

Outcomes and Risk in Proximal Aortic Replacement with Concomitant Coronary Artery Bypass Grafting

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2024 AATS Aortic Symposium




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Background & Objectives

- Concomitant **coronary artery disease** (CAD) is present in **25-50%** of **patients requiring aortic surgery** and this incidence increases as aneurysmal disease becomes distant.
- **Long-term operative costs** of performing a CABG concomitantly to a proximal aortic procedure are **still unclear**.

PURPOSE

We analyzed proximal aortic repairs with and without concomitant coronary artery bypass graft (CABG) to understand the effect of concomitant CABG regarding the incidence of adverse events, operative mortality, and long-term survival in a high-volume aortic center.

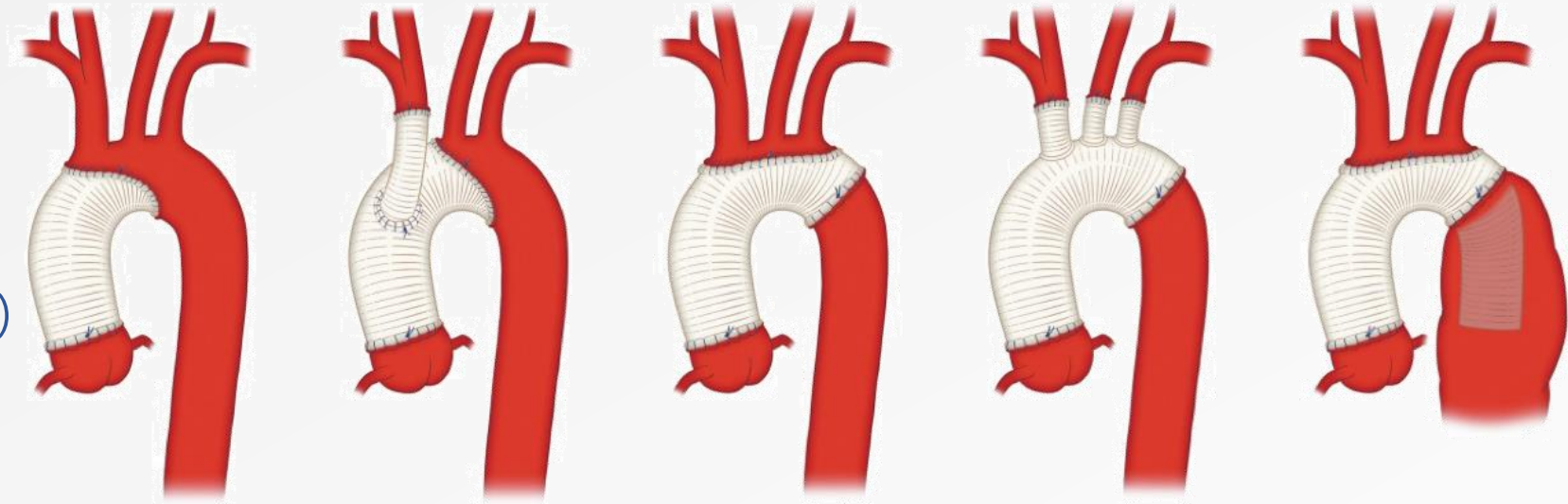
Methods

- Retrospective design
- Proximal aortic repairs (n=3916)
- Concomitant CABG (N=717)

Definitions:

- **Operative death:** death within 30 days of surgery or before final discharge
- **Adverse event:** operative death or persistent stroke, paraplegia, paraparesis, or renal failure necessitating dialysis

Propensity-matched analysis was performed.



