Title: "Maintaining an Optimal Fluid Balance Before, During and After Cardiopulmonary Bypass" A Study Report

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Abstract:

Background: Perfusionists at Texas Children’s Hospital (TCH) strive to create physiological primes matching the patients’ chemistries/electrolytes when placed on cardiopulmonary bypass (CPB). Patients recently have shown signs of dehydration (sunken eyes) following CPB. The COP/osmolality of CPB patients were studied and results were examined.

Methods: Our institution has two cardioplegia formulas. First Formula is for patients up to 10kg and the second formula is for larger patients greater than 10kg. Since the two formulas have different colloids, 49n study patients were divided into the following groups:

Cohort 1 (C1) – 24n - 0-10Kg – 25% Albumin Cardioplegia
Cohort 2 (C2) – 25n - 10.1kg/greater – 20% Mannitol Cardioplegia

3 labs/sampling – Total Serum Solid (COP), Total Protein, Osmolality. Samples: 1)prime, 2)baseline, 3)10’ on CPB, 4)hourly CPB, 5)10’ before wean, 6)chest closure, 7)24hr

Results: The mean weight and age for C1 and C2 were 6.33kg/7 months and 40.65kg/11 years/5 months, respectively. The mean circuit prime COP for C1-11.51mmHg and C2-11.38mmHg. The mean baseline and maximum COP was C1-17.11mmHg/23.98mmHg, a 40% increase, while C2-19.90mmHg/20.80mmHg, only a 5% increase. Eight patients were positive for dehydration. Their COP had (C1-7n) a 73% increase and (C2-1n) had a 33% increase. The osmolality showed an increase from baseline to maximum level of 7% for both C1 and C2 groups, without any differential seen in the dehydrated patients.

Conclusion: Colloid in C1 cardioplegia is albumin, which if it enters the circuit, is there permanently. Most likely, it is the culprit causing elevated COP. The C2 cardioplegia colloid is Mannitol, which entering the circuit, acts as a diuretic. It may be prudent to attempt to scavenge cardioplegia solutions containing albumin to avoid elevation in COP in the smaller patients. On complex cases, the use of 2nd FFP is common practice. Possibly, use KCentra rather than a 2nd FFP to aid in lowering COP.