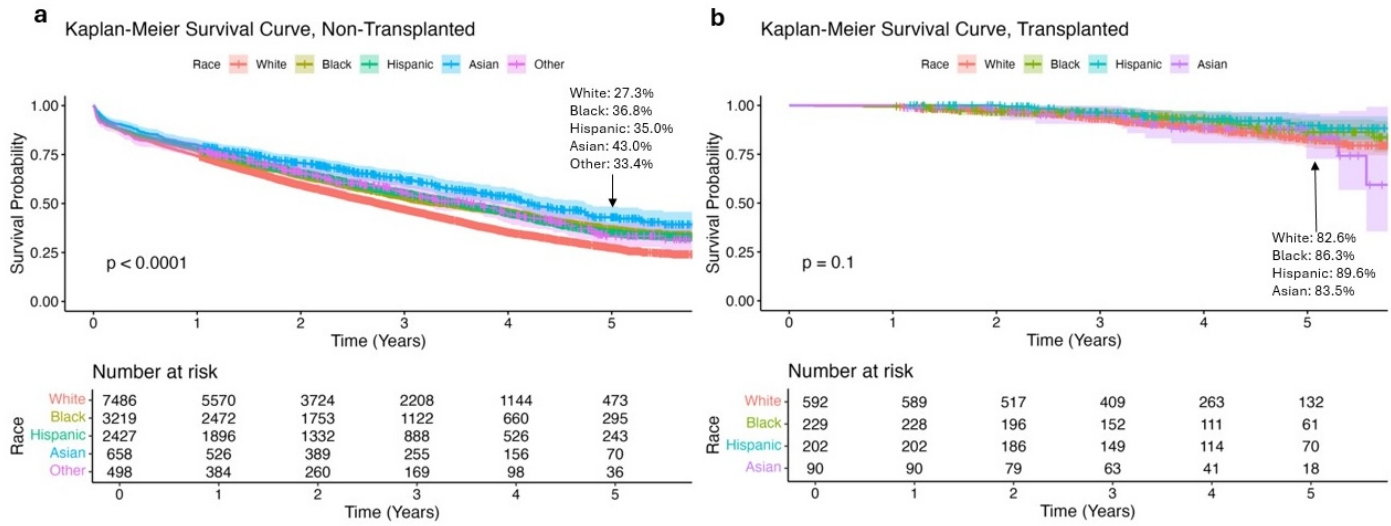
Results: In the overall, unmatched cohorts there were 15,429 patients including 8,078 white, 3,448 black, 2,629 Hispanic, 748 Asian, and 526 patients with race marked as “other” (Table 1). White patients were older ($p<0.001$), with more comorbidities such as COPD (8.1% vs. 6.0% overall, $p<0.001$) and CHF (27.3% vs. 26% overall, $p<0.001$). Black patients had the longest preoperative dialysis (1,382.5 vs. 863 days overall, $p<0.001$). Asian patients had the highest transplant rate (12%), while black and “other” had the lowest rate of transplant (6.6% and 5.3% respectively, $p<0.001$). Black patients and “other” had the highest in-hospital mortality at 7.3% and 8.4% respectively compared to 7.0% overall ($p=0.01$). After IPTW-adjustment, cohorts were well-balanced. Among non-transplanted patients, white patients had the worst 5-year survival (27.3%) compared to black (36.8%), Hispanic (35.0%), Asian (43.0%), and other (33.4%) ($p<0.0001$) (Figure 1). Among transplanted cohorts, there was no significant difference in long-term survival between races ($p=0.1$).

Conclusion: Among ESRD patients undergoing CABG with arterial grafting who do not undergo subsequent kidney transplant, these data demonstrate that white patients have lower long-term survival compared to other races. This racial disparity is mitigated in patients who undergo subsequent kidney transplant.

Table 1: Baseline, unadjusted characteristics of arterial grafting patients with ESRD stratified by race.

	Overall	White	Black	Hispanic	Asian	Other	p
Number	15429	8078	3448	2629	748	526	
Age (years)	61.00 [52.00, 69.00]	64.00 [55.00, 71.00]	57.00 [48.00, 65.00]	57.00 [50.00, 65.00]	62.00 [53.00, 68.00]	57.00 [49.00, 65.00]	<0.001
Male gender	10827 (70.2)	5979 (74.0)	2107 (61.1)	1860 (70.7)	540 (72.2)	341 (64.8)	<0.001
BMI	29.30 [25.38, 34.25]	29.60 [25.60, 34.54]	29.83 [25.72, 35.52]	28.72 [25.25, 32.98]	25.74 [22.86, 29.44]	29.43 [25.54, 34.45]	<0.001
Dialysis Duration (days)	863.00 [231.00, 1817.00]	606.50 [114.00, 1401.75]	1382.50 [490.00, 2453.50]	1080.00 [391.00, 2066.00]	906.50 [245.00, 1768.00]	1116.50 [406.25, 2076.00]	<0.001
Cause of Dialysis							<0.001
Diabetes	9473 (61.4)	4676 (57.9)	1852 (53.7)	2012 (76.5)	516 (69.0)	417 (79.3)	
Glomerulonephritis	791 (5.1)	497 (6.2)	155 (4.5)	75 (2.9)	43 (5.7)	21 (4.0)	
Hypertension	3691 (23.9)	1857 (23.0)	1214 (35.2)	407 (15.5)	149 (19.9)	64 (12.2)	
Other	1474 (9.6)	1048 (13.0)	227 (6.6)	135 (5.1)	40 (5.3)	24 (4.6)	
CHF	4018 (26.0)	2209 (27.3)	922 (26.7)	604 (23.0)	152 (20.3)	131 (24.9)	<0.001
COPD	922 (6.0)	653 (8.1)	170 (4.9)	65 (2.5)	15 (2.0)	19 (3.6)	<0.001
CVD	1244 (8.1)	717 (8.9)	291 (8.4)	163 (6.2)	48 (6.4)	25 (4.8)	<0.001
Hypertension	14090 (91.3)	7278 (90.1)	3238 (93.9)	2402 (91.4)	694 (92.8)	478 (90.9)	<0.001
PVD	1667 (10.8)	996 (12.3)	300 (8.7)	274 (10.4)	36 (4.8)	61 (11.6)	<0.001
Diabetes	11021 (71.4)	5554 (68.8)	2355 (68.3)	2114 (80.4)	570 (76.2)	428 (81.4)	<0.001
Liver Disease	353 (2.3)	207 (2.6)	57 (1.7)	58 (2.2)	12 (1.6)	19 (3.6)	0.005
PCI	142 (0.9)	80 (1.0)	27 (0.8)	19 (0.7)	12 (1.6)	4 (0.8)	0.181
Previous CABG	165 (1.1)	91 (1.1)	27 (0.8)	31 (1.2)	10 (1.3)	6 (1.1)	0.441
Hospital Mortality	1000 (6.5)	486 (6.0)	251 (7.3)	182 (6.9)	37 (4.9)	44 (8.4)	0.01
Follow-Up Years	2.24 [1.13, 3.67]	2.13 [1.06, 3.47]	2.31 [1.17, 3.81]	2.37 [1.23, 3.96]	2.59 [1.34, 4.07]	2.23 [1.15, 3.77]	<0.001
Transplanted	1141 (7.4)	592 (7.3)	229 (6.6)	202 (7.7)	90 (12.0)	28 (5.3)	<0.001

Figure 1: Kaplan-Meier survival curve among IPTW-adjusted groups by race for ESRD patients receiving arterial grafting A) Non-transplanted patients with ESRD. B) Transplanted patients with ESRD.



Case Presentation: Challenging Case: Interposition Graft of Left Anterior Descending Artery After Resection of Circumferential Hemangioma

Author List: Jessica B. Briscoe MD, Uzma Rahman MD, Nkosi H. Alvarez MD, Deven C. Patel MD, Jigesh Baxi MD, Jeremy Johnson MD PhD, AlleaBelle Bradshaw MD, Ahmet Kilic MD

Full Case Scenario: A 49-year-old with no past medical history was referred to the emergency department (ED) with complaints of 3 to 4 months of progressive worsening dyspnea on exertion and tachycardia, and a chest x-ray demonstrated a mediastinal mass. A chest CT demonstrated a large mass of 7.6 x 5.2 x 7.4 cm centered in the left suprahilar region, likely arising from the mediastinum. The mass was contiguous with and exerted mass effect on the main pulmonary artery and proximal left main pulmonary artery as well as the adjacent portion of the left atrium. The mass was contiguous with and possibly invaded the superior wall of the left ventricle (LV) with concern for compromise of the left anterior descending artery (LAD) and left circumflex (LCx) as they were found to pass through this mass. She was admitted for oncologic and cardiac surgery evaluation. On Positron Emission Tomography (PET/CT), the mass was ill-defined, inseparable from the adjacent left ventricle, with homogenous low-level activity and a Standardized Uptake Value (SUV) max of 1.3. Obtaining a biopsy was difficult due to limited access to the mass. Thus, cardiac magnetic resonance imaging (MRI) was obtained and showed a lack of invasion of the adjacent structures and findings consistent with a benign cavernous hemangioma. An echocardiogram demonstrated that the echo-dense mass had a mild compressive effect on the left ventricle (LV) and left atrium (LA) but without impacting systolic or diastolic function, with an ejection fraction at 60-65%. The patient was taken for surgical resection. The bilobar pericardial mass was lateral in the left ventricle near the left ventricular-left atrial groove, completely encompassing the left anterior descending (LAD) artery. Although the mass was tediously dissected from his adjacent structures, it became abundantly clear that it was somewhat bilobed, with the middle of the tumor essentially circumferentially abutting the proximal LAD all the way to the mid-LAD at the level of the bifurcation from a diagonal vessel. To fully excise this mass with an R0 resection, the LAD had to be transected at the proximal left anterior descending artery and the left anterior descending artery at the bifurcation of a diagonal vessel. The frozen section was sent and positive for hemangioma. After the excision of the mass, the transected end of the proximal LAD was approximately 3 mm past the bifurcation of the LCx. The distal coronary sinus at the base of the LCx was closed. Distally, two epicardial feeding veins were clipped. The edge of a diagonal vessel and the LAD required distal reconstruction. We elected to perform an endoscopic saphenous vein harvesting and subsequent greater saphenous vein interposition grafting. Direct cardioplegia was given through the os of the distal LAD and the os of the distal diagonal vessel, in addition to occluding the proximal LAD to give cardioplegia down the LCx artery. The saphenous vein graft was spatulated, reversed, and an end-to-end anastomosis between the distal LAD and was reimplanted to the proximal LAD artery. Thus, a reverse saphenous vein graft was once used to the diagonal vessel from the proximal aorta. The patient was weaned uneventfully off cardiopulmonary bypass on minimal pressor support.

Pre-Operative Imaging

Figure 1. Preoperative cardiac MRI demonstrating the large mass, 8.4 cm x 7.5 cm x 4.2 cm), compressing but not invading the left anterior wall of the left atrium, the anterolateral wall of the left ventricle, the left aspect of the aortic root and the inferior left aspect of the main pulmonary artery.

Postoperative discussion points/questions: Patients presenting with cardiac tumors that compromise coronary flow or require a coronary excision to obtain an R0 resection may require uncommon surgical revascularization techniques. A tissue biopsy is vital to a discussion on informed consent and conduit planning. However, when a biopsy is not possible, a comprehensive discussion is needed to inform patients of the possibility of extensive cardiac revascularization, the risk of a non-R0 resection to spare coronaries, patency rates, and long-term follow-up.

Abstract: Minimally Invasive Coronary Surgery: An Early Community Hospital Experience

Author List: Andrew Papoy, MD, Brock Daughtry, DO, Alexis Thomas, PA-C

Purpose: We aim to evaluate the outcomes of a new minimally invasive coronary artery surgery (MICS-CABG) program at a community hospital and compare outcomes of patients undergoing MICS-CABG to those undergoing traditional sternotomy. We also aim to highlight how outcomes have evolved between the earliest versus latest patients treated with MICS-CABG.

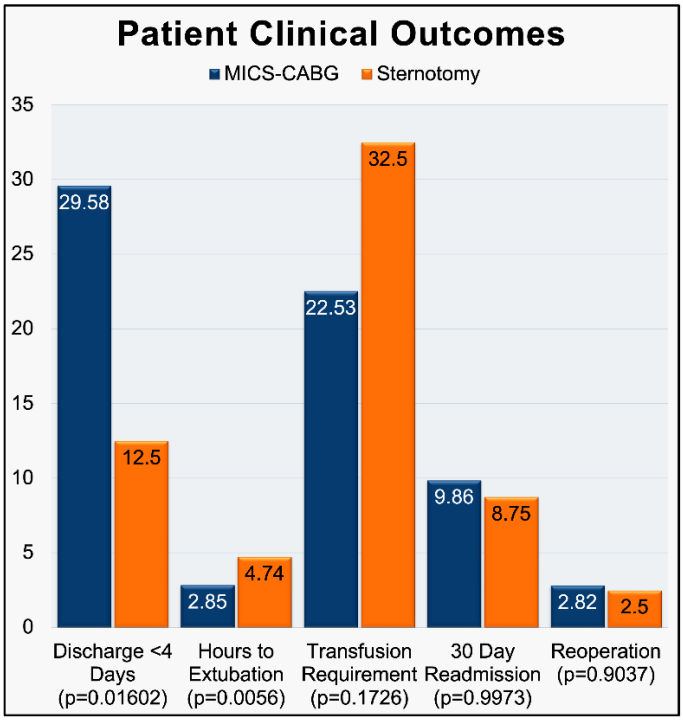
Methods: This is a retrospective review of all patients treated at a single center by a single surgeon who underwent coronary artery bypass grafting from May 1, 2024 to March 1, 2025. All patients who underwent coronary artery bypass grafting were included. There were 80 patients who underwent coronary artery bypass grafting through traditional sternotomy and 71 treated through left anterior thoracotomy. The two groups and their outcomes were then compared using 2 sample t-tests. We then analyzed the first 35 patients who underwent minimally invasive surgery to the latest 35 and compared outcomes between the two groups.