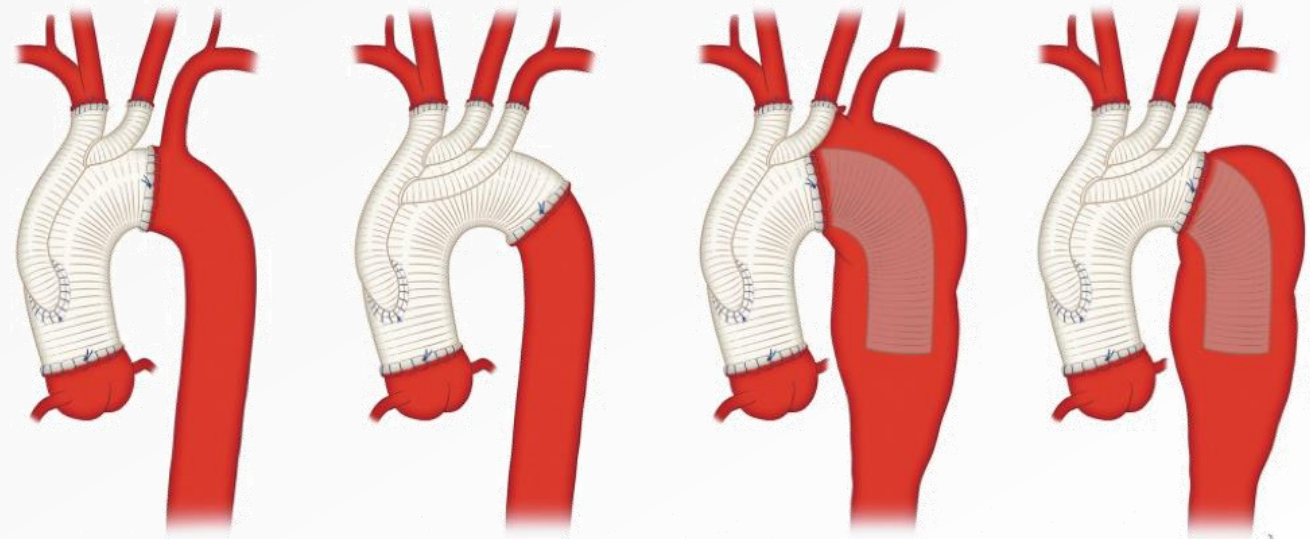
Hemiarch

Beveled arch with innominate graft

Arch with island

Branched arch graft

Elephant trunk with island



Arch with single Y-graft

Arch with double Y-graft

Elephant trunk with single Y-graft

Elephant trunk with double Y-graft

Preoperative Characteristics

- Patients with concomitant CABG were **older** and **more** likely to have **comorbidities** such as chronic kidney disease, and diabetes.
- After **matching** both groups had **comparable** key preoperative **characteristics**.

VARIABLE	UNMATCHED			MATCHED		
	With CABG (n=717)	Without CABG (n=3199)	<i>P</i> value	With CABG (n=260)	Without CABG (n=260)	SMD
Age	67 [51-73]	60 [36-69]	<.001	67 [58-73]	66 [58-73]	0.015
Male	520 (72.5)	2128 (66.5)	.002	379 (72.9)	380 (73.1)	0.004
Heritable thoracic aortic disease	85 (11.9)	1071 (33.5)	<.001	60 (11.5)	55 (10.6)	0.024
Acute or subacute aortic dissection	85 (11.9)	574 (17.9)	<.001	43 (8.3)	38 (7.3)	0.027
Hyperlipidemia	330 (46.0)	1026 (32.1)	<.001	271 (52.1)	277 (53.3)	0.024
Diabetes	85 (11.9)	263 (7.4)	<.001	60 (11.5)	68 (13.1)	0.05
Chronic kidney disease	241 (36.9)	672 (23.1)	<.001	179 (34.4)	166 (31.9)	0.05
Left ventricular EF	61 (10.7)	130 (5.2)	<0.001	49 (9.4)	53 (10.2)	0.3

Values are n (%), median [interquartile range]. Chronic kidney disease = eGFR < 60, mL/min/1.73 m². Heritable thoracic aortic disease, having a confirmed or suspected genetic disorder or having aortic disease at a young age, namely ≤50 years.

