Anticoagulative Effects of a Heparin-coated Oxygenator Analyzed Based on the Prothrombin Levels Using the Carinactivase-1 Method

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Abstract: Object: Heparin-coated oxygenators and cardiopulmonary bypass (CPB) circuits are used for the prevention of thrombus formation in cardiac surgery. We review our experience in order to determine whether heparin-coated oxygenators and CPB circuits are effective.

Methods: From November 1999 to May 2001, this blood coagulation study was performed in 25 patients who underwent coronary artery bypass grafting (CABG) using CPB. The patients were randomly divided into two groups. The heparin-coated group (HC group, n=14) used Capiox SX (HP) SX-18 (Terumo, Tokyo, Japan) as the heparin-coated oxygenator. The non-heparin-coated group (NHC group, n=11) used the Affinity NT CVR (Medtronic Inc, Minnesota, USA) as the non-heparin-coated oxygenator. A centrifugal pump (BioMedicusBP-80, Baxter, International Inc., Illinois, USA) was used for all operations. We measured the prothrombin levels by using a Ca^{2+}-dependent prothrombin activator, carinactivase-1 (CA-1).

Results: The results, at the end of CPB, revealed less of a reduction in the prothrombin levels and blood platelet counts for the HC group in comparison to the NHC group. A larger reduction in these levels, correlated with a decrease in the thrombin formation.

Conclusion: The anticoagulation activity was studied in both the HC and NHC groups. Both the % blood platelet counts and the % prothrombin in the HC group were higher than those in the NHC group at the end of CPB. These results suggested that the coagulation activity was more strongly suppressed in the HC group than in the NHC group. Therefore, the heparin-coated oxygenator seemed to be the best device for CPB.

Key words: cardiopulmonary bypass, coronary artery bypass graft, heparin-coated oxygenator, prothrombin, carinactivase-1 method