2023 STS Coronary Conference
Accepted Abstracts

Abstract Session I – Saturday, June 3, 11:30 AM – 12:30 PM ET

Abstract 1: Two Decades of Coronary Artery Bypass Grafting in Females: Has Anything Changed?

Author List:
Elizabeth L Norton, MD, Maya Dassanayake, MD, Nanette K Wenger, MD, Alison F Ward, MD

Purpose:
Coronary artery bypass grafting (CABG) is the most common operation in cardiac surgery. Studies have shown that females have worse outcomes; but it's unclear if this knowledge has led to change and improved outcomes females undergoing CABG over time. This study sought to examine temporal trends in females undergoing CABG.

Methods:
From 2000-2021, 9062 females underwent isolated CABG at a single institution. The institutional Society of Thoracic Surgeons (STS) database was queried for pre-, intra-, and post-operative variables. The cohort was stratified by date of surgery into 6 groups coinciding with versions of the STS database: 2002-2004/version 2.41 (n=1348, 15%), 2004-2007/version 2.52 (n=2413, 27%), 2008-2011/version 2.61 (n=2244, 25%), 2011-2014/version 2.73 (n=1230, 14%), 2014-2017/version 2.81 (n=783, 9%), 2017-2021/version 2.9 (n=1044, 12%).

Results:
The median cohort age was 66 (58, 74) years. Ethnic diversity increased from the first (2002-2004) to the last (2017-2021) time-period: Latinos 2% to 4%, Blacks 26% to 37%, Asians 2% to 4%, while Whites decreased 69% to 55%. Comorbid conditions including chronic lung disease, cerebrovascular disease, diabetes, hypertension, and heart failure increased over time. The number of women undergoing elective CABG decreased with time, 76% in the 2002-2004 group to 32% in the 2017-2021 group; while the number of urgent CABGs increased from 20% in the 2002-2004 group to 66% in the 2017-2021 group ($p<0.0001$). From

2002-2004 to 2017-2021, the use of an internal mammary artery increased from 85% to 92% (p<0.0001). Mortality in females was stable over time; however, in-hospital mortality was significantly higher among females 3.6% versus 1.8% in males, (p<0.0001) overall and remained the gap between males and females remained unchanged over the years.

Conclusion:

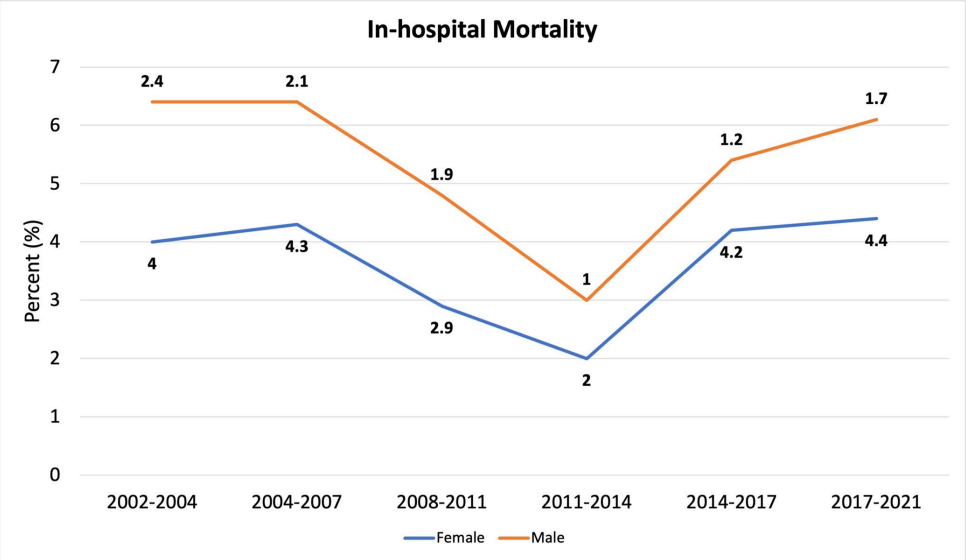
Over the past two decades, females undergoing CABG had more diversity and preoperative comorbidities. Mortality of females undergoing CABG at our institution (3.6%) remains higher than the male institutional cohort(1.8%) and the overall national average(~2%). Further studies to understand this disparity and improve care for females undergoing CABG are needed.

Table

	Total (n=9062)	2002-2004 (n=1348)	2004-2007 (n=2413)	2008-2011 (n=2244)	2011-2014 (n=1230)	2014-2017 (n=783)	2017-2021 (n=1044)	p-value
Preoperative								
Age, years	66 (58, 74)	65 (57, 73)	67 (58, 75)	67 (58, 75)	67 (59, 74)	67 (60, 74)	66 (59, 72)	**0.002**
Race/Ethnicity								
Latino	186 (2.1)	12 (0.9)	45 (1.9)	47 (2.1)	25 (2.0)	15 (1.9)	42 (4.0)	**<0.0001**
Black	2333 (26)	302 (22)	493 (20)	548 (24)	331 (27)	268 (34)	391 (37)	**<0.0001**
White	6234 (69)	997 (74)	1774 (74)	1585 (71)	833 (68)	468 (60)	577 (55)	**<0.0001**
Asian	191 (2.1)	13 (1.0)	39 (1.6)	36 (1.6)	35 (2.9)	24 (3.1)	44 (4.2)	**<0.0001**
Chronic lung disease	2083 (23)	257 (19)	432 (18)	462 (21)	375 (30)	229 (29)	328 (31)	**<0.0001**
Renal failure on dialysis	390 (4.3)	47 (3.5)	88 (3.7)	113 (5.0)	62 (5.0)	32 (4.1)	48 (4.6)	0.09
Cerebrovascular disease	2143 (24)	287 (21)	505 (21)	528 (24)	280 (23)	233 (30)	310 (30)	**<0.0001**
Diabetes	4315 (48)	571 (42)	1053 (44)	1056 (47)	624 (51)	413 (53)	598 (57)	**<0.0001**
Hypertension	8212 (91)	1157 (86)	2134 (88)	2053 (91)	1125 (91)	738 (94)	1005 (96)	**<0.0001**
Cardiogenic shock	250 (2.8)	20 (1.5)	67 (2.8)	60 (2.7)	36 (2.9)	31 (4.0)	36 (3.5)	**0.01**
Ejection fraction, %	55 (45, 60)	55 (45, 60)	55 (45, 60)	55 (45, 60)	55 (45, 60)	58 (50, 60)	58 (50, 60)	**<0.0001**
Previous cardiac intervention	2979 (33)	451 (33)	791 (33)	721 (32)	387 (31)	268 (34)	361 (35)	0.56
Previous cardiac surgery	402 (4.4)	64 (4.8)	113 (4.7)	103 (4.6)	49 (4.0)	32 (4.1)	41 (3.9)	0.82
Previous CABG	295 (3.3)	55 (4.1)	85 (3.5)	82 (3.7)	39 (3.2)	15 (1.9)	19 (1.8)	**0.007**
Status								**<0.0001**
Elective	4935 (54)	1021 (76)	1730 (72)	1247 (56)	361 (29)	247 (32)	329 (32)	
Urgent	3629 (40)	264 (20)	546 (23)	849 (38)	790 (64)	493 (63)	687 (66)	
Emergent	472 (5.2)	59 (4.4)	126 (5.2)	141 (6.3)	77 (6.3)	42 (5.4)	27 (2.6)	
Emergent Salvage	25 (0.3)	4 (0.3)	10 (0.4)	7 (0.3)	2 (0.2)	1 (0.1)	1 (0.1)	
Operative								
Cardiopulmonary bypass time	104 (78, 137)	103 (83, 129)	97 (70, 130)	95 (71, 137)	113 (84, 145)	115 (91, 151)	111 (87, 142)	**<0.0001**
Cross clamp time	74 (52, 103)	58 (44, 82)	66 (46, 94)	70 (48, 107)	88 (61, 117)	86 (69, 115)	84 (67, 114)	**<0.0001**
Distal anastomosis #	3 (2, 3)	3 (2, 4)	3 (2, 3)	3 (2, 3)	3 (2, 3)	3 (2, 3)	2 (1, 2)	**<0.0001**
IMA used	7875 (87)	1145 (85)	2032 (84)	1939 (86)	1108 (90)	691 (88)	960 (92)	**<0.0001**
LIMA	6875 (82)	1083 (80)	1923 (80)	1865 (83)	1038 (84)	843 (82)	323 (98)	
RIMA	98 (1.2)	13 (1.0)	20 (0.8)	31 (1.4)	27 (2.2)	7 (0.9)	0 (0)	
BIMA	270 (3.2)	49 (3.6)	89 (3.7)	43 (1.9)	43 (3.5)	41 (5.2)	5 (1.5)	
IABP	905 (10)	76 (5.6)	259 (11)	222 (9.9)	127 (10)	117 (15)	104 (15)	**<0.0001**
Postoperative								
Pneumonia	413 (4.6)	87 (6.5)	110 (4.6)	118 (5.3)	41 (3.3)	30 (3.8)	27 (2.6)	**<0.0001**
Prolonged ventilation	1564 (17)	228 (17)	418 (17)	440 (20)	204 (17)	135 (17)	139 (13)	**0.001**
Renal failure requiring dialysis	189 (2.1)	22 (1.6)	53 (2.2)	48 (2.1)	20 (1.6)	13 (1.7)	33 (3.2)	0.09
Atrial fibrillation	2097 (23)	239 (18)	477 (20)	514 (23)	298 (24)	252 (33)	317 (30)	**<0.0001**
Postoperative LOS		6 (4, 8)	6 (5, 9)	6 (5, 9)	6 (5, 9)	6 (5, 9)	6 (4, 8)	0.01
In-hospital mortality	**328 (3.6)**	**54 (4.0)**	**104 (4.3)**	**66 (2.9)**	**25 (2.0)**	**33 (4.2)**	**46 (4.4)**	**0.003**

Image:

Trends in Females Undergoing CABG Over Time



Abstract 2:

Women and CABG: A Comparison of Graft Conduit Outcomes from the National Adult Cardiac Surgery Audit Database

Author List:
Arnaldo Dimagli MD, Lamia Harik MD, Shubhra Sinha MBBS, Daniel Fudulu MD PhD, Roberto Perezgrovas Olaria MD, Giovanni Jr Soletti MD, Talal Alzghari MD, Gianmarco Cancelli MD, Kevin R An MD, Gavin Murphy MD, Gianni Angelini MD, Mario Gaudino MD, PhD

Purpose:
To investigate outcomes in women undergoing isolated coronary artery bypass grafting (CABG) using different types of conduits (saphenous vein grafts [SVGs], radial artery [RA] grafts, and right internal thoracic artery [RITA] grafts).

Methods:
The National Adult Cardiac Surgery database was queried for women undergoing isolated CABG in the United Kingdom from 1996 to 2019. Temporal trends of the use of CABG conduits were investigated and propensity score-based pairwise comparisons were performed between graft types. The primary outcome was in-hospital mortality. Secondary outcomes included return to the operating room for any reasons, cerebrovascular accidents, deep sternal wound infection (DSWI), need for post-operative dialysis, mechanical support, and hospital post-operative length of stay.

Results:
A total of 58,063 women were included, all with a left internal thoracic artery graft. The most used conduit was the SVG (84.2%) and the RA was the most used second arterial conduit (10.6%), while the RITA was used in only a minority of cases (4.2%). The use of both arterial conduits showed a significant decreasing trend (Figure 1).

In-hospital mortality was similar between the RA and the RITA grafts (2.3% vs 2.8%;OR 0.80, 95% CI 0.53-1.22;P=0.39) and between the RA and SVG (2.3% vs 2.0%;OR 1.20, 95% CI 0.93-1.55;P=0.17) but was higher in the RITA group compared to the SVG (2.7% vs 1.4%;OR 7.58, 95% CI 7.50-7.66;P<0.001)(Table 1). Women receiving the RITA graft were more likely to develop DSWI compared to

the RA (0.6% vs 0.06%;P=0.004) and the SVG (0.6% vs 0.2%;P=0.032). DSWI was consistently associated with higher risk of in-hospital mortality. There were no differences in other secondary outcomes.

Conclusion:

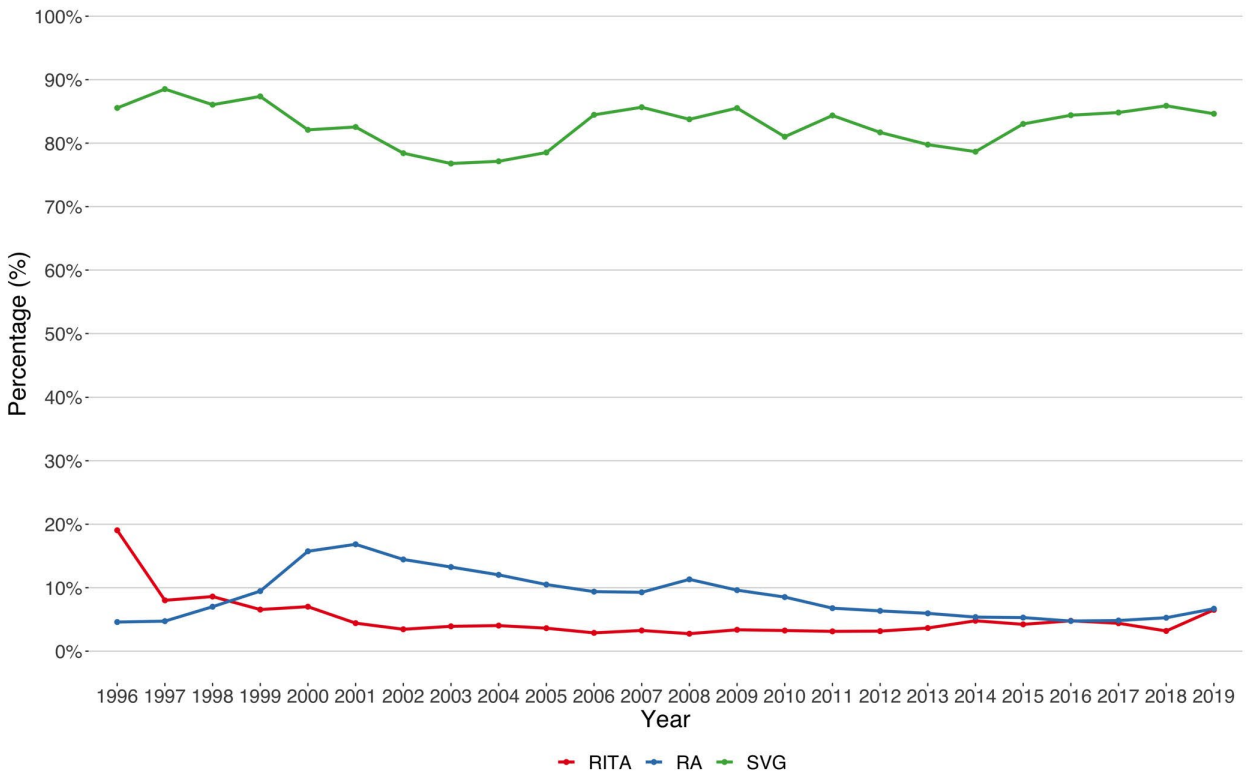
A thorough assessment of risks and benefits and a tailored approach are essential to improve outcomes in women as our findings showed that RITA graft has a higher risk of DSWI, which was independently associated with in-hospital mortality.

Identify the source of the funding for this research project:

British Heart Foundation and the NIHR Biomedical Research Centre at University Hospitals Bristol and Weston NHS Foundation Trust and the University of Bristol

Image

Temporal trends of the use of the saphenous vein graft, the radial artery and the right internal thoracic artery in the United Kingdom from 1996-2019.



Table

Table 1. Postoperative clinical outcomes in the three comparison groups after propensity score matching.

Radial artery vs right internal thoracic artery			
	RITA, N = 1,813	**RA,** N = 1,813	**P**
Mortality	50 (2.8%)	42 (2.3%)	0.39
Return to theatre	75 (4.1%)	96 (5.3%)	0.10
Stroke	29 (1.6%)	25 (1.4%)	0.58
Deep sternal wound infection	11 (0.6%)	1 (0.06%)	0.004
Dialysis	30 (1.7%)	37 (2.0%)	0.39
Need for mechanical support	6 (0.3%)	6 (0.3%)	0.99
Length of stay (days)	8 (7, 12)	8 (7, 13)	0.28
Radial artery vs saphenous vein graft			
	SVG, N = 5,532	**RA,** N = 5,532	**P**
Mortality	109 (2.0%)	130 (2.3%)	0.17
Return to theatre	213 (3.9%)	239 (4.3%)	0.21
Stroke	55 (1.0%)	71 (1.3%)	0.15
Deep sternal wound infection	17 (0.3%)	7 (0.1%)	0.051
Dialysis	118 (2.1%)	117 (2.1%)	0.95
Need for mechanical support	17 (0.3%)	13 (0.2%)	0.47
Length of stay (days)	9 (7, 13)	9 (7, 13)	0.44
Right internal thoracic artery vs saphenous vein graft			
	SVG, N = 1,836	**RITA,** N = 1,836	**P**
Mortality	25 (1.4%)	50 (2.7%)	0.004
Return to theatre	67 (3.6%)	75 (4.1%)	0.49
Stroke	16 (0.9%)	29 (1.6%)	0.07
Deep sternal wound infection	3 (0.2%)	11 (0.6%)	0.032
Dialysis	22 (1.2%)	30 (1.6%)	0.26
Need for mechanical support	2 (0.1%)	6 (0.3%)	0.29
Length of stay (days)	8 (7, 12)	8 (7, 13)	0.45

RA, radial artery; RITA, right internal thoracic artery; SVG, saphenous vein graft.

