Tranexamic acid and aprotinin in primary cardiac operations: an analysis of 220 cardiac surgical patients treated with tranexamic acid or aprotinin.

BACKGROUND: Antifibrinolytics are widely used in cardiac surgery to reduce bleeding. Allogeneic blood transfusion, even in primary cardiac operations with low blood loss, is still high. In the present study we evaluated the impact of tranexamic acid compared to aprotinin on the transfusion incidence in cardiac surgical patients with low risk of bleeding. METHODS: This prospective, randomized, double-blind study included 220 patients undergoing primary coronary artery revascularization (coronary artery bypass grafting [CABG]) or aortic valve replacement (AVR). Randomized in blocks of 20, patients received either tranexamic acid (approximately 6 g) or full-dose aprotinin (approximately 5-6 x 10^6 Kallikrein Inhibiting Units). Transfusion was guided by a strict transfusion algorithm. Molecular markers of hemostasis were determined to assess differences in the mode of action of the two drugs. Primary end-points were the incidence of allogeneic red cell transfusion and 24-h postoperative blood loss. Data were analyzed according to the intention-to-treat principle and compared using the chi(2) and Mann-Whitney U-test. RESULTS: Two-hundred-twenty patients were enrolled (CABG: 134, AVR: 86). In the aprotinin Group 47% of patients received allogeneic blood during the
hospital stay as compared to 61% in the tranexamic acid group (P = 0.036). Aprotinin conferred a 23% reduction in allogeneic transfusion risk (RR 0.77, 95% CI 0.53-0.88). Overall, no significant difference in postoperative bleeding was observed, although 24-h blood loss was reduced in aprotinin-treated CABG patients (500, 350-750 mL vs 650, 475-875 mL (median, 25th-75th percentile); P = 0.039). Despite the lower transfusion rate, the hemoglobin concentration on the first postoperative day was higher in the aprotinin group (11.3, 9.9-12.1 vs 10.6, 9.9-11.6 mg/dL; P = 0.023). The fibrinolytic activity at the end of operation determined by D-Dimer was comparable in both groups. (0.15, 0.11-0.17 mg/L [aprotinin] versus 0.18, 0.12-0.24 mg/L [tranexamic acid]). The activated partial thromboplastin time was prolonged up to 4 h postoperatively in the aprotinin group, while the heparin requirement was reduced: 19% of the patients in the aprotinin group and 45% in the tranexamic acid group received at least one additional bolus heparin during cardiopulmonary bypass (P< 0.001). Troponin T levels postoperatively and on postoperative day 1 were significantly higher in the tranexamic acid group (P = 0.017). No differences in renal, cardiac, or mortality outcomes were observed. CONCLUSION: Considering the rate of transfusion of red blood cells, tranexamic acid was slightly inferior in patients undergoing CABG, but there was no difference in patients receiving AVR. Tranexamic acid seems to be less effective in operations with increased bleeding such as CABG. Clinical benefit depends on specific patient and institution characteristics (ClinicalTrials.gov NCT00396760).