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INTRODUCTION: Hemostasis is greatly perturbed following coronary arteries surgery with cardiopulmonary bypass (CPB). During off-pump coronary arteries bypass grafting (OPCABG), because of the lack of contact between the blood and the non-endothelial surfaces of the CPB circuit, one might expect that hemostatic defect could be reduced. Recent data (1,2,3,4) even suggest a hypercoagulable state following OPCABG. We addressed this issue by studying coagulation factors, fibrinolysis and hypercoagulability in ten patients who had OPCABG.

METHODS: The study protocol was approved by the ethical committee of our institution and consent was obtained from patients the night before their surgery. In 10 patients who had OPCABG, D-Dimers, Factor VII, fibrinogen and prothrombin fragment 1.2 (PF 1.2) were assessed at induction of anesthesia, at the end of surgery, 24 hours and 96 hours after surgery. Patients received heparin to maintain an ACT around 250s during surgery and had protamine reversal at the end of surgery. Specimens anticoagulated with sodium citrate 3,2% were centrifuged in less than 1 hour at 4800 rpm for 15 minutes. The plasma was collected and immediately cooled to -80C until analysis. We used analysis of variance and Fisher's PLSD test for statistical analysis.

RESULTS: Fibrinogen decreased at the end of surgery and increased at 96 hours, Factor VII decreased in the first 24 hours but returned to normal at 96 hours, PF1.2 increased significantly at 96 hours after the surgery and there was a trend for D-Dimers to increase 24 hours and 96 hours after the surgery (Table). Blood loss during the surgery was 2623 ± 1671 ml.

DISCUSSION AND CONCLUSIONS: Prothrombin fragment 1.2 is a marker of systemic thrombin generation and its increase represents a procoagulant state. In the first day following OPCABG surgery, there is decrease of coagulation factors (fibrinogen and factor VII). Hemodilution probably account for these results as our patients had important volemic shifts during their surgery. Consumption of factor might be a minor contributor but systemic activation of coagulation was not present at this time. However, at 96 hours after surgery, PF 1.2 was significantly increased, factor VII returned to normal and fibrinogen increased. A systemic inflammatory response can be observed after most major surgeries. The increase in fibrinogen at 96 hours in our patients is probably related to this inflammatory response as might be the hypercoagulable state observed. The factor VII is not know to be a marker of inflammation and returned to normal. Thus our results support a hypercoagulable state after OPCABG.

REFERENCES: 1) Ann Thor Surg 1999; 67 :1370-5 2) Anesthesiology 2001;95(5):1103-9 3) Anesth Analg 2004; 99:634-40 4) J Thorac Cardiovasc Surg 2006; 131(2):290-7

Table : Results (means±SD and relative levels to induction of anesthesia)				
Dosage Periods	Anesthesia induction (0)	End of surgery (1)	24 hours after surgery(2)	96 hours after surgery (3)
Fibrinogen ^a (g/L)	3.48±.78 (100%)	1.78±.55 (51%)	3.92±1.13 (112%)	7.70±1.66 (221%)
D-dimers (µg/L)	214±104 (100%)	164±78 (76%)	379±460 (177%)	502±624 (234%)
Factor VII ^b (IU)	1.079±.293 (100%)	.549±.140 (55%)	.515±.100 (51%)	.974±.249 (97%)
PF 1.2 ^c (nmol/L)	.75±.50 (100%)	1.24 ±.58 (166%)	1.11 ±.48 (149%)	2.40 ±1.35 (322%)
<i>P</i> < 0.001: ^a 0 vs 1,3; 1 vs 2,3; 2 vs 3 ^b 0 vs 1,2; 1 vs 3; 2 vs 3 ^c 0 vs 3; 1 vs 3; 2 vs 3				