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CLINICAL PREDICTORS FOR RENAL DYSFUNCTION AFTER DEEP HYPOTHERMIC CIRCULATORY ARREST

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Introduction: Renal dysfunction (RD) after deep hypothermic circulatory arrest (DHCA) is common and affects clinical outcome after DHCA.(1;2) Although the clinical predictors of RD-DHCA have been investigated, there is still controversy about whether full Hammersmith aprotinin (FHA) is associated with RD-DHCA.(1;3) This study tested the null hypothesis that RD-DHCA has no multivariate predictors, including FHA.

Methods: With IRB approval, 144 adults (2000/1) undergoing thoracic aortic surgery requiring DHCA with retrograde cerebral perfusion were studied. All medical records were archived in an Access database and statistically interrogated with Stata 7 software. All patients received an antifibrinolytic and were cooled during extracorporeal circulation with a standard protocol.(4) Anticoagulation with heparin was titrated for an activated clotting time (ACT) greater than 400 seconds (celite ACT for aminocaproic acid; kaolin ACT for aprotinin). RD was defined as a 50% or greater increase in serum creatinine coupled with an abnormal peak creatinine (RD-AB50CR). Donor exposures were defined as the donor exposure total from all perioperative transfusion.

Results: Antifibrinolytic exposure was 100%: 65.9% FHA and 34.1% aminocaproic acid. The dialysis incidence was 2.8% and was unrelated to antifibrinolytic ($p > 0.05$). RD-AB50CR incidence was 22.9%. RD-AB50CR was a significant multivariate predictor of prolonged stay in the ICU. Multivariate analysis of RD-AB50CR identified the following significant perioperative multivariate predictors:

- A. SEPSIS (OR 9.7:1; CI 1.3-76; $p = 0.030$);
- B. APROTININ EXPOSURE (OR 5.90:1; CI 1.7-20, $p = 0.005$);

- C. PREOPERATIVE HYPERTENSION (OR 4.5:1; CI 1.02-19.6; $p = 0.047$);

- D. AGE (OR 1.06:1; CI 1.01-1.12; $p = 0.02$);and,

- E. DONOR EXPOSURES (OR 1.03:1; CI 1.00-1.06; $p = 0.03$).

Conclusions: Dialysis incidence is 50% better than predicted, and unrelated to FHA. Although RD-DHCA prolongs ICU stay, it has entirely resolved by hospital discharge. Based on the identified RD-DHCA predictive model, aggressive perioperative management of hypertension, transfusion, and sepsis may further reduce RD-DHCA. FHA as a multivariate RD-DHCA risk factor has not been previously reported.(1) This observation may reflect selection bias (aprotinin reserved for high-risk DHCA) or may be a real association. This data set further justifies a RCT of full Hammersmith aprotinin in DHCA.

References:

1. Mora Mangano CT, Neville MJ, Hsu PH, et al: Aprotinin, Blood Loss, and Renal Dysfunction in Deep Hypothermic Circulatory Arrest. *Circulation*. 2001; 104: I276-I281.
2. Augoustides JG, Weiner J, Pinchasik D, et al: Clinical Predictors for Prolonged ICU Stay in Adults after Thoracic Aortic Surgery Requiring Deep Hypothermic Circulatory Arrest. *Anesthesiology* 2003; 99: A123
3. Ehrlich M, Grabenwoger M, Cartes-Zumelzu F, et al: Operations on the Thoracic Aorta and Hypothermic Circulatory Arrest: Is Aprotinin Safe? *J Thorac Cardiovasc Surg*. 1998; 115: 220-5.
4. Stecker MM, Cheung AT, Pochettino A, et al: Deep Hypothermic Circulatory Arrest: I. Effects of Cooling on Electroencephalogram and Evoked Potentials. *Ann Thor Surg*. 2001; 71: 14-21.