Abstract 3:
Intraoperative Extubation after Isolated CABG Improves Postoperative Outcomes

Author List:
Les James MD, MPH; Deane Smith, MD; Mike Allison, BS, MBA; Shash Shrivastava, MD; Darien Paone, MD; Mikhail Vaynblat, MD; Daniel Swistel, MD; Didier Loulmet, MD; Eugene Grossi, MD; Mat Williams, MD; Aubrey Galloway, MD; Elias Zias, MD

Purpose:
The association between ventilator time and morbidity in patients undergoing isolated CABG (isoCABG) is well-established. Extubation within 6 hours of leaving the operating room (OR) is an important quality metric. This study examined the impact of an intraoperative extubation protocol for patients undergoing isoCABG on postoperative outcomes.

Methods:
At a quaternary care academic medical center, a multidisciplinary protocol for intraoperative extubation of patients undergoing isoCABG was developed in January 2020. STS data for all patients who underwent isoCABG from January 2017 to December 2022 were analyzed. Patients were compared based on whether or not they were extubated intraoperatively following isoCABG. Patients were excluded if any other operations besides CABG were performed at the time of the index surgery (e.g. combined CABG and valve surgery). Outcomes of interest included reintubation, ICU and postoperative length of stay, postoperative complications, discharge disposition, 30-day readmission, and 30-day mortality.

Results:
In total, 1398 isoCABG were performed; 891 (63.7%) patients were extubated postoperatively and 507 (36.3%) patients were extubated intraoperatively. There was no difference in the rate of reintubation between the two groups (2.2% vs. 1.6%, p=0.393). Patients extubated intraoperatively had significantly shorter ICU length of stay (19.0Â±23.2 vs. 51.1Â±147.1 hours, p<0.0001), significantly shorter postoperative length of stay (3.4Â±2.3 vs. 7.1Â±7.9 days, p<0.0001), and were

more likely to be discharged directly to home (97.2% vs. 84.6%, p<0.0001) versus discharge to inpatient rehabilitation or to a subacute facility. While patients extubated intraoperatively had significantly lower rates of postoperative atrial fibrillation (5.3% vs. 19.2%, p<0.0001), there was no difference in the rate of postoperative kidney injury between groups. Patients extubated postoperatively were more likely to be readmitted within 30 days of discharge (4.9% vs. 2.4%, p=0.018). Intraoperative extubation following isoCABG did not have a significant impact on 30-day mortality (0.2% vs. 0.9%, p=0.116).

Conclusion:

Compared to traditional postoperative extubation, patients extubated intraoperatively following isoCABG had shorter length of stay, were more likely to be discharged home, and had fewer 30-day readmissions, with no increased risk of reintubation or mortality. Routine intraoperative extubation of patients undergoing isoCABG may be safe in appropriately selected patients.

Table 1. Patient demographics

	Postoperative extubation n=891	**Intraoperative extubation** n=507	***p-value***
Age, years (mean±SD)	65.3 ± 9.5	64.4 ± 9.2	0.524
Sex, n (%) Male Female	 687 (77.1) 204 (22.9)	 438 (86.4) 69 (13.6)	*<0.0001*
BMI (mean±SD)	28.2 ± 5.2	28.4 ± 8.0	0.4797
STS Risk Score % (mean±SD)	1.5 ± 2.0	1.1 ± 0.9	*<0.0001*
EF% (mean±SD)	54 ± 13	58 ± 10	*<0.0001*
CPB, min (mean± SD)	106 ± 30	112 ± 28	*0.0004*
X-clamp, min (mean± SD)	79 ± 35	91 ± 24	*<0.0001*

Table 2. Outcomes

	Postoperative extubation n=891	**Intraoperative extubation** n=507	***p-value***
Need for reintubation, n (%)	20 (2.2)	8 (1.6)	0.393
ICU length of stay, hours (mean±SD)	51.1 ± 147.1	19.0 ± 23.2	*<0.0001*
Postoperative length of stay, days (mean±SD)	7.1 ± 7.9	3.4 ± 2.3	*<0.0001*
Discharge to home, n (%)	754 (84.6)	493 (97.2)	*<0.0001*
Postoperative atrial fibrillation, n (%)	171 (19.2)	27 (5.3)	*<0.0001*
Postoperative kidney injury, n (%)	8 (0.9)	1 (0.2)	0.116
30-day readmission, n (%)	44 (4.9)	12 (2.4)	*0.015*
30-day mortality, n (%)	8 (0.9)	1 (0.2)	0.116

Abstract 4:

External Stenting for Saphenous Vein Grafts in Coronary Surgery: A Systematic Review and Meta-Analysis

Author List:
Arnaldo Dimagli, MD, Mario Gaudino, MD, PhD

Purpose:
SVGs are the most used conduits in CABG, but failure rates remain high. SVGs external stenting has been proved to reduce neointimal formation in animal models. This has paved the way for conducting RCTs in humans. We performed a meta-analysis to assess the impact of external stents on SVGs occlusion.

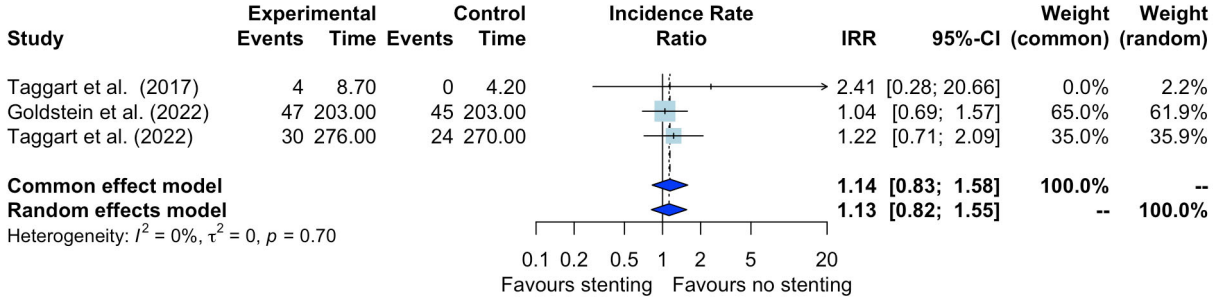
Methods:
On January 31, 2023, a systematic search was conducted on three medical databases (Ovid MEDLINE, Ovid Embase, Cochrane library) to identify all RCTs reporting the incidence of occlusion in stented and non-stented SVGs after coronary surgery. No language or publication date restrictions were applied. The primary outcome was the incidence of occlusion in stented and non-stented SVGs. SVGs occlusion was summarized as incidence rate ratio (IRR) and pooled using a random-effect meta-analysis.

Results:
The literature search yielded 190 results. After two rounds of screening, 3 RCTs totaling 437 patients were included. Of these, 360 (82%) underwent angiographic study during follow-up. Overall, 722 SVGs were analyzed, of which 370 (51%) were externally stented and 352 (49%) were non-stented. The IRR for the primary outcome was 1.13 [95% Confidence interval: 0.82-1.55] (Figure 1).

Conclusion:
Compared to non-stented SVGs, externally-stented SVGs are not associated with a reduction in the incidence of occlusion after CABG. Further RCTs and longer follow-up are needed to provide a definitive answer.

Image

Forest Plot for the Primary Outcome



Abstract 5:
Prevalence of Subocclusive Coronary Lesions and the Impact on Radial Artery Utilization

Author List:
Andrew M Young, MD, Raymond Strobel, MD, MSc, Anthony Norman, MD, Alex Wisniewski, MD, Kenan Yount, MD, Leora Yarboro, MD, Mohammed Quader, MD, Nicholas R. Teman, MD, Jared Beller, MD

Purpose:
Recent guidelines suggest that the radial artery should be the preferred second conduit for coronary artery bypass grafting (CABG) over the saphenous vein. Subocclusive stenosis is a potential contraindication to radial artery use, so we sought to describe its prevalence and its impact on optimal utilization rates.

Methods:
We analyzed catheterization data from patients who underwent coronary artery bypass grafting (CABG) between 2018 and 2021. We classified a lesion as subocclusive if it had <85% stenosis. Occlusive lesions were above this cutoff and indeterminate lesions may be above or below the cutoff. We only included venous and/or radial grafts, and excluded internal mammary grafts. Two definitions were used. Definition 1 required at least one venous/radial graft target with an occlusive lesion and no evidence of chronic kidney disease (CKD), and excluded subocclusive and indeterminate lesions. Definition 2 was broader and included patients with occlusive or indeterminate lesions.

Results:
Of the 5,491 patients who underwent CABG, we identified 12,134 venous or radial grafts with quantifiable occlusion lesions. We found 3,010 (24.8%) subocclusive lesions, 7,102 (58.5%) lesions with indeterminate occlusion, and 2,022 (16.7%) lesions with occlusion as shown in Figure 1. The overall prevalence of CKD was low at 3.7%. Based on Definition 1, 1,514 (27.6%) patients had at least one lesion suitable for radial artery grafting, with 58 (3.8%) of those patients receiving a radial graft. Using the less restrictive Definition 2, 4,528 (82.5%) patients were suitable for radial artery grafting. Only 232 (5.1%) appropriate patients received a radial artery graft. We could not evaluate the adequacy of ulnar collateral

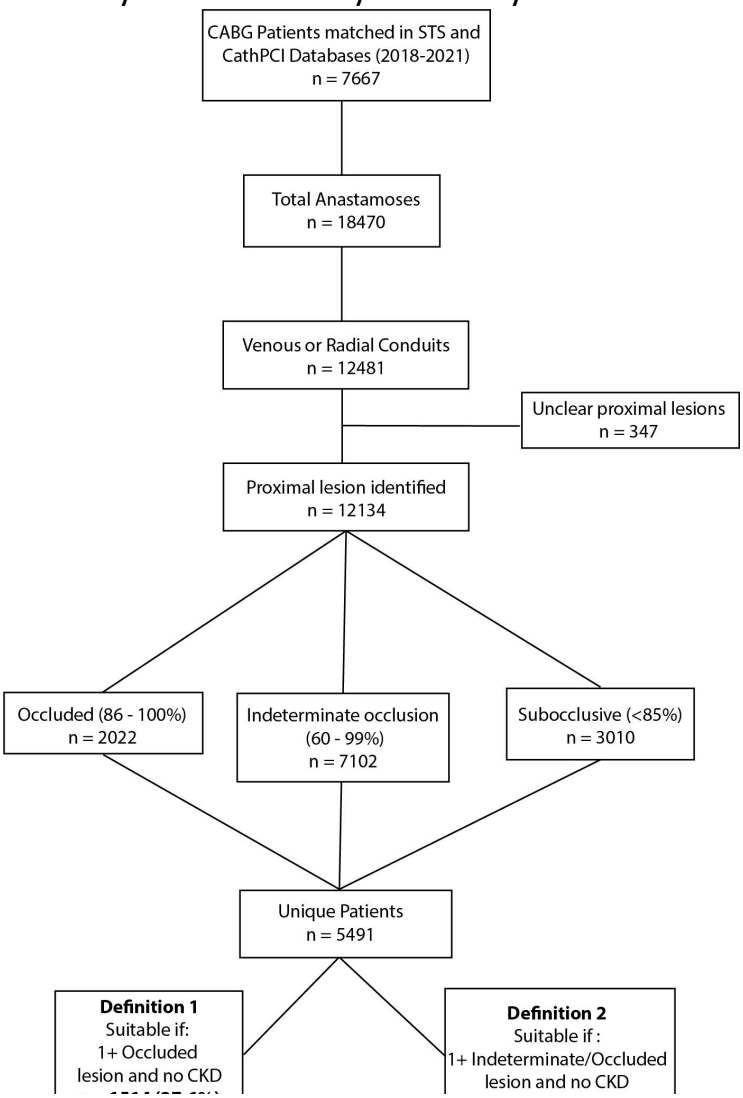
circulation or vascular disease in the extremities, which may have affect radial artery usability.

Conclusion:
Radial artery grafting is considered a less suitable option in the setting of subocclusive coronary occlusion. In our statewide database, depending on the criteria used to define the severity of coronary occlusion, up to 82.5% of patients could have been eligible for radial artery grafting.

Identify the source of the funding for this research project:
This work was supported by a research grant from NHLBI/NIH (T32HL007849). The content is solely the responsibility of the authors and does not represent the official views of the National Institutes of Health.

Image:

Pathway to radial artery suitability definition



Abstract 6:

The Differences in Transit Time Flowmetry Graft Measurements Between On-Pump and Off-Pump Coronary Artery Bypass Graft Surgery

Author List:
Krish Chaudhuri, FRACS, PhD, Zeke Pullan, MBChB, Parma Nand, FRACS, Nicolas P Smith, PhD

Purpose:
The reasons for the differences in transit time flowmetry (TTFM) graft flow measurements between on-pump and off-pump coronary artery bypass graft (CABG) surgery are unclear. The purpose of this study was to investigate the importance of mean arterial pressure (MAP) and resistance to blood flow as contributory hemodynamic factors.

Methods:
A total of 210 separate arterial grafts were compared between 3 groups using predictive computer-model derived TTFM measurements obtained from 40 patients. Measurements included mean graft flow (MGF), pulsatility index (PI), diastolic filling (DF), backward flow (BF) and mean graft pressure (MGP). Group 1 comprised of on-pump measurements calculated at MAP 80 mmHg and blood viscosity 0.035 dynïƒ—s/cm2 (n = 70). Group 2 had off-pump measurements calculated at MAP 80 mmHg but higher viscosity 0.046 dynïƒ—s/cm2 (n = 70) while Group 3 involved off-pump grafting measurements at a higher MAP 90mmHg and same viscosity 0.046 dynïƒ—s/cm2 (n = 70).

Results:
Predictive hemodynamic modelling enabled the exact same graft in an individual patient to be compared between on-pump and off-pump CABG scenarios (Figure 1). The MGF was overall higher for on-pump CABG compared to off-pump CABG calculated at the same MAP and also higher than off-pump CABG at a higher MAP (38.9 Â± 11.5 ml/min vs 34.9 Â± 10.9 ml/min vs 37.4 Â± 11.6 ml/min, P<0.001). The PI was lower for on-pump versus off-pump CABG at the same MAP, but lower for off-pump at higher MAP (1.71 Â± 0.66 vs 1.73 Â± 0.72 vs 1.63 Â± 0.68, P<0.001). There were minor differences between the respective groups for DF (76.1 Â± 5.9 vs 76.2 Â± 6.0 vs 75.6 Â± 5.9, P<0.001) as well as BF (0.96 Â± 1.88 vs

1.10 Â± 2.16 vs 0.87 Â± 1.86, P<0.001). Differences were also observed between TTFM parameters according to grafted territory (Table 1).

Conclusion:

Even when TTFM is performed at a higher MAP during off-pump CABG there tends to be higher MGF during on-pump CABG due to the lower viscosity of blood. This indicates that lower resistance to blood flow is more influential than higher pressure and TTFM cut-off values should reflect these differences.

Identify the source of the funding for this research project:

The study was funded by the Royal Australasian College of Surgeons (RACS) Surgeon Scientist Scholarship

Image:

Example of predicted differences in TTFM graft measurements for LIMA to LAD in one patient

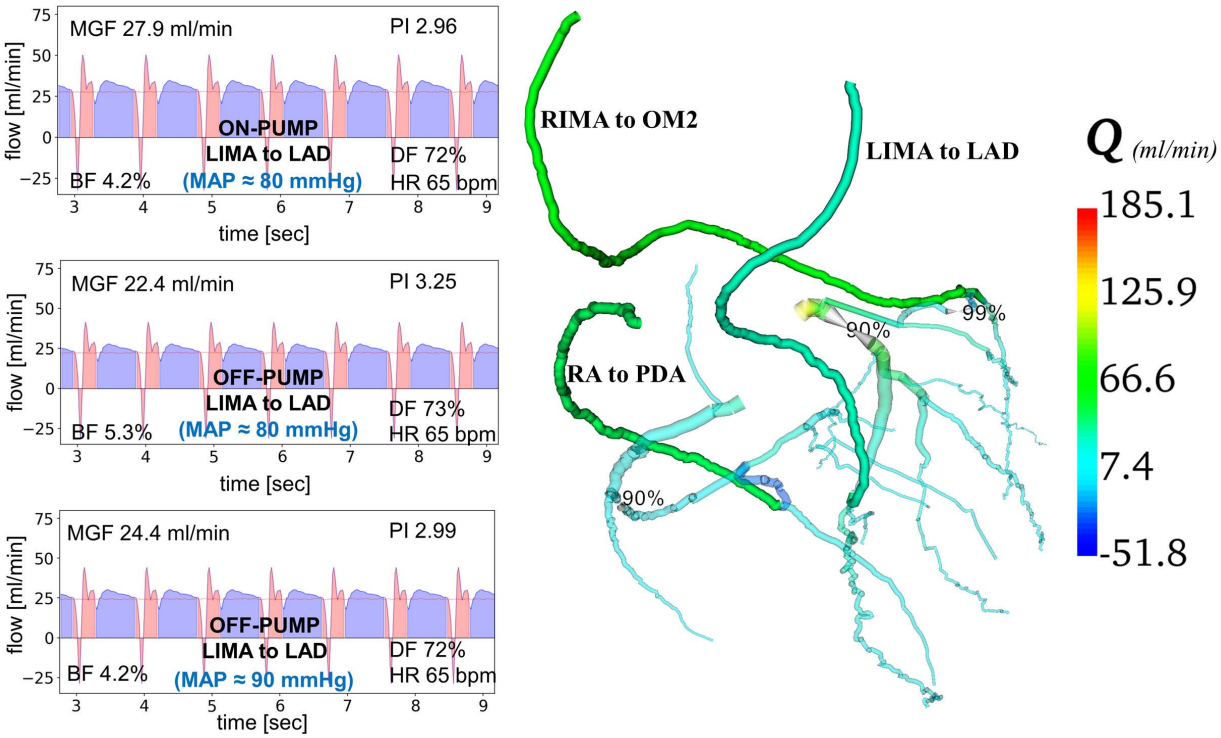


Table:

