

TITLE: SWAN-GANZ CATHETER ASSOCIATED THROMBOCYTOPENIA - EFFECTS OF HEPARIN COATING

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INTRODUCTION: Flow directed pulmonary artery catheters are associated with thrombocytopenia in both animals and patients, undergoing aorto-coronary bypass grafting. This study compares the effects of heparin coated Swan-ganz (S.G.) catheters with non-coated S.G. catheters on platelet counts during the 24 hours following aorto-coronary bypass grafting.

METHODS AND MATERIALS: Sixteen patients undergoing aorto-coronary bypass grafting were studied. Approval for the studies was obtained from University of Pennsylvania Committee on studies involving man, and informed consent obtained. Subjects were assigned randomly to one of two groups of eight patients, to receive either heparin coated (Group I) or non-heparin coated (Group II) S.G. catheters. The catheters were inserted via internal or external jugular veins and remained in situ for 24 hours. All platelet counts were performed in triplicate by phase-contrast microscopy on samples obtained from radial artery catheters. Samples were obtained prior to S.G. catheter insertion, six hours after S.G. catheter insertion (post-cardio-pulmonary bypass) and 24 hours after S.G. catheter insertion. Statistical analysis was performed using within-subjects two-factor analysis of variance (ANOVA) or student's test for unpaired data where applicable.

RESULTS: Premedications, anesthetics and post-operative medications were similar in both groups. There was no difference between the heparin coated and non-heparin coated groups in either age, bypass time, post-operative blood loss or post-operative blood replacement (table 1). The only statistically significant difference between the groups was BSA ($p < .05$). No patient received platelet transfusion in the perioperative period. The mean (\pm SEM) platelet count for the heparin and non-heparin coated groups are shown in table 2. The decrease in platelet counts at six hours in both groups corresponds to the period of cardiopulmonary bypass. There was no statistically significant difference between the two groups at 24 hours.

DISCUSSION: S.G. catheters are known to initiate clot formation. Several studies in animals, and man, have demonstrated thrombocytopenia when S.G. catheters are present. These findings suggest possible activation of the clotting cascade at least in the vicinity of the catheter. A recent study demonstrated decreased short term catheter-induced thrombogenicity in man if catheters coated with heparin was used. No studies to date have demonstrated that thrombocytopenia is prevented by heparin bonding. The present study has shown no statistically significant difference in platelet counts 24 hours after insertion of either heparin coated or non-heparin coated S.G. catheters. Possible explanations for this finding

are the effect of cardiopulmonary bypass on platelet function or the washoff of heparin from the catheter while in situ. In conclusion, it seems that present methods for heparin coating of pulmonary artery catheters offer no advantage in prevention of catheter-induced thrombocytopenia in patients undergoing aorto-coronary bypass grafting.

TABLE 1

	Age (yrs.)	Bypass time (min)	BSA (m ²)	Post-op Blood loss (cc)	Post-op Blood Replacement (cc)
Group I	57.1	86.4	2.06	652	343.8
mean (\pm SEM)	(± 3.2)	(± 7.3)	($\pm .06$)	(± 106.9)	(± 80.9)
Group II	62	72.1	1.83	630	281.3
mean (\pm SEM)	(± 3.8)	(± 8.7)	($\pm .05$)	(± 97.4)	(± 128.9)

TABLE 2

	Platelet Counts/mm ³		
	Control	Post-bypass	24 hours
Group I	255,190*	170,190**	120,560**
mean (\pm SEM)	($\pm 34,280$)	($\pm 18,570$)	($\pm 15,160$)
Group II	200,380*	119,190**	113,500**
mean (\pm SEM)	($\pm 32,480$)	($\pm 13,230$)	($\pm 14,020$)

*Significant differences between groups $p < .05$

**Significant difference from control $p < .05$

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