A NOVEL RISK PREDICTION MODEL FOR POSTOPERATIVE BLOOD LOSS IN ADULT CARDIAC SURGERY PATIENTS


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Introduction:
Postoperative bleeding is a serious complication after cardiac surgery and leads to increased morbidity and mortality.
Haemostasis is multifactorial impaired by using the extracorporeal circulation (ECC) for “on-pump” cardiac surgery. Platelet dysfunction, activation and increased consumption of coagulation factors are suggested pathomechanisms. Early identification of patients with an increased risk for excessive blood loss is necessary to prepare efficient therapeutic strategies.

Methods:
Between March 2006 and May 2007 a total of n=222 patients (mean age, 67 years range, gender) undergoing elective “on-pump” cardiac surgery procedures were included in a prospective observational study. Patient variables (ECC datas and preoperative laboratory variables e.g. platelet count and function, activated partial thromboplastin time, prothrombin time and ROTEM™ Thrombelastometry, Pentapharm, Munich, Germany) and postoperative blood loss were registered. Independent predictors of exceeded postoperative chest tube bleeding defined as more than 200 ml within 2 hrs (early blood loss) and more than 800 ml within 24 hrs postoperative (late blood loss) were identified with multiple regression models.

Results:
Among all included patients (n=222), 30 % (n=66) showed excessive postoperative blood loss. Using thrombelastometry at the end of the cardiopulmonary bypass when ACT values were back in normal range, ROTEM FIB-TEM values less than 8 mm were related
with 2.3 fold increased risk for early excessive postoperative blood loss. An impaired platelet function described as arachidon-induced aggregometry below 1000 AU/min was associated with 4.3 fold increased risk for early excessive blood loss. The combination of ROTEM FIB-TEM and platelet impedance aggregometry achieved 92% specificity and 21% sensitivity in prediction of exceeded postoperative blood loss in routine adult cardiac surgery patients.

**Conclusions:**
Intraoperative ROTEM FIB-TEM and platelet function determination allows early identification of patients with impaired haemostasis function and high risk for non-surgical postoperative bleeding after routine cardiac surgery. The novel risk model of combined intraoperative ROTEM FIB-TEM analysis and platelet function determination at the end of the cardiopulmonary bypass has excellent predictive value to identify patients with preserved postoperative haemostasis function (94%) after routine cardiac surgery. Excessive postoperative blood loss in these patients is at high risk to be enforced by a surgical bleeding source and required early surgical re-evaluation before haemodynamic function is deteriorated.