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Impact of perioperative myocardial infarction on temperature, platelet count and differential leukocyte count of patients just before and after coronary-artery bypass grafting

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We compared the median values of temperature, platelet count and differential leukocyte count (neutrophils, eosinophils, basophils, lymphocytes and monocytes) just before and after coronary artery bypass grafting (CABG) of patients not suffering from a perioperative myocardial infarction (PMI) (n=217) and patients suffering from a PMI (n=11). Just before surgery and at 7 h, 13 h, 22 h, 46 h and 142 h after surgery, blood samples were taken. For the PMI-patient group we found just before the surgery the lymphocyte count higher (*P*=0.0010) and at 7 h after surgery the patient temperature higher (*P*=0.024) in comparison to the patients not suffering from a PMI.

With CABG, a systemic inflammatory response may arise from the combined effects of CPB (cardiopulmonary bypass), surgical trauma, blood transfusion, hypothermia and haemodilution. CABG using CPB was found to cause neutrophilia and lymphopenia in the postoperative period (1). The aim of this study was to test the hypothesis that the occurrence of a PMI is an additional factor affecting patients temperature and haematological cell counts. To test this hypothesis patient temperature, platelet count and differential leukocyte count were measured before and at several intervals after CABG surgery in which CPB was used.

Patients and methods

Patients

Consecutive patients undergoing CABG with the use of CPB were included in our retrospective study. Patients undergoing CABG in combination with valve surgery and or patients with a confirmed myocardial infarction within 1 month prior to surgery were not included in the study. Patients undergoing a reoperation within three months after the first cardiac operation were also not included in the study. Finally a group of 228 patients was retrospectively analysed and divided in patients who did not suffer a PMI (n=217) and those who did (n=11). Two of the 11 patients suffering from a PMI had undergone an emergency CABG operation after a failed percutanuous transluminal coronary angioplasty (PTCA). Three others of these 11 patients underwent a CABG years before the present operation. The PMI patient group consisted of 5 patients suffering from an anterolateral infarction, 3 patients suffered an inferior infarction, 2 patients an infero postero lateral infarction and 1 patient a postero lateral infarction.

Assays

Blood specimen were collected just before surgery and at 7 h, 13 h, 22 h, 46 h and 142 h postoperatively and analysed immediately. Patient temperature was measured at 7 h, 13 h and 22 h after surgery. Platelet count and differential leukocyte count were measured on a CellDyn 4000 (Abbott Laboratories, Chicago, USA) using EDTA blood. Platelet count was assayed in the samples ranging from before surgery to up to 22 h, 46 h and 142 h after surgery.

Statistics

To test the impact of PMI on patients' median values just before surgery and at 7 h, 13 h, 22 h, 46 h and 142 h after surgery, a significance level of α=0.025 was used. The Shapiro-Wilk test was used to test if the assay results for the non-PMI- and PMI-patient groups were normally distributed. If the assay results did not follow a normal distribution they were log-transformed. The assay results after logtransformation were tested on normal distribution. If the assay results or their logtransformed results did follow a normal distribution the *t*-test was used. If the variances of both patient groups were not equal to each other, the *t*-test was replaced by the test of Satterthwaite to estimate the significance. If no normal distribution was obtained, the *t*-test was replaced by the distribution free Wilcoxon signed-rank sum test on the original assay results.

Results

Effect of PMI

The patients were divided into two groups, those who did not suffer from a PMI (n=217) and those who did (n=11). Results are shown in table 1. Using sample times of just before surgery and at 7 h, 13 h, 22 h, 46 h and 142 h after surgery, higher median values were

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Table 1. Median values from 217 patients not suffering, and 11 patients suffering from a PMI, at t = 0 (just before surgery), and at 7, 13, 46 and 142 h after surgery.

time (h)	temp. (C)		platelets (/nl)		neutrophils (/nl)		eosinophils (/nl)		basophils (/nl)		lymphocytes (/nl)		monocytes (/nl)	
	non	PMI	non	PMI	non	PMI	non	PMI	non	PMI	non	PMI	non	PMI
0			249	262	4.44	4.35	0.16	0.28	0.03	0.04	2.06	2.77*	0.61	0.60
7	35.8	37.3*			8.56	10.5	0.07	0.05	0.02	0.01	1.13	1.11	0.51	0.50
13	37.4	37.3			8.90	10.1	0.02	0.02	0.01	0.01	0.67	0.83	0.56	0.56
22	37.4	37.1	166	156	9.96	10.4	0.01	0.02	0.01	0.01	0.74	0.85	0.81	0.70
46			169	138	10.7	10.7	0.03	0.01	0.01	0.02	1.25	1.26	1.00	1.06
142			308	301	6.20	7.85	0.32	0.40	0.03	0.03	2.02	2.16	1.00	1.08

*significantly different from the patients who did not suffer a PMI ($P<0.025$)

obtained for the patient group suffering from a PMI compared to the patient group not suffering from a PMI, for the lymphocyte count just before surgery, 2.77 /nL and 2.06 /nL respectively, $P=0.0010$, and for the temperature at 7 h, 36.8 °C and 35.8 °C respectively, $P=0.024$.

Discussion

Analysis of all patient data surprisingly showed that the preoperative median lymphocyte count for the PMI patient group was significantly elevated compared to the median lymphocyte count of the patients who did not suffer a PMI. Reconsulting the medical reports of the PMI patients indicated no other circumstances mentioned in the patients' histories than cardiovascular, which could explain the difference in lymphocyte count between the two patient groups. The elevated temperature at 7 h may be explained as an effect of an inflammatory response caused by PMI.

The occurrence of a PMI was not confirmed to be an additional factor affecting patients haematological cell counts after surgery. The effects of CABG on the median cell counts at 7 h, 13 h and 46 h postoperatively for the patient group not suffering a PMI are in accordance with those previously described (2, 3) for the neutrophiles and lymphocytes.

Literature

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