Results: A total of 151 patients underwent coronary artery bypass grafting via sternotomy (n=80) or left thoracotomy (n=71). No differences were observed in age (65.8 vs. 64.7 years, p=0.4853), gender (male: 60% (40/80) vs. 74.7% (53/71), p=0.056), or BMI (29.67 vs. 28.89, p=0.4196). The STS risk score was not statistically different between groups (2.03±1.83 vs. 1.66±2.01, p=0.2532). MICS-CABG patients had a significantly shorter time to extubation (2.849±4.03 vs 4.47±2.93 hours, p=0.0056). Patients who underwent MICS-CABG were more likely to be discharged in less than 4 days (28.17% (21/71) vs 12.5% (10/80), p=0.01602). There was one mortality in the sternotomy group. Cardiopulmonary bypass was more common in sternotomy patients, who also had a higher number of grafts (3.39 vs. 1.69, p<0.0004). Comparison between the earliest and latest patients treated with MICS-CABG shows an increase in early discharge and extubation in the operating room. The time taken per graft has decreased with experience.

Conclusion: While starting a new minimally invasive coronary surgery program is difficult, our data shows that outcomes during the initial stages of MICS-CABG are comparable to outcomes of traditional CABG. With proper patient selection, improved outcomes such as shorter intubation times and shorter length of stay may be attainable.

Table 1: Comparison of the two patient populations and their clinical and surgical outcomes.

Patient Selection Characteristics			
	MICS-CABG	Sternotomy	P value
Age	64.7±9.47	65.8±9.24	p=0.4853
Percent Male	74.65	60	p=0.056
BMI	28.89±6.37	29.67±5.32	p=0.4196
Ejection Fraction (%)	49.86±10.52	50.71±9.67	p=0.6053
STS Score (%)	1.66±2.01	2.03±1.83	p=0.2532
Patient Clinical and Surgical Outcomes			
	MICS-CABG	Sternotomy	P value
Discharge <4 days (%)	29.58 (21/71)	12.5 (10/80)	p=0.01602
Time to Extubation (h)	2.85±4.04	4.47±2.93	p=0.0056
Total Length of Stay (d)	5±3.7	5.75±3.4	p=0.1999
Number of Grafts	1.69±0.84	3.39±0.97	p<0.0004
Patients with 3 or more Grafts (%)	18.31 (17/71)	83.95 (68/81)	p<0.0004
Reoperation (%)	2.82 (2/71)	2.5 (2/80)	p=0.9037
Atrial Fibrillation (%)	23.94 (17/71)	22.5 (18/80)	p=0.8338
Transfusion Requirement (%)	22.53 (16/71)	32.5 (26/80)	p=0.1726
30 Day Readmission (%)	9.86 (7/71)	8.75 (7/80)	p=0.8146



Case Presentation: Micro-axial Ventricular Assist Device Support In High-Risk Coronary Artery Bypass Surgery With Occluded Abdominal Aorta

Author List: Gina DeFelice, Niti Dalal, Jamil Borgi, Aabha Divya

Full Case Scenario: A 63-year-old male with a history of non-insulin-dependent diabetes mellitus, hyperlipidemia, and hypertension presented with NSTEMI, post-previous percutaneous coronary intervention (Ramus intermedius 2.5 x 16mm Synergy XD DES and OM 2-2.5 x 16mm Synergy XD DES), and peripheral vascular disease presented to the emergency department with chest pain, dyspnea, and diaphoresis. His medical history was further complicated by peripheral vascular disease, characterized by celiac and superior mesenteric artery stenosis and a chronically occluded infrarenal aorta, and a previous motorcycle accident resulting in right brachial plexus injury with chronic contracture of the right upper extremity. Workup revealed significant left main calcified disease with a trifurcation lesion on coronary angiography. Transthoracic echocardiography (TTE) demonstrated an LVEF of 35% with regional wall motion abnormalities and trace pulmonary valve regurgitation. Computed tomography angiogram (CTA) of the chest, abdomen, and pelvis confirmed that the abdominal aorta was completely occluded, just distal to the origins of the renal arteries. Extensive collaterals between the internal mammary and intercostal arteries and the inferior epigastric arteries provide flow to the external and internal iliac arteries bilaterally.
The right axillary artery was found to be severely stenotic, measuring 0.6 cm in diameter.

Given the patient's multivessel coronary artery disease, a four-vessel CABG was planned. Given the severely depressed left ventricular function, IABP was initially considered for preoperative support. However, femoral access was not feasible due to the infrarenal aortic occlusion. We decided to use the Impella 5.5 via an axillary artery approach to support the patient during the perioperative period. Due to prior trauma and chronic contracture from a motor vehicle accident, the right axillary artery was unsuitable for access. Thus, an alternative approach via the left axillary artery was chosen. On completion of the coronary artery bypass grafting surgery, the patient was weaned off the cardiopulmonary bypass after optimizing the inotropes. The patient was supported on four inotropes as expected due to his poor left ventricular function. The decision was taken to place the Impella 5.5 intraoperatively. Post-weaning off the cardiopulmonary bypass, the patient remained hemodynamically stable, requiring minimal inotropic support (norepinephrine at 0.05 mcg/kg/min and dobutamine at five mcg/kg/min) with device flow rate of 3.5 L/min.

The patient was extubated on postoperative day 1 (POD 1) and was successfully weaned off vasopressor support. Over the subsequent days, he tolerated a gradual reduction in Impella support, with complete weaning achieved on postoperative day 4. Following device removal, a repeat TTE demonstrated an improved EF of 65â€“70%. The patient was subsequently transferred out of the ICU on post-removal day 2 and discharged home the following day in stable condition.

Pre-Operative Imaging

Postoperative discussion points/questions: Patients undergoing CABG with severe left ventricular dysfunction are at increased risk for postoperative low cardiac output syndrome and cardiogenic shock (1). Traditionally, IABPs have been utilized to optimize hemodynamics in these patients (2, 3). However, peripheral vascular disease and prior vascular injuries may limit vascular access options for IABP insertion.

The Impella 5.5 has been widely utilized in high-risk percutaneous coronary interventions (PCI) and cardiogenic shock (4). Our case report demonstrated that perioperative Impella 5.5 placement in a high-risk CABG candidate improved hemodynamic stability and reduced the need for high-dose inotropic and pressor support postoperatively. Additionally, it provides an ambulatory capacity, which is particularly advantageous for postoperative recovery.

Patients with PVD present unique challenges in the placement of MCS devices due to the high prevalence of arterial calcifications, stenoses, and small vessel diameters. The presence of an occluded abdominal aorta, as in the case presented, further complicates access options (3). The right axillary artery is typically preferred, but prior trauma or vascular complications precluded its use in our case. In these cases, careful preoperative imaging and alternative strategies may be necessary. We placed the Impella 5.5 via the left axillary artery. This ensured adequate ventricular unloading and circulatory support.

The Impella 5.5 provides continuous ventricular unloading, reducing myocardial oxygen demand and improving perfusion, facilitating myocardial recovery (1). Several studies have suggested that prophylactic placement of Impella 5.5 in high-risk cardiac surgery patients can mitigate perioperative hemodynamic instability, leading to improved outcomes (5).

In this case, the patient was successfully weaned off inotropic support by postoperative day 5, and Impella 5.5 was removed by postoperative day 4, confirming myocardial recovery. This aligns with findings from Ramzy et al., which reported higher survival rates in patients receiving Impella 5.5 for surgical support compared to historical controls (4).

A study by Ranganath et al. demonstrated that temporary mechanical circulatory support in high-risk CABG patients resulted in early extubation, reduced inotropic requirements, and favorable hemodynamics postoperatively (2). Similarly, this patient achieved early mobilization, transitioned to step-down care by postoperative day 6, and was discharged home by postoperative day 9.

While extracorporeal membrane oxygenation (ECMO) and durable left ventricular assist devices (LVADs) provide alternative circulatory support, these options are associated with higher bleeding risks, anticoagulation requirements, and limited mobility (6). Impella 5.5 offers superior left ventricular unloading with lower complication rates, making it a more favorable choice for temporary perioperative support (7).

Goldstein et al. emphasized that Impella 5.5 represents a paradigm shift in cardiac surgery, providing effective ventricular unloading and reducing dependence on high-dose inotropes (3). Furthermore, a study by Thalji et al. identified that patients with severe left ventricular dysfunction undergoing CABG are at significantly higher risk for postoperative mortality, suggesting that prophylactic Impella placement may improve outcomes in this subgroup (8).

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Abstract: Sticking to The Basics: Outcomes of CABG in Patients with Severely Depressed Left Ventricular Ejection Fraction

Author List: Toyokazu Endo, MD., Joshua Crane, MD., Jaimin Trivedi, MD MPH., Rohan Samson, MD., Michele Gallo, MD., Brian Ganzel, MD., Mark Slaughter, MD,, Erin Schumer, MD MPH., Siddharth Pahwa, MD

Purpose: Impella 5.5 use is gaining popularity to support patients undergoing coronary artery bypass grafting with depressed left ventricular function. We investigated our single institution CABG outcomes in those with severely depressed left ventricular ejection fraction without the use of Impella 5.5.

Methods: A retrospective analysis of patients undergoing CABG from March 2021 to March 2024 was conducted. Only patients with preoperative LVEF of ≤ 35% were included. The primary outcome was in-hospital/30-day mortality. Secondary outcomes were reoperation for bleeding, stroke, and renal failure. A subgroup analysis was further conducted to compare outcomes for patients with or without IABP support. Non-parametric tests (Kruskal-Wallis and Chi-Squared) and the Log-Rank Test were used to compare patient characteristics and outcomes (alpha = 0.05).

Results: 103 patients underwent CABG during the study period, with a median preoperative LVEF of 23% (Median LVEDD (mm): 60 (49-60), Percent of Mitral Regurgitation (â‰¥Mild): 89%). 39 (38%) patient had an IABP placed peri-operatively. More patients in the IABP group were in cardiogenic shock at the time of CABG (5% v. 41%, p<0.01) and had lower LVEF (20% v. 25%, p<0.01). Patient characteristics are noted in Table 1. Operative mortality for the entire cohort was 2% (n=2), 3 (3%) patients required re-operation due to bleeding, 1 (1%) suffered a major neurological event, and 6 (5.8%) required dialysis. The outcomes did not differ between those with or without IABP (p>0.05). The median follow-up was 375 days with an overall 1-year mortality of 3% (Figure 1). EF improved in 78% of patients with a median EF of 35% (25-45). Similarly, 58% of patients saw a reduction in their LVEDD.

Conclusion: Patients with severely depressed left ventricular function undergoing CABG can have acceptable operative outcomes without the need for advanced mechanical circulatory support device use such as Impella 5.5. Our outcome suggests that IABP is sufficient to provide patients in cardiogenic shock through high-risk CABG.

Figure 1: Overall Survival and Follow Up Data

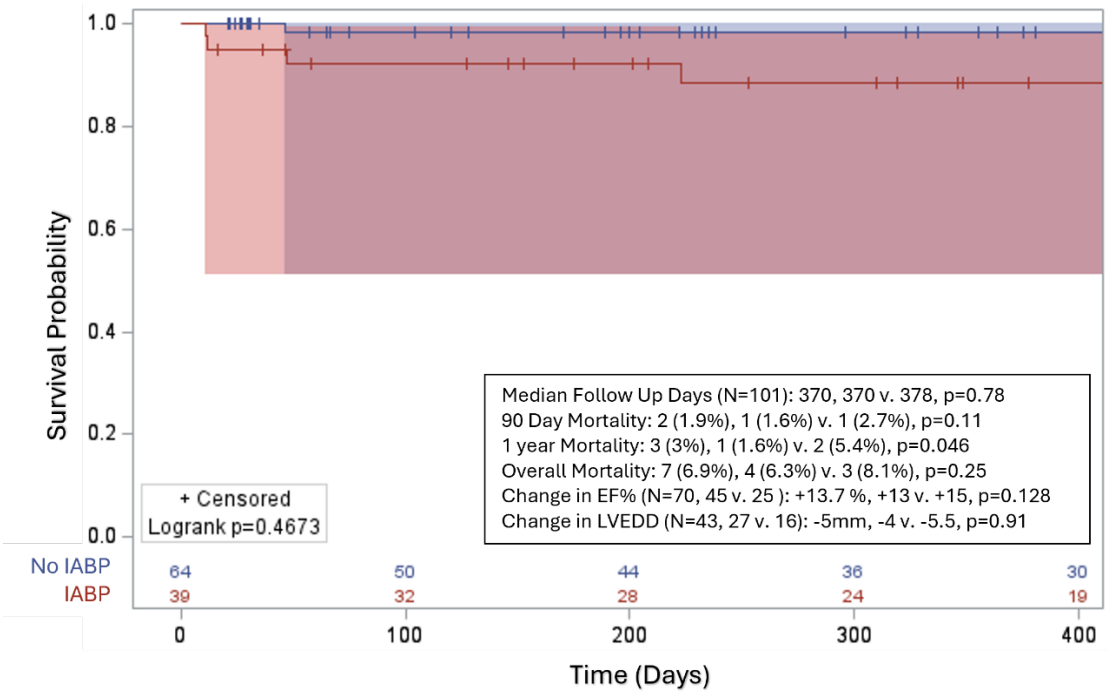

1.0
0.8
0.6
0.4
0.2
0.0
Survival Probability
+ Censored
Logrank p=0.4673
Median Follow Up Days (N=101): 370, 370 v. 378, p=0.78
90 Day Mortality: 2 (1.9%), 1 (1.6%) v. 1 (2.7%), p=0.11
1 year Mortality: 3 (3%), 1 (1.6%) v. 2 (5.4%), p=0.046
Overall Mortality: 7 (6.9%), 4 (6.3%) v. 3 (8.1%), p=0.25
Change in EF% (N=70, 45 v. 25): +13.7 %, +13 v. +15, p=0.128
Change in LVEDD (N=43, 27 v. 16): -5mm, -4 v. -5.5, p=0.91
No IABP
IABP
64
39
50
32
44
28
36
24
30
19
0
100
200
300
400
Time (Days)