GRAFT TERRITORY	**GROUP 1** **On-Pump** **MAP 80mmHg** **(N = 70)**	**GROUP 2** **Off-pump** **MAP 80mmHg** **(N =70)**	**GROUP 3** **Off-pump** **MAP 90mmHg** **(N = 70)**	**P-value**
Left Anterior Descending (LAD)	**n = 31**	**n = 31**	**n = 31**	
MGF (ml/min, mean ± SD)	34.01 ± 9.18	29.78 ± 8.26	32.00 ± 8.70	< 0.001
PI (mean ± SD)	1.75 ± 0.62	1.81 ± 0.75	1.68 ± 0.69	< 0.001
DF % (mean ± SD)	74.29 ± 2.67	74.52 ± 2.76	73.93 ± 2.73	< 0.001
BF % (mean ± SD)	1.08 ± 1.58	1.33 ± 2.06	0.99 ± 1.67	< 0.001
MGP (mmHg, mean ± SD)	76.11 ± 1.49	75.34 ± 1.76	85.10 ± 1.78	< 0.001
Circumflex (CIRC)	**n = 14**	**n = 14**	**n = 14**	
MGF (ml/min, mean ± SD)	42.41 ± 12.4	37.43 ± 10.8	39.15 ± 11.3	< 0.001
PI (mean ± SD)	2.15 ± 0.81	2.18 ± 0.81	2.10 ± 0.78	< 0.001
DF % (mean ± SD)	86.03 ± 5.06	86.23 ± 5.00	85.53 ± 4.85	< 0.001
BF % (mean ± SD)	2.19 ± 3.15	2.39 ± 3.33	2.08 ± 3.01	< 0.001
MGP (mmHg, mean ± SD)	75.92 ± 2.52	75.10 ± 2.81	85.03 ± 2.87	< 0.001
Right Coronary Artery (RCA)	**n = 25**	**n = 25**	**n = 25**	
MGF (ml/min, mean ± SD)	42.95 ± 11.7	39.80 ± 11.3	43.00 ± 12.2	< 0.001
PI (mean ± SD)	1.42 ± 0.44	1.37 ± 0.42	1.30 ± 0.41	< 0.001
DF % (mean ± SD)	72.82 ± 1.96	72.55 ± 1.74	71.99 ± 1.63	< 0.001
BF % (mean ± SD)	0.129 ± 0.24	0.09 ± 0.16	0.046 ± 0.09	0.003
MGP (mmHg, mean ± SD)	76.4 ± 2.42	75.32 ± 2.89	85.05 ± 3.04	< 0.001

Abstract Session II – Sunday, June 4, 8:50 AM – 9:50 AM ET

Abstract 1:
Postoperative Atrial Fibrillation Incidence and Outcomes According to Assessment Method and Definition: A Meta-Analysis

Author List:
Lamia Harik, MD, Roberto Perezgrovas-Olaria, MD, Arnaldo Dimagli, MD, Giovanni Jr Soletti, MD, Kevin R. An, MD, Gianmarco Cancelli, MD, Talal Alzghari, MD, Tulio Caldonazo, MD, Katia Audisio, MD, Mohammad Yaghmour, MS, Hillary Polk, MS, Michelle Demetres, MLIS, Leonard N Girardi, MD, Mario Gaudino, MD, MSCE, PhD

Purpose:
Postoperative atrial fibrillation (POAF) is the most frequent complication of cardiac surgery. Despite clinical and economic implications, there is ample variability in POAF assessment methods and definitions. We performed a study-level meta-analysis to evaluate the influence of POAF assessment method and definition on its incidence and association with clinical outcomes.

Methods:
A systematic literature search was conducted to identify studies comparing the outcomes of patients with and without POAF after cardiac surgery that also reported POAF definition and assessment method. The primary outcome was POAF incidence. The secondary outcomes were in-hospital mortality, stroke, intensive care unit (ICU) length of stay (LOS), and postoperative LOS.

Results:
Fifty-nine studies totaling 197,774 patients were included. POAF cumulative incidence was 26% (95% confidence interval [CI]: 23-29%). There were no differences in POAF incidence among assessment methods (27% (95% CI: 22-32%) for continuous telemetry, 27% (95% CI: 24-31%) for telemetry plus daily electrocardiogram, and 19% (95% CI: 13-28%) for daily electrocardiogram only; $P>0.05$ for all comparisons). No differences in in-hospital mortality, stroke, ICU LOS, and postoperative LOS were found between assessment methods. No significant differences in POAF incidence or any other outcomes were found between POAF definitions. The use of continuous telemetry or telemetry plus daily electrocardiogram was associated with higher POAF incidence compared to

daily electrocardiogram only in isolated coronary artery bypass grafting (CABG) studies.

Conclusion:

POAF incidence after cardiac surgery remains high. POAF incidence and its association with adverse outcomes are not influenced by the assessment method and definition used, except in patients undergoing isolated CABG.

Image:

Figure 1. Comparison of postoperative atrial fibrillation incidence by assessment method.

Table:

Table 2. Summary of primary and secondary outcomes based on assessment method.

Primary outcome			
Outcome	**Comparison group**	**Pooled estimates (95% CI)**	**P-value**
POAF incidence	Telemetry vs Telemetry + ECG	27% (22-32%) vs 27% (24-31%)	0.89
	Telemetry vs ECG only	27% (22-32%) vs 19% (13-28%)	0.12
	Telemetry + ECG vs ECG only	27% (24-31%) vs 19% (13-28%)	0.09
Secondary outcomes			
Outcome	**Comparison group**	**Pooled estimates (95% CI)**	**P-value**
Mortality	Telemetry vs Telemetry + ECG	4% (3-5%) vs 3% (2-4%)	0.29
	Telemetry vs ECG only	4% (3-5%) vs 2% (1-4%)	0.16
	Telemetry + ECG vs ECG only	3% (2-4%) vs 2% (1-4%)	0.47
Stroke	Telemetry vs Telemetry + ECG	3% (2-4%) vs 2% (2-3%)	0.30
	Telemetry vs ECG only	3% (2-4%) vs 2% (1-4%)	0.32
	Telemetry + ECG vs ECG only	2% (2-3%) vs 2% (1-4%)	0.88
ICU LOS	Telemetry vs Telemetry + ECG	3.7 days (2.1-5.2) vs 3.2 days (2.3-4.1)	0.63
	Telemetry vs ECG only	3.7 days (2.1-5.2) vs 3.0 days (1.8-4.3)	0.55
	Telemetry + ECG vs ECG only	3.2 days (2.3-4.1) vs 3.0 days (1.8-4.3)	0.82
Postoperative LOS	Telemetry vs Telemetry + ECG	13.6 days (9.1-18.1) vs 11.0 days (9.4-12.6)	0.29
	Telemetry vs ECG only	13.6 days (9.1-18.1) vs 10.1 days (7.7-12.6)	0.18
	Telemetry + ECG vs ECG only	11.0 days (9.4-12.6) vs 10.1 days (7.7-12.6)	0.56
Sensitivity analysis (Isolated CABG)			
Outcome	**Comparison group**	**Pooled estimates (95% CI)**	**P-value**
POAF incidence	Telemetry vs Telemetry + ECG	25% (21-29%) vs 26% (21-31%)	0.81
	Telemetry vs ECG only	25% (21-29%) vs 15% (10-22%)	**0.02**
	Telemetry + ECG vs ECG only	26% (21-31%) vs 15% (10-22%)	**0.02**

CABG: coronary artery bypass grafting; CI: confidence interval; ECG: electrocardiogram; ICU: intensive care unit; LOS: length of stay; POAF: postoperative atrial fibrillation.

Abstract 2:
Long Term Results of Surgical Myocardial Revascularization in Patients with Left Ventricular Dysfunction

Author List:
Andrea Garatti,MD,PhD; Matteo Scarpanti,MD; Mariangela D'Ovidio,PhD; Alberto Canziani,MD; Carlo Sassi,MD; Carlo De Vincentiis,MD; Alessandro Parolari,MD,PhD and Lorenzo Menicanti,MD.

Purpose:
to analyze the impact of preoperative LV dysfunction on the early and long-term outcome in a population of isolated sequential Coronary Artery Bypass Grafting (CABG).

Methods:
Between 2005-2016 a consecutive series of 4079 patients with stable multi-vessel coronary disease underwent isolated, on-pump-CABG. The patients were divided into four classes based on the preoperative EF: Class I (EFâ‰¥50%, 2771 pts, mean EF=57Â±6%), Class II (40%â‰¤EF<50%, 708 pts, mean EF=44Â±3%), Class III (30%â‰¤EF<40%, 285 pts, mean EF=35Â±3%) and class IV (EFâ‰¤30%, 152 pts, mean EF=24Â±4%). We performed an anonymous record linkage with the National Hospital Information System, for identification of the follow-up outcomes [long-term survival and freedom from Major Adverse Cardiovascular Events (MACE: acute MI, Repeated revascularization (PCI or CABG), HF admission)]. Follow-up was 96% completed.

Results:
from Class I to IV we observed a significant increase in preoperative risk factor incidence (diabetes, COPD, renal impairment) and clinical severity ad admission (NYHA Class III-IV, previous acute MI and unstable angina â€“ Table 1). Perioperative complications increased significantly among the classes (32% to 76%, p<.001). Inotropic support and IABP use as well as postoperative low cardiac output syndrome significantly increased among the classes (p<.001). Finally, 30-days mortality was not significantly different between class I and III (1.2-3%) but raised significantly in Class IV (7.3%). Long-term mortality increased significantly from Class I to III (19 to 38%,p<.001) but was comparable between class III and IV (p=.97). No significant differences existed among classes in term of freedom from

angina, acute MI and repeated revascularization. Finally freedom from HF-admission increased significantly between class I and III (13 to 58%, p<.001) but not between class III and IV (p=.89 â€“ Figure 1).

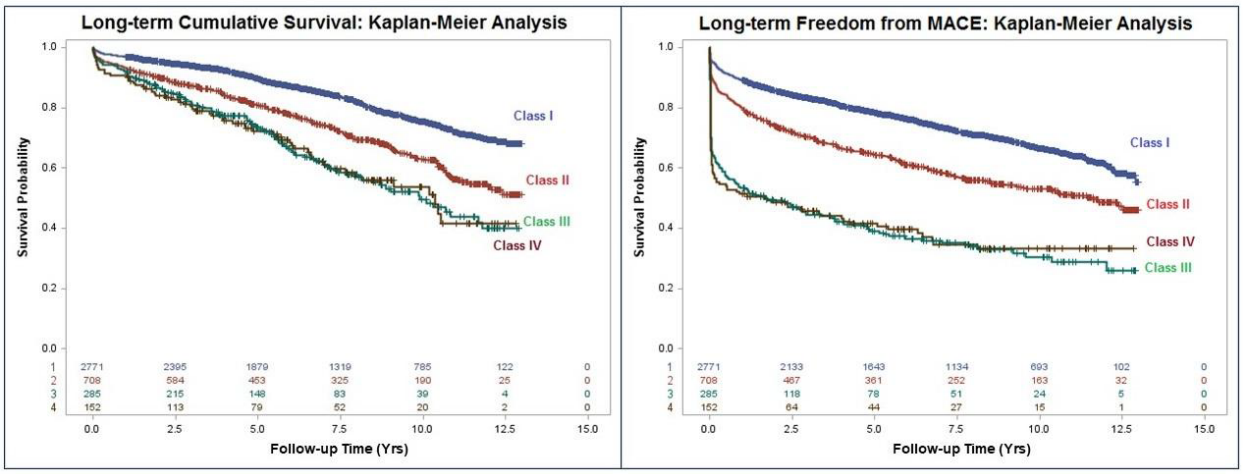
Conclusion:
CABG in patients with LV dysfunction can be performed with acceptable operative mortality and excellent long-term results. The EF threshold of 40% or lower seems to affect long-term outcomes. However, CABG seems to positively impact the natural history of severe ischemic cardiomyopathy even in patients with very low EF.

Identify the source of the funding for this research project:
Ricerca Corrente funding from Italian Ministry of Health

Table:

	Ejection Fraction classes				
	I (n=2877)	**II (n=740)**	**III (n=297)**	**IV (n=165)**	*p*
Mean EF (%)	56,63±6,16	44,06±2,96	34,61±2,87	24,27±4,06	***<0,001***
Age [years]	67±10	68±10	69±9	68±10	***<0,001***
Female Gender	482 (16,8%)	153 (20,7%)	50 (16,8%)	27 (16,4%)	0,089
Preoperative Variables					
COPD	138 (4,8%)	68 (9,2%)	36 (12,1%)	21 (12,7%)	***<0,001***
Diabetes mellitus	674 (23,4%)	224 (30,3%)	99 (33,3%)	50 (30,3%)	***<0,001***
eGFR [ml/min/1.73m²]	80,94±33,09	74,97±33,08	65,24±29,83	63,39±28,83	***<0,001***
Preoperative MI	508 (17,7%)	203 (27,4%)	84 (28,3%)	41 (24,8%)	***<0,001***
NYHA class >II	170 (5,9%)	73 (9,9%)	56 (18,9%)	36 (21,8%)	***<0,001***
Preoperative IABP	20 (0,7%)	20 (2,7%)	12 (4%)	11 (6,7%)	***<0,001***
Perioperative Variables					
CPB time [minutes]	65,52±22,28	68,11±21,72	71,44±27,26	73,82±28,28	***<0,001***
Clamp time [minutes]	40,53±14,16	41,33±12,92	42,13±15,26	42,52±12,44	0,065
Distal anastomoses	3,31±0,54	3,31±0,54	3,34±0,55	3,44±0,60	***0,020***
Inotropes	336 (11,7%)	207 (28%)	184 (62%)	122 (73,9%)	***<0,001***
IABP	34 (1,2%)	32 (4,3%)	28 (9,4%)	34 (20,6%)	***<0,001***
Mechanical Ventilation [hours]	17,90±41,47	21,29±40,87	47,75±208,50	52,92±107,13	***<0,001***
Postoperative Variables					
Transfusions	1186 (41,2%)	358 (48,8%)	167 (56,2%)	102 (61,8%)	***<0,001***
Complications	916 (31,8%)	307 (41,5%)	185 (62,3%)	125 (75,8%)	***<0,001***
Atrial fibrillation	517 (18%)	148 (20%)	88 (29,6%)	59 (35,8%)	***<0,001***
Low Cardiac Output Syndrome	254 (8,8%)	144 (19,5%)	120 (40,4%)	97 (58,8%)	***<0,001***
ICU stay [days]	2±4	3±4	5±5	6±8	***<0,001***
Hospital stay [days]	6±6	5±7	9±11	10±12	***<0,001***
In-hospital mortality	34 (1,2%)	22 (3%)	9 (3%)	12 (7,3%)	***<0,001***

Image:


Long-term Cumulative Survival: Kaplan-Meier Analysis
Survival Probability
1.0
0.8
0.6
0.4
0.2
0.0
Class I
Class II
Class III
Class IV
1 2771 2395 1879 1319 785 122 0
2 708 584 453 325 190 25 0
3 285 215 148 83 39 4 0
4 152 113 79 52 20 2 0
0.0 2.5 5.0 7.5 10.0 12.5 15.0
Follow-up Time (Yrs)
Long-term Freedom from MACE: Kaplan-Meier Analysis
Survival Probability
1.0
0.8
0.6
0.4
0.2
0.0
Class I
Class II
Class IV
Class III
1 2771 2133 1643 1134 693 102 0
2 708 467 361 252 163 32 0
3 285 118 78 51 24 5 0
4 152 64 44 27 15 1 0
0.0 2.5 5.0 7.5 10.0 12.5 15.0
Follow-up Time (Yrs)

Abstract 3:
Perioperative Cannabinoids Significantly Reduce Opioid Usage in Cardiac Surgery Patients

Author List:
Zain Khalpey MD, PhD, FACS; Antoni Macko PhD; Jessa Deckwa BS

Purpose:
Opioids are an effective agent for pain control following surgery, however, can prolong mechanical ventilation time and increase hospital stay. We hypothesized that Dronabinol used as an adjunct agent to opioids can reduce opioid requirements to manage post-operative pain, mechanical ventilation duration, and time in intensive care unit (ICU).

Methods:
A single-center prospective study was performed on patients open heart surgery with sternotomy were analyzed with consent under an IRB-approved protocol. Patients were enrolled in an experimental group (DRON N=31) and were treated with single doses of dronabinol both pre- and post-operatively or were enrolled in a control group (CTRL N=37) and received standard of care. Measured parameters included: patient demographics, cardiopulmonary bypass (CPB) duration, aortic cross clamp (XC) duration, pre- and post-operative ejection fraction (EF), post-operative morphine milligram equivalents (MME), mechanical ventilation duration, and ICU length of stay (LOS). Statistical analysis was completed using two-tailed, unpaired t-tests.

