Penn Medicine

Preemptive venovenous extracorporeal membrane oxygenation cannulation for post operative pulmonary support in aortic surgery

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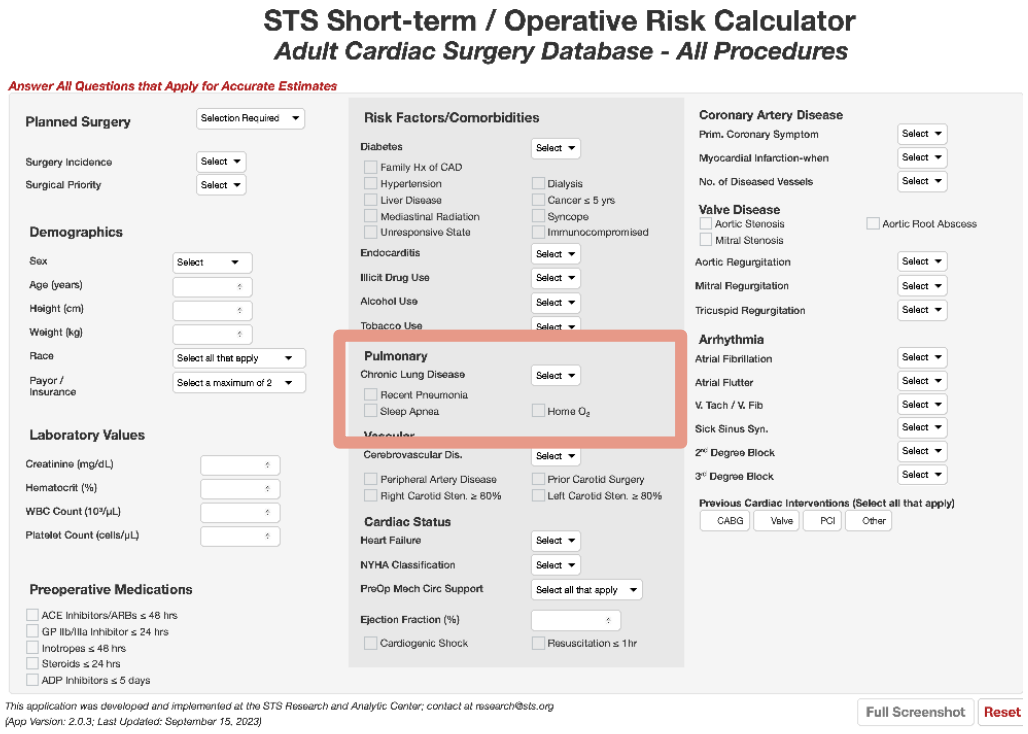
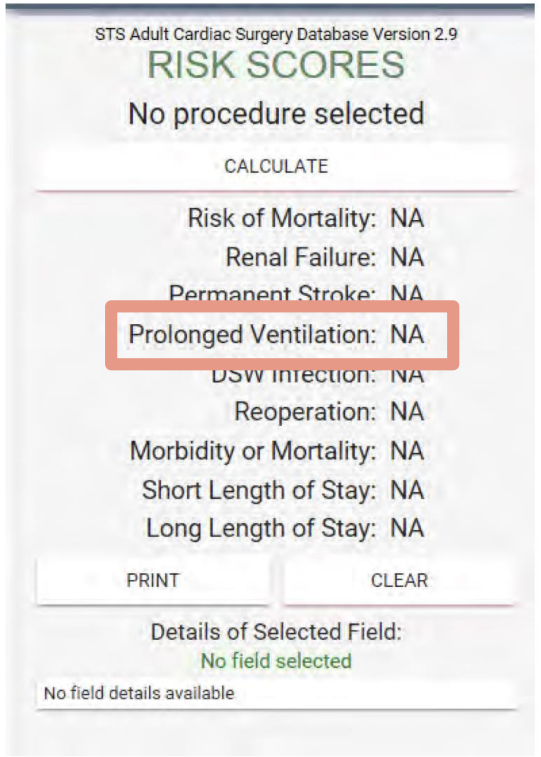
Conflicts of Interest