Table 1

	Overall	No IABP	IABP Support	P-value
	N=103	N=64	N=39	
Age	66 (58-70)	66 (58-70)	64 (58-71)	0.9079
Gender (M)	75 (72.8)	47 (73.4)	28 (71.8)	0.8558
Race (W)	79 (76.7)	50 (78.1)	29 (74.4)	0.5761
BMI	27.3 (24-30.9)	27.9 (24.2-31.2)	26.8 (23.5-30.1)	0.4243
Insurance (Medicare)	49 (47.6)	31 (48.4)	18 (46.2)	0.5615
Risk Factors				
Hypertension	100 (97.1)	61 (95.3)	39 (100)	0.1700
Diabetes	66 (64.1)	41 (64.1)	25 (64.1)	0.9967
Tobacco Use (Current)	36 (35)	22 (34.4)	14 (35.9)	0.8751
CLD (≥Moderate)	36 (34.9)	23 (37.5)	12 (30.8)	0.4871
CKD (Dialysis)	10 (9.7)	8 (12.5)	2 (5.1)	0.2203
Prior MI	81 (78.6)	50 (78.1)	31 (79.5)	0.8700
MR (≥Mild)	89 (86.4)	53 (82.8)	36 (92.3)	0.1726
Ejection Fraction				
Pre CPB	23 (18.7-27)	25 (20-27.1)	20 (12-26.4)	0.0058
Post CPB	35 (30-40)	35 (30-40)	35 (25-40)	0.4482
Prior to Discharge	32 (25-40)	32 (27-40)	32 (25-40)	0.6024
LVEDD	60 (49-60)	55.7 (49.6-59)	57 (51.9-61)	0.4694
Cardiogenic Shock	19 (18.5)	3 (4.7)	16 (41.3)	<0.0001
Elective Operation	28 (27.2)	22 (34.4)	6 (15.4)	0.0280
CABG Alone	86 (83.5)	54 (84.9)	32 (82.1)	0.5767
Number of Bypass				0.0759
1	8 (7.8)	5 (7.8)	3 (7.7)	
2	37 (35.9)	20 (31.3)	17 (43.6)	
3	49 (47.6)	36 (56.3)	13 (33.3)	
4	9 (8.7)	3 (4.7)	6 (15.4)	
Inpatient Outcomes				
Death	2 (1.9)	0 (0)	2 (5.1)	0.0673
ReOp for Bleeding	3 (2.9)	1 (1.6)	2 (5.1)	0.2966
CVA/TIA	1 (1)	1 (1.6)	0 (0)	0.4328
Renal Failure (Dialysis)	6 (5.8)	1 (1.6)	5 (12.8)	0.0180
Coronary Revascularization	0 (0)	0 (0)	0 (0)	1
MI	0 (0)	0 (0)	0 (0)	1
Cardiac Arrest	1 (1)	0 (0)	1 (2.6)	0.1980
MCS (Shock)*	4 (3.9)	0 (0)	4 (10.3)	0.0090

Median (IQR), N (%)

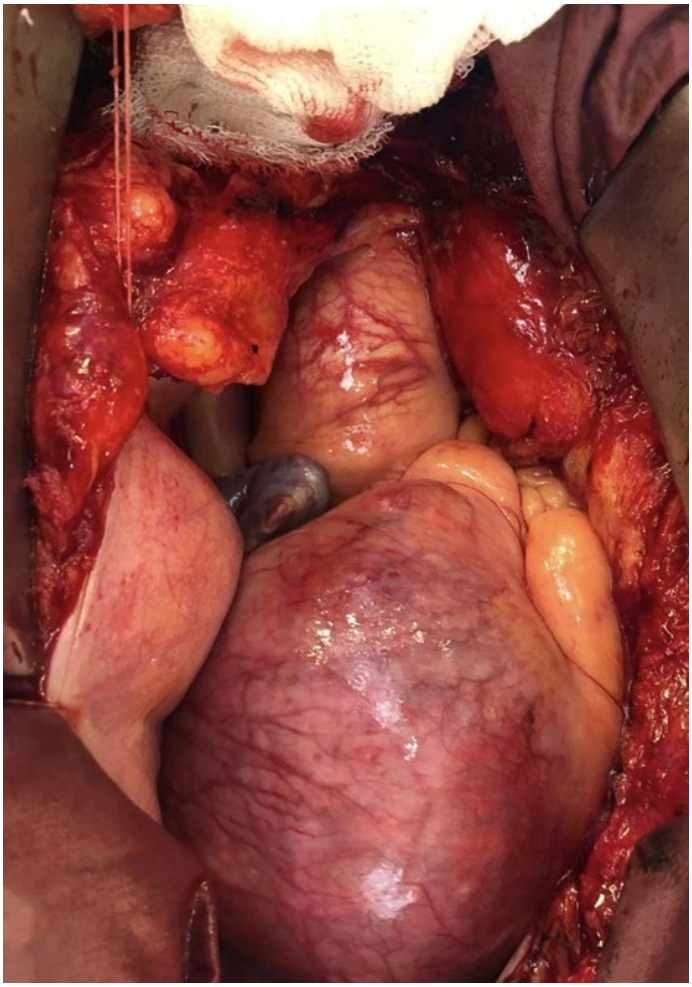
M: Male, W: White, CLD: Chronic Lung Disease, CKD: Chronic Kidney Disease, MI: Myocardial Infarction, MR: Mitral Regurgitation, LVEDD: Left Ventricular End Diastolic Diameter (mm), CPB: Cardiopulmonary Bypass, CABG: Coronary Artery Bypass Graft, CVA: Cerebral Vascular Attack, TIA: Transient Ischemic Attack, MCS: Mechanical Circulatory Support, *MCS: Impella Device, or VA-ECMO Post Op

Case Presentation: Giant right coronary aneurysm: right chambers restriction

Author List: Marcelo J Figueroa, MD, Daniel A Blangino, MD, Martina Canavesio, MD

Full Case Scenario: 73-year-old male patient, with history of high blood pressure, former smoker and a melanoma resection surgery. During surveillance of the melanoma, a chest CT revealed a giant right coronary aneurysm (80 mm x 72 mm) with compression of the right atrium and right ventricle, producing hemodynamic repercussion in both cavities. A cardiac MRI showed akinesia of the inferior wall with transmural necrosis of those segments.
Left ventricular ejection fraction: 41%, right ventricular ejection fraction: 51%. It also showed an aneurysm of the left anterior descending artery (7 mm). The coronary angiography confirmed the presence of both aneurysms and a total obstruction of the posterior descending artery. The surgical indication in this case is due to the high risk of rupture of the giant aneurysm and the hemodynamic repercussion. Other possible complications are thrombosis, embolization and fistula to right cavities. We carry out the procedure with femoral arterial and venous cannulation previous full median sternotomy. Del Nido cardioplegia was delivered via the aortic root, followed by the opening of the aneurysm. We observed a large amount of clots and necrotic material inside. We identified the in-flow and the out-flow of the aneurysm, which were carefully excluded from the outside of the aneurysmal sac. We also perform a marsupialization of the sac in order to occlude the remaining surface. During the postoperative period, the patient developed cardiogenic shock that required maximum doses of multiple inotropes, probably as a result of right ventricle failure. Subsequently, the patient went through multiple complex clinical events: acute renal failure, prolonged intubation, tracheostomy, distal phalangeal necrosis of both feet, nosocomial pneumonia, urinary infection; which were slowly resolved, getting discharged at POD #62. Four years later, an echocardiogram showed a preserved biventricular function.

Pre-Operative Imaging



Postoperative discussion points/questions: We have to be aware of the consequences of the sudden decompression of the right chambers, the most critical being the development of right ventricular failure in the early post operative period.

In this case, the main indication for surgery was the low ejection fraction of the right ventricle in consequence of the mass effect caused by the giant aneurysm.

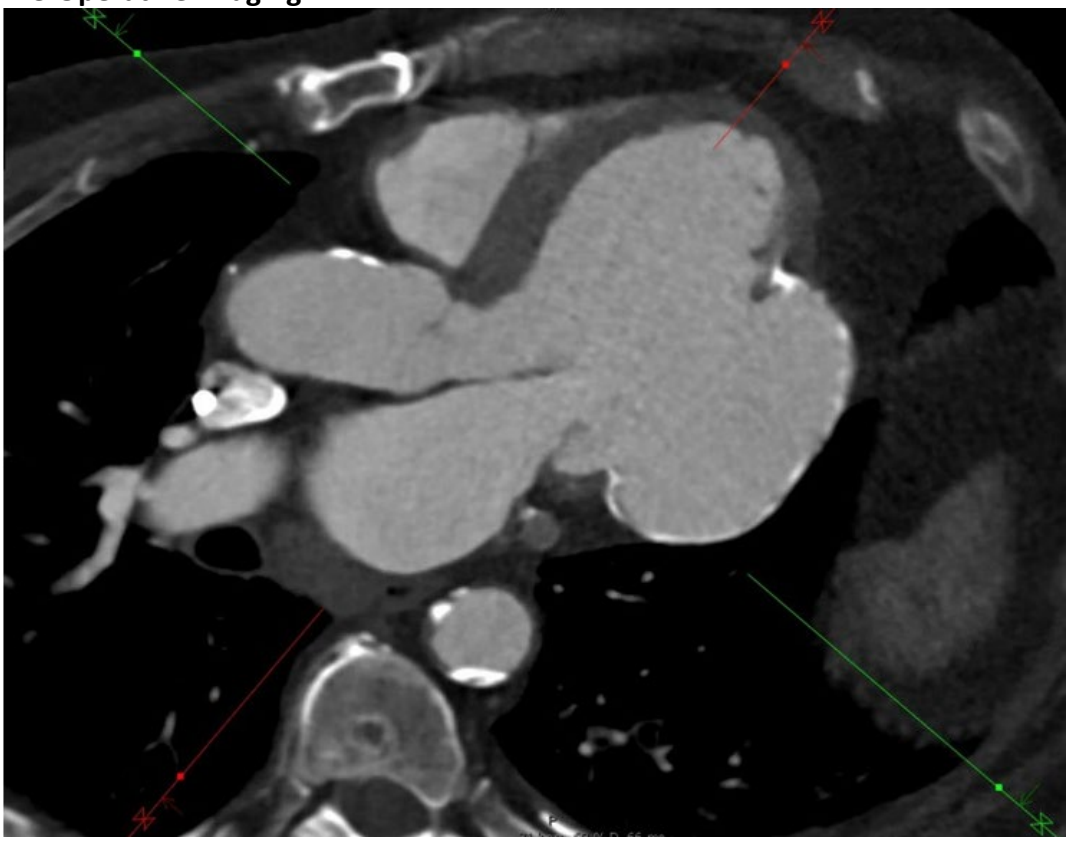
Case Presentation: Post-Infarct Left-Ventricular Aneurysm and Severe Mitral Regurgitation Following Prior CABG: a Case Report

Author List: Miia Lehtinen, MD PhD, Duc Thinh Pham, MD

Full Case Scenario: We present a case of a 71-year old male with coronary bypass graft operation (CABG) in 1990s and known, untreated lateral wall left-ventricular (LV) aneurysm, and now severe functional mitral regurgitation. His left internal mammary artery graft (LIMA) to left anterior descending artery remained patent; vein grafts to posterior descending artery and left obtuse marginal artery were occluded. He was asymptomatic. Given the slight increase in LV aneurysm size and its thin wall, transcatheter interventions for mitral valve were deemed too risky.

Given the previous CABG and a patent LIMA graft, multiple alternative techniques for cardiac protection were prepared for. As the LIMA graft was successfully identified intraoperatively, we used antegrade root cardioplegia together with direct retrograde cardioplegia with LIMA clamped. The thin and calcified LV aneurysm was resected and defect repaired with two bovine pericardial patches. Mitral valve was replaced with a tissue valve. Postoperative echocardiography showed normal LV size, ejection fraction 35%, well-seated prosthetic mitral valve. He was discharged home on postoperative day 7. One month after surgery he is recovering well and has resumed his daily activities. His postoperative computed tomography imaging is scheduled for 4/16/2025.

Pre-Operative Imaging



Postoperative discussion points/questions: Post-infarct ventricular aneurysm and functional MR have been described but this is the first report of delayed treatment of concomitant post-

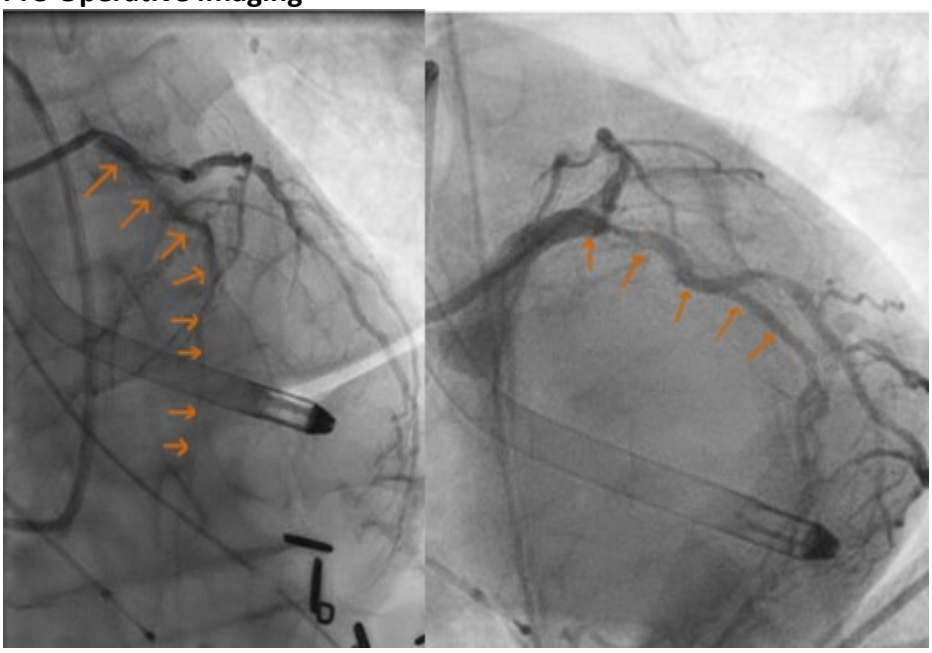
infarct LV aneurysm and severe MR. This case report underscores 1) the evolving, long-term nature of CAD, leading to multiple different surgical pathologies in a patient's lifetime; 2) the complexity of a redo operation after a prior CABG regarding cardiac protection when patent grafts are present.