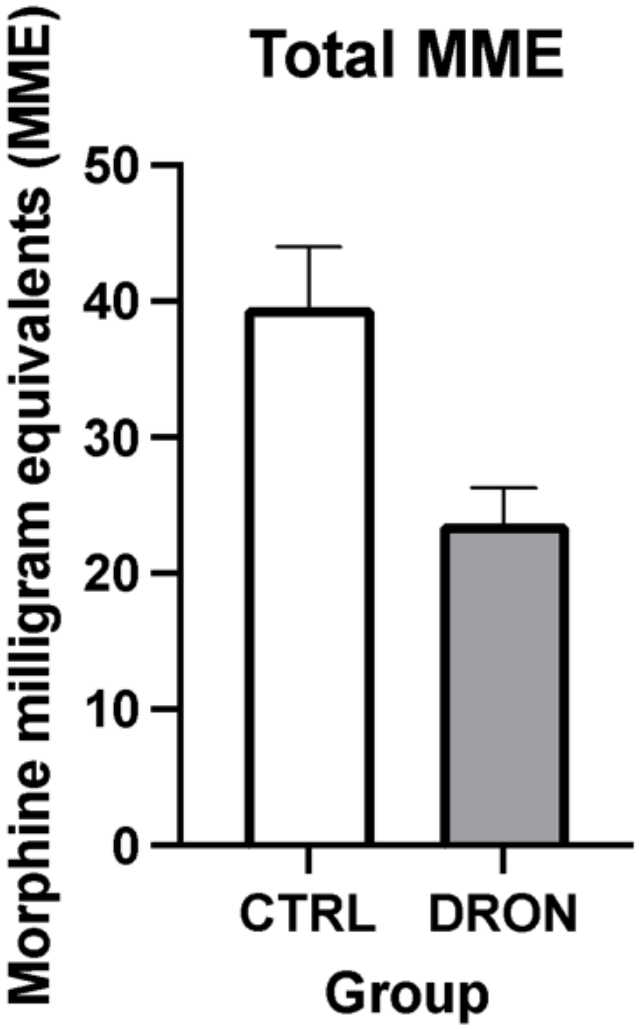
Results:
The CTRL and DRON groups were equivalent with regard to: age, body mass index (BMI), pre-operative EF, gender and race. There were no differences between CTRL vs. DRON groups in CBP duration (1187 vs 1016 minutes, respectively), aortic XC duration (796 vs 715 minutes, respectively). Total postoperative MME requirement was lower in the DRON group (404 vs 243, $p<0.05$). Both mechanical ventilation time (7.01.2 vs 6.00.8 hours) and ICU LOS (717 vs 645 hours) revealed no difference between the CTRL and DRON groups, respectively. Interestingly, while postoperative EF was equivalent between the CTRL and DRON groups (56Â±1 vs 57Â±1, respectively), a greater increase in EF from pre- to post-operative values was measured in the DRON group (41 vs 61 percent, $p<0.05$).

Conclusion:

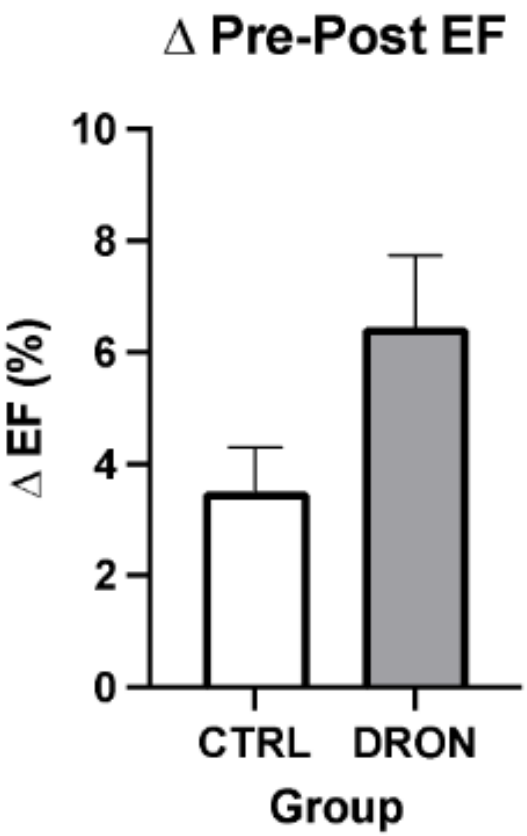
Our study found a reduction of 40% in opioid use and an improved EF (20%) in the dronabinol-treated group, however, there was no statistical difference or reduction of ventilation time and ICU length-of-stay. The results of this study, although limited by sample size, are very encouraging, warranting further investigation.

Image

Dronabinol Vs. Control Total MME and Pre and Postoperative Ejection Fraction



Table



Abstract 4:
TAR OPCAB Showed Similar Outcome Results Between More Than and Less Than 75 Years Old Age Groups

Author List:
Doosang Kim, MD,PhD, Hyuk Ahn, MD,PhD

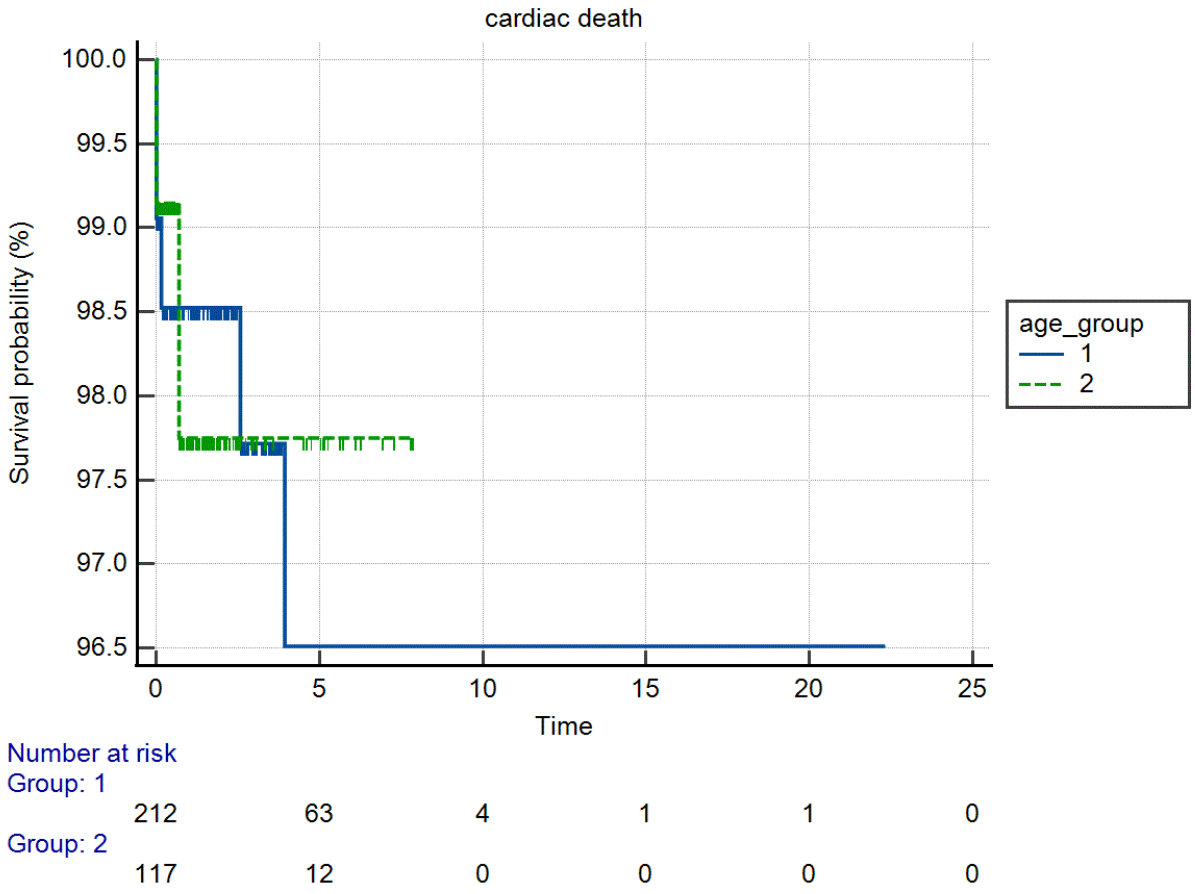
Purpose:
Total arterial revascularization is generally not recommended in elderly patients. To elucidate whether total arterial revascularization (TAR) OPCAB has efficacy in long-term outcome between less than and more than 75 years old age groups or not.

Methods:
From 2000 to 2023, 344 patients underwent TAR OPCAB. Among them, 227 patients of 74 years old or less were designated as group1 and 117 patients of 75 years old or more were designated as group2. We analyze survival outcomes between groups to elucidate TAR OPCAB efficacy.

Results:
Median age difference between two group is 9 years (Group 1: median 70 years, IQR25-75 67-72 years, Group2: 79 years, 76-82 years). Overall survival shows significant differences between two groups (5YSR of Group1: 81.1%, Group 2: 76.1%, p=.0009), However, there were no significant differences in cardiac death (Group 1: 96.5%, Group 2: 96.6%, p=0.9817) and cardiac death+MI+repeat revascularization (Group 1: 81.4%, Group 2: 82.0%, p=0.7851).

Conclusion:
In spite of different median age, TAR OPCAB showed similar long-term outcomes.

Table


cardiac death
100.0
99.5
99.0
98.5
98.0
97.5
97.0
96.5
Survival probability (%)
0
5
10
15
20
25
Time
age_group
1
2
Number at risk
Group: 1
212 63 4 1 1 0
Group: 2
117 12 0 0 0 0

Abstract 5:
Clinical Outcomes Of Cor-knot Micro Application In Robotic-Assisted Coronary Artery Bypass Grafting

Author List:
Aleksander Dokollari, MD, Serge Sicouri, MD, Ozgun Erten, MD, Basel Ramlawi, MD, Francis Sutter, MD, Leila Hosseinian, MD, Gianluca Torregrossa, MD

Purpose:
Robotic-assisted cardiac surgery is a subspecialty of CABG and COR-KNOT Micro is utilized in robotic-assisted procedures for LITA-LAD anastomosis. â€¢ However, angiographic and clinical outcomes of this procedure have yet to be determined. â€¢ We aim to report follow-up angiographic findings and clinical outcomes following robotic-assisted CABG using COR-KNOT Micro.

Methods:
This is an observational cohort study of consecutive patients undergoing CABG at our institution between June 2021- August 2022. Patients were included by all demographics and preoperative characteristics. â€¢ Procedure characteristics included COR-KNOT Micro use. â€¢ Inclusion criteria; patients undergoing robotic-assisted revascularization with COR-KNOT Micro. â€¢ Primary outcome was analysis of angiographic findings in COR-KNOT Micro patients after robotic-assisted CABG. â€¢ Secondary outcomes at follow-up included, overall death, cardiac death, cardiac readmission, stroke, myocardial infarction, repeat revascularization, angina, and MACCE.

Results:
28 patients received COR-KNOT Micro at LITA-LAD anastomosis. â€¢ Patients mean age was 70.07 Â± 10.8 years, the STS score was 1.5 Â± 1.3, 32% had diabetes, 25%had previous cerebrovascular events, 28% had previous percutaneous coronary intervention and 64% had previous myocardial infarction. â€¢ All patients had LITA graft anastomosis to LAD and 75%of them were extubated in the operating room. Mean postoperative ventilation time was 1.6 Â± 8.3 hours. â€¢ All new patients had off-pump surgery and there was no conversion to full sternotomy. â€¢There was no in-hospital death. â€¢ Angiographic findings at follow-up found no stenosis of the anastomosis and stents. - One patient died at 30-days follow-up due to iatrogenic liver injury.

Conclusion:

COR-KNOT Micro for LITA to LAD anastomosis for robotic-assisted CABG provides good angiographic findings and clinical outcomes in selected patients. Heart-team collaboration with the cardiologist as well as a dedicated team of experienced off-pump anesthesia and perfusionist and intensivists is also crucial in achieving excellent results.

Identify the source of the funding for this research project:

Sharpe-Strumia Research Foundation of Bryn Mawr Hospital, Wynnewood, Pennsylvania, USA. Grant Number (SSRF2022-10).

Image

Post-operative Outcomes and Angiographic Findings

Post-operative outcomes

Postoperative outcomes	Patients N= 31
Postoperative ventilation time (hours) mean ±SD	1.6 ± 8.3
Prolonged ventilation hours ≥24 hours n (%)	0
Total intensive care unit (hours) mean ±SD	62.6 ± 85.8
Stroke n (%)	0
Infection n (%)	0
Post operative Myocardial Infarction n (%)	0
Reoperation for bleeding n (%)	0
Postoperative creatinine level mean ±SD	1.15 ± 0.13
Postoperative renal failure n (%)	0
New postoperative atrial n (%) fibrillation	11 (35.5%)
RBC transfusion Unit Total	8
Cryoprecipitate transfusion Unit Total	4
Platelets Transfusion Unit Total	0
FFP transfusion unit Total	0
In-hospital deaths n (%)	0

Follow-up Clinical Outcomes	Patients N=31
Cardiac Readmission n (%)	5 (16.1%)
Overall Death n (%)	1
Cardiac Death n (%)	0
Repeat Revascularization n (%)	0
Myocardial Infarction n (%)	0
Stroke n (%)	0
MACE n (%)	1 (3.7%)
Angina n (%)	0
Mild/Moderate/Severe Angiographic Stenosis of anastomosis n (%) Total = 20	0
Time to Angiography mean ± SD	19.9 ± 30

Abstract 6:
Robotically Assisted Multivessel MIDCAB Vs Hybrid Coronary Revascularization

Author List:
Karikehalli Dilip, MD, Anna Gleboff, MPH, MS, Ahmad Nazem, MD, Anton Cherney, MD, Joan Dennis, BS, Charles Lutz, MD.

Purpose:
Minimally invasive multi vessel coronary artery revascularization can be achieved with robotic assisted minimally invasive direct coronary artery bypass (MIDCAB) alone or hybrid approach with single vessel robotic MIDCAB followed by percutaneous coronary intervention (PCI). The literature is scant with data comparing the two approaches. We present our data here.

Methods:
Cases of robotic MIDCAB from 2012 to 2022 were reviewed. Two groups of patients were selected, patients with multi vessel disease underwent robotic multi vessel MIDCAB (Surgery group) or hybrid approach (Hybrid group). Both groups underwent robotic assisted left internal mammary artery (LIMA) harvest. The camera port at fourth intercostal space was enlarged to 6 cm in both groups. All anastomoses were done by hand suturing with or without cardiopulmonary bypass in surgery group. In hybrid group, LIMA was anastomosed to left anterior descending artery (LAD) or sequentially to both LAD and Diagonal with PCI performed later within 30 days.

Results:
Data is summarized in the table. There were 105 patients in the surgery group and 81 patients in the hybrid group. Both groups had similar gender distributions, left ventricular ejection fractions, history of atrial fibrillation and cerebral vascular disease, however the surgery group had older patients.

Majority patients in hybrid group had LIMA to LAD, 4 patients had sequential LIMA to LAD and the diagonal artery. Patients in surgery group received 2 to 5 coronary artery grafts without PCI.

There were no mortalities in both groups or statistical differences between the two groups with respect to length of stay and other post operative complications.

The surgery group had longer ventilation times and post operative atrial fibrillation rates.

Conclusion:

Multivessel Robotic MIDCAB can be safe with comparable results to hybrid approach in selected patients. Hybrid approach is easier and is preferred for minimally invasive coronary artery revascularization. However, it is not feasible in some patients with complex lesions in non-LAD territories. Multivessel Robotic MIDCAB can be a good alternative.

Image

HYBRID CORONARY REVASCULARIZATION Vs ROBOTICALLY ASSISTED MULTIVESSEL MIDCAB

		HYBRID (n=81)	Surgical Multi Vessel (n=105)	P-value
Age (Years)	**(mean± SD)**	**65.35±12.15**	**70.05±9.27**	**0.004**
Gender (Male)	(Yes %)	60 74%	79 75%	0.856
BMI	(mean±SD)	29.52±6.022	30.37±5.902	0.339
Diabetes Mellitus	(Yes %)	33 41%	48 46%	0.498
Peripheral Vascular Disease	(Yes %)	11 14%	16 15%	0.75
Cerebral Vascular Disease	(Yes %)	20 25%	37 35%	0.122
Renal Disease	(Yes %)	5 6%	3 3%	0.269
Previous PCI	(Yes %)	40 49%	49 47%	0.713
History of Congestive Heart Failure	(Yes %)	21 26%	23 22%	0.522
Mean LV Ejection Fraction	(mean±SD)	50.6±11.583	53.25±11.043	0.13
Status - Elective	(Yes %)	39 48%	52 49.5%	0.852
Status- Urgent	(Yes %)	42 52%	53 50.5%	0.852
CABG x 1	(Yes %)	65 80%	0 0%	
CABG x 2	(Yes %)	16 20%	60 57%	
CABG x 3	(Yes %)	0 0%	40 38%	
CABG x 4	(Yes %)	0 0%	4 4%	
CABG x 5	(Yes %)	0 0%	1 1%	
Off Pump Procedure	**(Yes %)**	**72 89%**	**31 30%**	**<.001**
30 Day Mortality - Alive	(Yes %)	81 100%	105 100%	
Extubated < 6 hrs.	**(Yes %)**	**70 86%**	**28 27%**	**<.001**
Reoperation for Bleeding	(Yes %)	0 0%	2 1.9%	0.212
Post operative Renal Failure	(Yes %)	1 1.23%	0 0%	0.254
Post Operative Atrial Fibrillation	**(Yes %)**	**12 14.81%**	**29 27.62%**	**0.037**
Post Procedure LOS	(mean±SD)	5.84±2.87	6.32±3.52	0.307

Poster Presentation Abstracts

Abstract:

Percutaneous Coronary Intervention has Increased In-Hospital Mortality Rate in Diabetic Patients Compared to Coronary Artery Bypass Surgery: A Large-Scale National Inpatient Sample Analysis

Author List:
Qianyun Luo, BS, Renxi Li, BS

Purpose:
While studies have been devoted to understanding outcome differences between coronary artery bypass surgery (CABG) and percutaneous coronary intervention (PCI), short-term outcomes in patients with existing medical conditions remain underrepresented in literature. This study aims to compare the perioperative outcomes of these two revascularization procedures in patients with diabetes mellitus.

