Is Prior Cardiac Surgery a Risk Factor in Patients with Acute Type A Aortic Dissection?

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Introduction

- Few previous studies have explored the influence of prior cardiac surgery (PCS) on the operative mortality in patients undergoing surgery for Type A aortic dissection (AATAD) and have showed contradictory results.

- This study aims to determine whether PCS patients undergoing AATAD repair are more prone to experience unfavorable outcomes when compared with patients with no PCS history.

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Methods

- Retrospective cohort study.
- 403 patients undergoing repair for ATAAD between 1997 and 2023 at a single center
- Patients divided in two groups according to their previous history of cardiac surgery : PCS group (69 patients) and non-PCS group (334 patients).

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Preoperative Data

	Overall	No PCS	PCS	P value
N	403	334	69	
Preoperative details				
Age (median [IQR])	65.00 [53.00, 74.50]	64.00 [52.00, 74.00]	69.00 [59.00, 75.00]	0.093
Male (%)	246 (61.0)	206 (61.7)	40 (58.0)	0.661
Smoking (%)	230 (57.1)	185 (55.4)	45 (65.2)	0.171
BMI (median [IQR])	27.15 [23.64, 31.30]	27.23 [23.89, 31.15]	26.50 [23.35, 31.77]	0.84
Hypertension (%)	373 (92.6)	308 (92.2)	65 (94.2)	0.748
Previous Myocardial Infarction (%)	64 (15.9)	41 (12.3)	23 (33.3)	<0.001
COPD (%)	72 (17.9)	52 (15.6)	20 (29.0)	0.013
Diabetes (%)	62 (15.4)	44 (13.2)	18 (26.1)	0.012
Previous CVA (%)	73 (18.1)	52 (15.6)	21 (30.4)	0.006
Preop Renal impairment (%)	122 (30.3)	88 (26.3)	34 (49.3)	<0.001
Ejection fraction (median [IQR])	50.00 [45.00, 50.00]	50.00 [45.00, 50.00]	45.00 [40.00, 50.00]	<0.001
Connective tissue disease (%)	26 (6.5)	14 (4.2)	12 (17.4)	<0.001
Preop Shock (%)	61 (15.1)	53 (15.9)	8 (11.6)	0.473
Malperfusion at Presentation (%)				0.506
• Cerebral	24 (6.4)	22 (7.1)	2 (3.1)	
• Coronary	20 (5.3)	19 (6.1)	1 (1.5)	
• Coronary, renal, spinal, intestinal	2 (0.5)	2 (0.6)	0 (0.0)	
• Extremity	37 (9.8)	29 (9.3)	8 (12.3)	
• Intestinal	6 (1.6)	6 (1.9)	0 (0.0)	
• None	262 (69.5)	212 (67.9)	50 (76.9)	
• Renal	19 (5.0)	16 (5.1)	3 (4.6)	
• Spinal	7 (1.9)	6 (1.9)	1 (1.5)	
Site of Rupture (Ascending; %)	349 (86.6)	294 (88.0)	55 (79.7)	0.099
Degree of AI (%)				<0.001
· 0/1	98 (25.5)	65 (20.4)	33 (50.0)	
· 2/3	163 (42.3)	143 (44.8)	20 (30.3)	
· 4	124 (32.2)	111 (34.8)	13 (19.7)	

- Patients with PCS were older and more likely to have history of prior MI, COPD, Diabetes, prior CVA, Renal Impairment and Connective tissue disease
- There was no difference in malperfusion however the PCS group was less likely to have severe AI.

