



An ex vivo evaluation of blood coagulation and thromboresistance of two extracorporeal circuit coatings with reduced and full heparin dose.

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OBJECTIVES: Bioactive Carmeda® heparin-coated extracorporeal circuits (ECCs) have been shown to reduce contact phase and coagulation activation during cardiopulmonary bypass (CPB). Heparin coating is therefore effective in safely reducing coagulation during routine CPB. Balance® Biosurface is a new, recently developed biopassive coating containing negatively charged sulphonated polymers. This study sought to compare the clotting activation and thromboresistance of the Balance® (B) circuit with that of the Carmeda® (C) with full-dose systemic heparin (FDH) and reduced-dose systemic heparin (RDH).

METHODS: This ex vivo study set-up comprising 40 experiments consisted of simplified ECC and circulation of freshly donated human blood. RDH and FDH regimens were obtained with 0.5 IU/ml and 1 IU/ml heparin administered to reach target activated clotting times (ACTs) of 250 and 500 s, respectively. The study design comprised four groups: FDH-C, FDH-B, RDH-C and RDH-B (all n = 10). Blood was sampled prior to and during the 2-h CPB. Coagulation activation was assessed (FXIIa, F1.2) and electron microscope scan imaging of oxygenators enabled determination of adhesion scores.

RESULTS: With a biopassive compared with bioactive surface, mean ACT was lower, regardless of the heparin regimen applied ($P < 0.001$), whereas the total heparin dose required to maintain ACT was above target level ($P < 0.001$). However, FXIIa and F1.2 values were similar in all groups throughout, as were pressure gradients among oxygenators. All groups demonstrated similar adhesion scores following ultrastructural oxygenator assessment.

CONCLUSIONS: In the absence of surgical-related haemostatic disturbances and based on target ACT levels under reduced- or full-dose heparin, the clotting process was similar to heparin-coated and new sulphonated polymer-coated ECC, both demonstrating similar thromboresistance.

Résumé en anglais

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