Methods:
The National Inpatient Sample (NIS) database was used to extract patients who received CABG or PCI surgery between 2015 and 2020 based on the ICD10-PCS codes. Only patients aged 40 or greater were included to exclude congenital heart defects. The study compared the in-hospital perioperative outcomes between patients who received CABG and PCI surgery. Preoperative differences were noted and adjusted using multivariable logistic regression. Adjusted odds ratios (aOR) with 95% confidence intervals (CI) were estimated between PCI and CAGB groups.

Results:
A total number of 90,662 CABG and 173,725 PCI cases of patients with diabetes mellitus were identified in NIS. Compared to CABG, patients who underwent PCI had increased mortality (2.77% vs 2.00%, aOR 1.293, $p < 0.0001$), myocardial infarction (1.5% vs 1.17%, aOR 1.226, $p < 0.0001$), and were less likely to experience respiratory events (0.38% vs 6.32%, aOR 0.055, $p < 0.0001$), stroke (0.03% vs 0.07%, aOR 0.38, $p < 0.0001$), acute kidney injury (18.01% vs 20.19%,

aOR 0.865, p < 0.0001), renal events (0.05% vs 0.81%, aOR 0.07, p < 0.0001), bleeding events (0.13% vs 0.17%, aOR 0.787, p < 0.0245), shock (0.11% vs 0.74%, aOR 0.141, p < 0.0001). No difference was found in pulmonary embolism (0.03% vs 0.03%, aOR 1.147, p = 0.5609) or superficial wound complications (0.66% vs 0.68%, aOR 0.932, p = 0.1669).

Conclusion:

The NIS database collects enormous records from nationwide providers, offering great statistical power. PCI was associated with a markedly higher in-hospital mortality rate but a lower morbidity rate in patients with diabetes mellitus as compared to CABG. Therefore, physicians should weigh both mortality and morbidity when treating patients with diabetes.

Identify the source of the funding for this research project:

The George Washington University Hospital

Table 1. The in-hospital post-CABG and PCI surgical outcomes of patients with diabetes mellitus from 2015 to 2020 in the NIS database.

	CABG (n = 90662) No. of case (%)	PCI (n = 173725) No. of case (%)	aOR for PCI/CABG	Lower 95% CI	Upper 95% CI	p-value
Length of stay >7 days	52582 (58%)	24370 (14.03%)	0.091	0.089	0.093	**<.0001**
Mortality	1814 (2%)	4806 (2.77%)	1.293	1.223	1.367	**<.0001**
transfer	22511 (24.83%)	16635 (9.58%)	0.272	0.265	0.278	**<.0001**
Respiratory events	5733 (6.32%)	659 (0.38%)	0.055	0.051	0.06	**<.0001**
Stroke	59 (0.07%)	46 (0.03%)	0.38	0.258	0.561	**<.0001**
Myocardial infarction	1064 (1.17%)	2612 (1.5%)	1.226	1.14	1.319	**<.0001**
MACE	1660 (1.83%)	256 (0.15%)	0.076	0.066	0.086	**<.0001**
Acute kidney injury	18307 (20.19%)	31294 (18.01%)	0.865	0.847	0.884	**<.0001**
Superficial wound	614 (0.68%)	1149 (0.66%)	0.932	0.844	1.03	0.1669
Deep wound	185 (0.2%)	19 (0.01%)	0.055	0.034	0.089	**<.0001**
Sepsis	46 (0.05%)	16 (0.01%)	0.176	0.1	0.311	**<.0001**
Shock	675 (0.74%)	188 (0.11%)	0.141	0.12	0.166	**<.0001**
Renal events	738 (0.81%)	95 (0.05%)	0.07	0.056	0.086	**<.0001**
Bleeding events	150 (0.17%)	223 (0.13%)	0.787	0.639	0.97	**0.0245**
Pulmonary embolism	26 (0.03%)	58 (0.03%)	1.147	0.722	1.822	0.5609
Venous throboembolism	604 (0.67%)	722 (0.42%)	0.609	0.546	0.68	**<.0001**

Abstract:

Risk Score that Predict Long-Term Outcomes in Patients Undergoing Coronary Artery Bypass Grafting

Author List:
Serge Sicouri MD; Mary Ann Wertan RN; Basel Ramlawi MD; Noah Sicouri MPH; Ozgun Erten MD; Stephanie Kjelstrom MPH; Leila Hosseinian MD; Francis Sutter MD; Gianluca Torregrossa MD.

Purpose:
The STS and EUROSCORE II risk-scores are not able to predict long-term outcomes in patients undergoing coronary artery bypass grafting (CABG), including high-risk patients. We aim to provide a risk-score that predicts long-term outcomes after CABG including the impact of total arterial revascularization on overall survival and MACCE.

Methods:
This is a single-institution dataset from 2005-2020. We randomly split patients into 75% and 25% portions to create validation and training datasets and compare patients by two-sample t-tests or Mann-Whitney U tests for continuous variables and by chi-square of independence for categorical variables. A univariable Cox-proportional-analyses for all-cause mortality and MACCE was performed at one and five-years. We also used LASSO, backward selection, and stepwise selection, to create the best multivariable Cox proportional-hazard ratio models that predicted outcomes. We compare models using the Akaike Information Criteria (AIC) and test them in our validation dataset with the area under the curve.

Results:
Risk score included the following variables: STS-PROM; Underweight and Morbid Obesity; Chronic Kidney Disease (CKD); Chronic Obstructive Pulmonary Disease (COPD); Diabetes; Peripheral Vascular Disease (PVD); Atrial Fibrillation (Afib); Myocardial Infarction (MI); Prior Valve Surgery; Ejection Fraction (EF) lower than 50%; use of Bilateral Internal Mammary Artery (BIMA); and use of Radial Artery Graft (RAG).
Hazard Ratio was used to calculate multipliers for each risk-predictor.
In the validation dataset, the area under the curve at 5-years was 79% for Overall Survival and 76% for MACCE.

Final risk score was: 0.045 x (STS-PROM) + 0.59 x (Underweight or Morbidly Obese) + 0.7 x (CKD) + 0.6 x (COPD) + 0.52 x (Diabetes) + 0.43 x (Afib) + 0.39 x (MI) + 1.31 x (Prior Valve Surgery) + 0.38 (EF < 50%) â€“ 1.58 x (BIMA-use) â€“ 0.69 (RAG-use).
Survival groups at 5-years; Low risk: < 2.2; Medium risk: 2.2-30; High risk: >30.

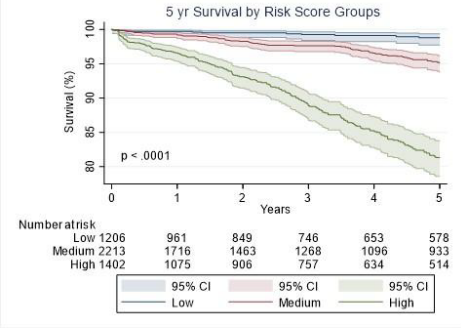
Conclusion:

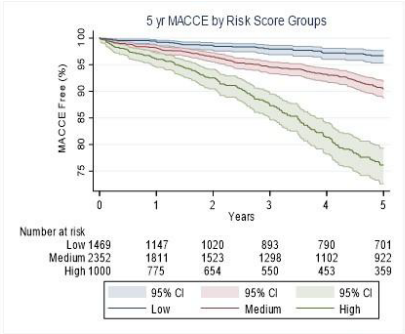
Our risk score can predict short and long-term survival and MACCE in all patients, including high-risk patients.
In addition, patients and surgeons can understand the importance of RAG and BIMA use based on patients individual profile.

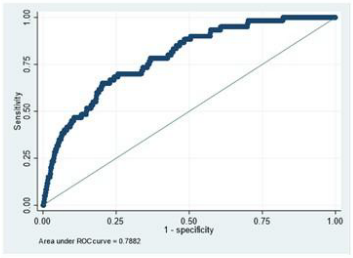
Identify the source of the funding for this research project:

Sharpe-Strumia Research Foundation of Bryn Mawr Hospital, Wynnewood, Pennsylvania, USA. Grant Number (SSRF2022-10).

Image







All Cause Mortality Predictors		
Variables	HR 95% CI	P-value
STS-PROM	1.04 (1.02, 1.1)	<.0001
Underweight or Morbid Obesity	1.8 (1.1, 3.0)	0.027
Chronic Kidney Disease	2.0 (1.5, 2.8)	<.0001
COPD	1.8 (1.3, 2.5)	<.0001
Diabetes	1.7 (1.3, 2.3)	<.0001
PVD	1.5 (1.1, 2.1)	0.01
Atrial Fibrillation	1.5 (1.03, 2.1)	0.034
Myocardial Infarction	1.4 (1.02, 2.0)	0.039
Prior Valve Surgery	3.7 (1.3, 9.4)	0.005
EF < 50%	1.5 (1.1, 2.0)	0.014
BIMA use	0.2 (0.07, 0.6)	0.002
Radial Artery Graft use	0.5 (0.3, 0.9)	0.015
AIC 2719	ROC 79%	

All Cause MACCE Predictors		
	HR (95% CI)	p
Female	0.7 (0.5, 0.9)	0.012
Black Race	1.5 (1.1, 2.1)	0.019
STS-PROM	1.1 (1.03, 1.1)	<.0001
Underweight or Morbid Obesity	1.8 (1.2, 2.9)	0.007
Chronic Kidney Disease	1.5 (1.2, 2.0)	0.003
COPD	1.4 (1.1, 1.9)	0.016
Total Arterial	0.7 (0.5, 0.99)	0.05
BIMA	0.3 (0.1, 0.7)	0.01
Diabetes	1.5 (1.2, 1.9)	0.002
Cerebrovascular Disease	1.4 (1.0, 1.8)	0.031
PVD	1.5 (1.1, 2.0)	0.007
Myocardial Infarction	1.5 (1.2, 2.0)	0.002
Prior Valve Surgery	2.9 (1.2, 7.4)	0.022
AIC	3729.5	
ROC	76.6	

Abstract:
Transition to Total Arterial Revascularization: A Large Single Surgeon Experience

Author List:
Dwight D. Harris II, MD, Louis Chu, MD, Michelle Doherty, MSN, RN, Kalon Ho, MD, Venkatachalam Senthilnathan, MD

Purpose:
Despite multiple randomized controlled trials demonstrating long-term benefits of total arterial revascularization (TAR), TAR remains underutilized, due to concerns such as sternal wound infections, patient selection, and learning curve. We present the largest reported experience of a single mid-career surgeon transitioning to TAR, focusing on short-term outcomes and learning curve.

Methods:
The Society of Thoracic Surgeon database was reviewed to identify all patients who underwent isolated CABG performed by a single surgeon from January 2014 through January 2022. The surgeon transitioned to TAR in August of 2017, and TAR was preferred for all comers with the exception of select anatomical considerations. Patients were divided into traditional CABG using one internal mammary artery and vein grafts (IMA-SVG) and those who had TAR with any combination of mammary and radial arteries. Exclusion criteria included off-pump, pump-assisted, single vessel or emergent CABG. Operative times were plotted to generate learning curves for TAR over time.

Results:
The study included 898 total patients (458 IMA-SVG and 440 TAR). Baseline demographics were similar between groups (Table 1). The 30-day mortality was one mortality per group ($p=1.00$). Although the TAR group had slightly longer clamp times, pump times, and operative times (all $p<0.01$), ICU stay was shorter and 30-day readmission rate was lower in the TAR group ($p<0.01$). The TAR group also required fewer postoperative transfusions ($p<0.01$). There was no difference in prolonged intubation, stroke, and length of stay between groups. There was no difference in sternal wound complications between groups. At six months, one year, and two years there was a trend toward less graft stenosis in the TAR group ($p=0.17$, $p=0.08$, and $p=0.17$). Kaplan-Meier analysis showed a trend toward decreased graft stenosis with TAG ($p=0.08$). The average TAR was 30 minutes

longer than IMA-SVG; However, learning curves showed no significant learning curve associated with TAR (figure 1).

Conclusion:

An experienced surgeon transitioning from IMA-SVG to TAR slightly increases operative time, but decreases ICU stay, readmissions, and postoperative transfusions with no significant difference in rates of post-op complications including sternal wound infections or 30-day mortality, with minimal learning curve. Furthermore, short-term results show a trend towards increased graft patency.

Table 1: All Coronary Artery Bypass Grafting Surgeries

Table 1: All Coronary Artery Bypass Grafting Surgeries

	A (440)	V (458)	p
Age (years, mean (SD))	66.6 (9.7)	66.9 (9.9)	0.70
Sex Male, n (%)	360 (81.8)	363 (79.3)	0.94
STS Risk Score (Median [IQR])	0.009 [0.012]	0.010 [0.016]	0.17
History of Smoking, n (%)	230 (52.3)	277 (60.5)	0.01
History of DM, n (%)	192 (43.6)	203 (44.3)	0.84
Urgent Case, n (%)	282 (64.1)	282 (61.6)	0.43
30-day Mortality, n (%)	1 (0.2)	1 (0.2)	1.00
Distal Anastomosis (Median [IQR])	3 [1.0]	3 [1.0]	0.16
Perfusion Time (minutes,Median [IQR])	84 (34)	76 (27)	< 0.01
Clamp Time (minutes, Median [IQR])	72 [30]	65 [24]	< 0.01
Case Time (hours, Median [IQR])	3.65 [1.0]	3.17 [0.9]	< 0.01
Time in ICU (hours, Median [IQR])	33.0 [37.8]	46.2 [48.0]	< 0.01
Renal Failure, n (%)	5 (1.1)	5 (1.1)	1.00
Prolonged Ventilator, n (%)	21 4.8)	28 (6.1)	0.54
Sternal Infection, n (%)	11 (2.5)	9 (2.0)	0.65
Stroke, n (%)	5 (1.1)	4 (0.9)	0.75
30-day Readmission, n (%)	39 (8.9)	73 (15.9)	< 0.01
Re-op , n (%)	11 (2.5)	14 (3.1)	0.61
IABP, n (%)	24 (5.5)	28 (6.1)	0.67
Need for ECMO, n (%)	0 (0.0)	1 (0.2)	1.00
Post-op Stay (Days, Median [IQR])	5 [3]	5 [2]	0.05
Need for Transfusion, n (%)	111 (25.3)	165 (36.0)	< 0.01
Cath with Stenosis at 6 Months, n (%)	8 (1.8)	15 (3.3)	0.17
Cath with Stenosis at 1 Year, n (%)	11 (2.7)	23 (5.0)	0.08
Cath with Stenosis at 2 Years, n (%)	17 (5.2)	36 (8.1)	0.17

A = total arterial grafting group; Cath = cardiac catheterization; M = diabetes mellitus; ECMO = extracorporeal membrane oxygenation; I = pre or post-op intra-aortic balloon pump; Re-op = any reoperations in first 14 days; STS = Society of Thoracic Surgeons;V = vein graft group; % for Cath with Stenosis is n over the number of paitents that have made it to that post-op time point.

Table

Figure 1. Learning Curves for Two, Three and Four Vessel CABG

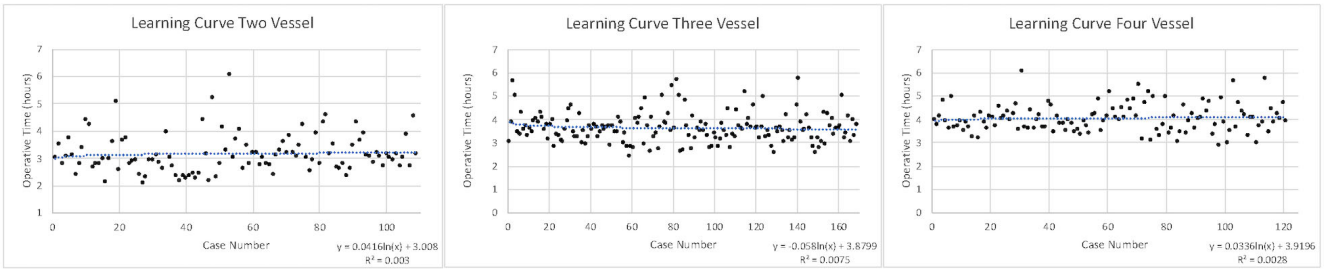


Figure 1: The case time plotted for each case number for for two, three and four vessel coronary artery bypass graft (CABG) using total arterial grafting. The data was analyzed with liner and logistic regression. Liner and logistic regression both showed no significant learning curve. Logistic regression results and R-squared values are in the lower right of all graphs.

Abstract:

Percutaneous Coronary Intervention has Better In-Hospital Mortality and Morbidity Than Coronary Artery Bypass Surgery Among Patients with Severe Renal Failure: A Retrospective National Inpatient Sample Analysis

Author List:

Renxi Li, BS, Qianyun Luo, BS

Purpose:

In patients with chronic kidney disease (CKD), coronary artery bypass surgery (CABG) was found to have better long-term outcomes than percutaneous coronary intervention (PCI). This study aims to provide a retrospective analysis of the in-hospital peri-operative outcomes between PCI and CABG in patients with severe renal failure.

Methods:

Patients who underwent CABG and PCI in 2015-2020 were identified in National Inpatient Sample (NIS) database by ICD10-PCS. Patients of age<40 were excluded for congenital heart defects. Comorbidities were defined based on Elixhauser Comorbidity Index. Patients with comorbidity of severe renal failure were included. Between patients undergoing PCI and CABG, preoperative variables were compared and corrected in multivariable logistic regression examining their in-hospital peri-operative outcomes. Adjusted odds ratios (aOR) were estimated for mortality, heart failure, stroke, myocardial infarction, respiratory complications, pulmonary embolism, venous thromboembolism, renal complications, acute kidney injury, bleeding, superficial/deep wound, sepsis, shock, length of stay>7 days, and transfer.