Intraoperative Data

Operative details	Overall	No PCS	PCS	P value
Pump Time (median [IQR])	144.50 [128.25, 167.00]	140.00 [127.00, 163.00]	162.00 [138.00, 190.00]	<0.001
Cardio Ischemic Time (circ arr+ xct) (median [IQR])	90.00 [74.00, 115.00]	91.00 [74.00, 115.00]	85.00 [71.00, 116.00]	0.25
RCP Time (median [IQR])	24.00 [20.00, 30.00]	24.00 [20.00, 29.00]	24.00 [20.00, 33.00]	0.439
CA Time (median [IQR])	24.00 [20.00, 30.00]	24.00 [20.00, 30.00]	25.00 [20.00, 33.75]	0.285
Site of Arterial Cannulation (%)				0.216
· Asc/arch	186 (46.6)	150 (45.3)	36 (52.9)	
· Axillary	2 (0.5)	1 (0.3)	1 (1.5)	
· Femoral	211 (52.9)	180 (54.4)	31 (45.6)	
DHCA Used (%)	365 (90.6)	302 (90.4)	63 (91.3)	0.998
Valve Repl Type (%)				0.498
· Bovine	49 (12.2)	42 (12.6)	7 (10.1)	
· Mechanical	44 (10.9)	39 (11.7)	5 (7.2)	
· None	307 (76.2)	250 (74.9)	57 (82.6)	
· Porcine	3 (0.7)	3 (0.9)	0 (0.0)	
CABG as conc procedure (%)	38 (9.4)	34 (10.2)	4 (5.8)	0.364

- **Pump time was longer in patients with PCS compared with patients without history of PCS**

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Intraoperative Observations

- Patients with PCS had longer cardiopulmonary bypass time (median 162 min, IQR [138, 190] vs median 140 min, IQR [127, 163]; P<0.001).
- Circulatory arrest time was the same in both groups (24 min [20, 30] vs 25 min [20, 34]; P=0.285). However, when stratified by the type of previous heart surgery, the ascending aorta intervention group showed a significantly higher circulatory arrest time (49 min [23, 59]; P=0.048).
- Patients with history of ascending aorta interventions were more likely to undergo total arch repair during surgery compared to the other groups (44.4%; P=0.017)

Postoperative Data

Postoperative outcomes	Overall	No prior cardiac surgery	Prior cardiac surgery	P value
**MAE (%)	50 (12.4)	35 (10.5)	15 (21.7)	0.017
Myocardial Infarction (%)	5 (1.2)	4 (1.2)	1 (1.4)	1
Postop CVA (%)	12 (3.0)	9 (2.7)	3 (4.3)	0.729
Postop Tracheostomy (%)	18 (4.5)	11 (3.3)	7 (10.1)	0.029
Postoperative GI Complications (%)	19 (4.7)	14 (4.2)	5 (7.2)	0.437
Postop Dialysis (%)	20 (5.0)	13 (3.9)	7 (10.1)	0.061
Takeback for Bleeding (%)	33 (8.2)	26 (7.8)	7 (10.1)	0.682
Operative Mortality (%)	21 (5.2)	12 (3.6)	9 (13.0)	0.004

** MAE–Major Adverse Events : Includes operative mortality, myocardial infarction, postoperative cerebral vascular accident, tracheostomy and dialysis

- Unadjusted Operative Mortality and MAE were significantly higher in patients with PCS.
- Incidence of postoperative tracheostomy was higher in patients with PCS.

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Meta-regression Analysis

Variable	Odds Ratio (95%CI) p-value
Age	1.04 [1.02;1.07] 0.000794
Males vs Females	1.21 [0.66;2.22] 0.541587
Previous myocardial infarction	2.46 [1.26;4.79] 0.008292
COPD	0.97 [0.48;1.95] 0.932000
Previous CVA	1.43 [0.75;2.74] 0.275569
Preop renal impairment	1.73 [0.92;3.24] 0.086289
Previous cardiac surgery	1.48 [0.76;2.89] 0.250854

- **Age and prior MI are significant predictors of MAE in patients with a history of PCS.**
- **PCS is not independently associated with the composite of MAE**

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Mortality Risk According to Previous Surgical Procedure

- Patients with a history of valve surgery had an increased post-operative mortality of 17.4%
- Patients who had previous isolated CABG had a post-operative mortality of 12.0%
- Patients who had previous valve/CABG had a postoperative mortality of 16.7%
- However, the difference in mortality between PCS groups was not significant (P=0.094)

Conclusion

- Patients with a history of PCS undergoing repair for ATAAD presented with more comorbidities and experienced an unadjusted increased risk of mortality and MAE, when compared with No PCS patients.
- On regression analysis PCS was not independently associated with MAE
- The type of PCS was not found to be a statistically significant predictor of operative mortality mortality.

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