Case Presentation: Protected PCI with Impella 5.5: A Clinical Perspective

Author List: Rohit Ponnada, BS; Lolita Golemi, MD; Shilp Arora, MD; Div Verma, MD; Anh Le, MD; Hersh Maniar, MD; Chien-Jung Lin, MD

Full Case Scenario: A 74-year-old male with extensive smoking history, hypertension, restrictive lung disease, peripheral artery disease, and abdominal aortic aneurysm – for which he received endovascular aneurysm repair (EVAR) 6 years prior – presented complaining of chest heaviness and shortness of breath. An EKG revealed a combination of an ST elevation in the aVR lead with diffuse ST depression and elevated high sensitivity troponin at 192 ng/L, which established a diagnosis of NSTEMI with subendocardial ischemia. An echocardiogram revealed a severely reduced ejection fraction of 13% along with a dilated right ventricle and abnormal left ventricular wall motion. Cardiac catheterization revealed severe 3-vessel coronary artery disease with 100% proximal right coronary artery (RCA) chronic total occlusion, and severe left main (LM)/left anterior descending (LAD)/left circumflex (LCX) bifurcation stenosis, and severe distal aorta/bilateral iliac in-stent thrombosis. The patient was evaluated by the multidisciplinary revascularization heart team. Coronary artery bypass graft (CABG) was deemed prohibitively risky, whereas mechanical circulatory support was deemed necessary with severely depressed cardiac function. Due to severe aortoiliac stenosis, the commonly used Impella 3.5 device was deemed not the best option. Instead, the Impella 5.5-protected PCI was planned to avoid passage through the distal aorta. The patient underwent elective Impella 5.5 implant via a graft created on the left axillary artery. The patient underwent orbital atherectomy LM/LAD/LCX bifurcation stenting without issues. The patient was subsequently extubated and Impella 5.5 explanted on POD2.

Pre-Operative Imaging



Postoperative discussion points/questions: Impella 5.5 heart pump is an alternative approach to protected PCI in patients with severe peripheral vascular disease. While Impella 5.5 insertion requires surgical grafting, this approach provides superior hemodynamic support and avoids

the aortoiliac severe stenosis. This strategy allows high-risk patients with significant medical history to undergo complex revascularization who would otherwise be deemed unsuitable for standard PCI.

Case Presentation: Complex Concomitant Coronary Surgery: Mitigating Postoperative Ventricular Arrhythmias via Combined Cardiac Sympathetic Denervation, Coronary Artery Bypass Grafting and Aortic Valve Replacement

Author List: Likitha Aradhyula, MS, Brian S Pritchard, BSN, Kumar Sanam, MD, Nikolai V Kolotiniuk, MD, Shamsuddin Khwaja, MD, Heidi J Reich, MD

Full Case Scenario: Purpose: Risk aversion in cardiac surgery is evolving. Reperfusion during coronary surgery, ventricular dysfunction and valve dysfunction impact myocardial arrhythmogenicity. Best practice to reduce postoperative ventricular arrhythmias following high risk concomitant coronary surgery is not defined. The addition of cardiac sympathetic denervation to high risk open cardiac surgery is a new strategy.
Methods- In this retrospective case report, preoperative characteristics, operative techniques and postoperative outcomes including echo and implantable cardioverter defibrillator data at 6 month follow-up were assessed.
Results: Following recurrent heart failure admissions, syncope and sustained ventricular arrhythmias terminated by implantable cardioverter defibrillator, a 77-year-old male was evaluated for high risk cardiac surgery. Clinical characteristics are summarized in Table 1 and Figure 1. Bilateral T1-T4 thoracoscopic sympathectomy and partial stellate ganglionectomy followed by coronary artery bypass grafting and aortic valve replacement with pre-emptive direct aortic insertion of a temporary left ventricular assist device were performed. Temporary left ventricular assist device was removed postoperative day 4 and patient was discharged postoperative day 14. At 6 months follow up, patient reported no heart failure symptoms, readmissions, compensatory hyperhidrosis, or Horner's Syndrome. He has been weaned off antiarrhythmic medications with no interim syncope, defibrillator discharges or sustained ventricular arrhythmias detected. Biventricular function by transthoracic echo was stable.
Conclusion - This is the first report of successful combined cardiac sympathetic denervation and high-risk open heart surgery, with coronary artery bypass grafting, aortic valve replacement and temporary left ventricular assist device.

Pre-Operative Imaging

Table 1. Preoperative Clinical Data

STS Operative Mortality Risk	Left ventricular ejection fraction	Right ventricular systolic function	Aortic Valve function	Mitral Valve function
4.73%	25-30%, moderate dilation	Mild depression	Severe insufficiency	Moderate-severe regurgitation

Figure 1. Left heart catheterization image showing 60-70% proximal left anterior descending in-stent restenosis and presence of implantable cardioverter defibrillator.

Postoperative discussion points/questions: Patient selection and risk factors for postoperative ventricular arrhythmias after cardiac surgery
Technical considerations in performing cardiac sympathetic denervation when complex concomitant coronary surgery, including left internal mammary harvest, is planned
Treatment algorithm for medical and surgical strategies to reduce postoperative ventricular arrhythmias following high risk concomitant coronary surgery
Potential complications of combined cardiac sympathetic denervation and complex concomitant coronary surgery

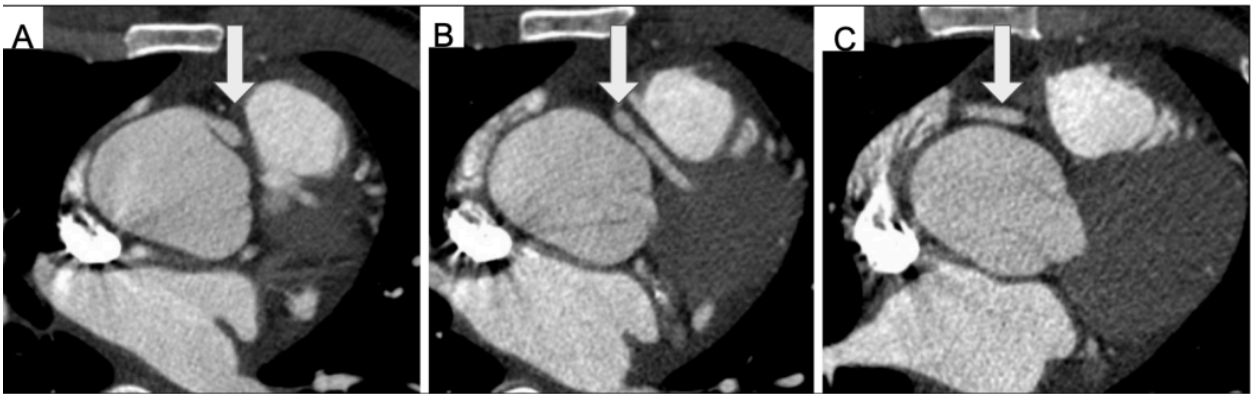
Case Presentation: Single Coronary Origin with associated Dilated Aortic Root and Myocardial Bridging of LMCA

Author List: Hanna Sams, MD, Jon Reimer, MD, Athanasios Tsiouris, MD, Ashok Kumar Coimbatore Jeyakumar, MD, Gopinath Perumal, MD

Full Case Scenario: A 42 year old African American male patient presented following out of hospital cardiac arrest. CPR performed for 11 minutes at home. EMS arrived, patient defibrillated for VF, ROSC obtained, intubated and transferred to hospital for evaluation. TTE revealed a dilated aortic root to 48 mm with moderate AI, tricuspid aortic valve, LVEF 50-55% . Coronary CT scan revealed a single coronary origin from the leftward aspect of right coronary sinus with interarterial course of LMCA, RCA arising from LMCA as the first branch. The LMCA distal to origin of RCA had an intraconal course of 2cm posterior to MPA with septal branches. A coronary angiogram confirmed the CT findings. Patient was discussed extensively in a multidisciplinary cath conference and decision made to proceed with mechanical bentall, intra aortic unroofing of coronary origin, LMCA myocardial bridge division and MPA translocation to LPA with RPA angioplasty.
A median sternotomy performed and CPB established with aortic arterial and bicaval venous cannulation. Aortic cross clamp applied and cardioplegia administered through retrograde cannula and patient cooled to 28 degrees. The single coronary trunk and proximal aspect of LMCA and RCA dissected circumferentially. The LMCA was followed with myocardial bridging noted, coronary myotomy performed for length of 2 cm to relieve coronary compression. Coronary button harvested which required unroofing of a 0.5 cm segment with intramural course for adequate mobilization. The aortic leaflets excised and a 25 mm OnX component graft placed. The decision was made to translocate the MPA towards the LPA to allow adequate room for the coronary button reimplantation and prevent interarterial compression. The MPA transected proximal to confluence, the LPA opened and MPA to LPA anastomosis completed with 5.0 prolene. A triangular pericardial patch placed on the RPA defect. This allowed for an additional 3 cm between the dacron conduit and MPA to prevent compression. Both reducing the 48 mm root to 26 mm graft and moving the MPA to LPA by 3 cm allowed adequate room to prevent future coronary compression The coronary button anastomosed to dacron graft with 5.0 prolene. The distal aortic anastomosis performed with 4.0 prolene as patient rewarmed. Aorta de-aired and clamp removed in standard fashion. Patient weaned from CPB uneventfully with normal ventricular function and adequate hemostasis.

Post operative TEE showed adequate prosthetic valve function, good biventricular function and no gradient from MPA to LPA. Patient underwent endocardial AICD placement as a precautionary measure prior to discharge and was discharged on the eighth postoperative day. Patient was discharged on anticoagulation for mechanical valve and resumed on antihypertensives. CT scan at 1 month follow up obtained with common coronary button widely patent and increased diameter between aortic root and main pulmonary artery origin.

Pre-Operative Imaging



Postoperative discussion points/questions: A number of hypotheses exist as to the proposed mechanism causing cardiac ischemia in these patients found to have coronary anomalies. Coronary anomalies can present in a variety of ways from asymptomatic to sudden cardiac arrest, depending on both the location of the origin and the course of the anomalous artery. Each case requires a specialized surgical approach depending on the pathology. The most well described surgical approaches being unroofing, reimplantation, pulmonary artery translocation, ostioplasty, and coronary artery bypass grafting.

The Bentall procedure was initially described as a solution for ascending aortic root aneurysm with or without aortic valve disease. The modified Bentall procedure requires mobilization of a â€œcoronary buttonâ€ with circumferential aortic tissue to allow reimplantation to graft and maintain coronary circulation. In our case the decision made to utilize the modified Bentall procedure was to both address the dilated aortic root of 48 mm and as a way to address the interarterial compression of single coronary origin.

This patient presented with the most severe and dreaded complication that can occur with anomalous coronary origins, being out of hospital sudden cardiac arrest. A combination of techniques that have been described in the literature were required to address this complex presentation of a dilated aortic root along the single coronary origin. Unroofing of the intramural course of LMCA was required. However, additional techniques such as supra arterial myotomy to address the myocardial bridge and translocation of the MPA to prevent further compression of the coronary button greatly increased the complexity of this case. Coronary anomalies can be fatal if not recognized and treated appropriately. The collaboration of a multidisciplinary heart team is crucial for success.

Case Presentation: Surgical Correction of a Coronary Fistula Between the Left Anterior Descending Artery and the Pulmonary Artery Trunk: A Case Report

Author List: Karlos Jennysson Sousa Soares, MD, MSc; Heraldo Guedes Lobo Filho, MD, PhD; Saul Landim, MD; Thiciane Coelho, MD; Marco Aurelio Barroso Aguiar, MD; Fabiano Gonçalves Jucá, MD

Full Case Scenario: A 73-year-old female patient with an ascending aortic aneurysm, moderate aortic insufficiency and complaints of dyspnea on moderate exertion (NYHA II). She had no history of cardiovascular disease, smoking, dyslipidemia or hypertension.
The electrocardiogram showed sinus rhythm with no ischemic or overload alterations. Transthoracic echocardiography showed moderate dilatation of the left atrium and left ventricle, preserved ejection fraction and anomalous flow in the pulmonary artery, suggesting communication with the coronary circulation. Angiotomography not only showed the ascending aortic aneurysm, but also confirmed the presence of a fistula between the anterior descending artery and the pulmonary artery trunk, with a tortuous and large-caliber path, without significant stenosis in the rest of the coronary arteries. Coronary cineangiography was performed, showing a tortuous course of the anterior descending artery and its communication with the pulmonary artery trunk.
Given the magnitude of the shunt, the risk of coronary steal, the unfavorable anatomy for a percutaneous approach and the timing of the surgery to repair the ascending aortic aneurysm, the decision was made to surgically repair the coronary fistula. The procedure was performed by median sternotomy with cardiopulmonary bypass and cold anterograde crystalloid cardioplegia. After identifying the fistula, it was distally ligated with a continuous 5-0 polypropylene suture. The anterior descending artery was preserved without the need for revascularization. The surgery was uneventful.
Postoperatively, the patient was hemodynamically stable, with progressive reversal of ventricular dilation. The control echocardiogram showed no signs of residual flow. She was discharged from hospital on the seventh postoperative day in good general condition, asymptomatic and with scheduled outpatient follow-up.

Pre-Operative Imaging

Fig1.: Distal closure of the anterior descending artery fistula leading to the pulmonary artery trunk, using 5-0 polipropylene.