Results:

In the NIS database, 4,512 cases of CABG and 13,242 cases of PCI patients with severe renal failure were identified. Compared to CABG, patients who received PCI had lower mortality (4.24% vs 5.47%, aOR 0.725, $p < 0.0001$) and had lower morbidity including heart failure (0.14% vs 2.97%, aOR 0.044, $p < 0.0001$), stroke (0.12% vs 0.47%, aOR 0.264, $p < 0.0001$), respiratory complications (0.51% vs 7.34%, aOR 0.063, $p < 0.0001$), renal complications (0.05% vs 0.49%, aOR 0.075, $p < 0.0001$), acute kidney injury (8.67% vs 12.66%, aOR 0.646, $p < 0.0001$), deep wound complications (0.02% vs 0.35%, aOR 0.042, $p < 0.0001$), shock (0.22% vs

0.95%, aOR 0.228, p < 0.0001), and length of in-hospital stay over 7 days (24.75% vs 73.52%, aOR 0.106, p < 0.0001).

Conclusion:

NIS is a comprehensive database of nationwide providers, providing robust power in analysis. In patients with severe renal failure, PIC offers an advantage over CABG in terms of postoperative in-hospital both mortality and morbidity in cardiac, pulmonary, renal, and wound complications.

Identify the source of the funding for this research project:

The George Washington University Hospital

Table 1. The in-hospital post-CABG and PCI surgical outcomes of patients with severe renal failure from 2015 to 2020 in the NIS database.

	CABG (n = 90662) No. of case (%)	PCI (n = 173725) No. of case (%)	aOR for PCI/CABG	Lower 95% CI	Upper 95% CI	p-value
Length of stay >7 days	52582 (58%)	24370 (14.03%)	0.091	0.089	0.093	**<.0001**
Mortality	1814 (2%)	4806 (2.77%)	1.293	1.223	1.367	**<.0001**
transfer	22511 (24.83%)	16635 (9.58%)	0.272	0.265	0.278	**<.0001**
Respiratory events	5733 (6.32%)	659 (0.38%)	0.055	0.051	0.06	**<.0001**
Stroke	59 (0.07%)	46 (0.03%)	0.38	0.258	0.561	**<.0001**
Myocardial infarction	1064 (1.17%)	2612 (1.5%)	1.226	1.14	1.319	**<.0001**
MACE	1660 (1.83%)	256 (0.15%)	0.076	0.066	0.086	**<.0001**
Acute kidney injury	18307 (20.19%)	31294 (18.01%)	0.865	0.847	0.884	**<.0001**
Superficial wound	614 (0.68%)	1149 (0.66%)	0.932	0.844	1.03	0.1669
Deep wound	185 (0.2%)	19 (0.01%)	0.055	0.034	0.089	**<.0001**
Sepsis	46 (0.05%)	16 (0.01%)	0.176	0.1	0.311	**<.0001**
Shock	675 (0.74%)	188 (0.11%)	0.141	0.12	0.166	**<.0001**
Renal events	738 (0.81%)	95 (0.05%)	0.07	0.056	0.086	**<.0001**
Bleeding events	150 (0.17%)	223 (0.13%)	0.787	0.639	0.97	**0.0245**
Pulmonary embolism	26 (0.03%)	58 (0.03%)	1.147	0.722	1.822	0.5609
Venous throboembolism	604 (0.67%)	722 (0.42%)	0.609	0.546	0.68	**<.0001**

Abstract:

Radial Artery Versus Right Internal Mammary Artery as a Second Conduit After Coronary Artery Bypass Grafting

Author List:

Eishan Ashwat, BS, James A. Brown, MD, Sarah Yousef, MD, Yisi Wang, MPH, Floyd W. Thoma, BS, Derek Serna-Gallegos, MD, Pyongsoo Yoon, MD, Danny Chu, MD, Johannes Bonatti, MD, David Kaczorowski, MD and Ibrahim Sultan, MD

Purpose:

Data regarding the most optimal secondary arterial conduit during coronary artery bypass grafting (CABG) is still lacking. This study aims to compare the clinical outcomes of patients who received radial artery (RA) grafts during CABG to those who received right internal mammary artery (RIMA) grafts.

Methods:

A retrospective, single-institution cohort study was performed on adults who underwent isolated coronary artery bypass surgery with multiple grafts between 2010-2022. Long-term postoperative survival was compared among RA and RIMA groups. Similarly, major adverse cardiac and cerebrovascular event (MACCE) rates were compared among both cohorts, with MACCE comprising death, myocardial infarction (MI), coronary revascularization, and stroke. Kaplan-Meier estimation and multivariable Cox regression were performed for both mortality and MACCE.

Results:

A total of 8,774 patients underwent CABG. Of those, 1,689 (19.2%) patients who underwent multi-arterial CABG were included in this analysis. 341 (20.2%) patients received RA grafts and 1,348 (79.8%) received RIMA grafts. Median BMI and preoperative STS risk were significantly increased in patients who received RA grafts ($p<0.001$). There were no significant differences in operative mortality, new-onset renal failure, or mechanical ventilation. Median follow-up was 5.66 (2.52-8.30) years. Kaplan-Meier survival estimates were comparable at both the 1- and 5-year time points. On multivariable Cox regression, RIMA was not significantly associated with an increased hazard of death (HR, 1.08; 95% CI:0.73-1.61; P=0.689), compared to the RA. However, RIMA grafting was associated with a lower hazard of MACCE (HR, 0.77; 95% CI:0.60-0.98; P=0.036). When separately assessing the individual components of MACCE, RIMA was associated with

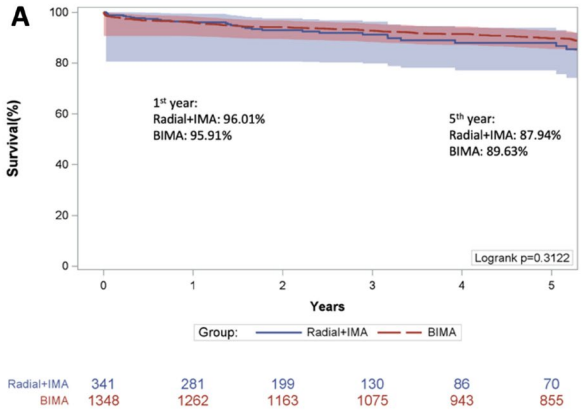
reduced MI and need for revascularization when compared to RA. No difference was observed for stroke.

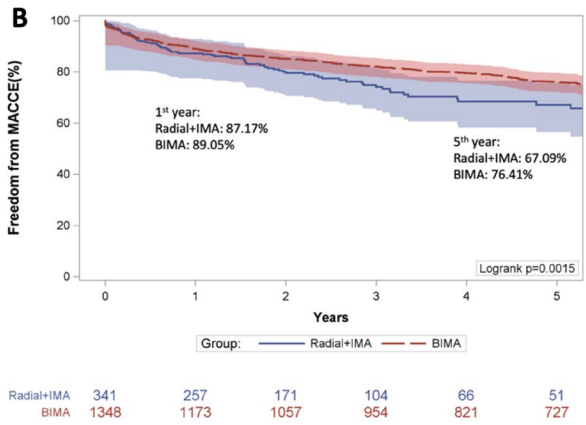
Conclusion:

Overall, RA and RIMA secondary conduits for CABG were associated with comparable immediate postoperative complications and long-term survival. RIMA vs RA grafting was associated with a significantly decreased probability of experiencing postoperative MACCE, specifically due to lower rates of MI and repeat coronary revascularization.

Image

Kaplan-Meier survival (Fig. 1a) and freedom from MACCE (Fig. 1b) estimates for the radial artery + left internal mammary artery (Radial + IMA) and bilateral internal mammary artery (BIMA) groups, with 1- and 5-year survival rates displayed.





Abstract:

Being Prepared for the Unexpected: Emergency CABG in an Octogenarian Using Bilateral Internal Mammary Artery Grafting

Author List:
Dominic C. Regli, BS, Eric J. Kuttler, FNP, Charlotte R. Heike, UT, Vishal G. Patel, MD, Christina A. McDowell, MD, David A. Philips, MD, Joseph M. Arcidi, Jr., MD

Purpose:
It is unwise to commence unfamiliar coronary revascularization strategies in the emergent setting. In our remote community hospital, however, over the past two years, we have utilized multiple arterial grafts in >50% of CABG patients. We suggest that this facilitated our ultimately successful outcome in a particularly complex emergent scenario.

Methods:
This 86yo woman with an anterior STEMI, 95% calcified left main trifurcation (Image A) disease, and 75% proximal RCA stenosis had early pulmonary edema, a 23mmHg LVEDP, 40% ejection fraction, severe anteroseptal hypokinesis/apical akinesis, and moderate mitral regurgitation. The limited history obtainable before emergency CABG revealed noninsulin-dependent diabetes, varicose veins, and a dual-chamber pacemaker. Only the RCA appeared amenable to coronary stenting. Angina persisted until IABP insertion. Left hand circulation was radial-dependent. Pre-sternotomy ultrasound demonstrated no useable left saphenous vein. Complete right endovein harvest returned one partially thrombosed segment. A bilateral internal mammary T-graft was the remaining surgical revascularization option.

Results:
Nonbeveled T-graft anastomosis was performed after bilateral skeletonized internal mammary harvests, consistent with our current practice (Table: STS report) The right internal mammary limb was placed to the mid-circumflex marginal, the left limb to the distal anterior descending, and following thrombectomy, the saphenous vein to the ramus intermedius. Mean electromagnetic flow of the proximal T-graft was 37.8ml/min, maximum was

64.6ml/min, and pulsatility index was 2.2. The patient was extubated in the operating room, IABP was removed on postoperative day 2, RCA was stented on day 5, and discharge to rehab occurred day 8. She was readmitted on day 24 with congestive failure, atrial fibrillation, severe mitral regurgitation, anteroseptal/apical akinesis, and postdiuresis ejection fraction of 45%. Transthoracic Doppler verified robust flow in both T-graft limbs (Image B). MitraClip implantation achieved trace mitral regurgitation. At 7 weeks postoperatively, the patient is home, ambulatory on room air, and planning her return to gardening.

Conclusion:

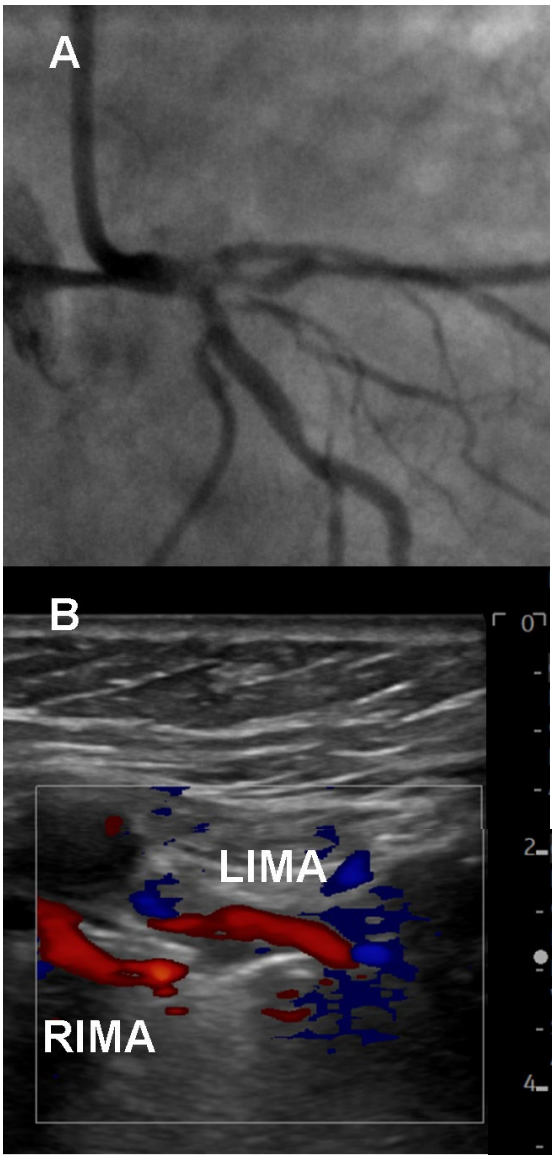
Our ultimately favorable outcome required unexpectedly complex, emergent revascularization using an internal mammary T-graft, prompted by venous conduit shortage. Centers which utilize a second arterial conduit only when facing such a shortage may be less prepared in emergent situations than programs, even remotely located, that frequently use multiple arterial grafts.

Identify the source of the funding for this research project:
Providence St. Joseph Hospital Foundation

Image

A: Left main trifurcation stenosis causing ST-elevation infarction

B: Postoperative T-graft transthoracic Doppler flow



Table

Risk Adjusted Report 12/7/2022

		My Site 2021	My Site 2022*	STS 2022
Multiple Arterial Grafts (%)	% of patients with multiple arterial grafts	52.38%	66.66%	15.56%
Internal Mammary Artery Used	IMA Used	100%	100%	99.56%
	Left	100%	100%	97.85%
	Right	9.52%	22.22%	7.99%
	Both	9.52%	22.22%	7.57%
	Missing	-	-	0.02%
Radial Artery Used	Radial Artery Used	42.85%	55.55%	10.24%
	Missing	-	-	0.11%

Abstract:

Peri-Operative Pre-Albumin Level Predicts Mortality and Transfusion Requirements in CABG Operations

Author List:
Andrew P. Rabenstein, MD, Rishabh Matta, BS, Brent Williams, PhD, Jeanette Brocious, MS, Rodrigo Campana, MD, Aryan Meknat, MD, Sean Forrest, MD, Stephen Bailey, MD, Michael S. Halbreiner, MD.

Purpose:
Albumin and BMI, as nutritional markers, have historically been used to predict mortality and morbidities. Many surgical specialties now use pre-albumin due to its more acute nature, but this this data is lacking in cardiac surgery. This study hypothesizes that pre-albumin is a predictor of mortality, readmission, and blood transfusions.

Methods:
A retrospective review of all patients undergoing CABGs at a single institution from July 1, 2017-December 31, 2021, was performed. Inclusion criteria were all patients undergoing CABG as part of an isolated or combined procedure (excluding an acute aortic dissection repair or for patient undergoing hypothermic circulatory arrest) that had a recorded peri-operative pre-albumin within 3 days pre-operatively or post-operatively. All data was queried from the institutionâ€™s STS database and EMR. All data was analyzed with SAS using ANOVA methodology. This project was approved by the institutional IRB.

Results:
A total of 1211 patients underwent a CABG and had a recorded peri-operative pre-albumin. Pre-albumin levels were stratified as <10, 10-15, 15-20 or >20 mg/dL. There was strong correlation between the pre-operative and post-operative pre-albumin among the 75 patients that had both (Spearmanâ€™s coefficient r=0.72). Among all 1211 patients there was no significant difference in pre-operative anti-platelet, anti-coagulant or concomitant procedures in the groups. Patients presenting with an NSTEMI ($p<0.001$), females ($p<0.001$), and older patients ($p<0.001$) were significantly more likely to have a lower pre-albumin. After controlling for co-variates, patients with a lower pre-albumin were more likely to have intra-operative red blood cell ($p<0.001$), post-operative red

blood cell ($p=0.02$), platelet ($p=0.005$), and plasma ($p=0.001$) transfusions. Patients with a lower pre-albumin had a higher 30-day mortality rate ($p<0.001$). While 30-day re-admission rate initially showed a difference ($p=0.02$), this disappeared when controlling for co-variates.

Conclusion:

Pre-albumin serves as reliable indicator of mortality and blood product transfusions. Additional research should focus on whether optimizing pre-operative nutrition and increasing pre-operative pre-albumin correlates with improved survival and decreased transfusion requirements.

Image

Intraoperative and postoperative transfusion requirements, 30-day mortality, and re-admission rates stratified by peri-operative pre-albumin level.

