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Background

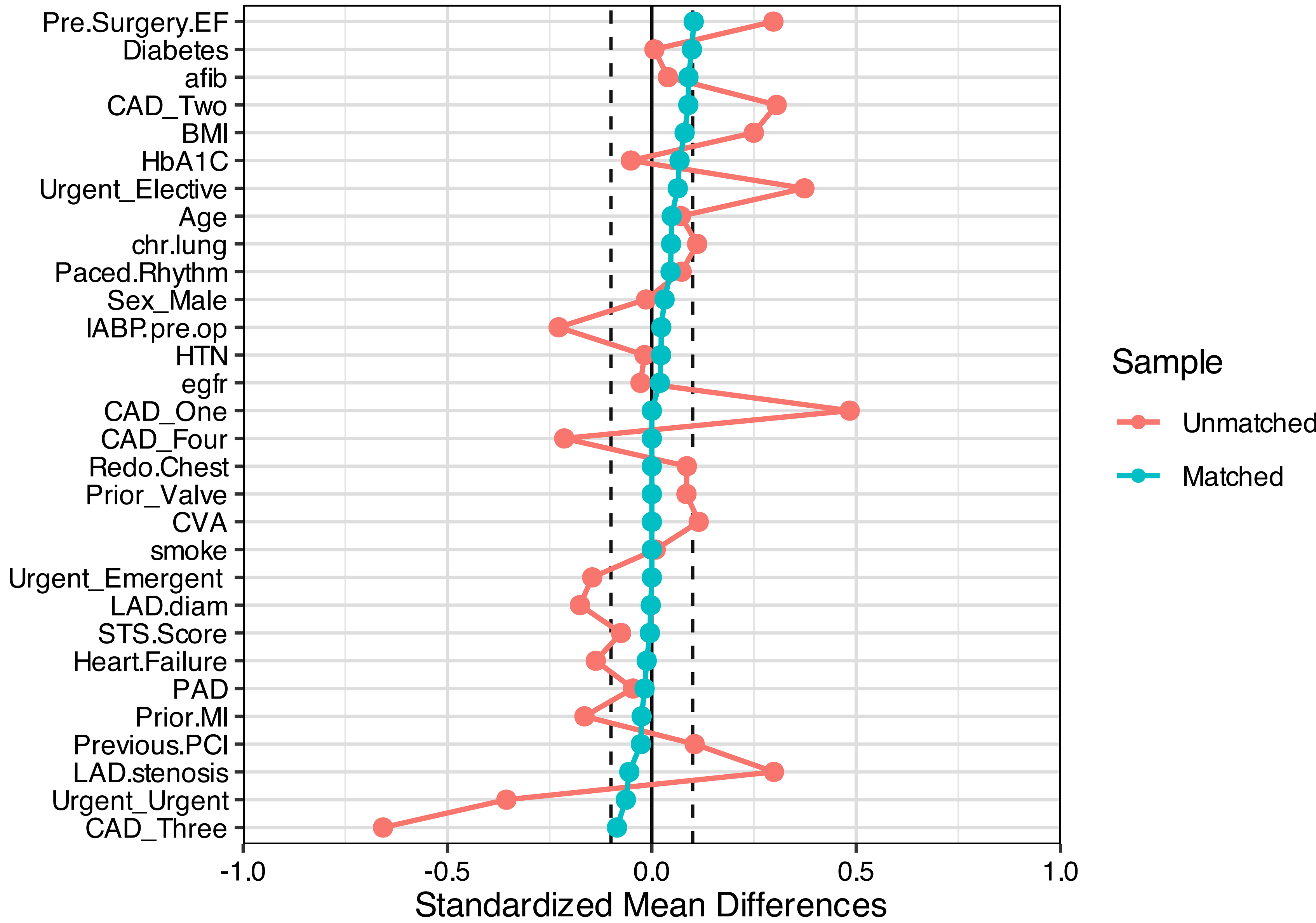
Robotic-assisted coronary artery bypass grafting (RACAB) and sternotomy CABG are two revascularization strategies performed in different technical ways. Operative times for RACAB, initially lengthy, have significantly shortened over two decades. Renewed adoption is driven by improved robotic technology, structured training, and reaffirmed advantages of CABG over PCI. Adoption remains limited due to high technical demands, substantial training requirements, and significant infrastructure costs: only a small number of dedicated programs maintain high-volume activity. This study compared perioperative outcomes and hospital course between propensity-matched cohorts undergoing RACAB or sternotomy CABG.

