

Totally Endoscopic Coronary Artery Bypass Surgery: Systematic Review and Meta-Analysis of Reconstructed Patient-level data



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Objective

The standard approach for Coronary Artery Bypass Grafting is open surgery. Totally Endoscopic Coronary Artery Bypass has emerged as an alternative for selected patients. This meta-analysis sought to evaluate clinical outcomes with this emerging technique.

Methods

A PRISMA-compliant search was performed up to December 14, 2022 in PubMed (MEDLINE), Scopus and Cochrane. Time-to-event data were reconstructed using Kaplan-Meier curves from source literature.

Results

2,774 patients with symptomatic coronary artery disease underwent Totally Endoscopic Coronary Artery Bypass in 18 eligible studies. Mean age was 63.20 ± 12.30 years and 77.51% (95% Confidence Interval, 72.22%-82.42%) of the included patients were males. Mean operative time was 304.2 ± 155 minutes, while mean internal mammary artery takedown time was 38.3 ± 18.4 minutes. 4.69% (95% Confidence Interval, 1.56% - 9.10%) of the patients required conversions to open surgery. Thirty-day complication rate was 5.90% (95% Confidence Interval, 1.23% - 13.09%), whereas late complications developed in 4.75% (95% Confidence Interval, 1.92% - 8.52%) of the patients. Freedom from major adverse cardiac events rate was 93.41% (95% Confidence Interval, 85.27% - 94.81%) and one-, three-, and five-year survival rates were 95.15%, 90.94% and 83.15% respectively. Reintervention was required in 3.31% (95% Confidence Interval, 2.34% - 4.41%) of the cohort within a mean follow-up of 42.5 ± 27.8 months.