			Prealbumin			
	All (n=1211)	≤ 10 (n=85)	>10 - ≤15 (n=351)	>15 - ≤20 (n=536)	>20 (n=239)	p-value
Intraoperative						
Red blood cell units (any)	198, 16.4%	40, 47.1%	91, 25.9%	53, 9.9%	14, 5.9%	<0.001
Unadjusted Odds Ratio	-	14.29 (7.18, 28.42)	5.62 (3.12, 10.15)	1.76 (0.96, 3.24)	1.00 (-)	<0.001
Adjusted Odd Ratio[1]	-	5.71 (2.38, 13.73)	2.99 (1.46, 6.14)	1.24 (0.62, 2.51)	1.00 (-)	<0.001
Platelets (any)	98, 8.1%	8, 9.4%	42, 12.0%	38, 7.1%	10, 4.2%	0.005
Unadjusted Odds Ratio	-	2.38 (0.91, 6.24)	3.11 (1.53, 6.33)	1.75 (0.86, 3.57)	1.00 (-)	0.005
Adjusted Odd Ratio[1]	-	0.72 (0.22, 2.32)	1.81 (0.80, 4.07)	1.32 (0.62, 2.82)	1.00 (-)	0.12
Fresh frozen plasma (any)	89, 7.3%	8, 9.4%	39, 11.1%	32, 6.0%	10, 4.2%	0.005
Unadjusted Odds Ratio	-	2.38 (0.91, 6.24)	2.86 (1.40, 5.85)	1.45 (0.70, 3.01)	1.00 (-)	0.005
Adjusted Odd Ratio[1]	-	1.02 (0.31, 3.29)	1.97 (0.86, 4.49)	1.19 (0.55, 2.56)	1.00 (-)	0.15
Any Intraoperative Transfusion	249, 20.6%	43, 50.6%	106, 30.2%	76, 14.2%	24, 10.0%	<0.001
Unadjusted Odds Ratio	-	9.17 (5.04, 16.69)	3.88 (2.40, 6.26)	1.48 (0.91, 2.41)	1.00 (-)	<0.001
Adjusted Odd Ratio[1]	-	3.72 (1.75, 7.88)	2.11 (1.18, 3.76)	1.08 (0.62, 1.86)	1.00 (-)	<0.001
Postoperative						
Red blood cell units (any)	364, 30.1%	45, 52.9%	133, 37.9%	144, 26.9%	42, 17.6%	<0.001
Unadjusted Odds Ratio	-	5.28 (3.07, 9.06)	2.86 (1.92, 4.26)	1.72 (1.17, 2.53)	1.00 (-)	<0.001
Adjusted Odd Ratio[1]	-	2.57 (1.31, 5.05)	1.95 (1.20, 3.16)	1.45 (0.94, 2.25)	1.00 (-)	0.02
Platelets (any)	110, 9.1%	18, 21.2%	41, 11.7%	41, 7.6%	10, 4.2%	<0.001
Unadjusted Odds Ratio	-	6.15 (2.71, 13.96)	3.03 (1.49, 6.17)	1.90 (0.93, 3.85)	1.00 (-)	<0.001
Adjusted Odd Ratio[1]	-	5.73 (2.10, 15.60)	2.95 (1.34, 6.50)	1.75 (0.84, 3.65)	1.00 (-)	0.003
Fresh frozen plasma (any)	145, 12.0%	25, 29.4%	50, 14.2%	53, 9.9%	17, 7.1%	<0.001
Unadjusted Odds Ratio	-	5.44 (2.76, 10.73)	2.17 (1.22, 3.86)	1.43 (0.81, 2.53)	1.00 (-)	<0.001
Adjusted Odd Ratio[1]	-	4.79 (2.03, 11.28)	2.05 (1.06, 3.97)	1.31 (0.72, 2.39)	1.00 (-)	0.001
Any Postoperative Transfusion	387, 32.0%	48, 56.5%	140, 39.9%	153, 28.5%	46, 19.2%	<0.001
Unadjusted Odds Ratio	-	5.44 (3.18, 9.30)	2.78 (1.89, 4.10)	1.68 (1.16, 2.43)	1.00 (-)	<0.001
Adjusted Odd Ratio[1]	-	2.92 (1.50, 5.69)	2.01 (1.26, 3.22)	1.45 (0.95, 2.22)	1.00 (-)	0.006
30-day mortality	25, 2.1%	8, 9.4%	12, 3.4%	5, 0.9%	0, 0.0%	<0.001
Unadjusted Odds Ratio	-	11.03 (3.52, 34.59)	3.76 (1.31, 10.77)	1.00 (-)	-	<0.001
Adjusted Odd Ratio[2]	-					
Readmission	139, 11.5%	15, 17.6%	46, 13.1%	62, 11.6%	16, 6.7%	0.02
Unadjusted Odds Ratio	-	2.99 (1.40, 6.35)	2.10 (1.16, 3.81)	1.82 (1.03, 3.23)	1.00 (-)	0.02
Adjusted Odd Ratio[1]	-	1.65 (0.67, 4.08)	1.56 (0.80, 3.05)	1.54 (0.84, 2.81)	1.00 (-)	0.54

Table. Intraoperative and postoperative transfusion requirements, 30-day mortality, and re-admission rates stratified by peri-operative pre-albumin level.

[1] Adjusted for age, gender, dialysis, liver disease, diabetes, body mass index, albumin, and preoperative medications (ADP inhibitor ≤ 5d, Aspirin ≤ 5d, Anticoag IV/SubQ ≤ 48h)

[2] No adjusted model due to small number of events.

Abstract:

Does Multi-Arterial Revascularization Confer Additional Survival Benefit In Heart Failure Patients Undergoing Coronary Artery Bypass Graft? A Systematic Review and Meta-Analysis

Author List:

Nader S. Aboelnazar, MD, MSc, Byron Gottschalk, MD, Mohsyn Malik, MD, Eiki Nagaoka, MD, Michelle Shaw, MSc, Dave Nagpal, MD, MSc

Purpose:

Multi-arterial revascularization (MAR) potentially achieves additional long-term survival post-CABG compared to single arterial revascularization (SAR). Patients with reduced left ventricular ejection fraction have improved survival expectations in the current era due to improved medical therapy. A MAR strategy might confer additional survival benefits for these high-risk patients undergoing CABG.

Methods:

A systematic review was performed utilizing multiple databases to identify all studies (peer-reviewed, full text, in English, until December 2021) comparing the use of MAR versus SAR in patients with low left ventricular ejection fraction (<40%) undergoing isolated CABG. The primary endpoint was survival, while secondary endpoints included short-term and long-term major adverse cardiovascular and cerebral events (MACCE). A random-effect model was utilized for the meta-analysis in progress, using a comprehensive meta-analysis software (v2, BioStat Inc.). Odds Ratios (95% confidence interval) derived from Kaplan-Meier plots and significance considered as $p<0.05$.

Results:

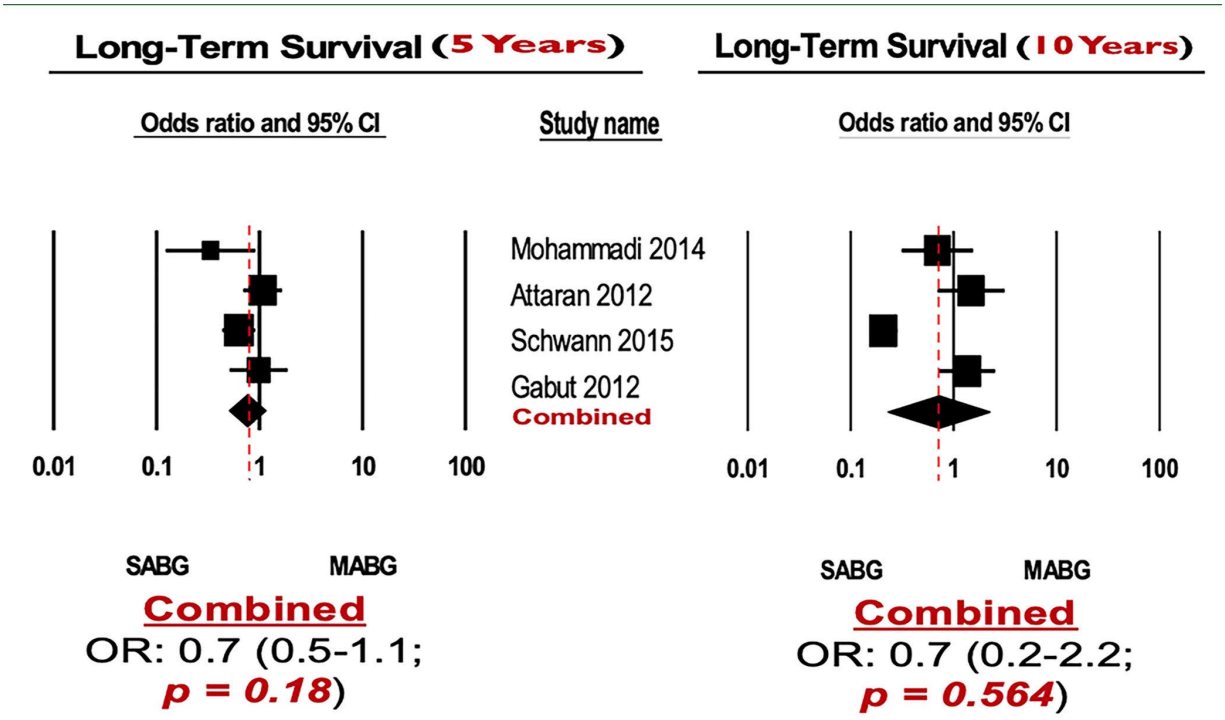
Eight papers met our criteria: all were retrospective and non-randomized. Variations existed in methodology, conduit analysis, outcomes, and duration of follow-ups. Two articles did not report propensity matching analysis. Preliminary meta-analysis demonstrates no significant differences with regards to MACCE and mid-to-late survival (Figure: 5 and 10-years). However, some studies reported a non-significant increasing trend in early mediastinitis with bilateral arterial thoracic revascularization. On the other hand, 7/8 studies reported that MAR confers a significant mid-to-late survival benefit regardless of the severity of left

ventricular dysfunction. It was reported that MAR in these high-risk patients is a strong independent predictor of survival (HR: 0.79; 95% CI: 0.66-0.94, p=0.007).

Conclusion:
Multi-arterial revascularization might confer additional survival benefit over a single-arterial strategy in patients with low left ventricular ejection fraction undergoing CABG. Future randomized studies are required.

Identify the source of the funding for this research project:
Internal

Image: Mid-to-Late Survival (5 & 10-Years)



Abstract:

Quality Analysis of Online Resources for Patients with Coronary Artery Disease Undergoing Coronary Artery Bypass Graft Procedure

Author List:

Natalia Roa-Vidal, BS, John A. Treffalls, BS, Zachary Brennan, BS, Omar M. Sharaf, BS, Brittany Rhoades, PhD, Lauren K. Barron, MD

Purpose:

Online resources are quickly becoming the primary educational resource for health conditions and surgical procedures. The quality and reliability of online information about coronary artery bypass graft procedures (CABG) are unknown. We aimed to systematically analyze available internet resources for English- and Spanish-speaking patients considering CABG.

Methods:

We queried four search engines (Google, Bing, Yahoo, and Dogpile) for the terms "coronary artery bypass," "coronary artery bypass graft," "coronary artery bypass graft surgery," and "CABG." The top 30 websites from each were aggregated for a total of 158. Duplicates, commercial websites, physician-oriented resources, and broken links were excluded. A total of 85 websites were graded with the DISCERN instrument (validated quality criteria for consumer health information), patient-focused criteria, and readability calculators using a two-reviewer system. Descriptive statistics and nonparametric analysis of variance were performed.

Results:

Of 85 websites analyzed, there were 43 hospital/healthcare organizations (50.6%), 30 open-access (35.3%), 9 governmental agencies (10.6%), 2 industry-sponsored (2.4%), and 1 professional medical society (1.2%). For DISCERN criteria, median reliability was 24 of 40 (IQR 19.5-31.5) and median quality was 20.5 of 35 (IQR 16.0-27.5). Accessibility was low, with 34.1% of websites disclosing their author and 23.5% available in Spanish. For DISCERN and patient-focused criteria, median total score was 55 of 95 (IQR 44.0-68.0). Median total score varied by website type (p=0.03). Governmental (69, IQR 56.6-75.5) and open-access (61.5, IQR 43.4-76.8) websites scored higher, while industry (51.8, IQR 47.1-56.4) and hospital/healthcare (49.0, IQR 40.0-61.0) websites scored lower. Readability was

low, with a median Flesch-Kincaid Grade Level score of 11.1 (IQR 9.5-12.6) and 75.3% of websites written above 8th grade reading level.

Conclusion:

The accessibility of online patient educational resources for CABG is limited by language barriers and level of education despite being widely available. The quality and reliability of the information offered varied between website types and warrants further study. Improving readability to ensure patient understanding and comprehensive decision-making should be prioritized.

Table 1. Summary of CABG online resource analysis by website type.

	DISCERN Reliability (out of 40):	DISCERN Total (out of 80):	Interactivity (out of 12):	Total Score (out of 95):	Flesh-Kincaid grade level:
Hospital/Healthcare (n = 43)	21.5 (17.8-26.5)	43 (35.3- 55.8)	4.0 (3.0-5.0)	49.0 (40.0-61.0)	11.7 (10.1-13.0)
Open Access (n = 30)	28.5 (20.6-35.3)	55.5 (39.9-68.5)	3.0 (2.0-6.8)	61.5 (43.4-76.8)	10.7 (9.1-12.6)
Governmental Agencies (n = 9)	31.5 (29.9-32.5)	62.5 (50.0-66.5)	5.0 (3.0-8.0)	68.5 (55.5-74.0)	9.6 (8.2-11.4)
Industry Sponsored (n = 2)	27.25 (26.6-27.9)	43.8 (39.1-48.4)	6.0 (5.5-6.5)	51.8 (47.1-56.4)	12.7 (10.4-14.9)
Professional Medical Society (n = 1)	31.5	68.0	5.0	76.0	11.0
P value	0.004	0.05	0.37	0.05	0.30

Continuous variables are presented as median (IQR).

Abstract:

A Novel Non-Atriotomy Posterior Wall Isolation to Reduce Post-Op Atrial Fibrillation in Isolated CABG Patients

Author List:

Armin Kiankhooy, MD, Carolyn Pierce, NP, Michaela Daw, BS, Susan Eisenberg, MD, Gansevoort Dunnington, MD

Purpose:

Post-operative atrial fibrillation (POAF) is common and is associated with morbidity and mortality. Effective intra-operative techniques aimed at reducing POAF focus on limiting left atrial triggers. We sought to observe the rate of POAF with a novel non-atriotomy left atrial posterior wall isolation (PWI) in patients undergoing isolated CABG.

Methods:

A retrospective observational cohort comparison study of first-time isolated CABG patients with (n=44) or without (n=90) prophylactic posterior wall isolation (PWI) from July 2020 thru November 2022. POAF was defined by standard STS definitions. Out of hospital POAF was determined by clinic EKG and 6-month continuous ambulatory monitoring (iRhythm ZioPatch) in patients that underwent PWI. Data are represented as mean +/- SD. P-values <0.05 are considered significant.

Results:

STS collected patient demographics did not differ significantly between cohorts. Mean age 67 +/- 9.7 years. The rate of POAF differed significantly between cohorts (No PWI, 41.1% vs PWI, 4.6%; $p<0.001$, OR 0.07 95% CI 0.016-0.27). The rate of Amiodarone usage on discharge differed significantly between cohorts (No PWI, 42.5% vs PWI 7.1%; $p<0.001$ OR 0.10 95% CI 0.03-0.33). Despite additional surgery, no significant difference in overall operative duration (No PWI, 332 mins vs PWI, 361 mins; p=NS) or cross-clamp time (No PWI, 74 mins vs PWI, 74 mins; p=NS) was observed. Thirty-nine PWI patients (89%-follow up) returned to clinic and all demonstrated freedom from AF on clinic EKG (40 +/- 22days). Thirty patients were eligible for AF burden evaluation with 6-month post-surgery ZioPatch monitoring, 13 (43%) complied with monitoring, all had 0% AF burden

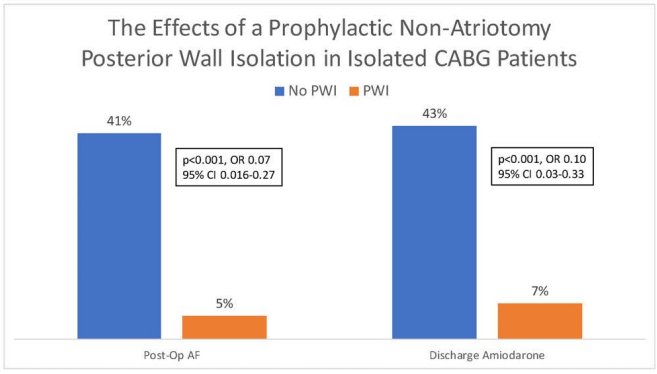
with an average of 9.8 + 3.8days of monitoring. No PWI related complications occurred.

Conclusion:

A prophylactic non-atriotomy left atrial posterior wall isolation may offer an additional tool to reduce the incidence of 30-day STS POAF and resultant need for anti-arrhythmic medications in isolated CABG patients. This prophylactic ablation may also limit late AF incidence. Future randomized prospective controlled studies are needed to prove effectiveness.

Image:

The Effects of a Prophylactic Non-Atriotomy Posterior Wall Isolation in CABG Patients



Abstract:

Robotic MIDCAB has Similar Mortality and Lower Morbidity Compared to Conventional Sternotomy CABG

Author List:

Amber Edwards, MD, Clayton Kaiser, MD, Evelio Rodriguez, MD, Chandrashekhar Ramaiah, Babatunde Yerokun, MD, MD, Mark Tedder, MD, Ashok Babu, MD

Purpose:

Robotic minimally invasive direct coronary artery bypass (rMIDCAB) is a revascularization technique with a relative paucity of rigorous comparison data to conventional sternotomy coronary artery bypass grafting (sCABG). The purpose of this study is to determine if rMIDCAB offers benefits over sCABG.

Methods:

This is a single-center retrospective review of patients undergoing CABG from January 2019 to September 2022. We included all patients undergoing isolated coronary revascularization (n=2931), including rMIDCAB approach (n=501) and sCABG (n=2429). Preliminary calculations were performed using unpaired t-tests for continuous data and two-tailed chi-square tests for categorical data. Primary outcome is perioperative mortality. Secondary outcomes include hospital length-of-stay (LOS), intensive care unit (ICU) LOS, operative time, ventilator time, transfusions, and postoperative morbidities.

Results:

There was no difference in perioperative mortality between the groups: 1.6% for rMIDCAB, 1.4% for sCABG (p=0.79). Hospital LOS was less in rMIDCAB, 8 vs. 9 days (p=0.01). ICU LOS was less in rMIDCAB, 50.7h vs. 60.7h (p=0.01). Operative time was shorter in the rMIDCAB group (4.6h vs 4.9h, p=0.01). Additionally, time on the ventilator was shorter in the robotic group (7.2h vs. 12.8h hours, p=0.01). There were no surgical site infections in the rMIDCAB group, and 20 (1%) in the ICAB group (p=0.04). Postoperative renal failure, atrial fibrillation, and stroke were similar in both groups (see Table 1). Intraoperative transfusions were less frequent with rMIDCAB (2.4% vs. 9.7%, p=0.01) while postoperative transfusions were similar (7.2% vs. 7.7%, p=0.69).

Conclusion:

rMIDCAB is a useful addition to sCABG for prohibitive risk patients, single vessel disease, or hybrid revascularization. rMIDCAB can be performed safely with similar mortality as sCABG. The data suggest these patients have less wound complications, hospital/ICU LOS, intraoperative transfusions, and ventilator time. Prospective studies are needed for adjudication.