Methods

We conducted a retrospective observational analysis of consecutive patients undergoing RACAB or sternotomy CABG between July 2021 and July 2025. To ensure maximal procedural comparability, the analysis was restricted to isolated left internal thoracic artery (LITA) to left anterior descending artery (LAD) grafting, excluding multivessel or complex reconstructions. A 1:1 propensity score matching (PSM) was applied to generate balanced cohorts. Intraoperative transit time flow measurement (TTFM) parameters and perioperative outcomes were compared between groups.

Results

A total of 526 patients underwent CABG without composite LITA-LAD grafting, 281 of which were robotic procedures. After PSM, 165 well-balanced pairs were formed.



Conclusions

Even after propensity matching and restriction to a uniform surgical target, RACAB and sternotomy CABG retain inherent procedural distinctions. Although intraoperative graft flow metrics were acceptable in both strategies, lower PI and BF values observed during sternotomy procedures may reflect technical factors related to flow assessment in robotic cases, including probe limitations and measurements obtained with the stabilizer in situ.

	Sternotomy N=165	Robotic N=165	p-value
Time in OR, hours, mean (SD)	5.7 [5.0, 6.0]	5.0 [4.4, 5.6]	<0.001
Off pump, n (%)	154 (93.3)	165 (100.0)	0.002
Cross clamp time, min, mean (SD)	55.0 [55.0, 55.0]	-	-
CBP time, min, mean (SD)	92.8 (39.9)	-	-
Hybrid, n (%)	2 (1.2)	109 (66.1)	<0.001
Reverse hybrid	2 (1.2)	26 (15.8)	<0.001
LAA occlusion, n (%)	51 (30.9)	13 (7.9)	<0.001
Sternotomy conversion, n (%)	-	0 (0.0)	-
Blood products, n (%)	13 (7.9)	4 (2.4)	0.043
LAD flow, ml/min, median [IQR]	55.0 [40.0, 80.0]	50.0 [40.0, 70.0]	0.556
PI, median [IQR]	2.20 [1.90, 2.70]	2.70 [2.30, 3.23]	<0.001
DF, median [IQR]	70.5 [65.7, 75.8]	72.7 [65.9, 78.1]	0.372
BF, %, median [IQR]	1.03 [0.20, 2.55]	1.70 [0.80, 3.50]	0.010

Extubated in OR, n (%)	49 (29.7)	113 (68.5)	<0.001
Ventilated hours, median [IQR]	4.0 [3.0, 8.9]	3.9 [2.8, 5.9]	0.447
Ventilation >24hrs, n (%)	5 (3.0)	1 (0.6)	0.214
Total ICU hours, median [IQR]	65.4 [44.9, 86.5]	47.6 [26.2, 69.9]	<0.001
Stroke, n (%)	1 (0.6)	0 (0.0)	0.498
Deep wound infection, n (%)	0 (0.0)	0 (0.0)	>0.999
Reoperation for bleeding, n (%)	3 (1.8)	1 (0.6)	0.623
Blood products, n (%)	45 (27.3)	15 (9.1)	<0.001
Unplanned coronary intervention, n (%)	0 (0.0)	1 (0.6)	>0.999
Creatinine, mg/dL, median [IQR]	1.10 [0.90, 1.30]	1.00 [0.80, 1.30]	0.767
Renal failure, n (%)	1 (0.6)	0 (0.0)	>0.999
New dialysis, n (%)	2 (1.2)	0 (0.0)	0.498
Postoperative atrial fibrillation, n (%)	36 (21.8)	35 (21.2)	>0.999
New pacemaker, n (%)	1 (0.6)	2 (1.2)	>0.999
Length of stay, days, median [IQR]	5.0 [4.0, 7.0]	4.0 [3.0, 5.0]	<0.001
Hospital mortality, n (%)	1 (0.6)	1 (0.6)	>0.999