Operative Details

VARIABLE	All (n=3916)	With CABG	Without CABG	P value
		(n=717)	(n=3199)	
Elective repair	2785 (71.1)	532 (74.2)	2253 (70.4)	0.04
Aortic root replacement	1355 (34.6)	186 (25.9)	1169 (36.5)	<0.001
CVG-mechanical	563 (14.4)	57 (7.9)	506 (15.8)	<0.001
Valve-sparing	259 (6.6)	26 (3.6)	233 (7.3)	<0.001
Bioprosthetic root	533 (13.6)	103 (14.4)	430 (13.4)	0.5
Aortic arch replacement	3105 (79.3)	571 (79.6)	2534 (79.2)	0.8
Hemiarch	2309 (59.0)	439 (61.2)	1870 (58.5)	0.2
Total aortic arch	796 (20.3)	132 (18.4)	664 (20.8)	0.2
Hybrid endovascular extension	271 (6.9)	28 (3.9)	243 (7.6)	<0.001
Bypass of any brachiocephalic artery	468 (12.0)	61 (8.5)	407 (12.7)	0.002
Valve or cardiac procedure	1785 (45.6)	380 (53.0)	1405 (43.9)	<0.001
Aortic valve	1638 (41.8)	360 (50.2)	1278 (39.9)	<0.001
Other cardiac valve (excluding aortic)	150 (3.8)	23 (3.2)	127 (4.0)	0.3
Cardiac procedure (non-valve)	102 (2.6)	20 (2.8)	82 (2.6)	0.7
Aortic clamp time, min (n=3609)	72 [42-101]	88 [61-119]	67 [39-97]	<0.001
CPB time, min (n=3896)	141 [110-178]	170 [107-213]	135 [106-169]	<0.001
Cardiac ischemic (n=3825)	94 [70-121]	112 [88-140]	90 [67-116]	<0.001

Early Outcomes

- Overall **adverse event** occurrence was 12.2%
- **30-day mortality** was 6.7% with **higher rates** in the **concomitant CABG** group.
- After matching:
 - **Operative death** was **similar** between groups.
 - Adverse event incidence remained higher for the concomitant CABG group, but **persistent stroke** and **renal failure lost significance**.

VARIABLE	UNMATCHED			MATCHED		
	With CABG (n=717)	Without CABG (n=3199)	P value	With CABG (n=260)	Without CABG (n=260)	P value
Adverse event†	130(18.1)	348 (10.9)	<0.001	86 (16.5)	62 (11.9)	0.03
Operative death	96 (13.4)	245 (7.7)	<0.001	61 (11.7)	49 (9.4)	0.2
30-day death	79 (11.0)	182 (5.7)	<0.001	47 (9.0)	33 (6.3)	0.1
Persistent stroke‡	33 (4.6)	94 (2.9)	0.02	23 (4.4)	13 (2.5)	0.1
Acute renal dysfunction	81 (11.3)	274 (8.6)	0.02	60 (11.5)	34 (6.5)	0.005
Persistent renal failure‡	54 (7.5)	139 (4.3)	<0.001	35 (6.7)	21 (4.0)	0.5
Spinal cord deficit	13 (0.3)	64 (1.6)	0.7	9 (1.7)	12 (2.3)	0.5
Respiratory failure	281 (39.2)	877 (27.4)	<0.001	191 (36.7)	146 (28.1)	0.003
Cardiac complication	422 (58.9)	1387 (43.4)	<0.001	312 (60.0)	240 (46.2)	<0.001
Arrythmia	320 (44.6)	1075 (33.6)	<0.001	240 (46.2)	179 (34.4)	<0.001
Cardiac failure	162 (22.6)	387 (12.1)	<0.001	119 (22.9)	75 (14.4)	<0.001

Values are n (%) or median [interquartile range]. †Present at the time of hospital discharge or early death.

