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Title: INCREASED HOMOLOGOUS BLOOD REQUIREMENT AFTER ISOVOLEMIC HEMODILUTION WITH 6% HYDROXYETHYL STARCH DURING ELECTIVE TOTAL HIP REPLACEMENT.

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6% Hydroxyethyl starch (HES) has potential inhibitory effects on the blood clotting system.[1,2] However, clinical studies controlling their incidence on perioperative blood loss and blood requirements in elective surgery are lacking. The aim of this study was to determine this incidence after isovolemic hemodilution (IH) for elective total hip replacement (THR).

Methods: After informed consent and institutional approval, 34 ASA class 1 or 2 patients scheduled for elective THR were included in this study. They were randomly divided into 2 groups: in group A (n=16), IH was performed with 5% Human Albumin (HA) and in group B (n=18) with 6% HES 450/0.7. Hb level was maintained during the procedure above 8 g/dl. Studied variables were: Hb level, preoperatively (Hb I) and at discharge from hospital (Hb II), measurable perioperative blood losses (suction, sponges, redons), homologous blood requirements and circulating factor VIII cofactors' level (VIIIc, VIII RAg and VIII vW) before IH (I), after IH (II) and on the first postoperative day (III). Statistical analysis was done with Student t-test. Results are expressed as means ± SD.

Results: Population data, duration of surgery and volume of colloid infused in each group (A: 20 ± 7 ml/kg vs B: 19 ± 3 ml/kg (i.e. 1.1 ± 0.2 g/kg)) were comparable. Measurable perioperative blood losses were similar in both groups (A: 1440 ± 702 ml vs B: 1659 ± 656 ml). Hb I and II were similar in both groups (A: 14.5 ± 1.3 vs B: 14.8 ± 1.3 and A: 11.2 ± 0.8 vs B: 11.6 ± 0.9 g/dl respectively) but a significant increase in homologous blood transfusions was noted in group B (A: 559 ± 583 vs B: 1315 ± 758 ml [p=0.003]). Factor VIII cofactors' levels are presented in table 1.

Table 1.

		Group A	Group B	t-test
VIIIc	I	120 ± 32	111 ± 32	n.s
	II	106 ± 34	79 ± 34	p= 0.04
	III	192 ± 52	98 ± 32	p= 0.0003
VIII Rag	I	121 ± 37	111 ± 38	n.s
	II	112 ± 47	75 ± 37	p= 0.02
	III	197 ± 49	103 ± 33	p= 0.0003
VIII vW	I	115 ± 37	111 ± 40	n.s
	II	108 ± 49	78 ± 36	p= 0.05
	III	167 ± 43	99 ± 31	p= 0.002

When compared with group A, they were all significantly lower in group B after IH. Moreover, the hypercoagulation phase observed on the first postoperative day in group A was completely inhibited in group B. Significant thigh hematomas were detected in 6 patients in group B.

Conclusions: In elective THR, 6% HES at recommended dosage (< 1.4 g/Kg) inhibits the physiological postoperative hypercoagulation phase and induces unmeasurable postoperative blood losses (thigh hematoma) with a significant increase (2.35 times) in homologous blood requirement. Thus, as blood bank exposure is concerned, 6% HES is not recommended for IH in elective THR.

References: 1. Transfusion 25: 349-354, 1985.
2. Intensive Care Med 11: 300-303, 1985.

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Title: DOES THE ANESTHETIC TECHNIQUE AFFECT HEMOSTASIS AFTER CARDIAC SURGERY?

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Introduction: Decreased levels of plasma von Willebrandt factor (vWF) have been shown to be associated with greater bleeding after cardiac surgery.[1] Vasopressin[2] (AVP), as well as its synthetic analogue desmopressin[1] (DDAVP), increase plasma levels of vWF and Factor VIII:C. Cardiopulmonary bypass (CPB) is known to cause release of AVP, but this response is attenuated with opioid-based anesthetic techniques.[3] This study compares opioid and inhalation anesthesia in terms of the release of AVP and stress related coagulation factors, FVIII: C and vWF.

Methods: Patients scheduled for primary CABG consented to the protocol approved by the Ethical Committee of the Helsinki University Hospital and were randomly assigned to one of the two groups (n=15 each). The fentanyl group received diazepam 0.3 mg/kg and fentanyl 50 µg/kg followed by an infusion of 0.3 µg/kg/min before and during CPB and 0.15 µg/kg/min, thereafter. The enflurane group received thiopental 2 - 4 mg/kg, fentanyl 5 µg/kg and enflurane 1-2%. Blood samples were obtained before CPB, 15 min, 2 h, 5.5 and 16 h after CPB. Plasma AVP was measured by RIA, vWF by immunoelectrophoresis and FVIII:C by the clotting assay. ANOVA and Sheffe's test test were used for statistical analyses.

Results: There was no difference between the groups in plasma AVP, vWF and FVIII:C after induction of anesthesia. The levels were increased immediately after CPB in the enflurane group, whereas in the fentanyl group, increases were observed only after fentanyl was discontinued. (Figure)

Discussion: The present study confirms that AVP release caused by surgery and CPB can be modified by the anesthetic technique. Increased plasma levels of AVP may be one mediator of the stress induced increases of FVIII:C and vWF after CPB. Thus, there is the potential for a difference in hemostasis between opioid and inhalation anesthesia after CPB.

References:
1. N Engl J Med 314: 1402-1406, 1986
2. Clinical Science 69: 471-476, 1985
3. Br J Anaesth 58: 1260-1266, 1986

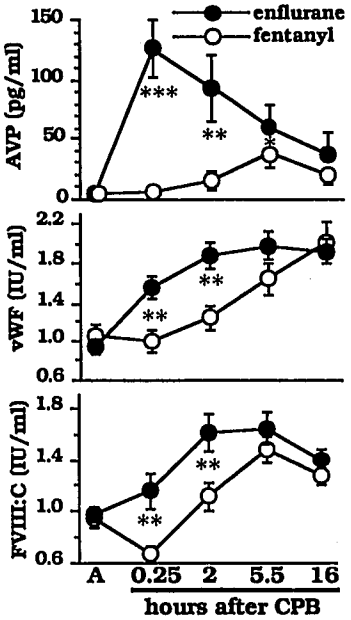

Figure. Plasma arginine vasopressin (AVP), von Willebrandt (vWF) and procoagulant (FVIII:C) component of Factor VIII after induction of anesthesia (A) and after cardiopulmonary bypass (CPB) in patients anethetized with enflurane or fentanyl (n=15 each). Anesthetics were discontinued before 2 hours after CPB. *P<0.05, **P<0.01 and ***P<0.001 enflurane vs fentanyl groups. Mean± SEM are indicated.