

Risk Factors Affecting Surgical Outcomes in Patients Undergoing Hypothermic Circulatory Arrest During Aortic Surgeries: A 10-Year Study

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Risk Factors Affecting Surgical Outcomes in Patients Undergoing Hypothermic Circulatory Arrest During Aortic Surgeries: A 10-Year Study

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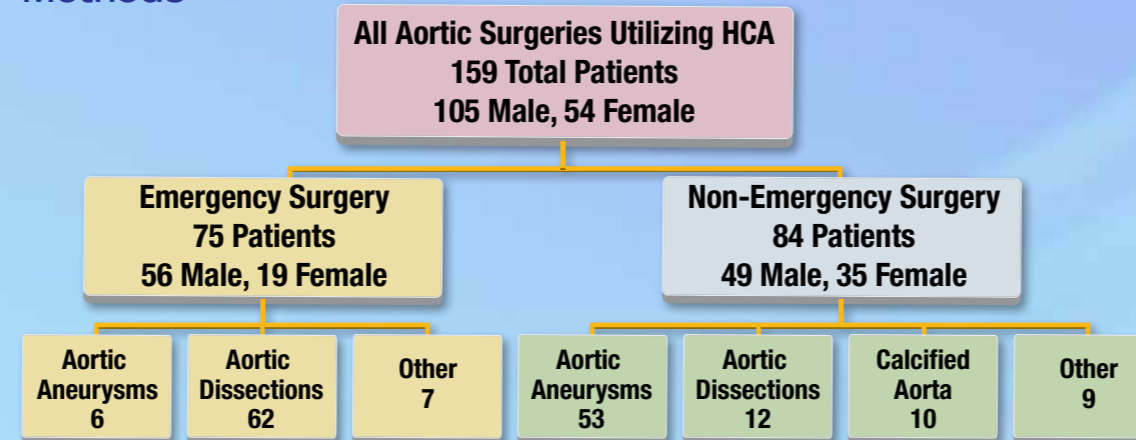
Background

Hypothermic Circulatory Arrest (HCA) is a cardio-pulmonary perfusion management technique used in heart surgery involving the aortic arch. It is used as a preventative measure for adverse neurological outcomes associated with these high risk surgeries in which blood circulation to the body and brain must be stopped. Patients are cooled on the cardiopulmonary bypass circuit to a targeted temperature, usually between 15°C and 18°C, blood is exsanguinated into a reservoir, and circulation is halted to allow for surgical repair of the ascending aorta and the aortic arch.

Objective

To evaluate surgical outcomes of mortality and peri-operative complications in patients who underwent HCA during aortic surgery, and to evaluate pre- and intraoperative risk factors.

Methods



- Patient charts were retrospectively reviewed from the Lehigh Valley Health Network Inpatient Electronic Medical Record and Department of Perfusion database from 2000-2010
- 159 patients with aortic pathologies requiring HCA
 - Patients were broken down according to surgery type and pathology
- Adverse outcomes evaluated included:
 - 30-day mortality
 - Cerebrovascular Accident (CVA)
 - Temporary Neurological Dysfunction (TND)
 - Renal Failure
 - Ventilator-Dependent Respiratory Failure (VDRF)

Results

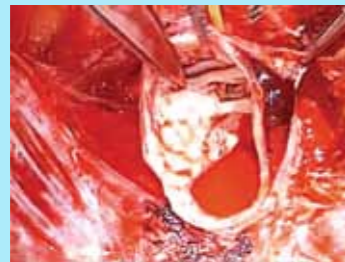
Outcome	Non-Emergency Surgery	Emergency Surgery	Overall
30-Day Mortality	5.95%	18.67%	11.95%
CVA	10.53%	14.93%	12.77%
Non-Recoverable CVA	5.26%	7.46%	6.38%
TND	11.84%	16.00%	13.84%
Renal Failure	11.67%	22.22%	16.37%
Required Dialysis	9.10%	20.60%	14.30%
VDRF	2.38%	22.67%	11.95%

Patient Characteristics Contributing to Increased 30-Day Mortality	Percentage	P-Value	Odds Ratio
Female Sex, n=54	33.90	0.048	3.098
Diabetes Mellitus, n=22	13.90	0.038	4.174

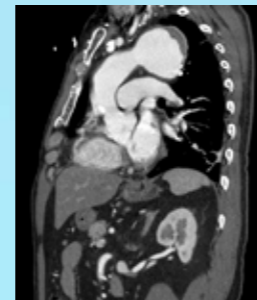
Intraoperative Risk Factors for Increased 30-Day Mortality	Duration (min.)	P-Value	Odds Ratio
Aortic Cross-Clamp Time	111 ± 69	0.030	0.989
Cardiopulmonary Bypass Time	220 ± 72	<0.010	1.020

Conclusions

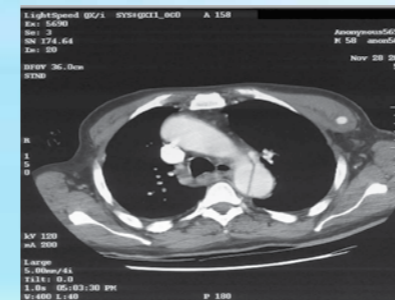
- Major aortic surgical operations requiring HCA have become safer in the past decade.
- Elective, non-emergent operations have very reasonable mortality and morbidity rates.
- Risk factors including emergency surgery, female sex, Diabetes Mellitus, aortic cross-clamp time, and duration of cardiopulmonary bypass significantly affect the likelihood of death



Type A aortic dissection repair during hypothermic circulatory arrest



CT Scan of Aortic Arch Aneurysm



CT scan of Type A Aortic Dissection