

INTRODUCTION

Postoperative pulmonary complications are common in patients who undergo cardiac surgery (up to 20%), with outcomes such as atelectasis, pneumonia, ARDS, pleural effusions, pulmonary embolism, ventilation longer than 24 hours, reintubation, and tracheostomy requirement. However, compared to non-aortic surgeries, aortic surgeries have an increased risk of postoperative pulmonary complications with an incidence of up to 30%.

This study aims to compare early postoperative respiratory and ventilatory data in patients who undergo elective thoracic aortic vs non-aortic surgery.

METHODS

A retrospective study identified patients >18 years old who underwent cardiac surgery at MUSC from 6/1/2024 to 6/15/2025. Exclusion criteria included age <18 years, concomitant cardiac/aortic cases, urgent, emergent, or emergent salvage cases, endocarditis, aortic dissections, transcatheter procedures, and those without preoperative PFTs.

Primary outcomes included early postoperative respiratory and ventilatory data, postoperative PFTs, and 30-day and overall mortality. PFT severity was categorized by FEV1: mild >70%, moderate 60-69%, moderately severe 50-59%, severe 35-49%, and very severe <35%.

Patients > 18 yo who underwent elective cardiac surgery at MUSC from 6/1/2024-6/15/2025

- Exclusions:
- concomitant cardiac/aortic
 - urgent, emergent, or emergent salvage status
 - endocarditis
 - aortic dissections
 - transcatheter procedures
 - patients without preoperative PFTs

210 patients

188 non-aortic
22 aortic

RESULTS

Of the 210 patients included in the study, 188 underwent non-aortic (55.0% CABG, 25.2% MVR/r, 19.3% AVR/r, 0.5% TVR/r) and 22 underwent aortic procedures.

Propensity score matching was performed based on preoperative PFTs, CPB time, and intraoperative blood product and RBC usage, resulting in 16 matched pairs.