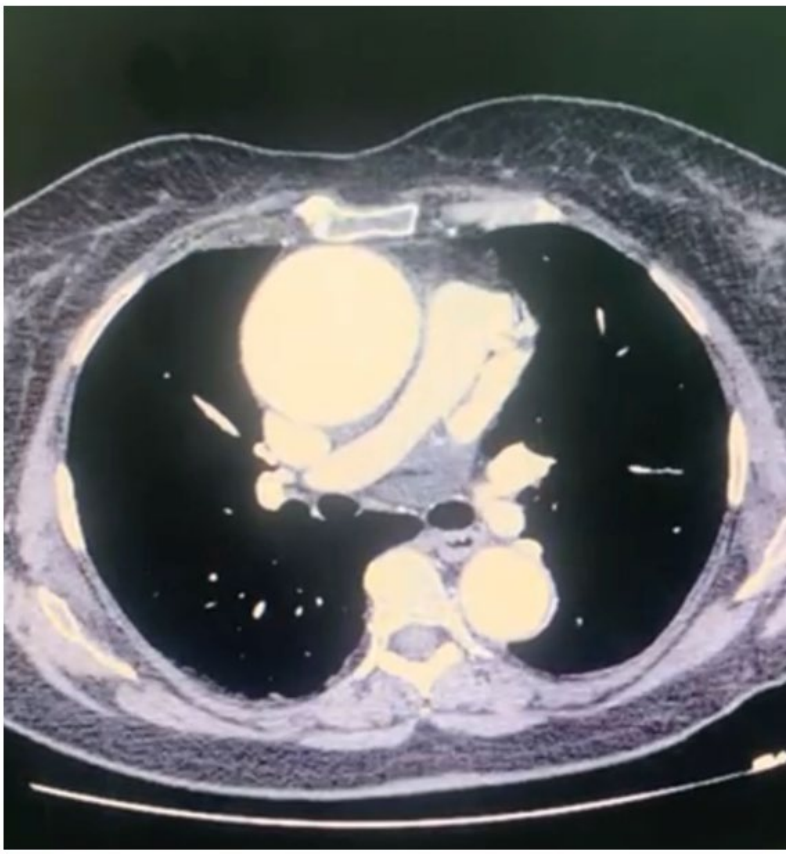


Fig2: AngioCT showing ascending aortic aneurysm and fistula Leading descending anterior artery to pulmonar artery

Fig. 3: Coronary angiography showing extravasation of contrast from the anterior descending artery into the pulmonary artery trunk

Fig. 4: Coronary angiography showing extravasation of contrast from the anterior descending artery into the pulmonary artery trunk

Fig. 5: Coronary angiography showing extravasation of contrast from the anterior descending artery into the pulmonary artery trunk

Postoperative discussion points/questions: Coronary fistulas represent a rare anomaly of the coronary system, with significant anatomical and clinical variability. In this case, we highlight a voluminous fistula from the anterior descending artery (LAD) to the pulmonary artery trunk (PAD), an infrequent configuration, responsible for less than 10% of the CFs described (1,3).
The clinical presentation can vary from an incidental finding on imaging tests to cases of myocardial ischemia, congestive heart failure and infective endocarditis (5,6). In our patient, the fistula was identified during an assessment of a continuous murmur and confirmed by angiotomography, an exam that has proved useful in the non-invasive anatomical characterization of these anomalies (7).
The therapeutic decision must take into account the size of the fistula, the shunt output, the presence of symptoms and the anatomy of the fistulous tract. The American Heart Association guideline recommends closing symptomatic fistulas with a large output or risk of complications, preferably using a minimally invasive approach when possible (9). However, the tortuous anatomy, high caliber and proximity to the pulmonary artery trunk make many of these cases unsuitable for percutaneous closure, as occurred in this patient.
Surgical repair, although invasive, is still the gold standard in large, multiple fistulas associated with aneurysms, or with anatomy unfavorable to percutaneous embolization (8,10). The direct approach with ligation of the fistulous tract, with or without the need for revascularization, depends on the intraoperative assessment of coronary perfusion after occlusion of the anomalous tract. In this case, the anterior descending artery remained patent and with adequate flow, requiring no additional intervention.
The clinical and anatomical success of the surgical correction in this case illustrates the importance of individualized and multidisciplinary assessment in the management of CFs. Outpatient follow-up is essential for early detection of recanalization or residual ventricular dysfunction.
Conclusion

Coronary fistulas, although rare, should be considered in the differential diagnosis of continuous murmurs and symptoms of myocardial ischemia in patients without significant atherosclerotic lesions. The fistula between the anterior descending artery and the pulmonary artery trunk, as in the present case, represents an unusual anatomical variant with the potential for important hemodynamic repercussions.

The choice of therapeutic strategy must be individualized, taking into account the anatomy of the fistula, the presence of symptoms and the risk of complications. Surgical repair remains a safe and effective option in complex cases or those that are not candidates for percutaneous treatment. Clinical and echocardiographic follow-up after the intervention is essential to monitor the recovery of cardiac function and prevent recurrences.

This case reinforces the importance of the multidisciplinary approach in the diagnosis and treatment of coronary fistulas, as well as the role of cardiac surgery as a resolving tool in specific situations.

Case Presentation: Urgent CABG in a patient with porcelain aorta: challenges of surgical management

Author List: Stetsyuk I., MD, PhD, Nechai I., MD, Mokryk I., MD, PhD, Todurov B., Prof., MD, PhD, Bitsadze O., MD, PhD, Stetsyuk L., MD, PhD.

Full Case Scenario: Urgent CABG in patients with porcelain aorta is a challenging dilemma in terms of: preoperative assessment time, bypass technique, choice of conduit, and selection of proximal anastomotic site due to the high incidence of thromboembolism and aortic injury. We present a successful case of treating severe coronary artery disease combined with severe ascending aorta calcification through OPCAB approach using SVG as a graft and innominate artery as a proximal anastomosis site.

Our patient a 66-year-old male was brought to us by ambulance with complaints on severe retrosternal pain and decreased tolerance to the minimal physical exertion. During the history taking, we discovered that he suffered MI 17 years ago. He is an active heavy smoker and has been smoking more than 50 years. Also, his medical history was significant for erythematous gastropathy and duodenal peptic ulcer disease in remission.
The patient was hemodynamically unstable. Troponin I ratio was increased up to 1,1. ECG showed sinus rhythm and ST-elevation. On EchoCG impairment of the global LV systolic function was detected.
Coronary angiography revealed subtotal occlusion of LAD – 98%, subtotal occlusion of LCx – 99% and ostial stenosis of the proximal portion of RCA – 90%. There was perfusion of LAD and LCx trough PDA collateral branches. The signs of severe calcification of the aortic wall were detected.
Besides, we noticed signs of severe calcification of the aortic wall on CAG. According to guidelines CT scans of the ascending aorta should be considered in patients over 70 years of age and/or with signs of extensive generalized atherosclerosis. But performing a CT scan under urgent conditions remains non-standardized. We have avoided the CT-scanning as we considered the evidence of porcelain aorta on CAG images to be sufficient. So, we expected to reveal a porcelain aorta during the operation. Due to severity of coronary artery disease, increased cardiac markers, unstable hemodynamical condition and porcelain aorta the patient was qualified for urgent surgery.
Each decision and surgical step were performed under urgent conditions due to hemodynamic instability of patient. We detected severe calcification of ascending aorta upon intraoperative examination.
According to guidelines off-pump CABG and preferably no-touch aorta techniques on the ascending aorta are recommended in patients with significant atherosclerotic aortic disease. OPCAB method was chosen because aorta was unsuitable for cannulation and femoral arteries were not controlled for calcification due to urgency.
According to guidelines arterial grafting with an IMA to the LAD system is recommended. Use of radial artery is recommended over the saphenous vein in patients with high-degree stenosis. LIMA and radial artery were not harvested due to lack of time under urgent conditions. We decided to rapidly harvest SVG in order to achieve the fastest possible revascularization. A patient-level meta-analysis pooling six RCTs comparing radial artery vs SVG states that despite a significantly lower risk of occlusion at follow-up angiography, no difference in all-cause

mortality was found. In fact, revascularization with SVG is a preferable strategy of revascularization under urgent conditions in our Institution. LCx was not appropriate for grafting due to extremely small diameter. Two separate distal anastomoses were constructed: SVG to LAD, SVG to PDA

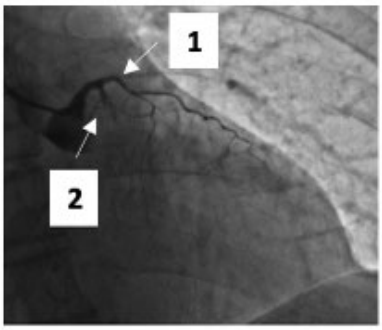
Aorta was unsuitable as a cite for proximal anastomosis construction. Innominate artery was selected as a site for proximal anastomoses as it was free from calcium plaques. It was a unique experience to construct proximal anastomoses in such place for our team. Two proximal anastomoses were constructed on side-clamped innominate artery. We do not possess the enclose proximal anastomosis device. The usage of devises is proven to decrease the incidence of stroke but their application may prolongate the operation time and lead to excessive blood loss.

Postoperative Coronary Angiography on Video 1 and Video 2 demonstrate patent venous graft from innominate artery to LAD and PDA one month after surgery, so we achieved sufficient revascularization. We do not control the graft patency with CAG routinely. In this case the decision was made because the patency of the graft could be compromised with calcium plaques.

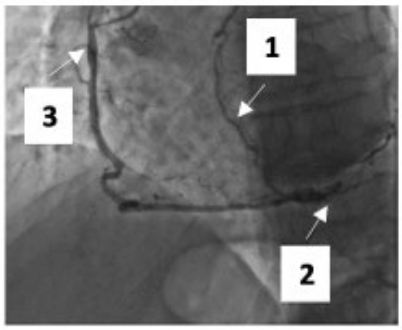
Operation was completed in a regular fashion. Total operation time was 150 min. Patient was brought to ICU in a stable hemodynamic condition. No mechanical circulatory support was necessary. He was extubated after 4 hours postoperatively.

His ICU stay was 2 days, insignificant for any major complications. Postoperative course was uneventful. No neurological event had occurred. Patient was discharged from hospital on postoperative day 6.

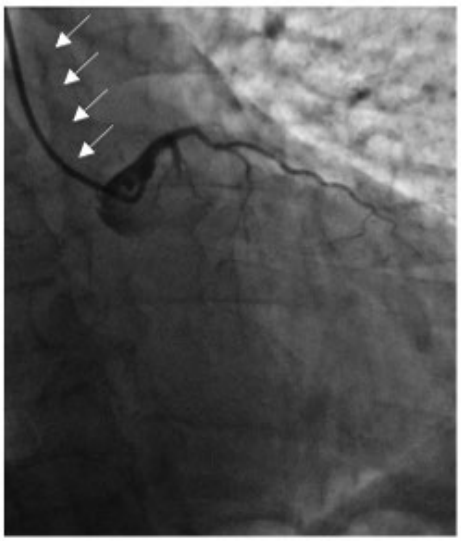
Pre-Operative Imaging



1- LAD; 2 – LCx



1 - LAD; 2 – LCx; 3 – RCA



Calcification of the ascending aorta

Postoperative discussion points/questions: The prevalence of porcelain aorta has been reported as to 7.5% in patients requiring cardiac surgery so the combination of urgent CABG and porcelain aorta is rare.

Alternative anastomotic methods, alternative cannulation sites, and off-pump techniques are all potential tools to avoid operative and postoperative complications.

The guidelines on myocardial revascularization state that reperfusion therapy is indicated in all patients with time from symptom onset <12h duration and persistent ST-segment elevation. Emergency CABG is recommended for patients with cardiogenic shock if the coronary anatomy is not amenable to PCI [258]. Our patient had a severe three-vessel coronary artery disease with anatomy that was unfeasible for PCI.

We want to conclude with:

1. Preoperative evaluation of urgent coronary patient is challenging due to time limitation.
2. No-touch aorta is technique of choice in case of porcelain aorta.
3. OPCAB for a patient with porcelain aorta is an optimal and safe strategy to treat coronary arteries disease.
4. SVG may be a preferable graft under urgent conditions.

5. Innominate artery may be a suitable site for constructing proximal anastomosis in case of porcelain aorta.

Abstract: Coronary artery bypass surgery on a beating heart as a safe method of surgical revascularization in high-risk patients with multifocal atherosclerosis in patients with coronary and lower limb arteries diseases.

Author List: Cheveliuk Olexander, MD, Arthur Gabriyelyan,DSci(Med), Olexander Cheveliuk, MD

Purpose: For coronary artery disease, every 5th patient suffers from peripheral artery disease that requires surgical correction. The choice of the optimal myocardial revascularization method, should the patient has critical lesions of the lower extremities and coronary arteries, ability to perform operations simultaneously, are the unresolved issues at the moment.

Methods: We analyzed he results of treatment of 48 patients with combined lesions of the coronary arteries and arteries of the lower extremities for the period from 2016 to 2024, simultaneously underwent surgery. Coronary artery revascularization in all patients was performed using the method of coronary bypass surgery on a beating heart. The first stage was coronary bypass, next - revascularization of the arteries of the lower extremities. The indication for simultaneous operations was the presence of critical lesions of both coronary arteries and lower limb arteries with the threat of acute myocardial infarction or limb loss.

Results: During coronary bypass surgery, mammary arteries were used as grafts in all 48 patients (100%), radial arteries in 8 (16%), gastro-omental arteries in 4 (8%), and venous autografts in 30 (63%) patients. The average number of grafts was 2.8 Â± 0.6 per patient. The postoperative period was smooth in 43 (90%) patients. No major adverse cardiac events were recorded. In the postoperative period, none of the patients experienced complications such as myocardial infarction or increased lower limb ischemia. There were no fatalities. In the postoperative period, 2 (4%) patients had signs of a mild transient ischemic attack, with rapid regression of clinical symptoms within 2 hours after the intervention. In no case were complications associated with thrombosis of vascular grafts or hemorrhagic complications associated with prolonged heparinization observed. Our results demonstrated that simultaneous operations in this category of patients can be performed safely and effectively.

Conclusion: Simultaneous interventions allow avoiding ischemic complications associated with postponing the next stage, which involves revascularization of other affected basins. Coronary artery bypass surgery on a beating heart allows for safe myocardial revascularization in patients with multifocal lesions of the coronary arteries and arteries of the lower extremities.

Abstract: Utilization of multi-arterial CABG in the United States: a real-world analysis of surgeons' perspectives

Author List: Nicholas J. Goel MD, Aidan P. Crowley BS, Alexandra E. Sperry MD, Michael A. Catalano MD, Chase R. Brown MD MS, Nimesh D. Desai MD PhD

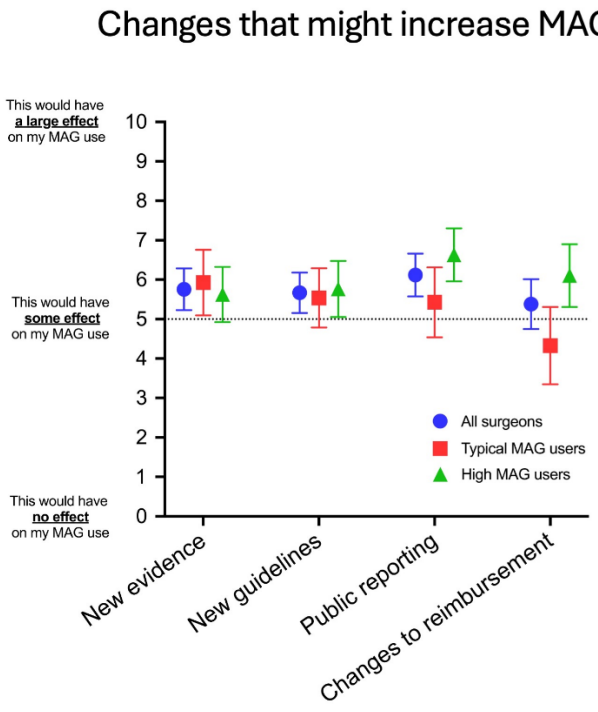
Purpose: Despite guideline recommendations, the rate of multi-arterial grafting (MAG) for CABG in the United States is far lower than in peer countries, has declined in the last 20 years, and varies widely from surgeon to surgeon. The reasons for uneven MAG utilization among US surgeons are not well understood.

