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TITLE: PERIOPERATIVE RHEOLOGICAL AND FIBRINOLYTIC CHANGES

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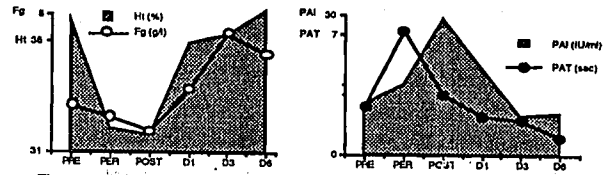
Haemostasis is often perturbed during and after the operation, where many factors take part in its imbalance (surgical tissue diseases, anesthetic agents, anticoagulants, transfusion and vascular clamping). These different parameters which are involved in this imbalance are evolutionary and intricate. They may induce some hemorrhagic, ischemic and thrombotic risks. Haemostasis has been extensively studied in perioperative periods[1,2]. The place of hemorheological disorders has been poorly confronted with hemostatic alterations and this was the aim of this study.

Hemorheological and fibrinolytic parameters of 15 patients undergoing elective aortic graft surgery were investigated before, during, and after surgery as well as during the first post-operative week. The average duration of operation was 225 minutes (210-300). After surgery, the patients received subcutaneous heparin at 300 IU.kg^{-1}day^{-1} in order to obtain an aPTT time ≥ 1.5 x control value. During the operation, a relative hemodilution was intentionally induced by infusion of cristalloids and albumin (12 ml x kg^{-1}, to compensate the first bleeding and to spare by autologous or homologous transfusion) leading to a fall in hematocrit (Ht) (35.5±6 -> 32±5.5 %, p < 0.01) with a decrease in fibrinogen (Fg) and platelets, and a shut-down in fibrinolysis (Euglobulin Clot Lysis Time increases 246 ± 52 -> 300 ± 46 mn, and PAI-1 (Plasminogen Activator Inhibitor) activity increases 10,5 ± 6.9 -> 15.1 ± 9 IU/ml, p < 0.01). A specific peroperative rheological impairment associating an increase in erythrocyte deformability (Ektacytometry : Elongation Index 0.57 ± 0.05 -> 0.60 ± 0.04) and a dissociation of erythro-aggregates (Sefam Erythro-aggregometry : Primary Aggregation Time (PAT) 3.37 ± 2.63 ->7.18±7.2 sec.) t-PA antigen only increases postoperatively (8.3 -> 14.5 ng/ml, p < 0.01.). During the first postoperative week the acute-phase response settles with an increase in fibrinogen, VIII RAg factor and plasma viscosity, inducing plasma hyperviscosity (1.33 ± 0.13 -> 1.49 ± 0.13 mPa x sec, p < 0.01).There is a return to baseline values of hematocrit and of the extrinsic fibrinolytic system (t-PA/PAI), whereas intrinsic fibrinolysis is still altered (Euglobulin Clot Lysis Time remains impaired).



Time course of 4 parameters illustrating the two (per and post) surgical phases

Recognition of the two distinct phases induced by surgery will help monitoring in the peroperative phase where the hemmorhagic risk is predominant and the acute-phase reaction of the first postoperative week that constitutes an added vascular risk factor. Assessment of the rheological and the fibrinolytic conditions should help to follow-up and treat specifically patients during the postoperative period.

References
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TITLE: LOW DOSE APROTININ OR TRANEXANIC ACID TREATMENT IN CARDIAC SURGERY.

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The reduction of transfusion requirements is an ongoing item of research for most cardiac surgery teams. The aim of this prospective and open ended study is to compare blood loss and homologous transfusion requirements in 3 groups of patients: those receiving aprotinin (group A), those receiving tranexanic acid (group TA) and a control group (group C). The shed blood is systematically retransfused up until the 8th postoperative hour.

Following institutional rewiev board approval and informed consent, 108 consecutive patients undergoing extracorporeal circulation (ECC) were randomized into one of three groups: group A (n=40) received 500000 kallikrein inactivator units (KIU) of aprotinin during 20 minutes after induction, followed by a constant infusion of 500000 KIU/h until the end of ECC; group TA (n=35) received tranexanic acid 15 mg/kg before the injection of heparin prior to ECC and 15 mg/kg after injection of protamine after ECC; group C (n=33) received no antifibrinolytic therapy. Shed blood loss was measured upon arrival in the intensive care unit (H0),from H0 through the 4th hour (H4), from H4 through the 8th hour (H8), and at the time of the final removal of drains.The hemoglobin concentration of the shed blood was determined at the same times in order to calculate the total hemoglobin lost. Patient pre, per, postoperative hematocrit values were measured. The amount of homologous blood transfused was noted. Statistical study used student t-test.

The 3 groups are homogeneous with regard to their make-up, type of surgery and ECC parameters. Patient hematocrit values pre, per, postoperatively and at the 7th day were similar for the 3 groups. Blood loss was similar for group A and TA (A: 530±435ml, TA: 506±381 ml; NS) and was significantly lower than in the group C (C: 851±593 ml; p<0,05).The hemoglobin loss between H4 and H8 was statistically lower (p<0.01) in group A (0.22±0.26 mmol) and in group TA (0.32±0.39 mmol) than in group C (0.57± 0.62 mmol). The percentage of patients transfused was statistically higher in group C(A:40%, B:34%, C:66%; p<0,05).The quantity of shed blood retransfused was higher (p< 0.01)in the group C (492±333 ml vs A: 241±186 ml, TA: 292±228 ml).

Low dose aprotinin and tranexanic acid decreased blood loss by 28% after ECC in cardiac surgery. In spite of shed mediastinal blood transfusion postoperatively, the number of patients transfused is higher in the group C. The hemoglobin loss is considerably lower in the aprotinin group than in the two others.