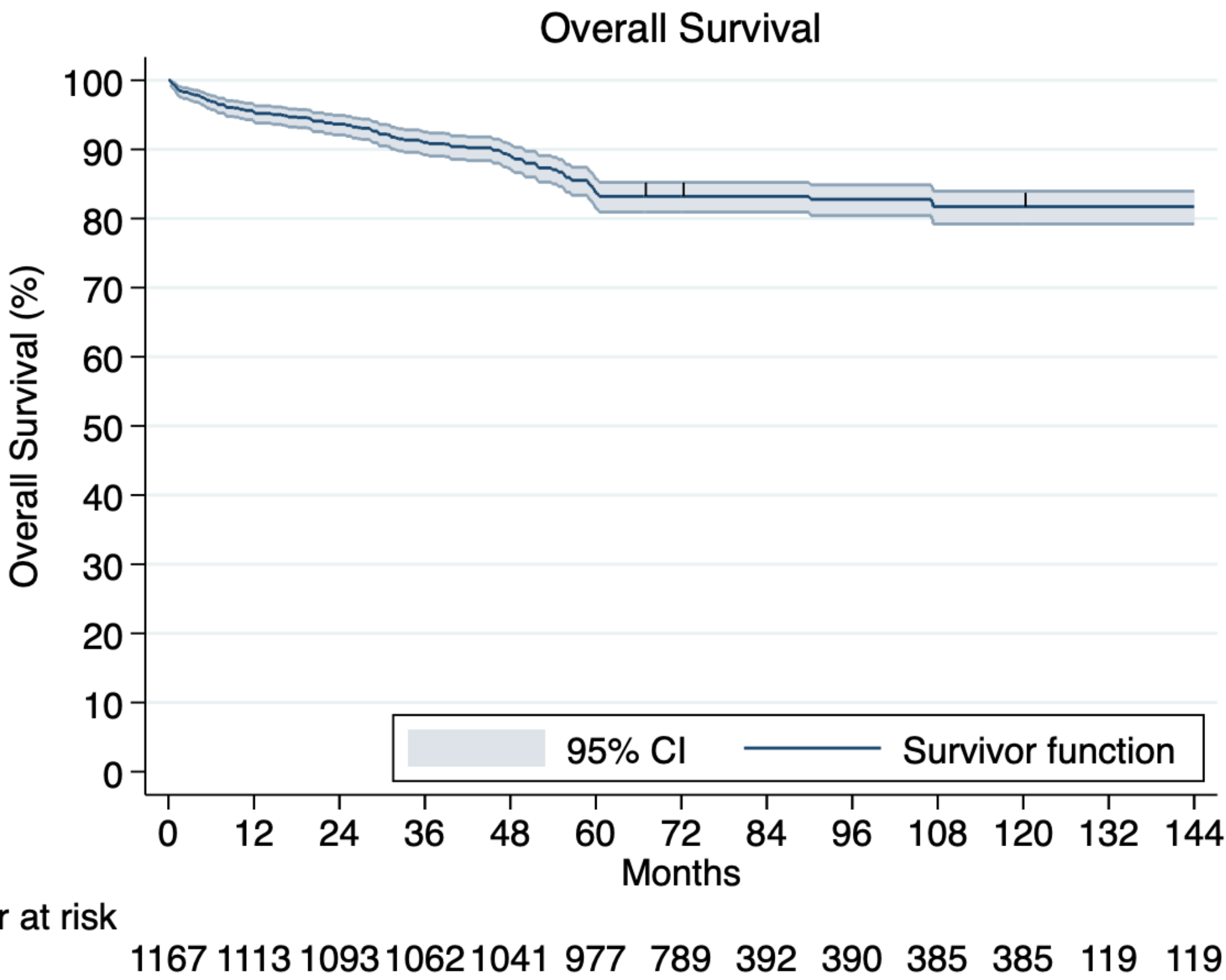


Figure 1: Kaplan-Meier curve demonstrating overall survival constructed by individualized patient data.

