

Introduction

The robot-assisted (RA) techniques for surgical coronary revascularization have been developed to achieve a less invasive alternative to conventional coronary artery bypass grafting (CABG), to improve postoperative recovery, patient satisfaction, and early discharge. This is particularly useful in selected patients with higher morbidity and mortality risk, that could benefit from hybrid revascularization. This study aimed to compare the feasibility of RA-CABG for one-stage versus hybrid two-stage revascularization.

Methods

The study accrued 72 patients who underwent RA-CABG for single and multi-vessel disease between January 2019 and July 2022 for planned one-stage and two-stage (hybrid) revascularization. The primary outcome measured was the number of patients who were discharged to their homes within five days after the operation. Secondary outcomes included the total length of hospital stay, 30-day and overall mortality. Quantitative data were compared with Mann-Whitney U test and expressed as median and interquartile range, while qualitative data were assessed with chi-squared test and expressed as absolute frequencies and percentages.

Results

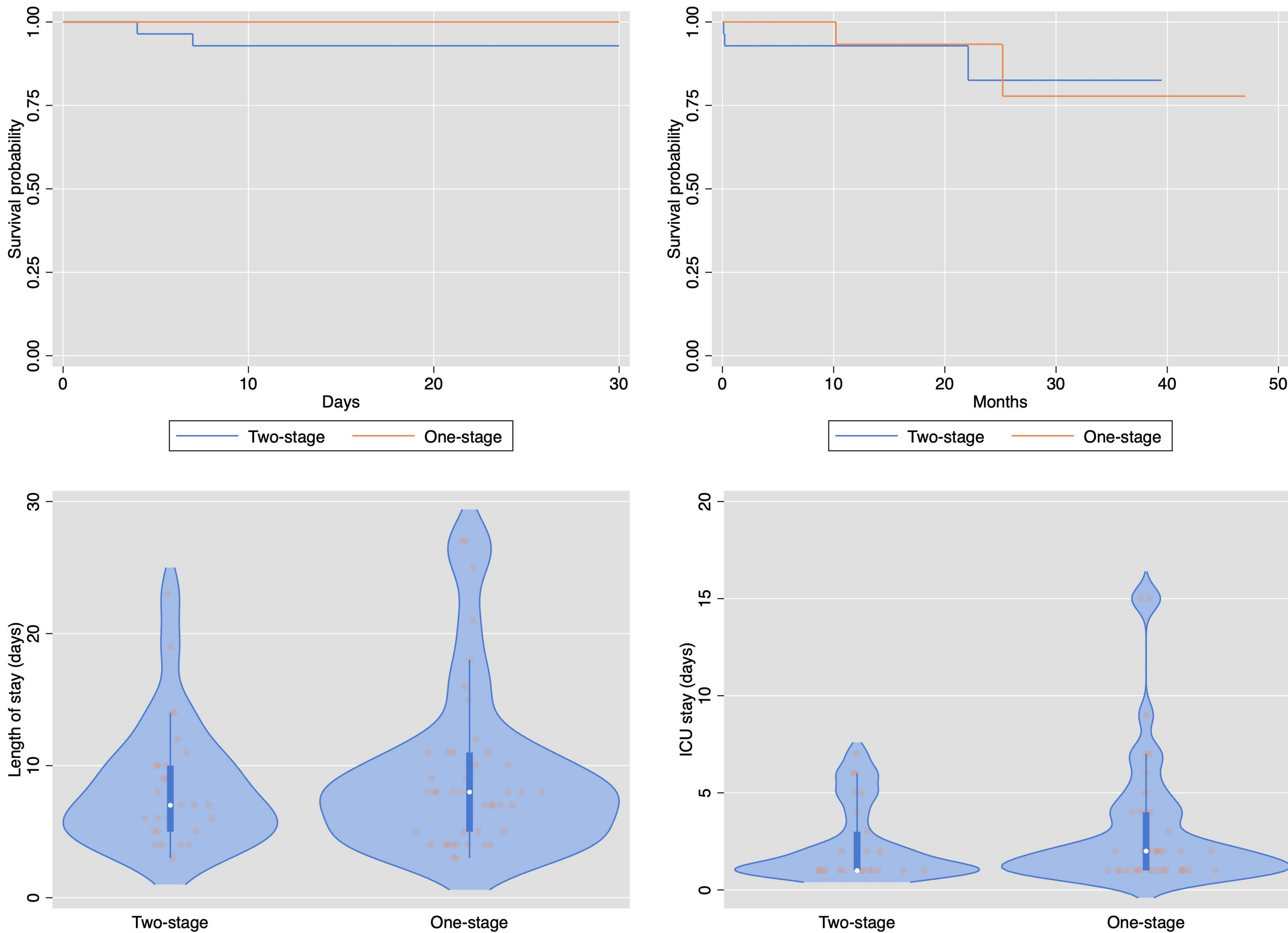
The results showed that 38% of the sample population was planned to undergo a two-stage approach. No significant differences were found in demographic and clinical features between the one-stage and two-stage groups (Table 1). But patients in the hybrid two-stage group were slightly older, had higher STS risk scores, according to the higher extension of the disease.

