Outcome of Post Cardiotomy Veno-Arterial Extra-Corporeal Membrane Oxygenation For Repair of Acute Aortic Syndrome Compared to Other Cardiac Operations

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Introduction (I)

- Ageing population with increasing complexity of disease and co-morbidities presenting for surgery

- Multiple levels of support available to manage the most challenging patients in cardiac surgery

- Cardiogenic shock following cardiac surgery characterised by severe myocardial contractile impairment and reduced organ perfusion with a mortality approaching 40%[1]

- Post-cardiotomy ECMO is utilised in patients in the highest risk spectrum
  - A valuable tool to rescue patients in refractory cardiocirculatory failure +/- concomitant respiratory dysfunction

- Prevalence of PC-ECMO is highly variable ranging from 0.4% - 3.7% [2]

Introduction (II)

- Acute aortic syndromes are life-threatening emergencies associated with high morbidity and mortality
  - PC-ECMO would allow an opportunity for recovery for these high-risk patients characterised by a critical pre-operative state, prolonged complex operation, post-operative circulatory and respiratory dysfunction, and the use of DHCA

- We aimed to assess the incidence of PC VA-ECMO at our institution

- Compare outcomes following repair of acute aortic syndrome to other cardiac operations
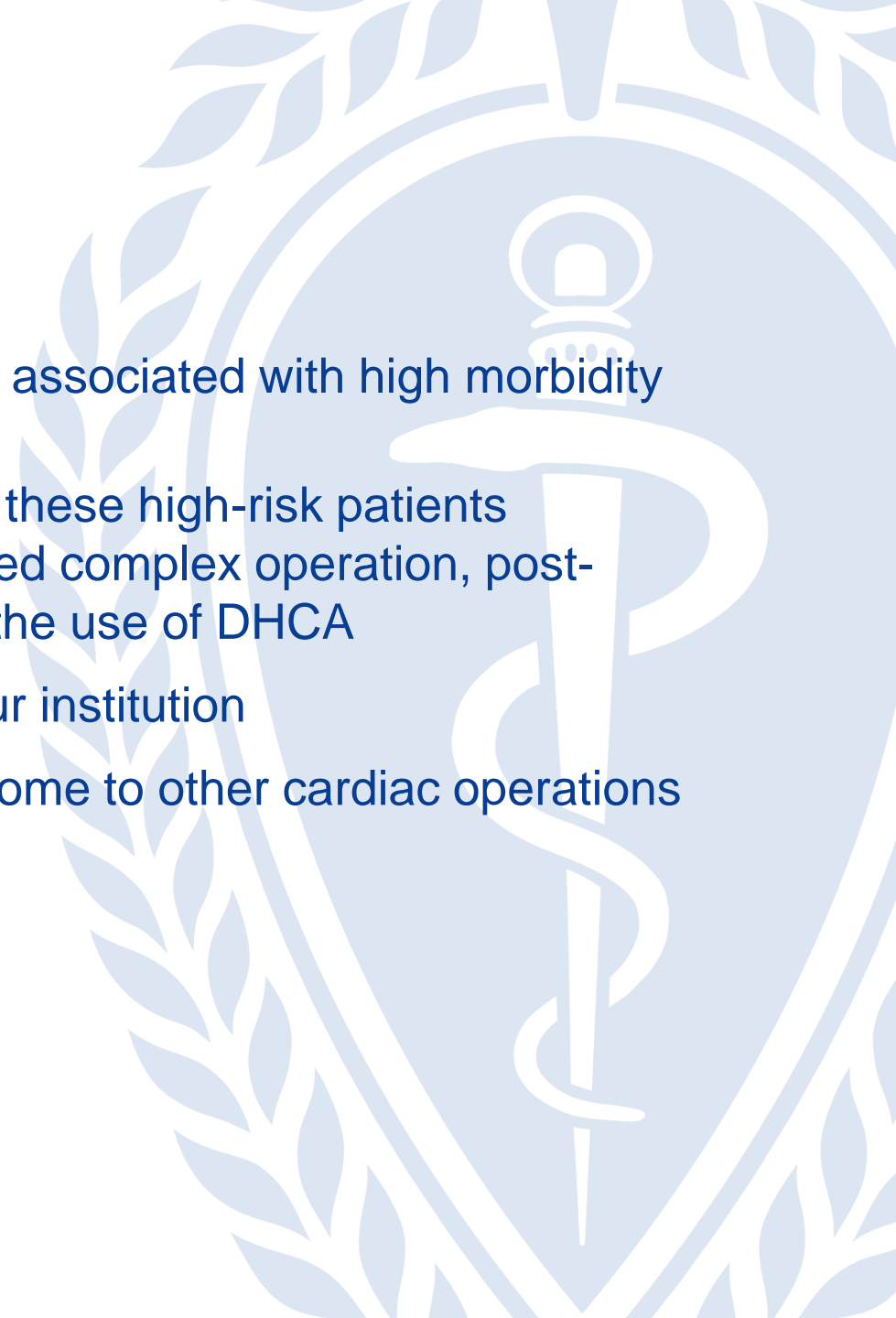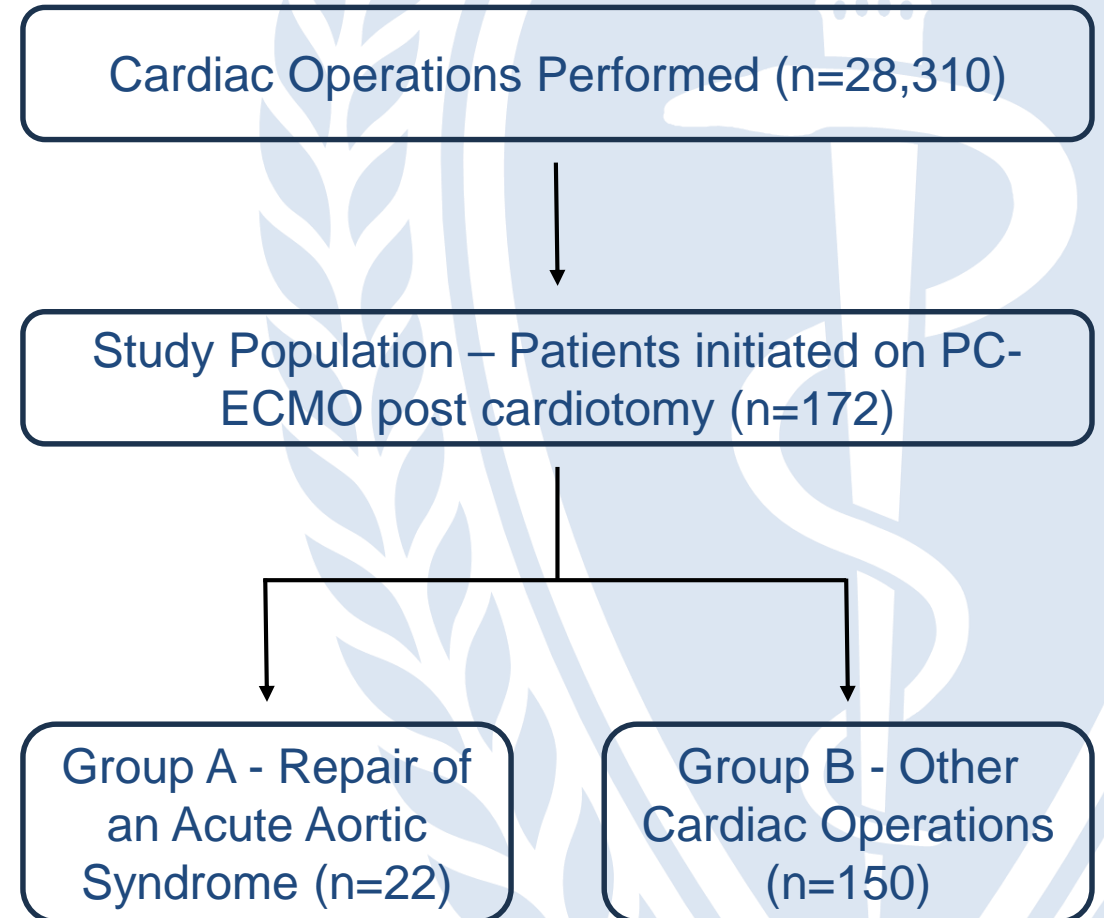
Methods