Figure 1. Patient cohort by procedure type

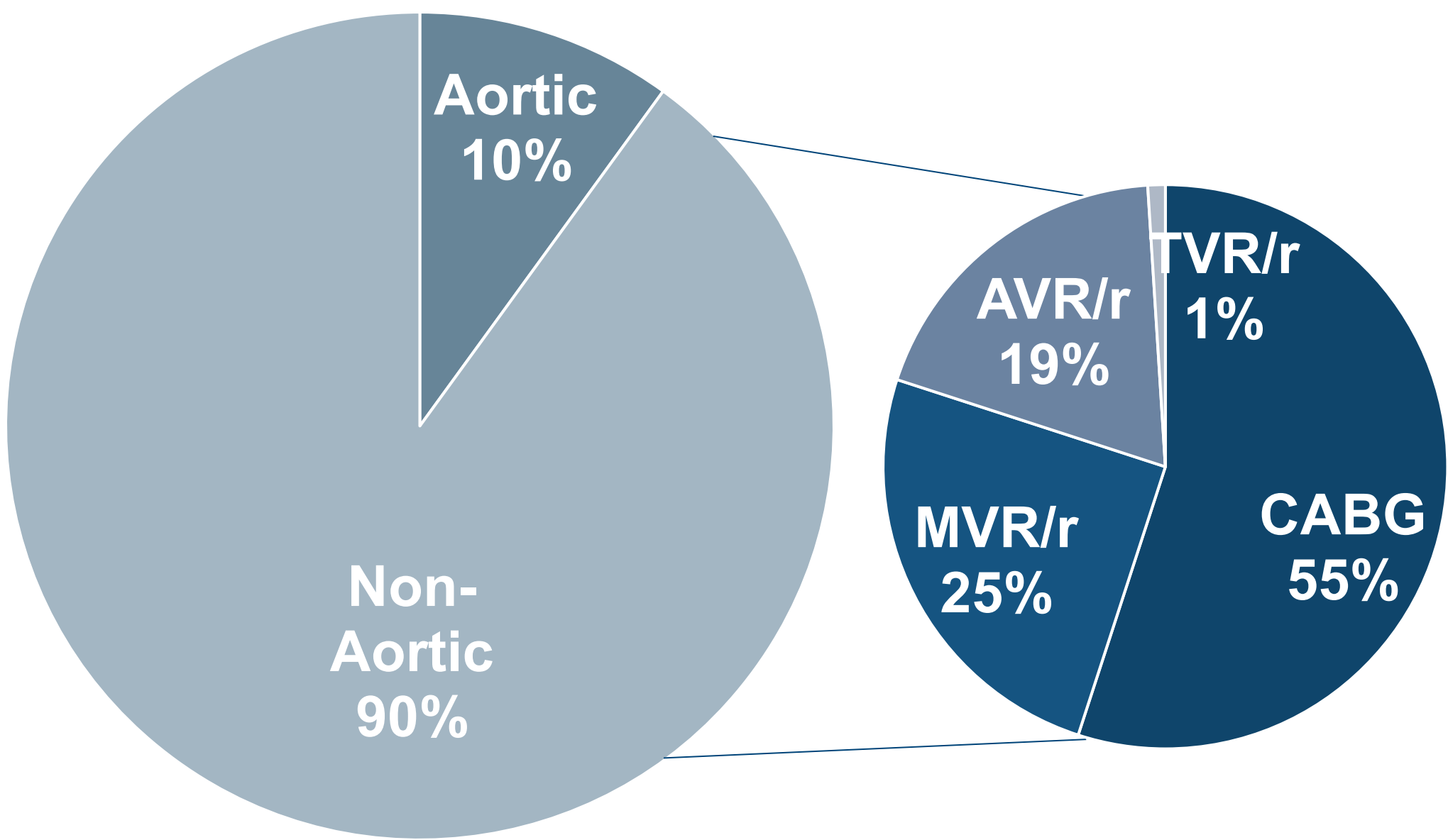


Table 1. Intraoperative and Postoperative Outcomes of Unmatched vs Matched Patient Cohorts.