Methods: A nationwide survey was conducted to better understand the real-world perspectives of US cardiac surgeons on MAG use. An anonymous survey was distributed by email to all Society of Thoracic Surgeons members in the US who are non-retired attending surgeons that primarily practice adult cardiac surgery. The survey contained detailed questions regarding surgeons' background, surgical practice, clinical decision-making, perceived barriers to MAG use and other topics. All data were self-reported. Responses were compared among surgeons who identified as "typical MAG users" (<20% of CABGs involve MAG) and "high MAG users" (≥20% of CABGs involve MAG).

Results: The survey was distributed to 1,919 eligible surgeons and completed by 141 (7.3%). Among respondents, 56 (40%) identified as typical MAG users and 85 (60%) as high MAG users. Between these groups, very few differences were identified in surgeons' background, practice, or case-mix including no difference in overall experience, exposure to MAG in training, case volume, CABG volume, or age of CABG patients (Table 1). The clearest difference between typical and high MAG users was their interpretation of existing evidence. Typical users were less likely to believe MAG offers survival benefit (71% vs 91%, p=0.006) or better long-term patency (70% vs 93%, p=0.001) and more likely to believe MAG is associated with higher risk of complications (38% vs 17%, p=0.009). Among four different theoretical policy/society-level interventions aimed at increasing MAG use, incorporating MAG use into publicly-reported quality metrics was rated most effective by surgeons (6.1 out of 10) (Figure 1).

Conclusion: A large nationwide survey of practicing US cardiac surgeons was conducted to understand perspectives affecting MAG utilization. We identified intriguing differences in how surgeons interpret existing evidence and tested their opinion on proposed policy changes. These data are crucial to explaining and potentially improving MAG utilization in the US.

Figure: Surgeons' opinions on policy changes to increase MAG utilization in the US



Rate (0-10) the degree to which each of the following theoretical changes would increase your MAG utilization.

1. New data If new data were published from one or more high-quality studies (including randomized controlled trials) that favored MAG over SAG for important outcomes.

2. New guidelines If consensus guidelines from societies of cardiac surgeons and cardiologists assigned stronger recommendation for MAG use than they do currently.

3. Public reporting If MAG utilization was accounted for in public rating systems for cardiac surgery similar to how LIMA utilization in CABG is accounted for.

4. Changes to reimbursement If reimbursement for CABG changed such that MAG utilization was reimbursed more favorably than it is now.

Table:

Variable	Total Sample (n = 141)	MAG use < 20% (n = 56, 39.7%)	MAG use ≥ 20% (n = 85, 60.3%)	P value
Surgeon background				
US Region				
Midwest	35 (24.8%)	11 (19.6%)	24 (28.2%)	0.18
Northeast	42 (29.8%)	15 (26.8%)	27 (31.8%)	
West	24 (17.0%)	14 (25.0%)	10 (11.8%)	
South	39 (27.7%)	15 (26.8%)	24 (28.2%)	
Other	1 (0.7%)	1 (1.8%)	0 (0.0%)	
Years in practice, mean ± SD	17.8 ± 10.6	19.3 ± 10.5	16.7 ± 10.5	0.16
Exposure to MAG in training				
Yes	96 (68.1%)	37 (66.1%)	59 (69.4%)	0.71
Not at all	45 (31.9%)	19 (33.9%)	26 (30.1%)	
Practice setting				
Primary payment model				
RVU	21 (14.9%)	8 (14.3%)	13 (15.3%)	0.40
Salary	110 (78.0%)	42 (75.0%)	68 (80.0%)	
Locums or other	10 (7.1%)	6 (10.7%)	4 (4.7%)	
Practice ownership model				
Hospital owned	127 (90.1%)	46 (82.1%)	81 (95.3%)	**0.038**
Privately owned	10 (7.1%)	7 (12.5%)	3 (3.5%)	
Locums or other	4 (2.8%)	3 (5.4%)	1 (1.2%)	
Academic center	56 (39.7%)	18 (32.1%)	38 (44.7%)	0.19
Mammary harvester				
Surgeon only	100 (70.9%)	45 (80.4%)	55 (64.7%)	0.07
Assistant or trainee	41 (29.1%)	11 (19.6%)	30 (35.3%)	
CABG practice and case mix				
Major cardiac cases annually				
0 - 50	2 (1.4%)	1 (1.8%)	1 (1.2%)	0.79
51 - 100	22 (15.6%)	11 (19.6%)	11 (12.9%)	
101 - 200	74 (52.5%)	29 (51.8%)	45 (52.9%)	
201 - 300	36 (25.5%)	12 (21.4%)	24 (28.2%)	
301 - 400	7 (5.0%)	3 (5.4%)	4 (4.7%)	
Proportion of surgical practice that is CABG				
0% - 25%	18 (12.8%)	5 (8.9%)	13 (15.3%)	0.43
26% - 50%	38 (27.0%)	14 (25.0%)	24 (28.2%)	
51% - 75%	57 (40.4%)	27 (48.2%)	30 (35.3%)	
> 75%	28 (19.9%)	10 (17.9%)	18 (21.2%)	
Median age of CABG patient				
56 - 60	1 (0.7%)	0 (0.0%)	1 (1.2%)	0.15
61 - 65	15 (10.6%)	4 (7.1%)	11 (12.9%)	
66 - 70	68 (48.2%)	22 (39.3%)	46 (54.1%)	
71 - 75	48 (34.0%)	25 (44.6%)	23 (27.1%)	
> 75	1 (0.7%)	1 (1.8%)	0 (0.0%)	
Unsure	8 (5.7%)	4 (7.1%)	4 (4.7%)	
Referring cardiologists express preference for conduit choice?				
No	53 (37.6%)	25 (44.6%)	28 (32.9%)	**0.030**
Yes, but rarely	67 (47.5%)	28 (50.0%)	39 (45.9%)	
Yes, frequently	21 (14.9%)	3 (5.4%)	18 (21.2%)	

Abstract: In-Hospital and 1-Year Outcomes of Isolated CABG Patients Requiring Pre-Operative Inotrope Therapy

Author List: Sabet Hashim, MD, Raymond McKay, MD, Ayyaz Ali, MD, Susane Collazo, RN, Anthony Tristani, Cesar Andres Rubio-Ramos

Purpose: A subset of patients referred for isolated CABG require preoperative inotrope for ventricular dysfunction with a depressed cardiac output secondary to ongoing myocardial ischemia and/or recent myocardial infarction. This study sought to determine in-hospital and 1-year clinical outcomes of isolated CABG patients requiring inotropic agents within 48 hours preceding surgery.

Methods: Retrospective analysis was made of an institutional CABG database with all data elements defined by the STS national registry. Late clinical outcomes were assessed from the electronic medical record.

Results: From a total cohort of 2,880 isolated CABG patients treated between 1/1/17 and 9/30/23, 35 patients required preoperative inotrope use. The study group included patients with a mean age of 62±14 years and an STS Risk Score of 13.9±13.13.2%. Pre-operative testing demonstrated a LV ejection fraction of 31.9±13.3%. Cross Clamp and Perfusion times averaged 66.1±18.7 and 97.8±33.3 minutes, respectively. Mechanical circulatory support was required in 20 patients including IABP use in 19 (54.3%) and V-A ECMO in 1 (2.9%).

In hospital all-cause mortality was 1 (2.9%) and 1-year mortality was 5 (14.3%).Total ICU stay averaged 137.0±76.6 hours with a postoperative length of stay of 10.3±6.0 days. A total of 5 patients (14.3%) were discharged on inotrope therapy. Follow up ECHO showed increase in LV EF with 40.8±9.0% in 30- day follow up and 40.2±14.0% in 1-year follow up.

Conclusion: In this single center study, high-risk patients requiring inotropic support in the 48 hours preceding isolated CABG with a preoperative STS Risk Score of 13.9% had an acceptable in-hospital and 1-year all-cause mortality, with a progressive post-discharge increase in LV ejection fraction.

Abstract: Anatomical Variations of the Circumflex Artery Diameter and Its Relationship with the Mitral Valve Annulus in Left- and Right-Dominant Hearts: Implications for Preoperative Assessment of Iatrogenic Injury

Author List: Mohamed Madan Medical student MD, Noor Abdulla Medical student MD, Quds Alsaadi Medical student MD, Shaima Almushaifri Medical student MD, Rawan Almaqbali Medical student MD, Saleh Almukta Medical student MD, Anil Kumar, Assistant professor in Anatomy MD

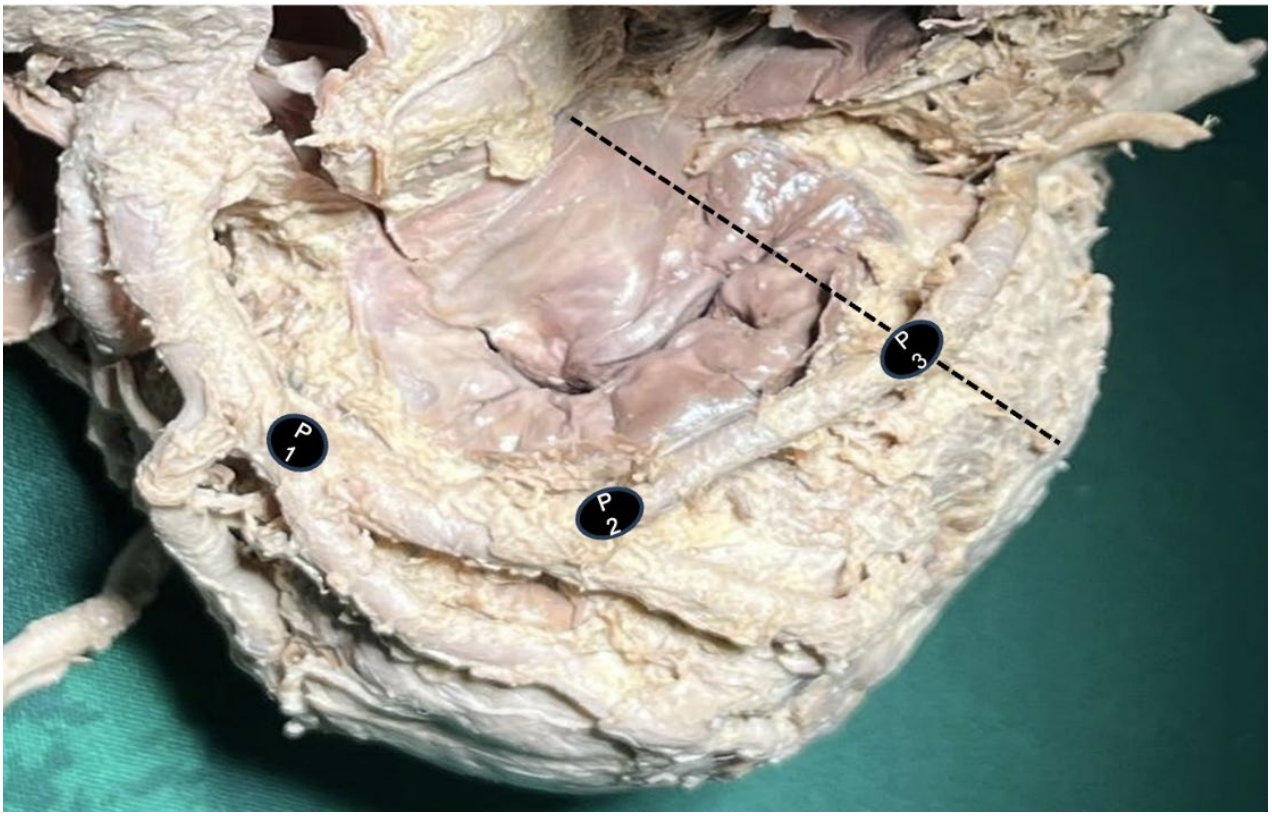
Purpose: The circumflex (Cx) artery's proximity to the mitral valve (MV) poses a surgical risk, with iatrogenic injury occurring in 0.15%–4% of cases. While studies link left dominance to higher risk, the relationship between Cx diameter and MV annulus remains unexamined. This study fills that gap, aiding preoperative risk assessment.

Methods: The study examined autopsied hearts and divided them into coronary dominance groups. Three locations were used to estimate the diameter of the CX artery: the origin (Point 1), the midpoint (Point 2), and the termination at the posteromedial commissure of the Mitral Valve (Point 3) as indicated in Figure 1. A vernier caliper was used to measure diameters and cusp lengths, while distances were measured using a metric thread. Statistical analysis included Kolmogorov-Smirnov and Shapiro-Wilk tests, One Way Anova test, Kruskal Wallis, Mann-Whitney, and student t-test.

Results: A total of 29 hearts were analyzed (20 right-dominant [69%] and 9 left-dominant [31%]). Left-dominant hearts had larger Cx artery diameters at all three points compared to right-dominant hearts, with the greatest difference at Point 1 (0.07 mm, $p = 0.179$) and the smallest at Point 2 (0.02 mm, $p = 0.526$). However, Cx artery diameter did not significantly vary from Point 1 to Point 3 in either dominance type. Conversely, right-dominant hearts exhibited a larger MV diameter (2.8 mm vs. 2.62 mm, $p = 0.144$) and longer cusps (1.7 mm vs. 1.45 mm, $p = 0.347$), except for posterior cusp height, which was greater in left-dominant hearts (1.96 mm vs. 1.69 mm, $p = 0.923$).

Conclusion: This study found no statistically significant association between coronary dominance and Cx artery or MV diameters. These findings suggest that coronary dominance may not be a reliable preoperative risk assessment indicator for iatrogenic Cx artery injury. Further studies with larger sample sizes and radiological correlation are needed to confirm results.