- This was a retrospective study of all patients that underwent cardiac surgery at our institution from January 2008 until July 2023

- Exclusion criteria:
    i. Patients initiated on ECMO prior to surgery
    ii. Patients placed on VV-ECMO or VAD
    iii. Patients undergoing mechanical circulatory support as a bridge to transplantation
    iv. Patients undergoing transplantation or Pulmonary thromboendarterectomy

- Patients initiated onto VA-ECMO post cardiotomy were identified and their records analysed further

- Acute Aortic Syndrome included – Acute Type A Aortic Dissection, Intra Mural Haematoma and Penetrating Aortic Ulcers

Results (I) – Study Cohort

- 28,310 general adult cardiac operations were performed

- 172 (0.61%) patients fulfilled inclusion criteria (PC VA-ECMO)
    - 22 (12.8%) of patients had repair of an acute aortic syndrome (Group A)
    - 150 (87.2%) patients underwent other cardiac operations (Group B)

Cardiac Operations Performed (n=28,310)

↓

Study Population – Patients initiated on PC-ECMO post cardiotomy (n=172)

Group A - Repair of an Acute Aortic Syndrome (n=22)

Group B - Other Cardiac Operations (n=150)

Results (II) - Baseline Characteristics

	Group A (n=22)	Group B (n=150)	P Value
Age	62.3 ± 11.75	64.9 ± 12.01	0.3434
Male	12 (54.5%)	99 (66%)	0.2943
Hypertension	14 (63.6%)	80 (53.3%)	0.3647
Extra-arterial disease	7 (31.8%)	21 (14%)	0.0345
History of stroke/TIA	2 (9.1%)	13 (9.7%)	0.9475
LVEF <30%	9 (40.9%)	50 (33.3%)	0.4845
Previous Cardiac Surgery	3 (13.6%)	25 (16.7%)	0.7192
Pre-Operative Cardiogenic Shock	5 (22.7%)	27 (18%)	0.8432
Pre-Operative Intubation	3 (13.6%)	25 (16.7%)	0.7912
Pre-Operative Inotropes	4 (18.2%)	23 (15.3%)	0.7344
EuroScore	12.4% ± 3.1%	9.9% ± 4.6%	**0.0131**

Results (III) – Operative Details

- The urgency of the index procedure in was elective in 29.1% (50/172), urgent in 29.1% (50/1972) and emergency/salvage in 41.8% (72/172)

- Total Time (minutes) on CPB: Group A 363 ± 132.6 vs Group B 204 ± 117.2, p=0.0001

- Total Time (minutes) on Aortic Cross Clamp: Group A 159 ± 52.9 vs 104 ± 52.9, p=0.0001

- VA-ECMO was instituted at the index operation in 20/22 in group A vs 87/150 in group B (p= 0.0029)

- Mean number of days on ECMO in group A of 7.5 ± 8.2 vs 5.9 ± 6 in group B (p=0.2685)

Results (IV) - Complications

|	Group A (n=22)	Group B (n=150)	P Value
Need for CVVH	20 (91%)	129 (86%)	0.5275
Cerebrovascular accident	5 (22.7%)	17 (11.3%)	0.1351
Tracheostomy	2 (9.1%)	21 (14%)	0.5275
Further Mechanical Circulatory Support*	3 (13.6%)	7 (4.7%)	0.0932
Length of Hospital Stay (days)	14.7 ± 14.6	13.1 ± 12.8	0.5915

