Does transfusion of blood and blood products increase the length of stay in hospital?

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Background and goals:

Blood and blood products are still frequently used in cardiac surgeries despite the implementation of protection strategies against transfusion. According to the guidelines published by the American Society of Cardiothoracic Anesthesia, the use of cell saver is the class 1 recommendation for all patients who have infection or malignancy and undergo cardiac surgery.

The quality- and material-related adverse effects caused by extended hospital stay have become more important today than ever before. The length of hospitalization after routine procedures has been specified as a measure of quality to reduce cost and hospital-acquired morbidity (7). However, there is less data specifically related to the cardiac surgery patients. In this retrospective study, we aimed to analyze the use of blood and blood products in cardiac surgeries and to investigate its effect on clinical outcomes.

Methods:

Following the Ethics Committee approval, patients who had open heart surgery at our clinic for coronary bypass and/or heart valve repair between 2006 and 2016 were included in our study. Perioperative transfusion requirements were noted. Also, patients were evaluated regarding survival, complication rates and the duration of hospitalization. Patients were divided into two groups considering the duration of hospital stay and the duration of the stay at the intensive care unit.

Table 1: The parameters affecting ICU stay more than 2 days

		ICU stay ≤ 2 days		ICU stay > 2 days		p	
		median±sd/n(%)	Median	median±sd/n(%)	Median		
Age		67,4±9,9	68,0	65,3±9,2	65,0	0,420	t
Gender	Female	40 (40,0%)		9 (52,9%)		0,317	x²
	Male	60 (60,0%)		8 (47,1%)			
BMI		26,7±1,8	26,3	26,7±2,2	26,0	0,985	m
Cell Saver blood amount		740,0±222,0	700,0	811,8±220,5	800,0	0,163	m
CBP TİME		118,9±54,8	115,0	170,6±72,0	180,0	0,004	m
CX Time		81,2±33,5	80,0	103,5±24,7	100,0	0,004	m
Cryoprecipitate	Preoperative	0,53±2,45	0,00	1,76±4,35	0,00	0,136	m
	Postoperative	0,14±1,30	0,00	1,06±2,33	0,00	0,000	m
FFP	Preoperative	3,47±3,42	3,00	4,29±2,85	4,00	0,149	m
	Postoperative	0,70±2,21	0,00	6,00±7,10	3,00	0,000	m
Platelet	Preoperative	3,12±5,59	0,00	4,59±6,26	1,00	0,162	m
	Postoperative	0,60±2,47	0,00	3,47±5,27	0,00	0,001	m
RBC	Preoperative	2,69±3,77	2,00	3,47±3,39	3,00	0,196	m
	Postoperative	2,00±3,60	1,00	11,47±16,04	2,00	0,002	m
Hb	Preoperative	12,4±2,2	12,4	12,2±1,7	12,3	0,798	m
	Postoperative	10,7±1,2	10,7	10,5±1,1	10,6	0,626	m
Htc	Preoperative	36,4±4,9	36,6	35,0±4,3	36,5	0,345	m
	Postoperative	31,2±3,3	31,1	30,2±2,4	30,1	0,233	m
INR	Preoperative	1,13±0,17	1,10	1,34±0,58	1,13	0,131	m
	Postoperative	1,28±0,16	1,25	1,34±0,30	1,29	0,659	m
BUN	Preoperative	19,8±8,1	17,0	16,7±9,3	15,0	0,063	m
	Postoperative	21,0±8,4	19,0	19,2±6,9	18,0	0,510	m
Creatinine	Preoperative	0,98±0,26	0,90	2,14±4,87	0,90	0,800	m
	Postoperative	1,14±0,40	1,00	1,14±0,42	1,10	0,879	m
Bleeding volume		565,2±321,7	490,0	849,4±392,6	750,0	0,003	m
t test / m Mann-whitney u test / X² chi-square test							

Results:

The cardiopulmonary bypass (CPB) time and the cross clamp (Cx) time, and the amount of used cryoprecipitate (Cryo), fresh frozen plasma (FFP), platelet (PLT), erythrocyte suspension (ES) and the bleeding amount were significantly higher in the groups that stayed at the hospital for > 7 days and at the intensive care unit (ICU) for > 2 days (p>0.05).

In the univariate model, to predict the patients who might stay at the hospital for more than one week and who might stay at the ICU for more than 3 days, we considered the significant efficacy of postoperative FFP, PLT, ES transfusion, bleeding amount, and the CPB time (p<0.05). In the reduced multivariate model, however, we analyzed the significant-independent efficacy of the postoperative FFP use to determine the patients who would stay at the hospital for more than one week and who would stay at the ICU for more than 3 days (p<0.05)

There was no significant correlation between the duration of ICU stay and age, BMI, and the levels of Hb, Htc, INR, BUN, and creatinine, whereas there was a significant positive correlation between the Cx and CPB time, and the amouns of administered cryoprecipitate, FFP, platelet, ES and the bleeding amount (p < 0.05).

Table 2: Comparison of transfusion rate, bleeding amount and CPB time in uni and multi variate models

	Univariate model			Multivariate reduced model			
	Odds Ratio	95% Confidence Interval	p	Odds Ratio	95% Confidence Interval		p
Postoperative FFP	1,404	1,144-1,723	0,001	1,404	1,144	- 1,723	0,001
Postoperative PLT	1,269	1,073-1,501	0,005				
Postoperative ES	1,314	1,103-1,564	0,002				
Bleeding amount	1,002	1,001-1,030	0,049				
CBP time	1,008	1,001-1,014	0,027				

Conclusion:

We have concluded that increased use of blood products was associated with the Cx and CPB time and prolonged duration of hospital and ICU stays. In open cardiac surgeries, the use of blood products due to bleeding was identified as a predictor for a stay longer than 3 days at the ICU and longer than 7 days at the hospital.

References:
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