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ABSTRACT

Blood transfusion during lung transplantation (LT) surgery is common but there is little evidence to identify potential candidates for transfusion-free LT surgery.

OBJECTIVES

We describe patient and procedural characteristics of LT patients in the era of ECMO and identify predictors of successful transfusion-free surgery.

METHODS

In this single-center, retrospective analysis, all adult patients undergoing LT between 9/5/2016-2/28/2019 were included. Multi-organ transplants were excluded.

Patients were grouped based on perioperative transfusions received over 72 hours; no products, 1-4 units PRBC, or >4 U PRBC.

Donor and recipient characteristics were compared between the three groups by univariate and multivariate analysis.

RESULTS

235 LTs were performed over the time period. 41 patients (17.4%) received no blood transfusions, while 194 patients (82.6%) received transfusions, most of which (n=101; 43%) received >4 U of product. Recipients requiring blood transfusions had prolonged ventilation time, length of stay, primary graft dysfunction (PGD) and worse 1-year graft survival.

Donor characteristics were similar between groups. Higher age, obstructive or restrictive lung disease, off-pump surgery, single orthotopic lung transplant (SOLT), lower Lung Allocation Score (LAS), higher starting hemoglobin, shorter ischemic time and case length were associated with a transfusion-free LT.

In a multivariate analysis, positive predictors for transfusion-free LT included SOLT(OR=6.27, p=0.0004), and higher preoperative hemoglobin (OR=1.35 per point, p.0231). Negative predictors included female sex (OR=0.13, p=0.0005) and higher LAS (OR=0.88 per point, p=0.0002).

	0U PRBCs (n=41; 17.4%)	1-3U PRBCs (n=93; 39.6%)	≥ 4U PRBCs (n=101; 43.0%)	p-value
Demographics & Surgical Characteristics				
Age	67(60-70)	60(50-67)	55(33-64)	<.0001
Race				.3782
Black	1(2.4%)	6(6.5%)	13(12.9%)	
White	38(92.7%)	84(90.3%)	83(82.2%)	
Other	2(4.9%)	3(3.2%)	5(5.0%)	
Sex				<.0001
Female	4(9.8%)	41(44.1%)	51(50.5%)	
Male	37(90.2%)	52(55.9%)	50(49.5%)	
Lung Allocation Score	37(35-42)	43(36-52)	45(38-54)	<.0001
Indication for Transplant				.0032
Chronic Obstructive Pulmonary Disease	8(19.5%)	22(23.7%)	12(11.9%)	
Idiopathic Pulmonary Fibrosis	28(68.3%)	40(43.0%)	34(33.7%)	
Cystic Fibrosis	4(9.8%)	13(14.0%)	26(25.7%)	
Sarcoidosis	0(0.0%)	3(3.2%)	5(5.0%)	
Primary Arterial Hypertension	0(0.0%)	2(2.2%)	4(4.0%)	
Other	1(2.4%)	13(14.0%)	20(19.8%)	
ECMO 0-72h	2(4.9%)	6(6.5%)	52(51.5%)	<.0001
Cardiopulmonary Bypass Used	0(0.0%)	13(14.1%)	34(33.7%)	<.0001
Donor Age	34(26-51)	35(28-52)	36(27-47)	.6806
Donation After Circulatory Death (DCD)	2(5.0%)	2(2.3%)	3(3.0%)	.7005
Ischemic Time (minutes)	379(326-430)	395(338-455)	438(371-504)	.0018
Preoperative Laboratory Values				
Hemoglobin (g/dL)	13.1(12.4-13.9)	12.4(11.3-13.2)	11.7(9.8-12.9)	<.0001
International Normalized Ratio	1.1(1-1.1)	1(1-1.1)	1(1-1.2)	.6839
Platelet Count (x 10 ⁹ /L)	213(176-253)	264(215-327)	244(180-312)	.0029
Mean Pulmonary Artery Pressure (mmHg)	24(22-28)	25(22-28)	25(21-32)	.2625
Total Transfusions (units)	0(0-0)	3(2-4)	15(8-33)	<.0001

Outcomes:

	0U PRBCs (n=43; 18.3%)	1-3U PRBCs (n=91; 38.7%)	≥ 4U PRBCs (n=101; 43.0%)	p-value
PGD at 72h				
0 or 1	34(82.9%)	62(66.7%)	42(41.6%)	<.0001
2	3(7.3%)	22(23.7%)	21(20.8%)	
3	4(9.8%)	9(9.7%)	38(37.6%)	
Mechanical Ventilation at 72h	4(9.8%)	15(16.1%)	58(58.0%)	<.0001
Graft Survival	38(95.00%)	78(87.64%)	75(74.26%)	.0042
Hospital Length of Stay (days)	17(13-24)	19(15-29)	36(24-65)	<.0001
Mortality	1(2.4%)	2(2.2%)	17(16.8%)	<.0001

CONCLUSIONS

Predictors of transfusion-free LT surgery include male sex, increased age, SOLT, off-mechanical support LT, lower LAS and higher starting hemoglobin.

This may guide decision making in exploring candidacy for transfusion-free LT or blood refusal patients in the era of ECMO.