*10 patients underwent further mechanical circulatory support
- 3 in group A (2x RVAD, 1x BiVAD)
- 7 in group B (1x LVAD, 4x RVAD, 2x BiVAD)

Results (V) – Survival Outcomes

|	Group A (n=22)	Group B (n=150)	P Value
In-Hospital Mortality	13 (59%)	119 (79.3%)	**0.0358**
1-month survival	8 (36.4%)	38 (25.3%)	0.2750
1-year survival	4 (18.2%)	20 (13.3%)	0.5399
Number of patients discharged from hospital	9 (40.9%)	31 (20.7%)	**0.0358**
1-year survival of patents discharged from hospital	4/9 (44.4%)	20/31 (64.5%)	0.2792

Results (VII) – Survival Outcomes
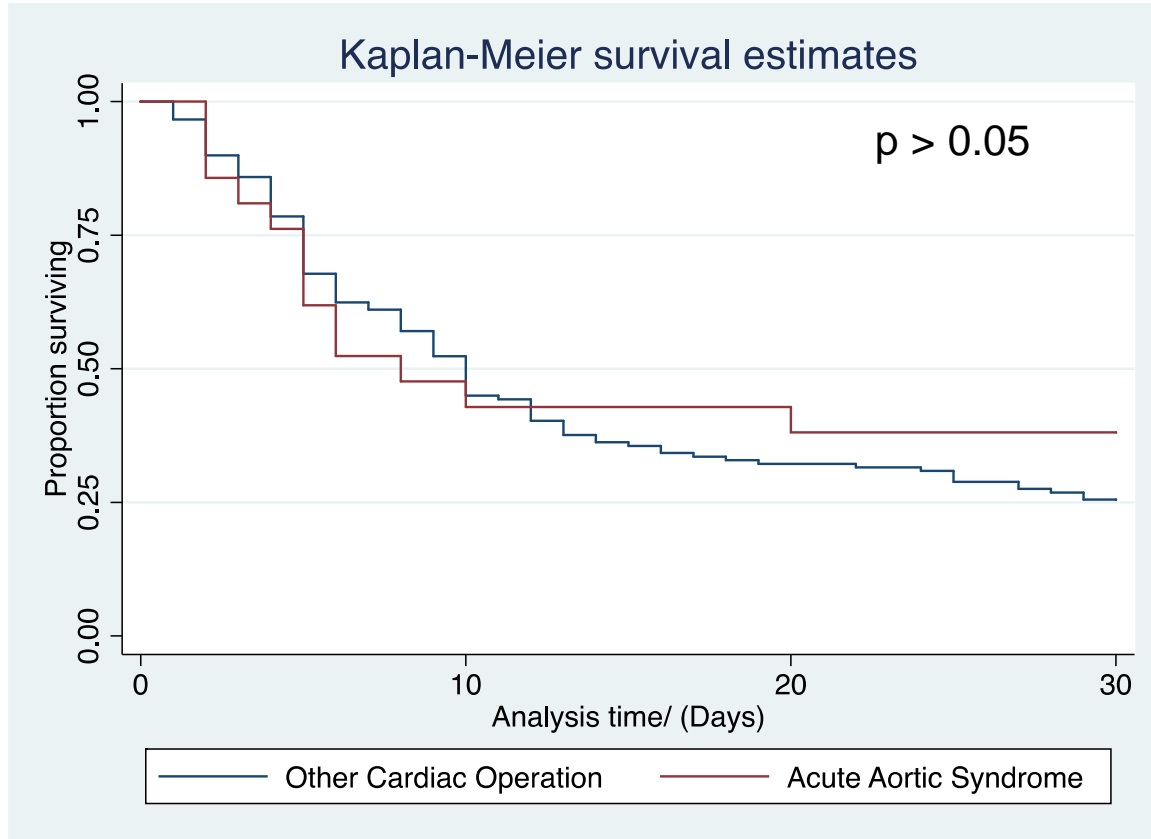
30 Day Survival Outcomes
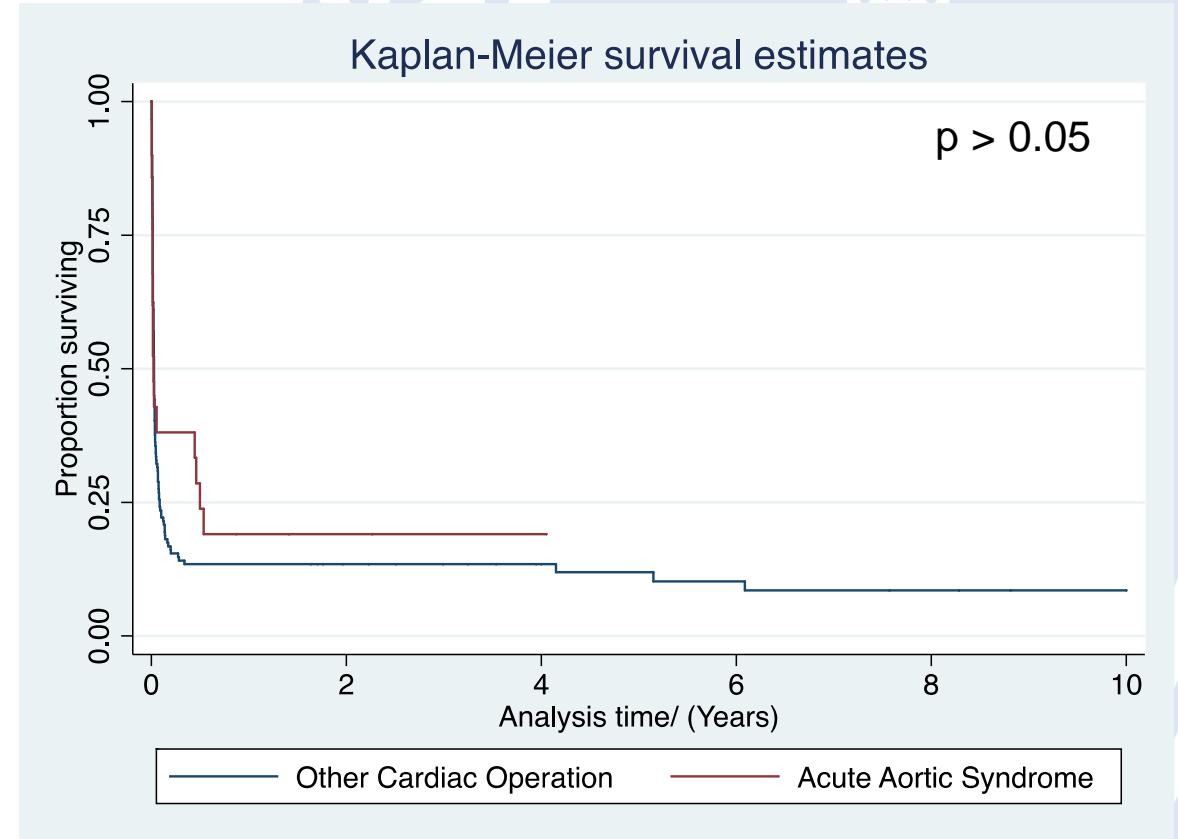
Overall Survival Outcomes

Conclusion

- PC-ECMO is a useful method of support following cardiac surgery

- PC-ECMO is associated with a high mortality, however without PC-ECMO mortality is almost a certainty

