

## SCA 2 EVALUATING THE EFFICACY OF NEWER STRATEGIES FOR IMPROVING CEREBRAL OUTCOMES AFTER DEEP HYPOTHERMIC CIRCULATORY ARREST FOR THO- RACIC AORTA SURGERY

Ti LK, Kang DS<sup>1</sup>, Chow MY<sup>2</sup>

National University Hospital<sup>1</sup> and Singapore General Hospital<sup>2</sup>,  
Singapore

**Background:** Adverse cerebral outcome is a major complication of deep hypothermic circulatory arrest (DHCA) for thoracic aorta surgery<sup>1</sup>. The risk factors for developing adverse cerebral outcome are known to be increased age, and length of circulatory arrest, while the use of hypothermia has long been the cornerstone of neurological protection. However, despite advances in surgical and anaesthetic techniques, adverse cerebral outcomes continue to occur in between 7-35% of patients. More recently, studies have indicated that the use of pharmacological agents such as steroids<sup>2</sup>, utilization of retrograde cerebral perfusion<sup>3</sup>, variation in cooling and rewarming rates<sup>4</sup>, and hemoglobin concentration<sup>5</sup> may all play important roles in neurological injury and protection. We interrogated our database to investigate if these newer strategies affected the neurological outcomes of patients undergoing DHCA for thoracic aorta surgery.

**Methodology:** From the cardiothoracic databases of National University Hospital, Singapore, and the Singapore General Hospital, we identified 53 patients who had undergone DHCA for repair of thoracic aortic aneurysms and dissections from January 1999 to April 2002. With institutional review boards' approval, a comprehensive chart review was performed, and data pertaining to their medical history, operative details, and postoperative course was extracted. Adverse cerebral outcomes were classified as either Type I or II. Type I outcomes were defined as death due to stroke or encephalopathy, non-fatal stroke, transient ischemic attack, stupor or coma at time of discharge. Type II outcomes were defined as new deterioration in intellectual function, confusion, agitation, disorientation, memory deficit, or seizure without evidence of focal injury. Patients with adverse cerebral outcomes were compared to those without adverse cerebral outcomes.

Data were analyzed with Student's t-test or Fisher's exact test as appropriate using a statistical software program (SPSS 11.0, Chicago IL). Results are presented as mean values.  $P < 0.05$  was considered significant.

**Results:** The overall mortality rate was 20.7%. 18 of the 53 patients (33.9%) had adverse cerebral outcomes in this study. 10 had type I outcomes while 8 had type II outcomes. 5 of these patients died (all type I outcomes). Demographic data and medical history and

operative data are shown in tables 1-2. Age and duration of circulatory arrest are associated with adverse neurological outcome, but steroids, retrograde cerebral perfusion, lowest temperature, rewarming time, rewarming temperature peak, and lowest hematocrit did not differ between the two groups.

**Conclusion:** Adverse cerebral outcome is a common complication of DHCA for thoracic aorta surgery, and is associated with significant mortality. Despite the use of newer strategies, age and duration of circulatory arrest remain the primary determinants for adverse cerebral outcome.

**Reference:** 1. Ann Thorac Surg 1991; 51:942-7; 2. Ann Thorac Surg 2001; 72:1465-72; 3. Ann Thorac Surg 2001; 72:1774-82; 4. Ann Thorac Surg 2001; 71:22-8; 5. Ann Thorac Surg 2002; 73; 189-90.

**Table 1. Demographic Data and Medical History**

	Adverse Cerebral Outcome	Normal
n	18	35
Age (yrs)	66 ± 7 *	59 ± 10
Gender (M/F)	14/4	30/5
Height (cm)	162 ± 8	164 ± 7
Weight (kg)	66 ± 8	67 ± 13
Preop Ejection Fraction (%)	63 ± 6	55 ± 12
Preop Hypotension (n)	6	8

**Table 2. Operative Data**

	Adverse Cerebral Outcome	Normal
Bypass Time (min)	258 ± 106	214 ± 50
Circulatory Arrest Time (min)	53 ± 32 *	37 ± 16
Lowest Temperature (°C)	16.3 ± 2.0	16.6 ± 1.8
Rewarming Time (min)	92 ± 29	76 ± 22
Peak Temperature (°C)	36.6 ± 0.7	36.1 ± 2.6
Retrograde Cerebral Perfusion (n)	13	30
Use of Methylprednisolone (n)	13	26

Preop hypotension defined as systolic blood pressure < 80 mmHg requiring inotropic support. \*  $P < 0.05$