ARTERIAL VERSUS VENOUS SAMPLING FOR ACTIVATED CLOTTING TIME MEASUREMENTS DURING OPEN HEART SURGERY. COMPARATIVE STUDY
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Introduction: Activated Clotting Times (ACT) are widely used for monitoring anticoagulation during open-heart surgery. It is a simple and cost-effective test performed at the bedside. However, significant variability of this test is well known. We believe that some variability in test results arises from the sample drawing site, the amount of discarded volume, and the instrument on which sample is processed. Consistent ACT values are important for anticoagulation management during cardiopulmonary bypass. Erroneous or ambiguous values can provoke additional heparin and/or protamine administration resulting in blood products being given unnecessarily. Additionally, inaccurate results could result in failure to treat coagulopathy with its associated consequences of postoperative bleeding and increased re-exploration rate.

Method: With institutional approval, 40 patients scheduled for CABG, valve or CABG/valve surgery were enrolled in the study. Specimens obtained from the arterial line and the pulmonary artery catheter side port were processed concurrently using two channels of the Hemocron 801 ACT machine with celite ACT tubes. Samples were collected: 1) baseline-I from the arterial site prior to anesthetic induction, two arterial samples were run on both channels of the Hemocron machine to eliminate the possibility of machine error; 2) baseline-II were obtained after pulmonary catheter insertion from both arterial and venous sites, the arterial sample was processed on channel-I and the venous sample on channel-II; 3) following heparin administration as described in #2 above; 4) following protamine administration as described above.

Results: The median values of ACT obtained from channel-I (arterial samples) and channel-II (venous samples except baseline-I) at all time points are very close and have no clinically significant difference (see Table 1). However, Bland and Altman analysis of the difference between the arterial and venous values showed that at the baseline II venous value are slightly greater than arterial (see Fig. 1) (scatter is within 50 sec.). After heparin, the difference is near zero (but very wide scatter (“+” or “-” 600 sec.) (see Fig. 2) with high variability (coefficient of variation of 33%). After protamine, the difference scatter is near zero and very narrow (see Fig. 3).

Discussion: The Bland and Altman analysis demonstrated that the methods were in agreement at baseline and after protamine and can be used interchangeably. However, the high variability of ACT values after heparin administration may mask the ability to accurately determine if the two collection sites provided similar ACT results. This variability might be due to Hemocron machine, sampling site and/or patients. These results show that the two sampling sites are interchangeable after protamine. However, further studies are required to analyze the source of variable clotting times at baseline and after heparin.

References: