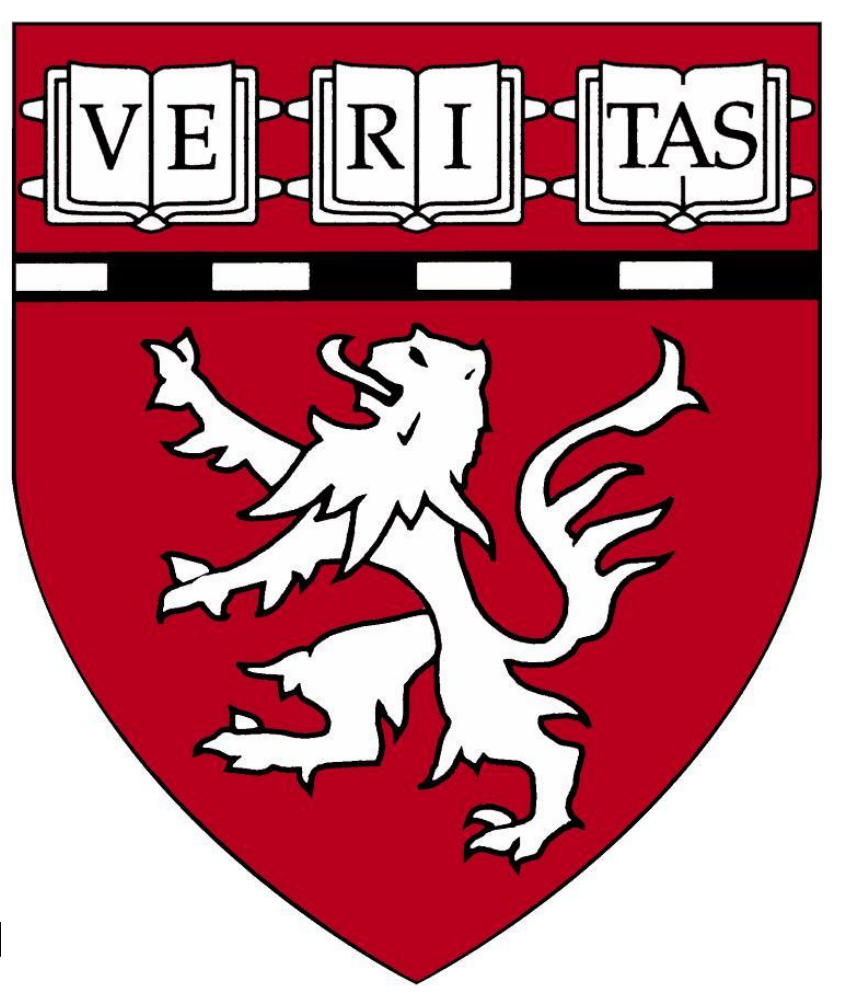




Rates of Primary Graft Dysfunction and Overall Survival Are Not Affected by the Laterality of the First Implanted Lung in Bilateral Lung Transplantation

Andrea L. Axtell, MD, Amy G. Fiedler, MD, Elbert E. Heng, BS, Serguei Melnitchouk, MD, MPH, David A. D'Alessandro, MD, George Tolis, MD, Todd Astor, MD, Yuval Raz, MD, Isabel P. Neuringer, MD, and Mauricio A. Villavicencio, MD, MBA



Background

Primary graft dysfunction (PGD) is a significant cause of morbidity and mortality. During off pump bilateral lung transplantation, the first lung is subject to the full cardiac output resulting in increased edema on that side. In this regard, a larger right lung that is implanted first may be better able to tolerate the initial full cardiac output exposure with less resulting PGD. We hypothesize that implantation of the right lung first results in less PGD and better associated survival.

Methods

Our institutional lung transplant database was analyzed to compare rates of PGD at 72 hours post-transplant for patients who had the right lung versus the left lung implanted first. Additionally, a survival analysis utilizing the UNOS database was conducted on all adult patients who received a bilateral lung transplant between 1988 and 2013. Baseline characteristics and post-transplant outcomes were compared between groups and survival analyzed using a Cox proportional hazards model.

