Title: Impact of Single Dose Cardioplegic Techniques on Hemodilution and Transfusion In Patients Undergoing Combined Adult Valve Surgery

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Abstract:

**Background:** Despite the increasing popularity of single dose cardioplegic techniques in valve surgery, potential outcome of high-volume, crystalloid-based solutions remains controversial. We compared the effects of four most commonly used cardioplegic solutions on hemodilution and transfusion rate during combined adult valve surgery.

**Methods:** This prospective cohort study included high-risk patients undergoing primary aortic valve replacement with CABG and received different cardioplegia solutions between January 2013 and November 2017: Group 1: St. Thomas- N=290; Group 2: Blood Cardioplegia (standard 4:1)- N=305; Group 3: Del Nido- N=251; Group 4: HTK- N=256. The primary end points were perioperative transfusion of allogeneic red blood cells (RBCs), with a secondary end points of hematocrit change. rSO2 desaturation risk score >6000 was calculated by multiplying rSO2 < 50% by time throughout the operation by using both cerebral and visceral oximetry. TEG parameters and coagulation-related outcomes were also collected.

**Results:** The total volume of administered cardioplegic solution was 2250 50 mL for St Thomas, 1950 50 mL for blood; 2100 50 mL for Del Nido and 2000 50 mL for HTK. Ultrafiltration was used for all cases before cessation of CPB until reaching target hematocrit of 27%. Total ultrafiltration volume was 950 25 mL for St Thomas, 780 20 mL for blood; 1250 50 mL for Del Nido and 1150 50 mL for HTK. Hematocrit change throughout the procedure is summarized in Figure 1. Early perioperative data is demonstrated in Table 1.

**Conclusion:** During complex cardiac surgery, the administration of different cardioplegic formulations did not have any deleterious effect on intraoperative hematocrit changes and transfusion related to the volume of crystalloid solution administered by using appropriate CPB techniques and ultrafiltration. Cardioplegia selection should rely more on higher scientific research, using evidenced-based medicine and ranking of clinical studies rather than clinician's preference as primary determining factor. Comparative effectiveness studies to associate commonly used solutions are needed.