Figure 1



Abstract: Analysis of Robotic Assisted Minimally Invasive direct CABG Procedures Utilizing Combination of Intraoperative ICGA and Transit Time Flowmeter Testing

Author List: Akshat Modi, MS, Nishil Mehta, Uday Dasika, MD

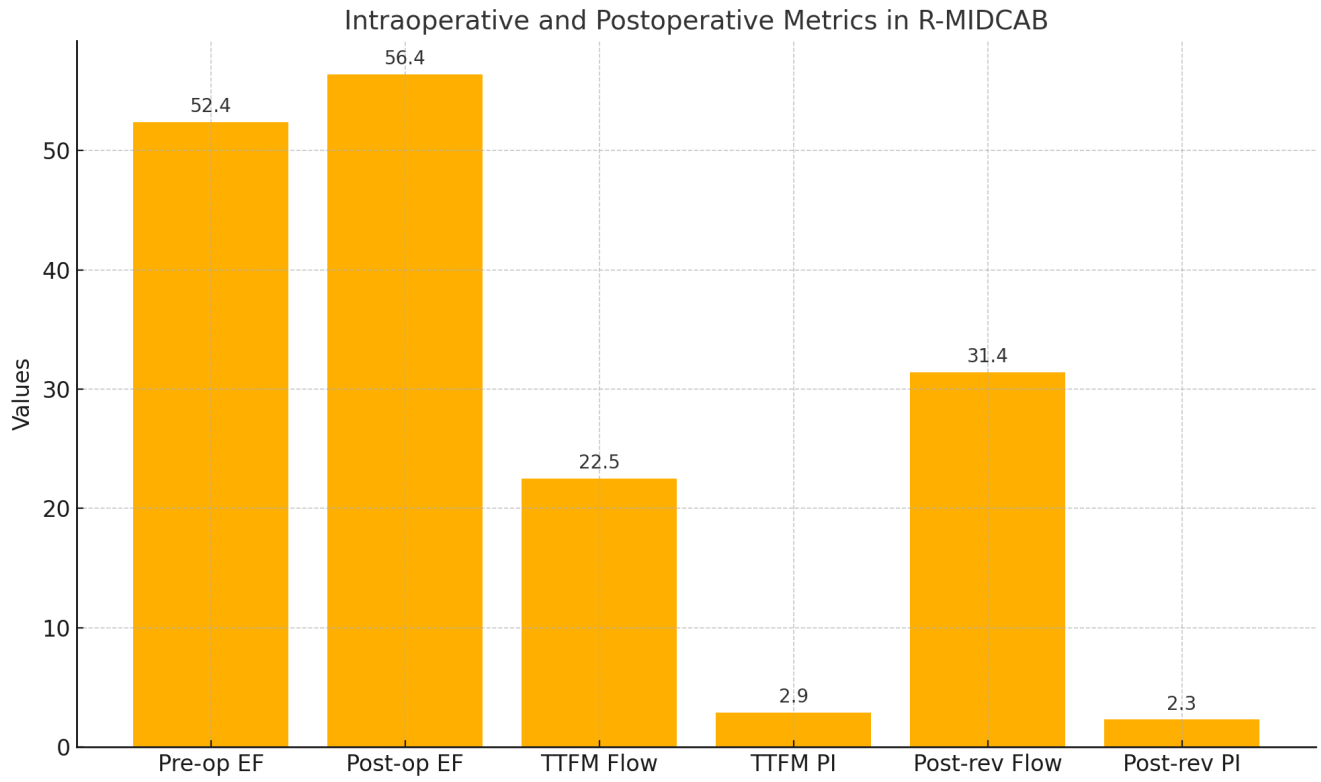
Purpose: Robotic-assisted minimally invasive direct CABG (R-MIDCAB) reduces morbidity while preserving surgical durability. Ensuring LIMA-LAD graft patency is essential. While ICGA and TTFM are individually used to assess grafts, their combined use is understudied. This study is among the first to evaluate the clinical utility of both modalities during R-MIDCAB.

Methods: We conducted a single-surgeon, retrospective review of 78 patients who underwent robotic-assisted CABG at Reading Hospital between May 2022 and June 2024. Both ICGA and TTFM were employed intraoperatively to assess graft patency. Preoperative risk factors (e.g., BMI, comorbidities, STS risk scores) and laboratory values were collected. Patients with incomplete intraoperative imaging data, dye allergies, or coagulopathies were excluded. Outcomes were assessed at 30-day follow-up, including changes in ejection fraction (EF), postoperative complications, and length of stay (LOS).

Results: The cohort was predominantly male (80%) with a mean age of 67.3 years. The average BMI was 32.0 kg/mÂ², with 40% of patients classified as obese. Elevated preoperative troponin (>6 ng/mL) was observed in 40% of patients. ICGA provided high-resolution visualization in all cases and was critical in confirming LIMA-LAD patency. TTFM showed mean flow of 22.5 mL/min and a mean pulsatile index (PI) of 2.9. Intraoperative revisions occurred in 10% of cases due to suboptimal flow metrics, with improved values following correction (mean flow: 31.4 mL/min, PI: 2.3).
At 30-day follow-up, EF significantly improved from a baseline mean of 52.4% (±13.5) to 56.4% (±11.6) ($p = 0.04$). Mean hospital LOS was 5.6 days. Complications included atrial fibrillation (10%), pleural effusion (5%), and wound infections (3%). Elevated BMI, diabetes, and high troponin levels correlated with prolonged LOS and increased complication rates.

Conclusion: This study highlights the clinical value of combining ICGA and TTFM for intraoperative graft assessment in R-MIDCAB. The dual-modality approach enhances intraoperative decision-making, facilitates early identification of technical issues, and may improve early postoperative outcomes. Our findings support the routine implementation of this combined strategy in robotic coronary revascularization.

Figure: Intraoperative and Postoperative Metrics in R-MIDCAB



Abstract: Low Molecular Weight Heparin vs Unfractionated Heparin for DVT Prophylaxis after Coronary Bypass Grafting

Author List: Michael D. Nguyen, BSA; Puja D. Patel, DO, Andre Y. Son, MD, MS

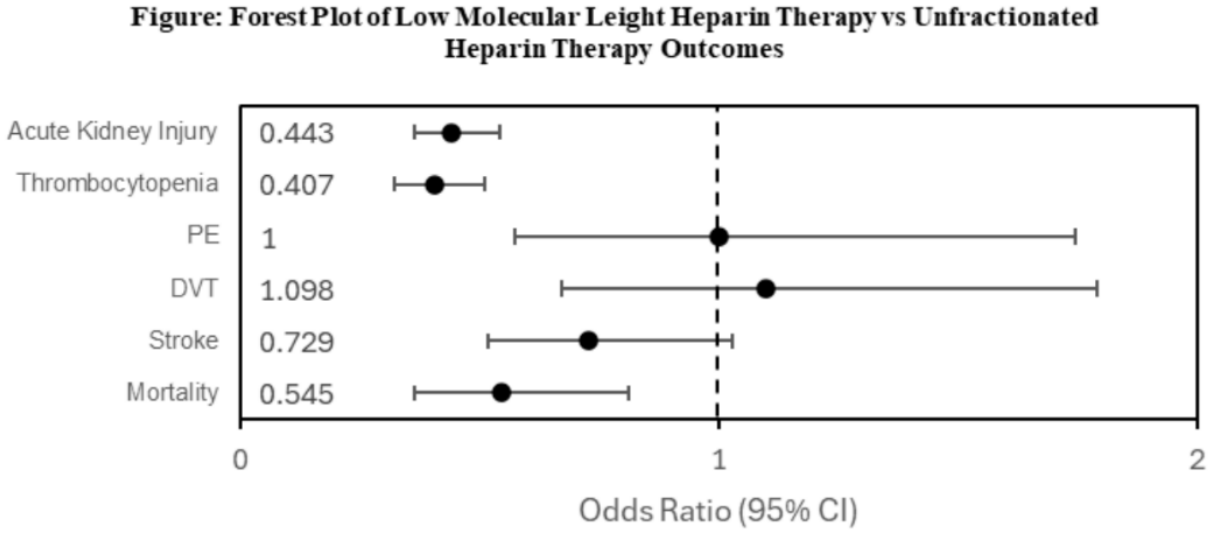
Purpose: Deep vein thrombosis (DVT) is a significant complication in patients undergoing coronary artery bypass grafting (CABG) and requires effective prophylactic anticoagulation. This study, leveraging the TriNetX global health research network, aimed to compare the outcomes of low molecular weight heparin (LMWH) versus unfractionated heparin (UFH) for DVT prophylaxis after CABG.

Methods: Data were extracted from 104 healthcare organizations (HCOs) within the TriNetX platform. Two cohorts were defined: Cohort 1 included 3,268 patients who received LMWH and Cohort 2 included 6,698 patients who received UFH. Propensity score matching was employed to balance demographic and clinical characteristics between the cohorts, ensuring comparability. The analysis examined six primary outcomes: death, stroke, DVT, pulmonary embolism (PE), thrombocytopenia, and acute kidney injury (AKI). Outcomes were assessed over a 30-day post-operative period using risk analysis, Kaplan-Meier survival curves, and measures of association, including risk difference, risk ratio, and odds ratio.

Results: After propensity score matching, there were 3,117 LMWH patients and 3,117 UFH patients. LMWH had decreased mortality risk compared to UFH (1.2% vs. 2.2%; OR 0.54 (95% CI 0.37, 0.81), P<0.01). LMWH had less risk for thrombocytopenia (3.5% vs. 8.2%; OR 0.41 (95% CI 0.32, 0.51), p<0.01) and acute kidney injury (4.8% vs. 10.2%; OR 0.44 (95% CI 0.36, 0.54, p<0.001)). Rates of thromboembolic events were comparably low after either LMWH or UFH: stroke (1.9% vs. 2.5%), deep vein thrombosis (1.1% vs. 1.0%), or pulmonary embolus (0.8% vs. 0.8%). Kaplan-Meier survival analysis showed higher survival probabilities in the LMWH cohort (98.74% vs. 97.75%, p<0.01).

Conclusion: Both LMWH and UFH appear to perform well for thromboembolic prevention. However, LMWH may improve outcomes after CABG compared to UFH by reducing mortality, thrombocytopenia, and acute kidney injury. The findings suggest that LMWH may be preferable for DVT prophylaxis after CABG.

Figure: Forest Plot of Low Molecular Weight Heparin Therapy vs Unfractionated Heparin Therapy Outcomes



Abstract: Evaluating Clinical Decision-Making in Hybrid Coronary Revascularization: A Comparative Analysis of ChatGPT-4o and OpenEvidence

Author List: Kevin Palmer, MD, MPH, Tamir Bresler, MD, Yamann Sahlool, MD, Nels Carroll, MD

Purpose: This study assessed the ability of two large language models (LLMs), ChatGPT-4o (OpenAI, San Francisco, CA) and OpenEvidence (Cambridge, MA), to provide accurate recommendations for complex coronary revascularization scenarios using guideline-based clinical standards.

Methods: Forty clinical scenarios were constructed using the European Society of Cardiology Working Group on Cardiovascular Surgery and European Association of Percutaneous Cardiovascular Interventions position paper on Hybrid Coronary Revascularization (HCR). Cases were input into both ChatGPT-4o and OpenEvidence without additional prompting. Responses were independently scored using a 5-point Likert scale: 5 = completely correct, 4 = correct with minor clarification, 3 = correct but incomplete, 2 = partially incorrect, 1 = completely incorrect. The primary outcomes were median score, interquartile range (IQR), and proportion of acceptable responses (score â‰¥ 4). A Wilcoxon signed-rank test was used to compare model performance.

Results: The median score was 5.0 (IQR 4.0–5.0) for ChatGPT-4o and 4.0 (IQR 4.0–5.0) for OpenEvidence. ChatGPT-4o achieved perfect scores (5) in 72.5% of responses compared to 45.0% for OpenEvidence. The Wilcoxon signed-rank test revealed a non-significant trend favoring ChatGPT-4o ($p = 0.088$). Acceptable responses (score ≥ 4) were 92.5% for ChatGPT-4o and 100% for OpenEvidence. Variability in performance between models was not statistically significant ($p = 0.741$, Levene's test).

Conclusion: Both ChatGPT-4o and OpenEvidence demonstrated high performance in clinical decision-making for hybrid coronary revascularization. While ChatGPT-4o achieved more perfect scores, OpenEvidence provided more consistently acceptable responses. These findings highlight the promise of both general-purpose and domain-specific LLMs in supporting evidence-based cardiovascular care.

Abstract: POST OPERATIVE OUTCOME OF CORONARY ARTERY BYPASS GRAFT SURGERY IN PATIENT WITH AND WITHOUT RENAL DYSFUNCTION AT TERTIARY CARE HOSPITAL, KARACHI

Author List: UZMA BAIG, ASAF SHAH, MOHAMMAD BASHIR, RIZWAN AZIZ MEMON, MUHAMMAD ASAD BILAL AWAN, ASIF RAZA RATHOR

Purpose: 1. To determine the frequency of renal dysfunction in patients undergoing coronary artery bypass graft surgery at Tertiary Care Hospital, Karachi.
2. To determine the postoperative outcome of coronary artery bypass graft surgery in patients with and without renal dysfunction at Tertiary Care Hospital, Karachi.

Methods: Quantitative and qualitative data was collected, presented and analyzed. Effect modifiers were controlled through stratification to see the effect of these on the outcome variable. Post stratification chi square test was applied taking p-value of â‰¤0.05 as significant.

Results: A total of 135 patients who met the inclusion and exclusion criteria were included in this study. Mean age and duration of CABG in our study was 62.39±10.49 years and 3.72±2.24 hours. 68 (50.4%) and 67 (49.6%) were male and female. Out of 135 patients, 79 (58.5%) and 56 (41.5%) had and did not have renal dysfunctional. Patients who had renal dysfunction had higher mortality, prolonged ventilation and prolonged postoperative stay.

Conclusion: Renal dysfunction significantly impacts patient outcomes, contributing to increased morbidity, prolonged hospitalization, and elevated mortality rates. By implementing targeted interventions and monitoring protocols, healthcare providers can mitigate the risk of renal impairment, ultimately enhancing the overall success and safety of CABG procedures.

Abstract: Pre-Operative Computer Tomography Chest in Stratifying Patients Undergoing Coronary Surgery detects Sarcopenia – A simplified, objective test

Author List: Jaishankar Raman, MBBS FRACS PhD, Pouya Nezafati, MD, Craig McFarlane, PhD, Lionel Hebbard, PhD, Pankaj Saxena, MBBS FRACS PhD

Purpose: Sarcopenia is assessed by evaluation of functional muscle strength and imaging of muscle. Previous studies have used psoas muscle imaging as a marker of sarcopenia in cardiothoracic surgery. The use of pectoralis major muscle (PMM) imaging defined sarcopenia frompre-operative CT Chest in patients undergoing coronary artery surgery is described.

