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Retrospective analysis of perioperative transfusion requirements in living donor renal transplantation

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ABSTRACT

Background: Extensive bleeding in solid organ transplantation is a major challenge faced by transplant surgeons. Our aim was to audit the peri-operative transfusion requirements in our patients.

Materials and methods: A retrospective analysis of living donor renal transplant surgeries performed from 1st May 2014 to 31st December 2014 was done. The blood/blood component usage during the peri-operative period was obtained. Univariate analysis was performed and the significant factors identified were further analyzed through multivariate regression analysis.

Results: A total of 510 patients (398 males: 78%, and 112 females: 22%) ranging from 18 to 77 years in age were included in the study. Of these, 269 (52.7%) patients were not transfused, while 241 (47.3%) patients received a total of 845 units of blood/blood components. The mean pre-operative hemoglobin in the transfused group was 8.7g/dl while in the non-transfused group it was 10.3g/dl. Leukoreduced packed red blood cell (PRBC) was the major blood component transfused during the peri-operative period. Multivariate regression analysis revealed that pre-operative hemoglobin was a major predictor of intra-operative PRBC transfusion (p = <0.001). Average post-operative length of stay (PLOS) was 10 ± 6 days. There was no significant difference in the PLOS between the transfused and non-transfused groups of patients; however, a statistical significant increase in utilization for both PRBC (p = 0.044) and fresh frozen plasma (p = 0.002) was observed with increased PLOS.

Conclusion: Nearly 47.3% of patients undergoing living donor renal transplant received transfusion. PRBC was the most common product transfused and pre-operative hemoglobin was identified as strong predictor of blood consumption.

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1. Introduction

Transfusion therapy plays an important role in the success of solid organ transplant programs. Blood transfusion is vital in managing anemia for patients awaiting renal transplantation or as replacement therapy for blood loss during the surgery. However, blood transfusion is associated with inherent risks like transfusion associated reactions, transfusion transmitted infections (TTI) and immunomodulatory effects [1]. With changing era, the necessity of blood transfusion especially red cell transfusion in patients undergoing renal transplantation has reduced due to the administration of drugs like erythropoietin, which stimulate the production of red blood cells [1,2]. Before blood transfusion is undertaken, every patient needs to be assessed for benefits of transfusion versus the risk involved. With the advent of newer immunosuppressive agents, the use of blood transfusion specifically for the immunological benefit is no longer practiced [1,2].

Given the complexity of the solid organ transplant surgeries, auditing the transfusion requirements and identifying

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risk factors of excessive blood consumption is a tool that aids in better inventory management and improved preparedness for such procedures. The aim of our study was to audit transfusion of blood and blood components especially packed red blood cell and to identify factors predicting transfusion requirements in patients undergoing living donor renal transplantation at our center.

2. Materials and methods

This retrospective study was conducted in the Department of Transfusion Medicine, Indraprastha Apollo Hospitals, New Delhi, after clearance from institution's ethical committee. Transfusion records of all ABO compatible, living donor renal transplant surgeries carried out at our center from May 2014 to December 2014 were retrieved and reviewed. Pediatric kidney transplants (less than 18 years) and ABO incompatible living donor renal transplants were excluded from the study. The data obtained from patient's case files included recipient's age, gender, cause of chronic kidney disease (CKD), history of dialysis, history of previous renal transplant, history of graft loss or rejection, if any, donor details (age, gender, relation, blood group) and anticoagulant administration at the time of admission.

Pre-operative laboratory parameters including hemoglobin (Hb), total leukocyte count (TLC), platelet count (Plt), activated partial thromboplastin time (APTT), prothrombin time (PT), international normalized ratio (INR), blood urea (B. urea), serum creatinine (S. creatinine), serum sodium ($Na+$) and serum potassium ($K+$) were documented. The post-operative length of stay (PLOS) for each patient in the hospital was calculated from the day of surgery. The blood component usage including leukoreduced packed red blood cell (PRBC), fresh frozen plasma (FFP), cryoprecipitate (cryo) and platelet concentrate (PC), during the intra operative as well as postoperative phase was obtained from the patient's blood bank records.

3. Statistical analysis

For statistical analysis, data were divided into two groups – transfused and non-transfused group. Pearson's product–moment correlation was used for measuring the correlation between continuous variables and Pearson's Chi-squared test for measuring association between categorical variables. Variables found to be statistically significant in a univariate analysis were studied under Multivariate Regression Model. Significance was assumed at p value less than 0.05. Statistical analysis was performed using IBM SPSS Statistics software version 20.0 and R-3.2.1 (SPSS Inc., Chicago, IL, USA).

4. Results

A total of 510 patients (398 males: 78%, and 112 females: 22%) ranging from 18 to 77 years (average 41 years) in age underwent living donor renal transplant during the study period. Of these, 269 (52.7%) patients did not receive any transfusion, while 241 patients (47.3%, 188 males: 78%, and 53 females: 22%) were transfused in the peri-operative phase. The most common cause of underlying CKD was diabetic nephropathy (44%) followed by hypertensive nephropathy (22%) (Table 1). Table 2 shows the demographics and pre-operative laboratory values for the transfused and non-transfused group.

A total of 845 blood components were utilized peri-operatively, out of which 263 units were transfused intra-operatively (PRBC = 184; FFP = 79; 128 patients) and 582 units (PRBC = 340, FFP = 219; Cryo = 6; PC = 17; 175 patients) post-operatively. If transfused, the average consumption of PRBC was 2.17 units, 1.23 units of FFP, 0.07 units of PC and 0.02 units of cryo (Table 3). Sixty-six patients (27%) were exclusively transfused intra-operatively

Table 1
Number of patients according to diagnosis.

Diagnosis	Number of patients (percentage)
Diabetic nephropathy	226 (44)
Hypertensive nephropathy	114 (22)
APCKD (adult polycystic kidney disease)	61 (12)
CIN (contrast induced nephropathy)	34 (7)
FSGS (focal segmental nephropathy)	21 (4)
IgA nephropathy	10 (2)
Miscellaneous	44 (9)

Table 2
Demographics and pre-operative laboratory values.

	Transfused group n = 241 (mean)	Non-transfused group n = 269 (mean)	p-Value
Age	18–76 (41)	18–77 (42)	0.15
Dialysis (months)	0–120 (9)	0–96 (10)	0.622
PLOS (days)	6–30 (10)	6–44 (9.8)	0.64
Donor age (years)	21–73 (42)	19–75 (44)	0.791
Hemoglobin (g/dl)	4.9–14.2 (8.7)	5.5–17.3 (10.32)	<0.001
Total leukocyte count (cumm)	2400–21,600 (8044)	2400–28,000 (7722)	0.269
Total platelet count (cumm)	52,000–465,000 (196991)	10,200–250,000 (221778)	0.02
B. urea (mg/dl)	20–273 (114)	21–273 (107)	0.124
S. creatinine (mg/dl)	1.8–17.2 (8.21)	2.4–17 (8.19)	0.959
S. sodium (mEq/l)	128–149 (139)	128–149 (139)	0.045
S. potassium (mEq/l)	0.6–7.2 (4.3)	2.7–6.6 (4.5)	0.214
APTT (seconds)	21.4–43.6 (31)	19–43.4 (30.8)	0.214
PT (seconds)	8.7–29 (12)	7.8–18.9 (11.8)	0.039
INR	0.8–2.9 (1.06)	0.7–2.8 (1.03)	0.032