- Our results demonstrate that PC VA-ECMO can be utilised in patients following repair of acute aortic syndromes with similar outcomes compared to other cardiac operations
  - No significant difference at 30 days, 1 year or during long term follow up
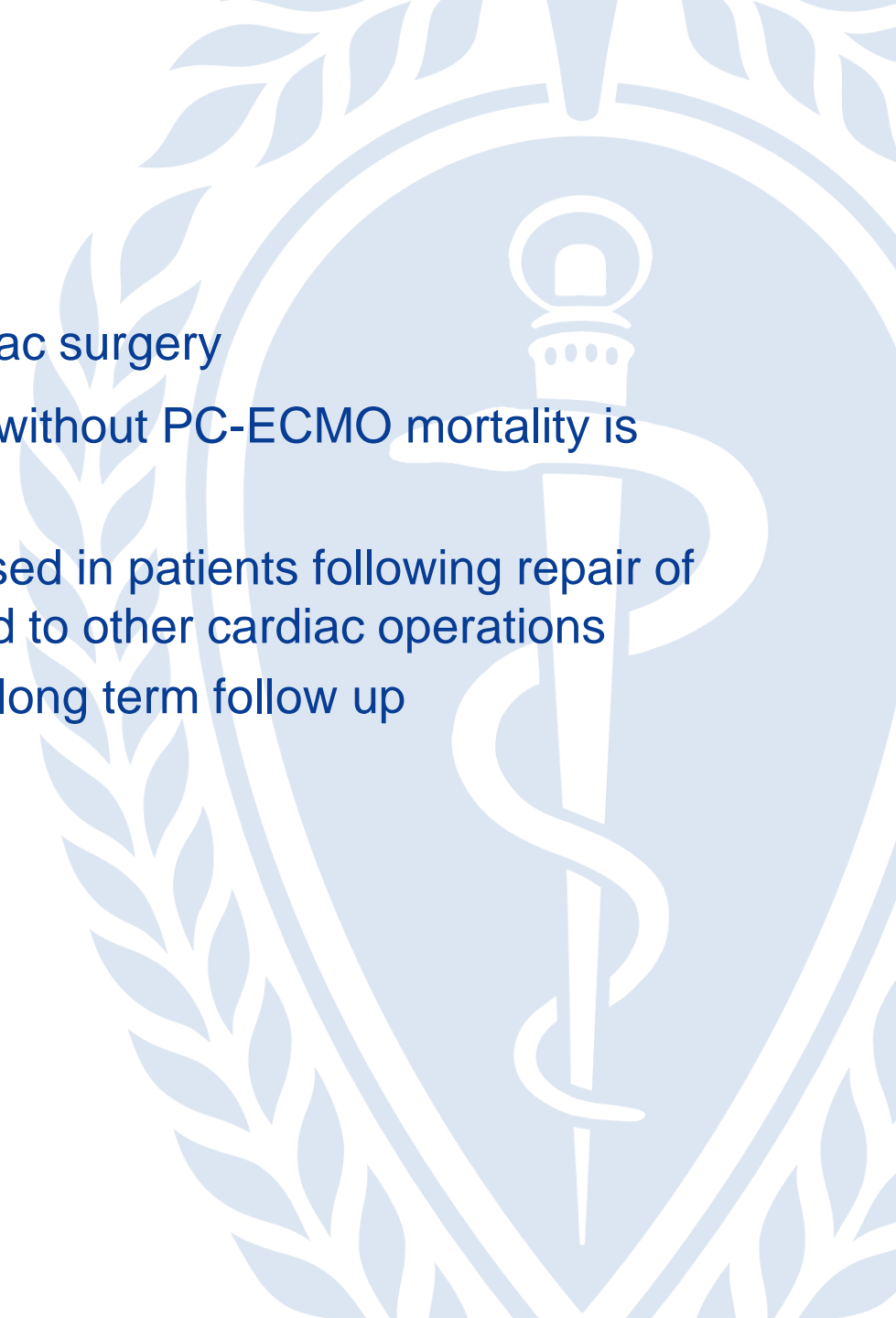
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