Methods: 148 isolated Coronary Artery Bypass Grafting (CABG) and 49 concomitant CABG and valve surgery patients with pre-operative CT Chest from 2019 to 2023 were studied. PMM slice at the level of Thoracic Vertebra 4, Muscle Area, Density and Thickness measurement dimensions were performed by a radiologist replicated by residents. PMM was segmented by drawing a region of interest (ROI) along the edge of the right and left PM. PM area (PMA) and PM thickness (PMT) were evaluated. Sarcopenia cut-off value was defined as the lowest sex-specific quartile in PMA and PMT, validated by functional muscle strength tests.

Results: Cut-off values for PMM dimensions among the patients were calculated to be 1045 mm2 and 609 mm2 for male and female, respectively. Thickness cut-off values were calculated to be 12 cm in male and 8 cm in female.
Functional muscle strength as per the Revised European Working Group of Sarcopenia in Older People 2 (EWGSOP). was assessed in 30 patients from the cohort. Handgrip strength with cut-off points of < 16 kg and < 27kg in female and male, respectively, and 5-time chair rise test of > 15 seconds were considered positive for sarcopenia. Objective functional muscle strength assessment of sarcopenia was confirmed in 10 patients stratified within the PMM CT Chest defined sarcopenia according to PMA and PMT.
Time taken for the assessment of PMM dimensions per patient was less than one minute, with the test reliably replicated by resident staff. T

Conclusion: CT chest is being utilized pre-operatively in many patients undergoing coronary artery and valvular surgery. Measurement of pectoralis muscle dimensions such as PMA and PMT, can be assessed quickly using a CT chest to objectively define sarcopenia as a risk stratifying tool.

Abstract: Primary Contributing Factors Leading to Early Readmissions in Patients Undergoing Coronary Artery Bypass Grafting in a Low- to Middle-Income Country: A Retrospective Cohort Study

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Purpose: Coronary Artery Bypass Graft (CABG) surgery is an expensive cardiac procedure globally. Early readmissions after CABG affect healthcare quality and costs, particularly in low- to middle-income countries (LMICs) with high rates of cardiovascular disease. While extensive research exists in high-income settings, data on early readmissions in resource-limited contexts remain scarce.

Methods: This study aims to identify the frequency, causes, and predictors of early readmissions after CABG in a low- and middle-income country (LMIC) setting. A retrospective review was conducted on isolated CABG procedures performed at a tertiary care center in Pakistan between January and December 2022. The data were analyzed using R version 4.4.2 to compare preoperative, intra-operative, and post-operative variables between the readmitted and non-readmitted groups. Early readmissions were defined as any readmission to the hospital within 30 days after discharge from the index hospitalization for isolated CABG.

Results: Among 194 patients undergoing isolated CABG, 22 (11.3%) experienced early readmissions. The median age of patients in the readmitted group was 61 (IQR: 53-67), compared to 60 (IQR: 52-65) in the non-readmitted group. Males predominated in both groups, with 18 (80%) in the readmitted group and 138 (80%) in the non-readmitted group. The most common causes of readmission were wound infection (13.6%), acute pulmonary edema (13.6%), and acute gastroenteritis (13.6%). No significant differences were found in pre-operative and post-operative variables between the two groups, which contrasts with findings reported in the literature. However, the use of Left Internal Mammary Artery was significantly lower in the readmitted group.

Conclusion: The findings indicate that the early readmission rate is similar to those observed in high-income countries. However, infectious complications emerged as a significant concern, highlighting a potential area for further research to help reduce early readmission rates.

Abstract: Evaluating Coronary Revascularization Conduit Compliance of Hybridized 3D-Printed Bypass Grafts through Finite Element Analysis

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Purpose: In Coronary Artery Bypass Grafting (CABG), Saphenous Vein Grafts (SVG) exhibit compliance mismatch which leads to intimal hyperplasia formation and high occlusion rates. Using Finite Element Analysis (FEA), we studied how hybridized 3D-Printed Bypass Grafts (3DP-BG) mechanics may improve patency to serve as an alternative conduit to the SVG.

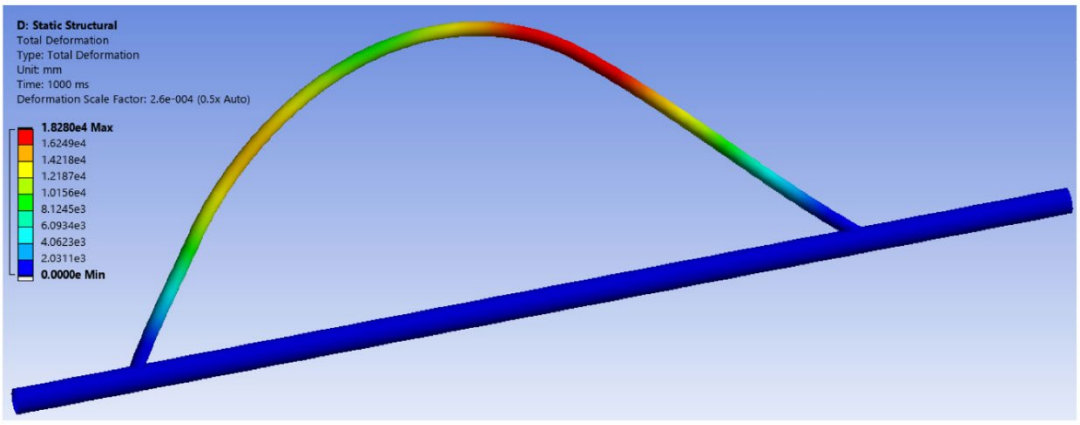
Methods: Using ANSYS SpaceClaim (2025R1), a Computer-Aided Design (CAD) model of a bypass graft was anastomosed in end-to-side fashion to the coronary artery. Finite Element Analysis (FEA) was conducted under physiological intraluminal pressures using ANSYS Mechanical 2025R1. Deformation, shear stress, shear elastic strain, and strain energy (indicators of vessel compliance) were obtained of solid and scaffold 3DP-BG composed of Thermoplastic polyurethane (TPU) and Polycaprolactone (PCL), each hybridized with Chitosan, Gelatin, and Collagen. Results were compared with the Left Internal Mammary Arterial (LIMA) graft, SVG, solid and scaffold TPU and PCL hybridized with Silk-Fibroin responses.

Results: FEA revealed that PCL-Gelatin grafts demonstrate deformation and strain energy distributions most similar to the LIMA (Figure 1). This suggests that 3DP-BG composed of PCL-Gelatin potentially exhibit similar compliance to a LIMA graft, offering a mechanical environment that is less likely to form intimal hyperplasia and eventual graft occlusion. The deformations and strain energy distributions of PCL-Collagen and TPU-Chitosan demonstrate their potential for improved compliance compared to the SVG and TPU-Silk graft studied previously (Table 1). The maximum shear stress and strain were located at the anastomoses of all models. The anastomotic shear strain distributions of PCL-Collagen and TPU-Chitosan (Table 1) behaved most similarly to the LIMA. This suggests their potential to offer an improved shear stress and strain anastomotic environment which may also reveal improvement in the Wall Shear Stress (WSS) differentials exhibited by SVG. WSS improvements potentially reduce intimal hyperplasia formation and occlusion compared to the SVG.

Conclusion: FEA of PCL-Gelatin grafts demonstrate similar mechanical responses to the LIMA, suggesting potential improvements to the compliance mismatch leading to intimal hyperplasia formation and occlusion observed with the SVG. Future work evaluates how PCL-Gelatin, PCL-Collagen, and TPU Chitosan conduits improve long-term patency by addressing the mechanics leading to SVG failure.

Figure: Finite Element Analysis Results Demonstrating Comparable Mechanical Behavior Between Hybridized 3D-Printed Grafts and the Left Internal Mammary Artery

LIMA DEFORMATION



PCL-GELATIN DEFORMATION

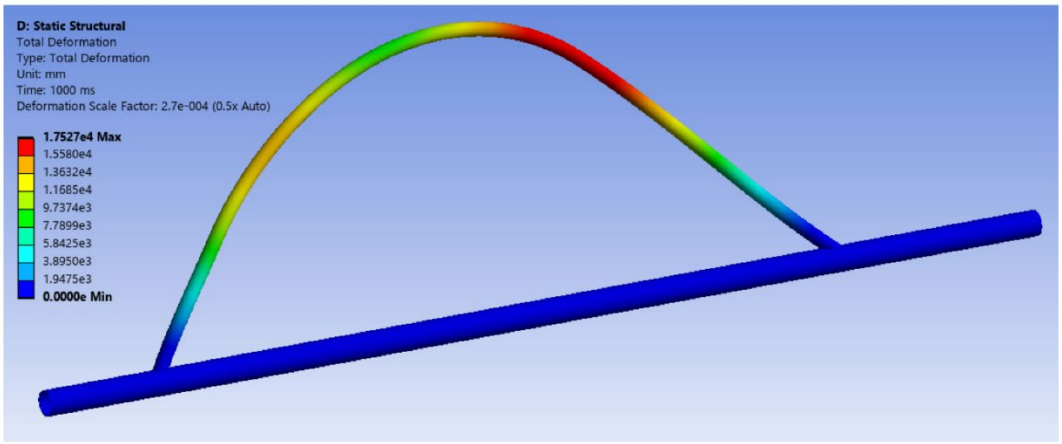


Table:

GRAFT MATERIAL	DEFORMATION [mm]	SHEAR STRAIN [mm/mm]	STRAIN ENERGY [mJ]
CONTROL			
LIMA	1.8280×10^4	21.759	119.86
SVG	5.1185×10^3	5.0045	33.56
TPU SILK	5.2017×10^3	5.0859	34.106
HYBRIDS			
PCL-GELATIN	1.7527×10^4	30.221	109.36
PCL-COLLAGEN	1.0168×10^4	17.081	63.387
TPU-CHITOSAN	1.1013×10^4	18.823	69.545

Abstract: The Role of N-Acetylcysteine in Reducing Postoperative Atrial Fibrillation in CABG Patients: A Meta-Analysis of Randomized Controlled Trials

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Purpose: Postoperative atrial fibrillation (POAF) is a common complication after coronary artery bypass grafting (CABG), increasing morbidity and hospital stays. Oxidative stress plays a key role in POAF development. This meta-analysis evaluates the effectiveness of intravenous N-acetylcysteine (NAC), a potent antioxidant, in reducing POAF incidence in CABG patients.

Methods: A systematic search was conducted across major medical databases, including PubMed, ScienceDirect, and Google Scholar, with the keywords “N-acetylcystein, “Coronary Artery Bypass Graft” or “CABG,” and “Atrial Fibrillation” to identify the studies. Studies were screened based on predefined inclusion and exclusion criteria, and PRISMA guidelines performed data extraction and also screened based on the Grading of Recommendations, Assessment, Development, and Evaluation (GRADE) to examine the quality of this review.. The primary outcome assessed was the incidence of POAF, while secondary outcomes included hospital length of stay.

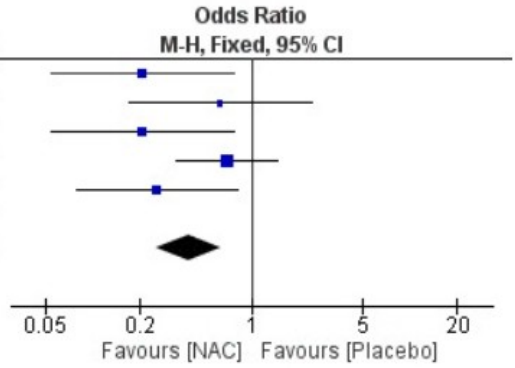
Results: This systematic review and meta-analysis included five randomized controlled trials (RCTs), comprising of 711 patients who underwent coronary artery bypass grafting (CABG). All included studies were assessed to be of high quality using the GRADE approach. The findings suggest that patients receiving N-acetylcysteine (NAC) had a significantly lower risk of developing atrial fibrillation (AF) postoperatively compared to the control group (odds ratio [OR] = 0.40; 95% confidence interval [CI], 0.25–0.64; P = 0.0001). This indicates that NAC may have a protective effect against postoperative AF in patients undergoing CABG. However, despite the observed reduction in AF incidence, there was no significant difference in hospital length of stay between the NAC group and the control group (mean difference [MD] = 0.08; 95% CI, -0.17 to 0.34; P = 0.52). These findings suggest that while NAC may help reduce postoperative AF, its impact on overall recovery time and hospital discharge remains uncertain.

Conclusion: This review suggests N-acetylcysteine (NAC) reduces atrial fibrillation risk after CABG, highlighting its protective potential. However, it did not significantly impact hospital stay, leaving recovery effects uncertain. Despite high-quality evidence, further large-scale trials are needed to confirm NAC’s benefits and mechanisms as an adjunctive therapy.

Figure: Forrest Plot for N-Acetylcystein vs Placebo in the Incidence of Atrial Fibrillation in patients post CABG

Study or Subgroup	NAC Events	NAC Total	Placebo Events	Placebo Total	Weight	Odds Ratio M-H, Fixed, 95% CI
Barios 2008	3	58	12	57	19.9%	0.20 [0.05, 0.77]
El-Hamamsy 2007	4	50	6	50	9.6%	0.64 [0.17, 2.41]
Erdoğan 2008	3	58	12	57	19.9%	0.20 [0.05, 0.77]
Kazemi 2013	14	120	19	120	29.0%	0.70 [0.33, 1.47]
Kiabi 2018	4	72	13	69	21.7%	0.25 [0.08, 0.82]
Total (95% CI)		**358**		**353**	**100.0%**	**0.40 [0.25, 0.64]**
Total events	28		62			

Heterogeneity: Chi² = 5.22, df = 4 (P = 0.27); I² = 23%
Test for overall effect: Z = 3.80 (P = 0.0001)



Study or Subgroup	NAC Mean	NAC SD	NAC Total	Placebo Mean	Placebo SD	Placebo Total	Weight	Mean Difference IV, Fixed, 95% CI
El-Hamamsy 2007	5.4	2.3	50	5.3	2.5	50	7.2%	0.10 [-0.84, 1.04]
Habibi 2012	7.4	1.9	30	8.2	1.8	30	7.3%	-0.80 [-1.74, 0.14]
Kazemi 2013	7.4	1.3	120	7.2	0.9	120	79.5%	0.20 [-0.08, 0.48]
Kiabi 2018	8.81	2.88	72	9.22	3.31	69	6.0%	-0.41 [-1.44, 0.62]
Total (95% CI)			**272**			**269**	**100.0%**	**0.08 [-0.17, 0.34]**

Heterogeneity: Chi² = 4.96, df = 3 (P = 0.17); I² = 40%
Test for overall effect: Z = 0.65 (P = 0.52)