Left Heart Bypass vs Venoarterial Extracorporeal Membrane Oxygenation In Descending Thoracic Aortic Surgery: Results Of A Retrospective Cohort Study

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Disclosures

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Introduction

- **University of British Columbia**
  - 4000 km north-south distance
  - 500000 mi^2
- **Multidisciplinary aortic program**
- **25-30 open thoracic aortic cases per year**
- **40 TEVARs per year**

Background

Distal aortic perfusion is a critical component of organ preservation in descending thoracic aortic surgery

Variety of techniques available depending on specifics of each case

- Cardiopulmonary bypass
- Circulatory Arrest
- Axillo-femoral bypass
- VA- ECMO

VA-ECMO: proposed advantages
Better gas exchange, temperature, pH management
Conversion to full bypass if needed
Convenience

Methods

- Between 2007 and 2023, 128 patients underwent open descending thoracic aortic repair using LHB or VA ECMO
- Excluded patients using other perfusion methods
- Clinical outcomes were measured and compared (binary variables were evaluated with Fisher's exact test, continuous variables with Wilcoxon's rank sum test)

VA ECMO: Technique

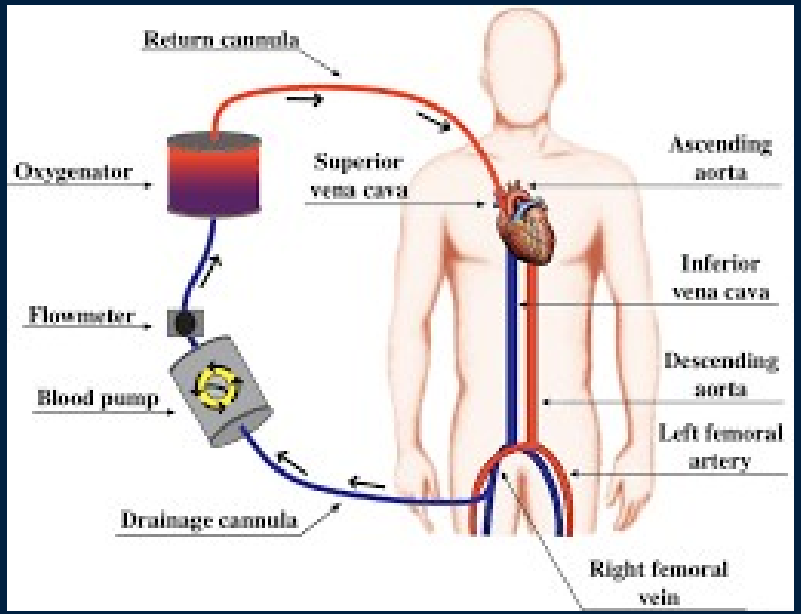
Venous drainage: Left common femoral vein cannulation, Multiport Cannula placed with tip in SVC, under TEE guidance

Arterial inflow: 10 mm Dacron graft sewn to left CFA

Target MAP: 80-90 mm Hg, measured through right femoral line

Arch vessels perfused via beating heart

ACT 190 seconds



Results: Baseline characteristics

	VA- ECMO N=28	LHB N=100	p-value
Sex (Male)	18 (64.3%)	71 (71.0%)	0.55
Age, median	54.9	59.7	0.23
CAD	7 (25.0%)	28 (28.0%)	1.00
COPD	5 (17.9%)	17 (17.0%)	0.77
Previous thoracic aortic surgery	12 (42.9%)	44 (44.0%)	1.00
Baseline eGFR (umol/L)	72.5 ± 25.2	66.6 ± 19.6	0.34
Degenerative aneurysm	14 (50%)	47 (47.0%)	1.00
Coarctation	2 (7.1%)	4 (4.0%)	0.60
Chronic dissection	7 (25%)	37 (37%)	0.37
Trauma	1 (3.6%)	2 (2%)	1.00
Rupture	1 (3.6%)	5 (5%)	1.00
Other indications	2 (7.1%)	9 (9.0%)	1.00
Emergent	3 (10.7%)	9 (9%)	1.00
Urgent	3 (10.7%)	5 (5%)	0.36

Intraoperative characteristics

	VA- ECMO N=28	LHB N=100	p-value
Highest lactate	3.3 ± 1.4	2.8 ±1.7	0.05
Lowest pH	7.2 ± 0.1	7.3 ± 0.1	0.37
Lowest eGFR	58.9 ± 22.7	62.4 ± 23.6	0.52
Intra-operative transfusion	4.5 ± 4.1	3.1 ± 2.9	0.09
Post-operative transfusion	2.2 ± 2.8	1.4 ± 3.4	0.11
Total transfusion	6.7 ± 5.2	4.5 ± 5.2	0.11
RBC Returned to Patient (mL)	2751 ± 1623	3016 ± 1713	0.47
Total pump time	141 ± 35.3	135 ± 42.6	0.15
Operative time	351 ± 95.7	319 ± 93.7	0.06
Intercostal re-implanted	1 (3.7%)	8 (8%)	0.89
Spinal drain	20 (74.1%)	88 (88%)	0.13

Postoperative characteristics

	VA- ECMO N=28	LHB N=100	p-value
In-hospital mortality	0 (0%)	4 (4%)	0.58
Long-term mortality	4 (14.3%)	26 (26%)	0.31
Paraplegia	0 (0%)	2 (2%)	1.00
Re-intubation	4 (14.8%)	5 (5%)	0.09
Days intubated	1.69 ± 2.45	1.66 ± 1.67	0.39
Length of stay	16.4 ± 14.3	13.2 ± 13.4	0.09
Stroke	2 (7.1%)	5 (5%)	0.65
MI	0 (0%)	0 (0%)	1.00
Pneumonia	4 (14.8%)	12 (12%)	0.75
Re-operation	2 (7.1%)	9 (9%)	1.00
Unplanned Re-operation	1 (3.6%)	5 (5%)	1.00
Temporary Hemodialysis	1 (3.6%)	1 (1%)	0.36

Results

Overall favourable results in patients undergoing open descending thoracic aortic surgery regardless of distal aortic perfusion technique.

Post operative clinical results similar between groups

- **Limited by small number of patients and time effect**

Higher inflammatory markers in the VA-ECMO group

- **No significant difference in clinical results**

Conclusion

VA-ECMO is a safe alternative to LHB in patients undergoing open descending thoracic aortic surgery

VA-ECMO preferred by our anaesthesia and perfusion colleagues

- **Better hemodynamic and gas exchange support, especially in patients with poor pre-operative pulmonary function**

VA-ECMO is convenient and favoured by surgical team