Characteristics	Baseline Cohort (n=210)			1:1 Propensity Score Matching (n=32)		
	Aortic (n=22)	Non-Aortic (n=188)	P-value	Aortic (n=16)	Non-Aortic (n=16)	P-value
Preoperative PFTs (mean [IQR])						
FEV1 (%)	86.0 [76.2–95.5]	86.0 [74.0–99.5]	0.814	86.0 [76.2–95.5]	87.5 [77.5–95.8]	0.975
FVC (%)	87.5 [78.5–96.0]	91.0 [80.0–103.0]	0.569	87.5 [78.5–96.0]	91.0 [80.8–103.5]	0.649
DLCO (%)	91.0 [74.5–97.5]	86.0 [72.2–99.8]	0.805	91.0 [74.5–97.5]	83.5 [70.0–97.8]	0.982
Intraoperative (mean [IQR])						
Cardiopulmonary bypass time (min)	192.0 [166.2–214.2]	109.0 [82.0–145.5]	<0.001	192.0 [162.0–210.8]	180.0 [159.5–210.2]	0.285
Cross clamp time (min)	152.0 [108.2–167.0]	78.0 [60.0–103.0]	<0.001	157.0 [124.8–171.5]	123.5 [90.2–160.8]	0.010
Circulatory arrest time (min)	0.5 [0.0–15.0]	0.0 [0.0–0.0]	<0.001	7.0 [0.0–16.5]	0.0 [0.0–0.0]	0.008
Lowest temperature (°C)	30.8 [27.0–31.6]	32.2 [31.3–33.3]	<0.001	29.3 [27.1–31.8]	31.2 [30.9–31.9]	0.034
Lowest intraop Hgb (g/dL)	8.8 [8.2–9.9]	8.5 [7.5–9.5]	0.204	9.2 [8.5–9.9]	8.5 [7.7–9.6]	0.443
Lowest intraop Hct (%)	26.0 [24.0–29.0]	24.5 [21.0–28.0]	0.098	26.0 [24.0–29.0]	24.0 [20.8–26.5]	0.069
Intraop blood product use, n (%)	12 (54.5%)	72 (38.3%)	0.141	8 (50.0%)	6 (37.5%)	0.688
Intraop RBC (units)	0.0 [0.0–1.0]	0.0 [0.0–1.0]	0.176	0.0 [0.0–1.0]	0.0 [0.0–1.0]	0.552
Intraop FFP (units)	0.0 [0.0–1.5]	0.0 [0.0–0.0]	0.003	0.0 [0.0–0.0]	1 (6.2%)	0.144
Postoperative (mean [IQR])						
Postop blood product use	6 (27.3%)	29 (15.4%)	0.158	5 (31.2%)	5 (31.2%)	1.000
Postop RBC (units)	0.0 [0.0–0.8]	0.0 [0.0–0.0]	0.102	0.0 [0.0–1.0]	0.0 [0.0–1.0]	0.726
Postop FFP (units)	0.0 [0.0–0.0]	0.0 [0.0–0.0]	0.043	2 (12.5%)	0 (0.0%)	0.500
Postop platelets (units)	0.0 [0.0–0.0]	0.0 [0.0–0.0]	0.016	0.0 [0.0–0.0]	1 (6.2%)	0.180
First 24 hours						
Highest PCO2 (mmHg)	45.5 [39.2–48.0]	44.5 [42.0–48.0]	0.866	45.5 [39.0–48.0]	43.0 [40.2–47.0]	0.711
Lowest PaO2 (mmHg)	72.0 [61.0–81.5]	75.0 [65.0–87.2]	0.182	71.0 [59.8–80.5]	74.5 [64.0–82.2]	0.289
Lowest set TV (mL)	445.0 [385.0–492.5]	430.0 [375.0–470.0]	0.345	460.0 [402.5–492.5]	430.0 [375.0–480.0]	0.157
Highest set TV (mL)	455.0 [402.5–492.5]	430.0 [380.0–470.0]	0.224	465.0 [402.5–492.5]	430.0 [400.0–485.0]	0.300
Lowest exh TV (mL)	434.0 [339.0–468.0]	399.0 [332.5–460.5]	0.524	457.5 [344.0–469.5]	394.0 [338.0–508.5]	0.733
Highest FIO2 (%)	40.0 [40.0–50.0]	40.0 [40.0–44.0]	0.096	42.0 [40.0–60.0]	40.0 [40.0–44.0]	0.327
Highest PEEP (cmH20)	8.0 [8.0–8.0]	8.0 [8.0–8.0]	0.190	8.0 [8.0–8.0]	8.0 [7.5–8.0]	0.071
ARDS	1 (4.5%)	5 (2.7%)	0.490	1 (6.2%)	1 (6.2%)	1.000
VV-ECMO	0 (0.0%)	2 (1.1%)	1.000	0 (0.0%)	0 (0.0%)	1.000
Prolonged intubation >24 hours	3 (13.6%)	16 (8.5%)	0.429	3 (18.8%)	2 (12.5%)	1.000
Reintubation	0 (0.0%)	8 (4.3%)	0.058	0 (0.0%)	0 (0.0%)	0.102
Prolonged ventilation >5 days	1 (4.5%)	5 (2.7%)	0.490	1 (6.2%)	1 (6.2%)	1.000
ICU length of stay (days)	4.5 [3.0–5.8]	3.0 [2.0–4.0]	0.020	5.0 [3.0–5.2]	3.5 [2.0–5.2]	0.552
PFTs – FEV1 (%)	30.5 [15.2–45.8]	66.0 [0.0–86.0]	0.547	30.5 [15.2–45.8]	86.0 [86.0–86.0]	N/A
PFTs – FVC (%)	34.0 [17.0–51.0]	82.0 [0.0–95.0]	0.547	34.0 [17.0–51.0]	95.0 [95.0–95.0]	N/A
PFTs – DLCO (%)	33.5 [16.8–50.2]	28.0 [0.0–68.8]	1.000	33.5 [16.8–50.2]	107.0 [107.0–107.0]	N/A
30-day mortality	1 (4.5%)	4 (2.1%)	0.428	1 (6.2%)	1 (6.2%)	1.000
Overall mortality	1 (4.5%)	6 (3.2%)	0.545	1 (6.2%)	2 (12.5%)	1.000

CONCLUSIONS

Patients who underwent elective thoracic aortic versus non-aortic cardiac surgery did not exhibit differences in early postoperative pulmonary complications.

This data may suggest that critical care following cardiac surgery at our institution has evolved to prevent and address pulmonary complications.

FUTURE DIRECTIONS

Future studies will include patients over a longer period of time, ideally a 10-year follow-up, to look at trends of pulmonary complications over time and to include more postoperative PFT data.

ACKNOWLEDGEMENTS

This study was funded by the MUSC T32 Program in Pulmonary Focused Foundations in Innovation and Scholarship (PUFFINS).

REFERENCES

1. Etz CD, Di Luozzo G, Bello R, et al. Pulmonary complications after descending thoracic and thoracoabdominal aortic aneurysm repair: predictors, prevention, and treatment. Ann Thorac Surg. 2007;83(2):S870-S892.
2. Girardi LN, Lau C, Munjal M, et al. Impact of preoperative pulmonary function on outcomes after open repair of descending and thoracoabdominal aortic aneurysms. J Thorac Cardiovasc Surg. 2017;153(2):S22-S29.e2.