



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

STS Short-term / Operative Risk Calculator
Adult Cardiac Surgery Database - All Procedures

Answer All Questions that Apply for Accurate Estimates

Planned Surgery
Selection Required:
Surgery Incidence:
Surgical Priority:

Demographics
Sex:
Age (years):
Height (cm):
Weight (kg):
Race:
Payor / Insurance:

Laboratory Values
Creatinine (mg/dL):
Hematocrit (%):
WBC Count (10³/μL):
Platelet Count (cells/μL):

Preoperative Medications
 ACE Inhibitors/ARBs ≤ 48 hrs
 GP IIb/IIIa Inhibitor ≤ 24 hrs
 Inotropes ≤ 48 hrs
 Steroids ≤ 24 hrs
 ADP Inhibitors ≤ 5 days

Risk Factors/Comorbidities
Diabetes:
 Family Hx of CAD
 Hypertension
 Liver Disease
 Mediastinal Radiation
 Unresponsive State
Endocarditis:
Dialysis:
Cancer ≤ 5 yrs:
Syncope:
Immunocompromised:
Illicit Drug Use:
Alcohol Use:
Tobacco Use:
Pulmonary
Chronic Lung Disease:
 Recent Pneumonia
 Sleep Apnea
 Home O₂

Cardiac Status
Heart Failure:
NYHA Classification:
PreOp Mech Circ Support:
Ejection Fraction (%):
 Cardiogenic Shock
 Resuscitation ≤ 1hr

Coronary Artery Disease
Prim. Coronary Symptom:
Myocardial Infarction-when:
No. of Diseased Vessels:
Valve Disease
 Aortic Stenosis
 Mitral Stenosis
 Aortic Root Abscess
Aortic Regurgitation:
Mitral Regurgitation:
Tricuspid Regurgitation:
Arrhythmia
Atrial Fibrillation:
Atrial Flutter:
V. Tach / V. Fib:
Sick Sinus Syn.:
2nd Degree Block:
3rd Degree Block:
Previous Cardiac Interventions (Select all that apply)
 CABG Valve PCI Other

This application was developed and implemented at the STS Research and Analytic Center; contact at research@sts.org
(App Version: 2.0.3; Last Updated: September 15, 2023)

[Full Screenshot](#) [Reset](#)

STS Adult Cardiac Surgery Database Version 2.9

RISK SCORES

No procedure selected

CALCULATE

Risk of Mortality: NA
Renal Failure: NA
Permanent Stroke: NA
Prolonged Ventilation: NA
USW Intrection: NA
Reoperation: NA
Morbidity or Mortality: NA
Short Length of Stay: NA
Long Length of Stay: NA

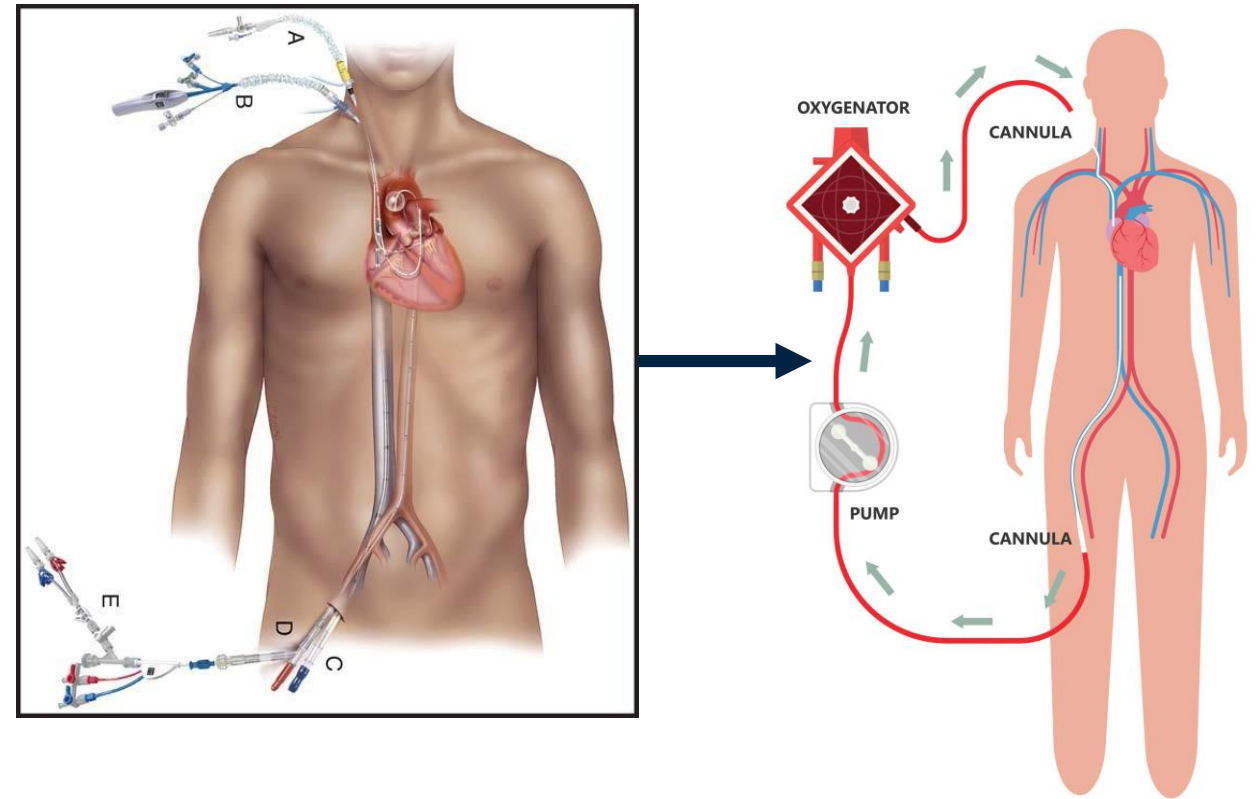
PRINT CLEAR

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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