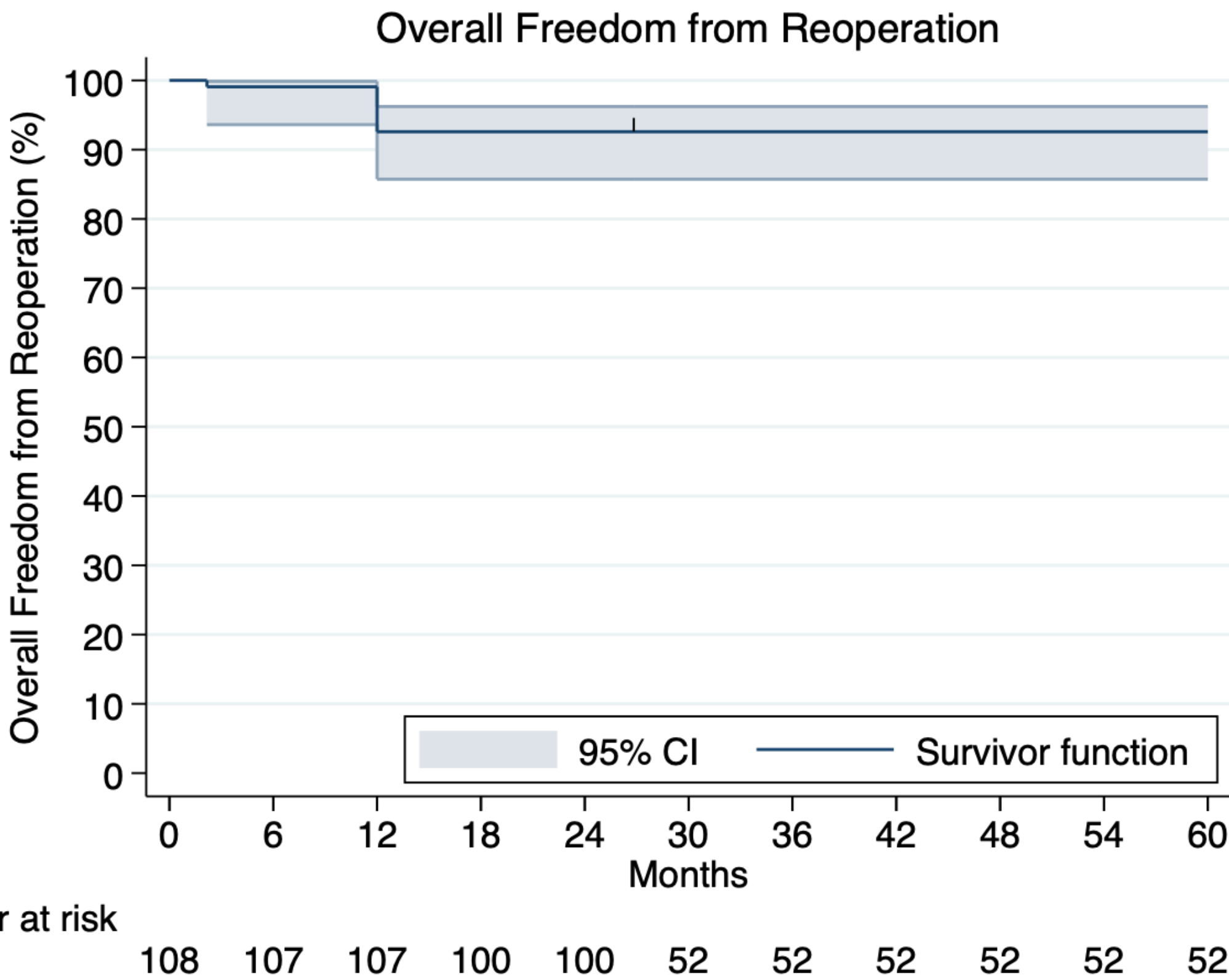


Figure 2: Kaplan-Meier curve demonstrating overall freedom-from-reintervention constructed by individualized patient data.

Author	TECAB (n)	Single vessel CABG (n, %)	Double vessel CABG (n, %)	Triple vessel CABG (n, %)	On-pump CABG (n, %)	Off-pump CABG (n, %)
Argenziano 2006	85	85 (100)	0 (0)	0 (0)	85 (100)	0 (0)
Balkhy 2021	544	238 (44)	265 (49)	40 (7)	0 (0)	544 (100)
Balkhy 2011	120	78 (65.0)	37 (30.8)	5 (4.16)	0 (0)	120 (100)
Cheng 2021	126	105 (83.3)	NR	NR	0 (0)	126 (100)
Claessens 2022	347	NR	NR	NR	347 (100)	0 (0)
deCanniere 2007	228	205 (90)	NR	NR	117 (51.3)	111 (48.7)
Dogan 2002	62	50 (80.6)	12 (19.4)	0 (0)	54 (87)	8 (13)
Efendiev 2015	50	50 (100)	0 (0)	0 (0)	0 (0)	50 (100)
Jegaden 2011	59	56 (95)	3 (5)	0 (0)	0 (0)	59 (100)
Kappert 2008	41	37 (90.2)	4 (9.8)	0 (0)	8 (19.6)	33 (80.4)
Mishra 2006	13	13 (100)	0 (0)	0 (0)	2 (15.4)	11 (84.6)
Pasirja 2018	50	50 (100)	0 (0)	0 (0)	28 (56)	22 (44)
Srivastava 2012	164	93 (56.7)	64 (39)	6 (3.7)	0 (0)	164 (100)
Srivastava 2010	214	139 (65)	68 (31.8)	7 (3.3)	0 (0)	214
Wiedemann 2013	500	334 (66.8)	150 (30)	15 (3)	98 (19.6)	402 (80.4)
Zaouter 2015	38	38 (100)	0 (0)	0 (0)	0 (0)	38 (100)
Dhawan 2012	106	30 (28)	67 (63)	8 (7.5)	3 (2.8)	103 (97.2)
Mohr 2001	27	27 (100)	0 (0)	0 (0)	27 (100)	0 (0)

CABG=Coronary Artery Bypass Graft, NR=Not Reported

Table 1: Number of bypassed vessels and CPB usage.