Table 1: Baseline Characteristics of Recipients and Donors – UNOS Data

Characteristics	Right First (n=4,731)	Left First (n=5,757)	p-value
Recipient age, years (mean ± SD)	48.6 ± 14.2	47.0 ± 14.3	<0.01
Sex, female	2131 (45%)	2619 (45%)	0.21
Race			<0.01
White	3995 (84%)	4960 (86%)	
Black	436 (9%)	442 (8%)	
Hispanic	233 (5%)	237 (4%)	
Indication for transplant			0.01
Pulmonary Fibrosis	1186 (25%)	1334 (23%)	
COPD/Emphysema	1625 (34%)	1902 (33%)	
Cystic Fibrosis	1131 (24%)	1433 (25%)	
Other/Unknown	789 (17%)	1088 (19%)	
LAS score (mean ± SD)	45.4 ± 16.4	46.3 ± 17.1	0.08
History of smoking	1917 (41%)	1834 (32%)	<0.01
Diabetes mellitus	589 (12%)	488 (8%)	<0.01
BMI			0.03
<18.5	670 (14%)	928 (16%)	
18.5-25	2175 (46%)	2625 (46%)	
25-30	1332 (28%)	1528 (27%)	
>30	554 (12%)	676 (12%)	
Creatinine (mean ± SD)	0.86 ± 0.50	0.88 ± 0.69	0.03
Wait time, months (mean ± SD)	10.8 ± 16.1	10.5 ± 14.5	<0.01
Ventilator dependent	248 (5%)	363 (6%)	0.02
ECMO dependent	62 (1%)	75 (1%)	0.97
Donor Age, years (mean ± SD)	33.1 ± 14.2	32.2 ± 13.8	0.03
Donor Sex, female	1928 (41%)	2394 (42%)	0.39
Right lung ischemic time, hrs (mean ± SD)	3.91 ± 1.35	5.65 ± 1.63	<0.01
Left lung ischemic time, hrs (mean ± SD)	5.57 ± 1.62	3.96 ± 1.30	<0.01
Difference, hrs (mean ± SD)	1.67 ± 0.78	1.70 ± 0.72	0.06
Total ischemic time, hrs (mean ± SD)	5.58 ± 1.62	5.65 ± 1.62	0.01

DISCLOSURES

- None of the authors have a financial conflict of interest or relationship to disclose.
- The data reported here were supplied by the United Network of Organ Sharing as the contractor for the Organ Procurement and Transplantation Network.