- No conflicts to disclose

Severe Lung Disease and Aortic Surgery

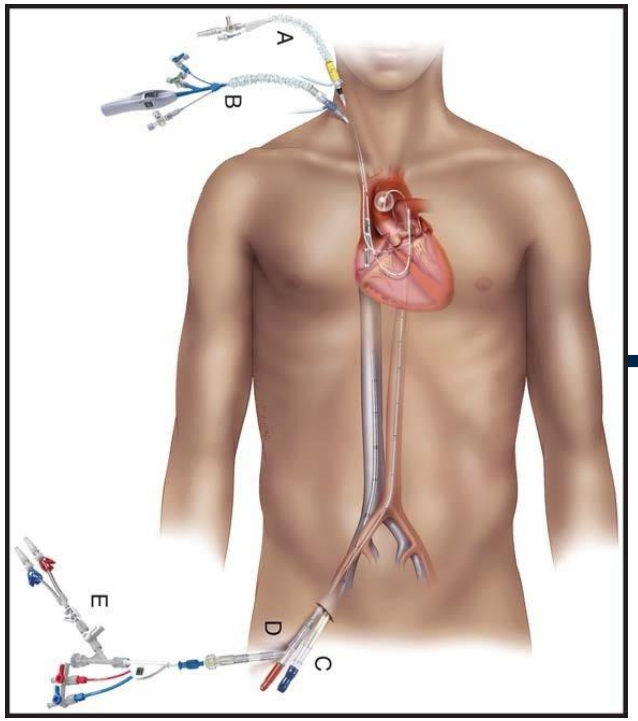
- Preexisting comorbid severe lung disease present a unique challenge for patients who require elective or semi-elective aortic surgery
- STS calculator for risk predicts post operative Pulmonary complications and prolonged ventilator

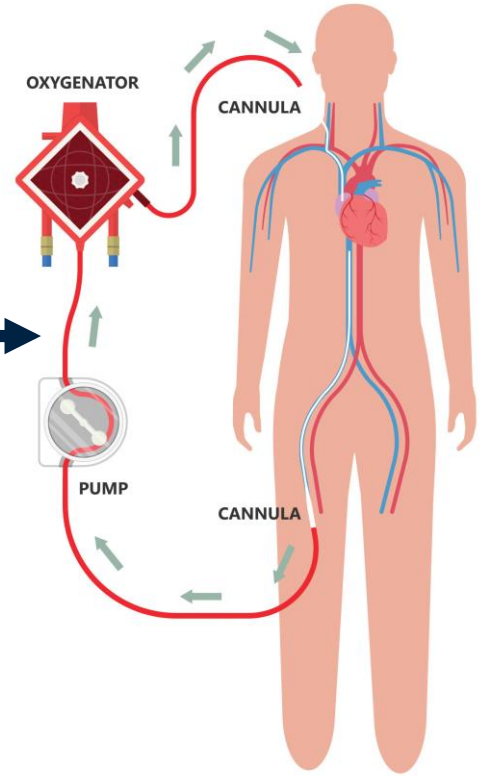




MIS AORTIC Surgery Cannulation

- Using the principles of drainage in MIS surgery, pre-planning for post operative VV ECMO can be made up front
- 25 French Femoral Venous Cannula
  - Typically in MIS aortic surgery the femoral drain is positioned in the mid right atrium. For VV ECMO the cannula is in the IVC/RA junction to avoid VV ECMO recirculation
- **21 French Internal Jugular Cannula
  - Typically the working cutoff for a neck drain is based on BSA, Smaller BSA don't need neck drain, and if a neck drain is used typically it's a 15 French. Here a large 21 drain is placed for VV ECMO flow





Peripheral CPB drainage to VV ECMO Cases

Case	Age	BMI	Surgery	Indication	Gender	PFTs	CT	Lung Comorbidities	Echo
1	32	57.0	AVR – 25 Inspiris Valve	Endocarditis	Male	Restricted. Severely reduced FEV1, Severely reduced DLCO	Bilateral ground glass opacities with consolidation	Pulmonary Effusion, COPD, COVID-19	EF 50%, Severe AI. No aortic stenosis
2	73	30.1	AVR + Root Ascending Replacement (Konnect 27)	Aortic Regurgitation	Male	FEV1= 0.89 L (31.8%) FVC 2.6L	Diffuse Advanced destructive centrilobular emphysema	COPD	EF 50% Severe AI. Normal gradients
3	67	23.8	Redo-AVR – (Konnect 25)	Aortic Regurgitation	Male	FEV 1 = 2.55L (62%), FVC 4.08	Severe Emphysema	COPD, ILD, 42 year smoking history, 20 cig/day	EF 60%, Severe AI. Gradient 37/18 mmHg PASP 64 mmHg.

Outcomes

Case	CPB Time	Duration of Mechanical Ventilator	Hours on ECMO	Days on ECMO	ICU Length of Stay (days)	Hospital Length of Stay (days)
1	169 min	160 hours	92	4	20	38
2	175 min	40 hours	30	1	2	6
3	291 min	30 hours	32	1	3	19

Conclusion

- With the advent of MIS aortic surgery, in situ cannulas can be used as a platform for conversion to VV ECMO after the conclusion of the case
- Preoperative planning is necessary to accomplish this transition
- Anticoagulation free VV ECMO is possible
  - Ok to fully reverse heparinization
- If RA and or RCP isolation is needed then the cannulas will need to be positioned for correct caval snaring
- Select cases with high risk for post operative pulmonary complications or prolonged mechanical ventilation may be considered for early planned VV ECMO support immediately after CPB
- On table extubation is possible to limit ventilator exposure