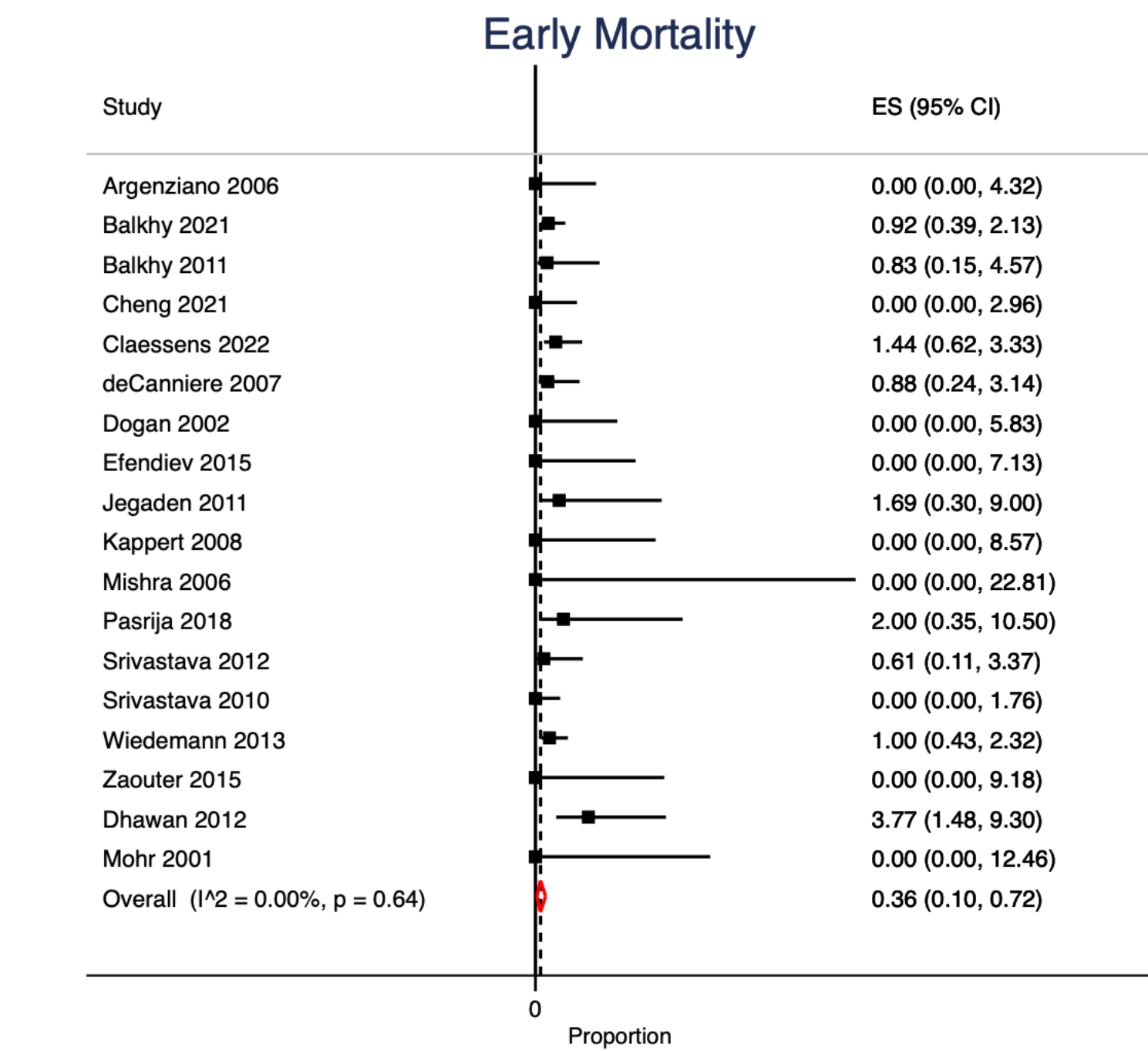


Figure 3: Early mortality proportion analysis from the included studies.

Conclusions

Totally Endoscopic Coronary Artery Bypass may be a safe and viable alternative for selected patients with coronary artery disease. Long-term follow up will help define the place of robotic endoscopic treatment in the armamentarium of myocardial revascularization.