Features		One-stage (n=44)	Hybrid two-stage (n=28)	p
Age, years		62 (16.5)	66.5 (21.7)	0.262
Sex (%)	Female	14 (32)	6 (21)	0.337
	Male	30 (68)	22 (79)	
Weight, kg		87.5 (29.4)	87.7 (24.1)	0.303
Height, m		1.75 (0.15)	1.76 (0.16)	0.663
BMI, kg/m ²		29.1 (9.7)	28.1 (5.5)	0.326
Ethnicity (%)	Non-Hispanic White or Caucasian	29 (66)	15 (53)	0.554
	Non-Hispanic African-American or Black	7 (16)	5 (18)	
	Asian	3 (6)	5 (18)	
	Hispanic	4 (9)	3 (10)	
	American Indian or Alaska native	1 (3)	0 (0)	
Primary insurance coverage	Medicare (including commercial)	18 (41)	14 (50)	0.734
	Commercial	24 (55)	13 (46)	
	Military	1 (2)	1 (4)	
	No insurance	1 (2)	0 (0)	
Charlson Comorbidity Index		5 (3)	5 (4)	0.490
ESRD, %		6 (14)	4 (14)	0.938
WBC, x10 ⁹ /L		7.6 (2.4)	7 (2.4)	0.053
Hematocrit, %		39 (11.5)	39.6 (6.8)	0.860
Platelets, x10 ⁹ /L		199 (99)	183 (75)	0.233
Creatinine, mg/dL		1.1 (0.8)	1.1 (0.7)	0.812
Disease extension (%)	Single Vessel	25 (57)	0	0.000
	Two Vessels	12 (27)	14 (50)	
	Three or more (Multivessel)	7 (16)	14 (50)	
STS Risk, %	Mortality	0.7 (1.5)	1.1 (2.6)	0.210
	Renal Failure	0.8 (1.4)	1.3 (2.1)	0.213
	Stroke	0.4	0.7 (0.6)	0.145
	Prolonged Ventilation	4.1	5.0 (5.4)	0.603
	DWS infection	0.1 (0.1)	0.1 (0.1)	0.551
	Reoperation	1.9 (1.5)	2.5 (1.9)	0.070
	Morbidity-Mortality	7.0 (7.3)	8.9 (11.4)	0.358
	Short LOS	57.1 (39.2)	47.0 (37.5)	0.282
	Long LOS	2.6 (3.6)	4.1 (4.7)	0.248
Admission status (%)	Surgery admit	22 (50)	14 (50)	0.999
	Inpatient	22 (50)	14 (50)	
Surgery time, min		239 (84)	238 (120)	0.459
ECMO (%)		15 (34)	7 (25)	0.414
ECMO time, min		179 (73)	288 (132)	0.073
Target (%)	LAD	38 (86)	24 (85)	0.430
	LAD and other	4 (9)	4 (15)	
	Non-LDA	2 (5)	0 (0)	
Graft (%)	LIMA	39 (88)	24 (85)	0.715
	LIMA and RIMA	5 (12)	4 (15)	
VIS @ ICU admission		1.3 (1.5)	0.9 (2.2)	0.703
VIS @ 6 h		1.2 (2.7)	1.6 (4.1)	0.406
VIS @ 24 h		0.6 (1.5)	1.2 (3.9)	0.865
VIS @ 48 h		0.3 (1.3)	1.0 (3.5)	0.435
ICU time, days		2 (3)	1 (2.5)	0.430
LOS, days		8 (6)	7 (5)	0.761
Disposition (%)	Home	40 (91)	23 (88)	0.134
	Healthcare-Home	0 (0)	2 (7)	
	Skilled nursing facility	4 (9)	1 (5)	
30-day readmission (%)		8 (18)	6 (23)	0.621

Table 1. Main features of sample population.

Results

The two-stage group length of stay ≤5 days occurred in 15 (53%) of patients and in 28 (63%) of patients in the one-stage group, being no significantly different (p 0.396). The 30-day mortality rate was 6% in the two-stage group, but no significantly different than in one-stage group. Similarly, overall mortality at 24 months was 9.7% and 3.5% in the two-stage and one-stage groups, respectively. Other secondary outcomes did not differ significantly between the groups.



Conclusions

RA-CABG is a safe and feasible approach and is associated with a high early discharge rate. The shorter hospital stays were not related to any difference in 30-day mortality. This alternative may reduce healthcare resources and provide a consistent framework for hybrid coronary revascularization.