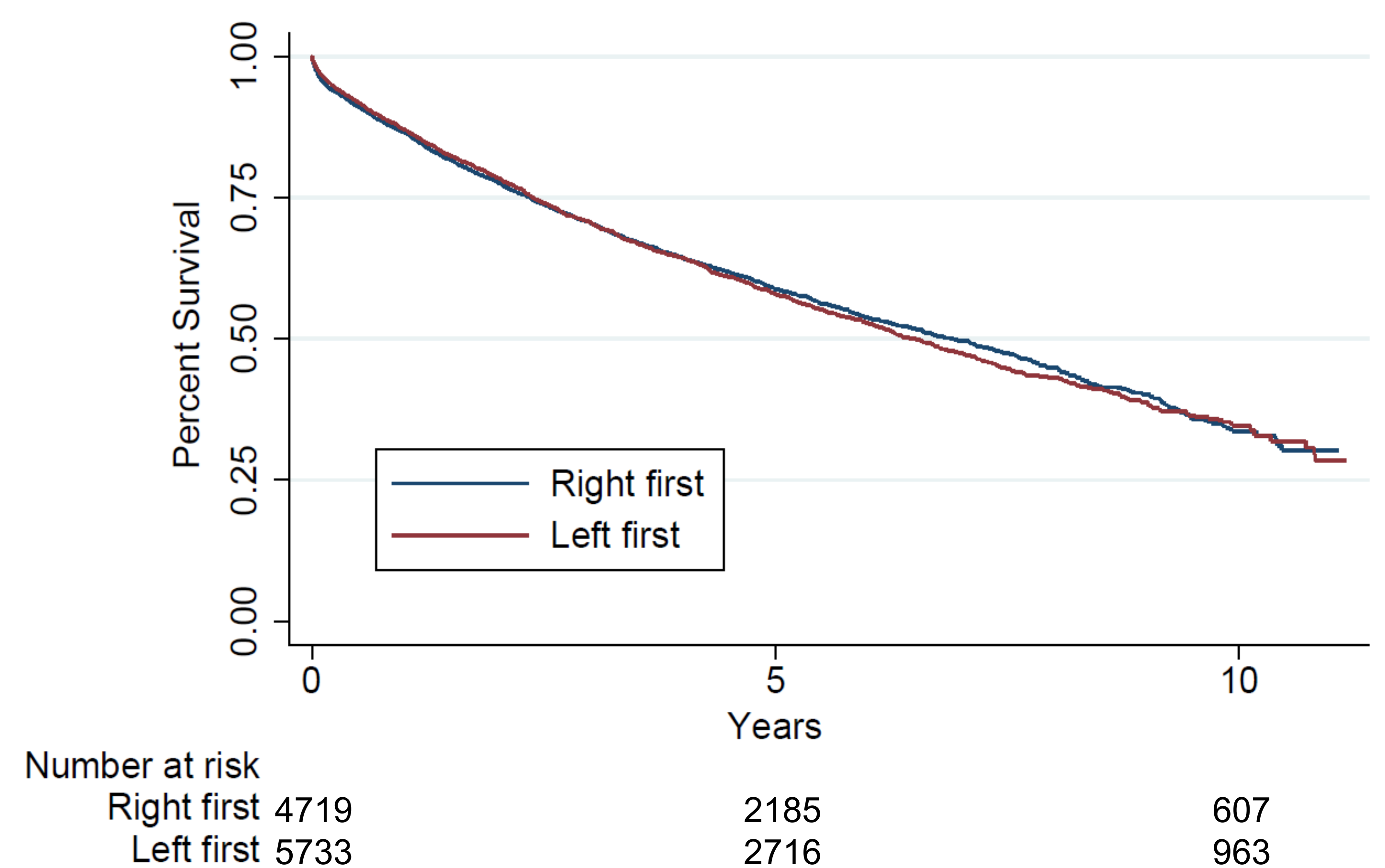
Results

In our institutional cohort, 85 patients were identified - 39 had the right lung implanted first and 46 had the left lung implanted first. Recipient and donor characteristics were similar between groups. Six (15%) patients in the right lung first group had PGD compared to 7 (15%) in the left lung first group (p=0.98). Of these patients, only 3 (8%) in the right lung first group had grade 3 PGD compared to 1 (2%) in the left lung first group (p=0.23). There were no differences in length of mechanical ventilation (30 vs 25 hours, p=0.28), length of stay (22 vs 33 days, p=0.55), or episodes of rejection (4 vs 9, p=0.24) between those patients who had the right versus left lung implanted first. Utilizing UNOS data, a total of 10,488 patients were identified – 4,731 had the right lung implanted first and 5,757 had the left lung implanted first. There was no significant difference in survival between groups (log rank p=0.79). Median survival was 7.1 years (IQR 2.2-14.1) in those who had the right lung implanted first compared to 6.5 years (IQR 2.1-13.1) in those who had the left lung implanted first (p>0.05).

Table 2: Post-Transplant Outcomes – Institutional Data

Outcomes	Right first (n=39)	Left first (n=46)	p-value
PGD at 72 hours	6 (15%)	7 (15%)	0.98
PGD 3 at 72 hours	3 (8%)	1 (2%)	0.23
Length of mechanical ventilation, hours	29.8 ± 38.5	25.4 ± 22.8	0.28
Length of Stay, days	21.5 ± 10.0	33.3 ± 51.9	0.55
Treated for Rejection in 1st Year	4 (10%)	9 (20%)	0.24

Figure 1: Post-Transplant Survival – UNOS Data



Conclusion

There are no significant differences in primary graft dysfunction or survival in patients in whom the right lung is implanted first during bilateral off pump lung transplantation. Therefore, the side implanted first should be determined by the pre-operative perfusion scan and surgeon preference.

REFERENCES

1. Christie JD, Carby M, Bag R, et al. Report of the ISHLT Working Group on Primary Lung Graft Dysfunction part II: definition. A consensus statement of the International Society for Heart and Lung Transplantation. JHLT. 2005;24(10):1454–1459.
2. Lee JC, Christie JD. Primary graft dysfunction. Proc Am Thorac Soc. 2009;6(1):39–46.
3. Christie JD, Sager JS, Kimmel SE, Ahya VN, Gaughan C, Blumenthal NP, Kotloff RM. Impact of primary graft failure on outcomes following lung transplantation. Chest 2005;127:161–165..