Predictors of Mortality & Adverse Events

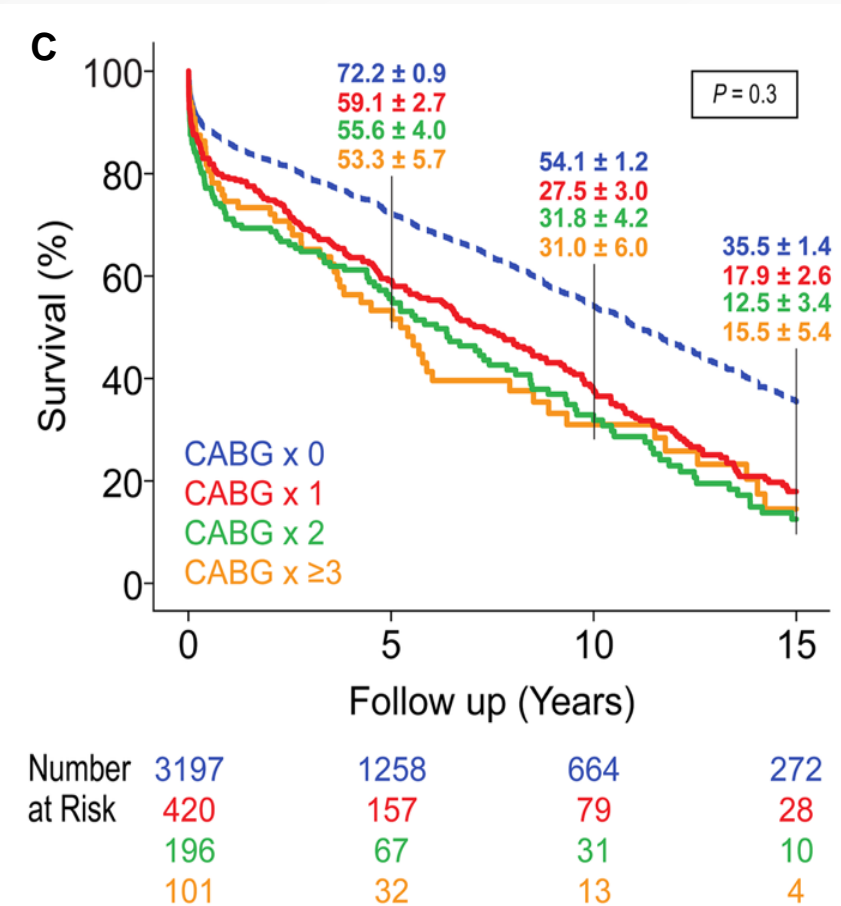
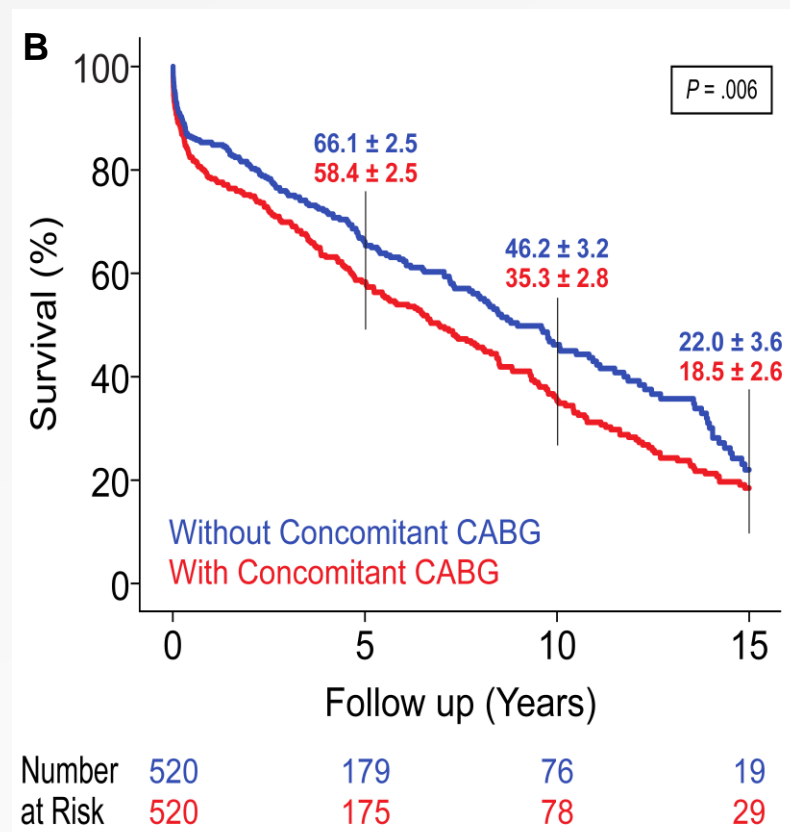
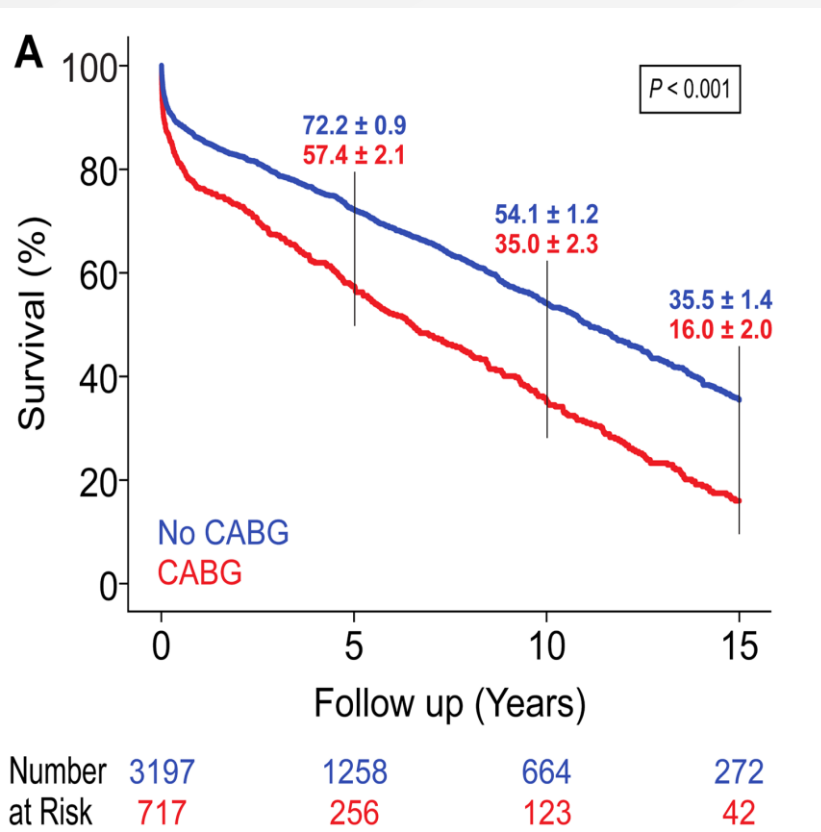
VARIABLE	Odds Ratio (95% CI)	P value
ADVERSE EVENTS		
Concomitant CABG	1.52 (.94-2.45)	0.09
Male	0.57 (.34-0.95)	0.03
Chronic dissection	1.87 (1.06-3.29)	0.03
Left ventricular Ejection Fraction% <40	2.04 (1.01-4.10)	0.05
Cardiovascular disease	1.90 (1.09-3.33)	0.02
Chronic kidney disease	2.78 (1.72-4.48)	<0.001
Rupture	8.11 (1.77-37.18)	0.007
Branch vessel bypass	3.83 (2.14-6.85)	<0.001
Concomitant valve (excluding Aortic Valve)	3.96 (1.56-10.08)	0.004

VARIABLE	Odds Ratio (95% CI)	P value
OPERATIVE MORTALITY		
Left ventricular Ejection Fraction % <40	2.12 (.99-4.57)	0.05
Cardiovascular disease	1.78 (.94-3.37)	0.08
Chronic kidney disease	2.38 (1.39-4.08)	0.002
Acute symptoms	1.91 (1.01-3.60)	0.05
Rupture	8.98 (1.95-41.27)	0.005
Branch vessel bypass	4.44 (2.41-8.16)	<0.001

After matching, **concomitant CABG** was **not a predictor** of operative mortality or adverse event occurrence.

Late Outcomes

- Long term survival was significantly **decreased** in patients with **concomitant CABG** in the overall and matched cohort.
- Nonetheless, survival was **unaffected** by the **number of bypasses** performed.



Conclusions

- Patients who underwent **concomitant CABG experienced adverse events more frequently**, were older, and had more co-morbid conditions.
- **Long-term survival** was significantly **decreased** in concomitant CABG patients.
- Findings suggest that patients who require concomitant CABG are more medically fragile, and they may benefit from close postoperative follow-up focused on the **management of non-aortic related comorbidities**.

Thank you