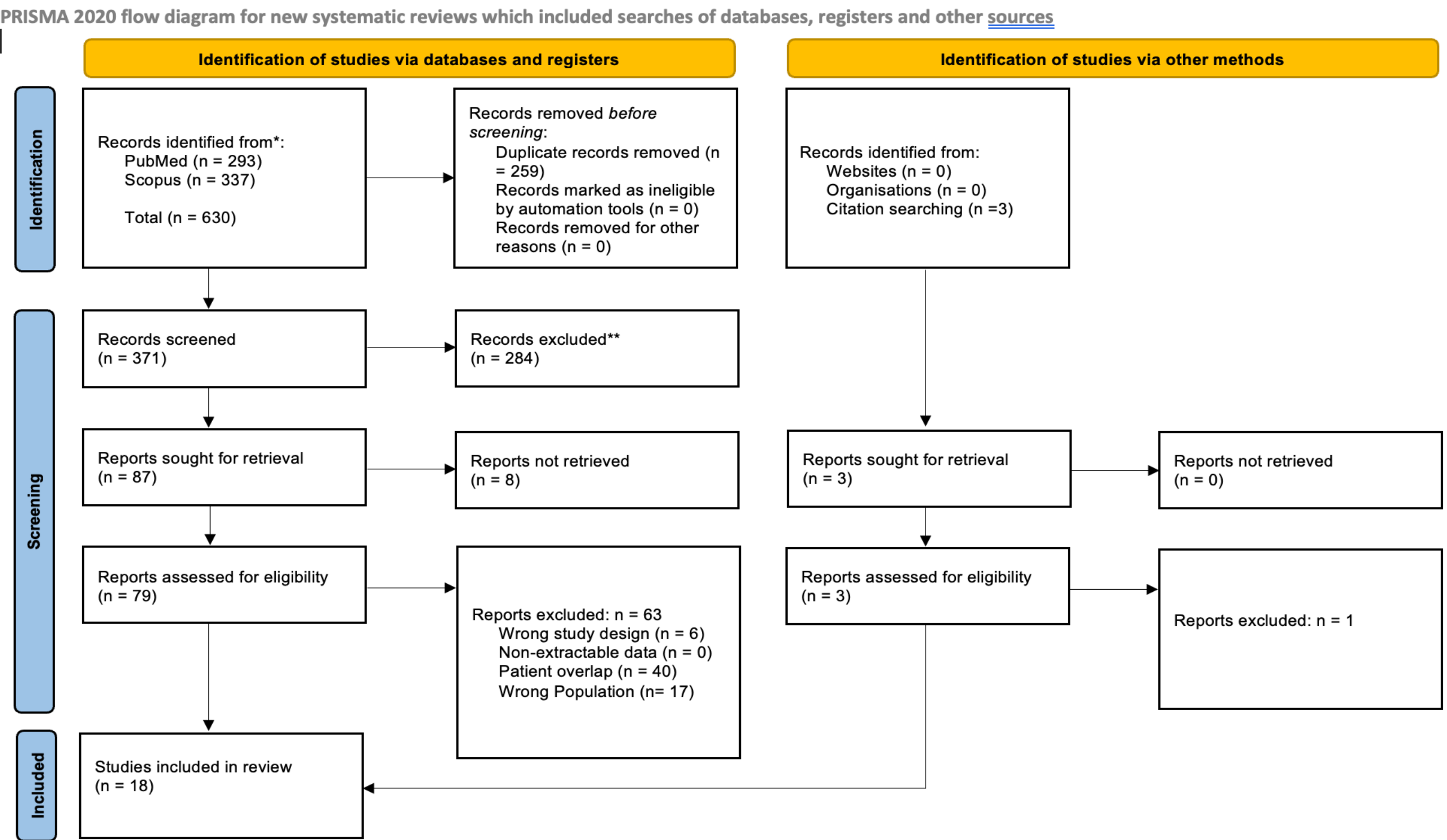


Table 2: Flow diagram in accordance with the PRISMA 2020 guidelines.