

Fibrinogen, a Potential Biomarker for Bleeding after Cardiac Surgery

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Background

Bleeding remains a major complication after cardiac surgery. Fibrinogen, a key protein in hemostasis, is converted into fibrin at the site of tissue damage, in order to minimize blood loss and initiate tissue repair. We investigated the association between the preoperative plasma fibrinogen concentration and the amount of postoperative bleeding after cardiac surgery.

Methods

Eighty-eight coronary artery bypass surgery patients (mean age 68.9 years, 70% men) operated with cardiopulmonary bypass were included in a prospective descriptive study. Fibrinogen, platelet count, activated partial thromboplastin time (APTT) and prothrombin time were measured the day before surgery. Bleeding was registered during the first 12 postoperative hours. Correlations between bleeding and markers were calculated.

Results

Mean postoperative bleeding was 498.311 mL/12h. Six patients (7.0 %) were re-explored due to excessive bleeding. There was a significant inverse correlation between the preoperative fibrinogen concentration and the amount of postoperative bleeding ($r=-0.61$, $p<0.0001$). All patients had fibrinogen levels over the lower normal limit (2.0 g/L). The preoperative platelet count correlated also to bleeding but considerably weaker ($r=-0.29$, $p=0.006$), while APTT and PT concentrations and bleeding did not correlate ($r=-0.10$ and $r=0.11$ respectively). The risk for bleeding >50 mL/h increased with decreasing fibrinogen levels (odds ratio 3.0 per unit (95% CI 1.4-6.6), $p=0.003$). Patients undergoing re-exploration had lower preoperative fibrinogen levels (3.5 ± 0.1 vs. 4.1 ± 0.1 g/L, $p=0.050$).

Conclusions

The results suggest that the fibrinogen level, even within the normal range, is a limiting factor for postoperative hemostasis after cardiac surgery. Preoperative fibrinogen analysis provides more information about potential postoperative bleeding compared to conventional laboratory tests - and may therefore be used as a biomarker.