Image: Robotic CABG Outcome Comparison Table

	rMIDCAB	sCABG	p-value
Mean LOS (d)	8	9	0.0001
Mean ICU LOS (h)	50.7	60.7	0.0054
OR Time (h)	4.6	4.9	0.0001
Time on ventilator (h)	7.2	12.8	0.0073
Mean # Anastomoses	1	3	0.0001
Post op stroke (%)	1.4	1.1	0.5867
Post op renal failure (%)	1.2	1.2	0.9447
Post op A. fib (%)	23.6	24.5	0.6683
Post op PCI (%)	13.8	1.11	0.0001
30-d Mortality (%)	1.6	1.4	0.7916
SSI (%)	0	0.8	0.0415
Intraop transfusion (%)	2.4	9.7	0.0001
Intraop PRBCs (%)	1.2	7.2	0.0001
Intraop FFP (%)	2.6	10	0.0001
Intraop Platelet (%)	2.4	5.6	0.0032
Intraop Cryo (%)	0.8	2.5	0.0188
Postop transfusion (%)	7.2	7.7	0.6934
Postop PRBCs (%)	6.8	6.9	0.9167
Postop FFP (%)	1.2	1	0.6714
Postop Platelet (%)	1.6	0.9	0.1317
Postop Cryo (%)	0.6	0.8	0.604
Reop for Bleeding (%)	2.2	1.1	0.0509

Abstract:
Medistim Flow Rates in Arterial vs. Venous Conduits in a Veteran Population

Author List:
Curt Wozniak, MD, Augusto Valera, MD, Elaine Tseng, MD, FACS, Marko T. Boskovski, MD, MHS, MPH

Purpose:
Transit time flow meter measurements (TTFM) are becoming increasingly more utilized as a quality control measure in coronary artery bypass graft (CABG) surgery. However, insufficient data has been recorded in the literature that elaborates upon the differences in flow rates between arterial and venous grafts.

Methods:
From 2021 to 2023, we analyzed consecutive CABG and concomitant CABG and AVR cases from 59 male veterans that had TTFM data recorded. We collected the flow rates off cardiopulmonary bypass and after protamine for the internal mammary arteries (IMA), which included the left and right IMAs and non-internal mammary arteries (non-IMAs), which included radial artery grafts (RAGs) and saphenous vein grafts (SVGs). All variables were compared using the Wilcoxon rank sum test.

Results:
The mean flow rate was similar between the LIMA (38.4 mL/min) and RIMA (42.8 mL/min). The flow between radial artery grafts (RAG) and SVGs was also similar, 50.4 mL/min and 47.1 mL/min, respectively. Flow rates in IMA grafts were significantly lower than non-IMA grafts (39.4 mL/min vs. 48.5 mL/min, p=0.048). There were no significant differences in target vessel mean flows when accounting for IMA vs. non-IMA grafts.

Conclusion:
We found a significant difference in mean flow rates between the IMA grafts and non-IMA grafts, but no significant differences between grafts to different target vessels.

Identify the source of the funding for this research project:
San Francisco Veterans Affairs Medical Center

Table

Medistim Flow Rates Off Cardiopulmonary Bypass, After Protamine				
No. of patients	n = 59			
Graft	No. of Grafts	% of Grafts	Flow Rate (mL/min)	SD
IMA	73	46%	39.4	22.6
LIMA	57	35%	38.4	21.9
RIMA	16	11%	42.8	25.1
Radial	36	22%	50.4	22.6
SVG	52	32%	47.1	39.1
Target				
LAD	57 (93% LIMA, 7% RIMA)	43%	39.7	22.8
OM	52 (40% RAG, 38% SVG, 13% RIMA, 8% LIMA)	32%	46.2	27.3
PDA/PLV	33 (52% SVG, 36% RAG, 12% RIMA)	21%	52.3	39.3

Abstract:

Outcomes of Concomitant Coronary Artery Bypass Grafting in Patients with Infective Endocarditis - A Systematic Review and Meta-analysis

Author List:

Tulio Caldonazo, MD, Alexandros Moschovas, MD, Torsten Doenst, MD, PhD, Marcus Franz, MD, PhD, Gloria Faerber, MD, PhD, Hristo Kirov, MD, Mahmoud Diab, MD, PhD

Purpose:

It is current practice to perform concomitant coronary artery bypass grafting (CABG) in patients with infective endocarditis (IE) who have relevant coronary artery disease. However, CABG may add complexity to the operation. We aimed to investigate the impact of concomitant CABG on perioperative outcomes in patients undergoing surgery for IE.

Methods:

We performed a systematic review and a meta-analysis of studies that presented outcomes from patients who underwent valve surgery due to IE with or without concomitant CABG. Three Databases (MEDLINE, Web of Science, and the Cochrane Library) were assessed. Long-term survival was the primary outcome. Perioperative mortality and post-operative stroke were the secondary outcomes. Inverse variance method and random model were performed.

Results:

Five studies with a total of 1,739 patients were included. Mean follow-up was 8,2 years. Just one studied addressed exclusively patients with documented coronary artery disease. Long-term survival did not differ between patients who received and those who did not receive concomitant CABG (OR: 1.79, CI: 0.88-3.65, p= 0.11). Perioperative mortality did not differ between patients with or without concomitant CABG (OR: 1.53, 95% CI: 0.52-4.48, p=0.44). Only one study from a multicenter registry reported on the occurrence of postoperative stroke and demonstrated that its incidence, after adjustment using inverse probability weighting, was 26% in patients with concomitant CABG vs 21% in patients without concomitant CABG, p=0.003.

Conclusion:
The results showed that in endocarditis patients, adding CABG to valve surgery did not affect perioperative mortality or long-term survival. Data available on the impact of concomitant CABG on neurological outcome are limited to a retrospective multicenter registry and suggest that concomitant CABG may be associated with higher postoperative stroke

Identify the source of the funding for this research project:
Deutsche Forschungsgemeinschaft (DFG, German Research Foundation)

Abstract:

Racial and Ethnic Disparities in Post-Operative Atrial Fibrillation Following Isolated Coronary Artery Bypass Grafting: Impact of Left Atrial Volume Index

Author List:
David W Yaffee, MD, Raymond G. McKay, MD, Jeffrey Mather, MS, Sean McMahon, MD, Trevor Sutton, MD, Sabet W. Hashim, MD

Purpose:
Prior studies have demonstrated a lower prevalence of post-operative atrial fibrillation (POAF) in Black, Hispanic, Asian and American Indian patients compared to White cohorts following coronary bypass grafting (CABG). We hypothesized that pre-operative differences in left atrial size may explain these observed disparities.

Methods:
We assessed the incidence of new POAF in 1,837 patients undergoing first-time isolated CABG between 1/1/2017 and 12/31/2021. The study group included 261 Minority (158 Hispanic, 63 Black, 36 Asian, 4 American Indian) and 1,576 White patients. Pre-operative left atrial volume index (LAVi) was assessed in a subset of 550 patients (88 Minority, 462 White).

Results:
Minority patients were younger and more likely female, with more cardiovascular risk factors and comorbidities, including diabetes, heart failure, prior stroke, and dialysis. There was no difference between Minority patients and White patients with respect to postoperative mortality, stroke, renal failure, or reoperation for bleeding, but Minorities did have a lower incidence of POAF. Minorities were also more likely to receive intra-operative banked blood products, and have longer ICU stays and longer total hospital length of stay.

Overall, mean LVAi was higher for Minority patients compared to White patients (33.7 Â± 14.6 vs 30.4 Â± 10.2 ml/m2, p=0.045). For Whites, LAVi was higher for patients with POAF than without POAF (32.3 Â± 10.9 vs 29.5 Â± 9.6 ml/m2, p =0.015). For Minorities, there was no difference in LAVi between patients with and without POAF (37.8 Â± 20.7 vs 32.7 Â± 12.8 ml/m2, p = 0.34).

Conclusion:

Despite having more cardiac risk factors and comorbidities and higher pre-operative LAVi, Minority patients had a lower incidence of POAF compared with White patients. LAVi may be predictive of POAF in Whites patients but not in Minority patients.

Table

Comparison of Pre-Operatve Risk Factors and Post-Operative Outcomes between Minority and White Patients

	Minority (N=261)	**White** (N=1576)	**p-value**
Risk Factors			
Mean Age (years)	60.9 +/- 10.7	67.2 +/- 9.8	<0.001
Female	28.4% (74)	21.1% (332)	0.009
Diabetes	66.3% (173)	43.7% (689)	<0.001
Congestive Heart Failure	23.4% (61)	17.1% (269)	0.013
Prior Stroke	14.6% (38)	6.7% (105)	<0.001
Dialysis	7.7% (20)	1.0% (16)	<0.001
Outcomes			
30-day Mortality	1.5% (4)	0.7% (11)	0.13
Stroke	2.3% (6)	1.3% (21)	0.26
Renal Failure	2.3% (6)	1.3% (21)	0.22
Reoperation for Bleeding	1.5% (4)	2.3% (36)	0.44
Post-Operative Atrial Fibrillation (POAF)	18% (47)	29.8% (469)	<0.001
Intra-Operative Blood Transfusion	35.2% (92)	26.5% (417)	0.015
Mean ICU Length of Stay (Hours)	69.0 +/- 74.5	56.2 +/- 80.8	0.010
Mean Hospital Length of Stay (Days)	10.8 +/- 7.1	8.7 +/- 6.1	<0.001

Abstract:

Outcomes Using the Enhanced Recovery Pathway in Cardiac Surgery: A Large Single-Center Study

Author List:

Rodrigo E. Campana, MD, Sarah Burki, MD, Michael S. Halbreiner, MD, Stephen Bailey, MD

Purpose:

Implementation of Enhanced Recovery after Cardiac Surgery (ERACS) has demonstrated improved outcomes compared to standard pathways but findings are limited to small cohorts. The purpose of this study was to compare outcomes of patients using ERACS versus standard pathways in a larger cohort.

Methods:

This single center, retrospective study includes adult patients undergoing cardiac surgery from 2016 to 2022. Early years of the study were all non-ERACS patients while the last 3 years were mostly ERACS patients based on changes in clinical practice. Inclusion criteria were adult patients undergoing elective AVR, MVR or CABG. A final cohort of 734 patients was reached for the two groups. The primary endpoint was readmission within 30 days. Secondary endpoints included bypass time, cross-clamp time, ventilator/ICU time, length of stay (LOS), postoperative atrial fibrillation, pneumonia, renal failure, dialysis, bleeding requiring reoperation, transfusion, stroke, 30-day mortality and discharge location.

Results:

734 patients were included, of which 37% (n=268) were in the ERACS group (48%[128/268] CABG, 27% [73/268] AVR, and 25%[67/268] MVR).Total time on a ventilator and ICU stay time were less in the ERACS group ([5.62Â±6.1 hrs vs 9.65Â±33.8 hrs; p< 0.0001], [48.56Â±33.7 hrs vs 51.92Â±50.0 hrs; p< 0.0001], respectively). Interestingly, POAF was more common in ERACS group (78.9%[56/71] vs 60.9%[98/161], p=0.0075). More patients were discharged to home in the ERACS group (93.3% vs 88.5%, p=0.0364); however readmission rate was no different (7.81%[20/256] vs 10.8%[49/453], p=0.1949). 30-day mortality trended in favor of ERACS but did not reach significance (0.37%[1/268] vs 1.72%[8/466]; p=0.11) and LOS was no different (5.56Â±3.5 days vs 5.54Â±3.8 days; p< 0.1141). In a subgroup analysis, LOS was significantly shorter in the ERAS-

AVR group (4.9 days vs 6.3 days, p< 0.0001) and significance in discharge only persisted in the CABG group (93.8%[120/128] vs 83.6%[112/134]; p=0.0098).

Conclusion:

Patients who followed an ERACS pathway had improved perioperative results and postoperative outcomes, particularly decreased ventilator and ICU times, greater likelihood to be discharged directly to home, and decreased hospital length of stay in some subgroups. These findings may suggest improved patient outcomes and reduced hospital costs with ERACS pathways.

Abstract:

Perioperative LVAD Support In Open Heart Surgical Patients With Reduced Ejection Fraction Mitigates Acute Kidney Injury

Author List:

Zain Khalpey MD, PhD, FACS; Usman Aslam DO; Joseph Gulotta BS; Jessa Deckwa BS

Purpose:

Percutaneous left ventricular assist devices are emerging as an effective strategy to ensure adequate end-organ perfusion during high-risk cardiac procedures. For patients who undergo CABG procedures with poor cardiac function at baseline may precipitate irreversible kidney damage. We evaluated the preoperative use of Impella LD in prevention of postoperative AKI.

Methods:

A single center retrospective analysis was performed, which included patients undergoing valvuloplasty, CABG, or both by a single surgeon (2019-2021). Those with a preoperative EF less than 35% and preoperative creatinine of greater than 1 dg/mL were included in the study and stratified into two groups based on preoperative Impella LD implantation. Renal protective effects were evaluated using KDIGO criteria and daily postoperative serum creatinine levels.

Results:

Twenty-three (70% men, mean age 68y Â±5.24y) patients were enrolled in this study. Of these, 8% of subjects in the Impella group (n=1/12) developed AKI by POD 7 compared to 64% in the control group (n=7/11). The mean change in creatinine was significantly lower in the Impella group compared to control (0.07 vs 0.59, p=0.02) over the first 7 days. There was no significant difference between these groups when mean creatinine change was compared for duration of hospitalization (0.46 vs 0.42, p=0.47).

Conclusion:

Our data suggests that intraoperative placement of this device is associated with a lower incidence of early postoperative AKI. Intraoperative implantation of Impella LD is a method of ensuring adequate end-organ perfusion and oxygen

delivery in patients and can make the postoperative recovery less eventful without the need of dialysis.

Table:
Patients highlighted in red met the KDIGO criteria for AKI.

	Control 1	Control 2	Control 3	Control 4	Control 5	Control 6
POD#1	0.7	1.8	0.8	1.2	0.9	1.3
POD#2	0.7	1.8	1.4	1.4	1	1.4
POD#3	0.6	2.2	1.9	1.4	1.3	1.3
POD#4	0.8	2	1.7	1.4	1.6	1.7
POD#5	0.6	1.6	1.9	1.3	2.2	1.6
POD#6	0.9	1.8	2.2	1.1	1.9	1.4
POD#7	0.8	1.6	1.8	1.1	1.4	1.4

	Impella 1	Impella 2	Impella 3	Impella 4	Impella 5	Impella 6
POD#1	1.1	2.3	2.3	1.3	1	0.9
POD#2	1	2.3	2.4	1.6	1	1
POD#3	0.9	2.4	2.2	1.6	0.8	1.1
POD#4	0.7	2.4	2	2	0.8	0.8
POD#5	0.8	2.4	2.1	2.4	0.9	1.1
POD#6	0.8	2.3	2	2	0.9	1
POD#7	0.8	2.3	2.1	1.6	0.9	1.2

Abstract:
Cost Transparency in American Academic Cardiac Surgery Centers

Author List:
Ian Nickel, MD, Manish Karamchandani, MD, Ryan Hall, MD, Tina Moon, MD, Abhishek Chatterjee, MD, Masashi Kawabori MD

Purpose:
To evaluate the availability of Centers for Medicare and Medicaid Services (CMS) mandated, hospital-provided cost estimates for patients exploring the potential financial impact of the most commonly performed cardiac surgery in the US - CABG.

Methods:
All medical centers with ACGME Thoracic Surgery Fellowship programs were included. Individual authors conducted searches using their own health insurance (as well as an uninsured search) to evaluate the availability of transparent cost information and its ease of access for the average patient. Availability of a CABG-specific cost estimate, a generic cardiac surgery cost estimate, the time to reach the cost estimate tool, time to obtain cost estimate and price ranges were obtained. Times to cost estimators and the cost estimates themselves are reported as median values with associated interquartile ranges.

Results:
Seventy-five (n=75) medical centers were analyzed. All centers provided a cost estimator; however, the ease of use varied widely. Generic cardiac surgical procedure estimates were obtainable in 77.3% and 72.0% of insured and uninsured searches. CABG-specific estimates were far less available - appearing in 10.0% and 9.3% of these same searches. The average success rate for obtaining an estimate was 21.3% and 56.0% for insured and uninsured patients. The median time to reach a centerâ€™s cost estimate calculator was 30.8 seconds (21.2-43.3 s). In successful attempts, the median time taken to reach CABG cost was 48.7 seconds (22.4-74.1 s) with an average pre-insurance cost of $253,406 ($181,125-$399,219). For insured searches, the time to cost estimate was longer [70 seconds (51.7-88.0 s)] than uninsured searches [23.4 seconds (15.3-41.2 s), $p < 0.00001$]. Insured estimates were higher than uninsured estimates, with median prices of $264,294 ($243,048-$399,219) and $225,777 ($116,393-$311,759), $p = 0.03$.

Conclusion:

The majority of academic medical centers do not provide cost estimates for the most commonly performed cardiac surgery, CABG. This study highlights the significant need for improvement in price transparency for patients considering the financial impact of this major surgery.

Table:

Rates of Success for Obtaining Cost Estimate and Numeric Cost Estimates for CABG

Table 1:

	Cardiac Surgery Estimate (%)	CABG Estimate (%)	Cost Estimate Success (%)	Time to Calculator (s)	Time to Calculate Cost (s)	Total Cost (pre-insurance) ($)
All	-	-	-	30.8 (21.2-43.3)	48.7 (22.4-74.1)	$253,406 ($181,125-399,219)
Uninsured	72.0%	9.3%	56.0%	41.7 (32.6-67.4)	23.4 (15.3-41.2)	$225,777 ($116,394-$311,759)
Insured	77.3%	10.0%	21.3%	24.2 (18.5-35.2)	70 (51.7-88.0)	$264,294 ($243,048-$399,219

CABG = coronary artery bypass grafting