



Cardiopulmonary Bypass Use Does Not Affect Outcomes in Single Lung Transplantation



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Background

- Cardiopulmonary bypass (CPB) use may be required for hemodynamic support or intra-cardiac repair during single lung transplantation.
- The potential of CPB to induce an inflammatory state and possibly effect lung graft function is well-known.
- We sought to evaluate the impact of CPB on outcomes after single lung transplantation.

Methods

- Retrospective analysis of lung transplant recipients at UCLA performed between Jan 1999 – Dec 2016.
- The records of single lung transplant recipients who underwent transplantation with CPB were reviewed.
- A 1:1 matched cohort of non-bypass recipients was identified based on age, lung allocation score, diagnosis, era, and organ ischemic time.
- Survival analysis performed via Kaplan-Meier method, censored at 5 years.

Results

Variables	Off-Pump (N=70)	CPB (N=70)	p-value
Recipient Age (years)	66.4 ± 3.5	66.6 ± 4.0	0.736
Body Mass Index (kg/m ²)	25.5 ± 4.2	26.4 ± 3.8	0.173
Diagnosis Category			1.000
A – Obstructive	10 (14.3%)	10 (14.3%)	
B – PPH	-	-	
C – Cystic Fibrosis	-	-	
D – Restrictive	60 (85.7%)	60 (85.7%)	
Lung Allocation Score	44.0 ± 10.9	44.2 ± 10.8	0.868
Wait Time (days)	105 ± 175	91 ± 146	0.904
Preoperative Comorbidities			
Diabetes Mellitus	24 (34.3%)	21 (30.0%)	0.587
Hypertension	32 (45.7%)	41 (58.6%)	0.128
GERD	36 (51.4%)	46 (65.7%)	0.004
Cytomegalovirus Positive	43 (61.4%)	41 (58.6%)	0.730
Preoperative Pulmonary Status			
6-minute Walk (ft)	514 ± 401	490 ± 409	0.637
Preoperative O ₂ (L/min)	4.0 ± 2.0	4.9 ± 3.4	0.335
Life Support (MV or ECMO)	0 (0%)	0 (0%)	1.000
FEV ₁ (%)	46 ± 17	49 ± 18	0.436
FVC (%)	45 ± 13	48 ± 16	0.334
Preoperative Heart Catheterization			
Systolic PAP (mmHg)	36 ± 9	39 ± 12	0.171
Diastolic PAP (mmHg)	15 ± 6	17 ± 6	0.032
PCWP (mmHg)	10 ± 5	11 ± 5	0.128
Donor Age (years)	38.5 ± 15.0	37.1 ± 14.1	0.566
Donor Body Mass Index (kg/m ²)	26.2 ± 7.6	26.3 ± 6.5	0.590
Concomitant Cardiac Surgery	4 (5.7%)	39 (55.7%)	<0.001
Intraoperative Characteristics			
Ischemia Time (min)	254 ± 57	256 ± 59	0.907
CPB Time (min)	-	154 ± 73	

Values presented as mean ± standard deviation or percent of population.
CPB = cardiopulmonary bypass; ECMO = extracorporeal membrane oxygenation; FEV₁ = forced expiratory volume in one second; FVC = forced vital capacity; GERD = gastroesophageal reflux disease; MV = mechanical ventilation; PAP = pulmonary artery pressure; PCWP = pulmonary capillary wedge pressure; PPH = primary pulmonary hypertension.

Discussion

- The use of CPB does not negatively affect short- or intermediate-term outcomes after single lung transplantation.
- The use of CPB itself does not increase the risk of postoperative primary graft dysfunction when compared to a cohort of similar illness severity.
- In selected patients, CPB may allow for safer procedures and improved technical outcomes. The use of CPB may allow for concomitant cardiac surgical procedures without decrement in outcomes.
- Long-term rates of CLAD are unaffected by the use of CPB, suggesting any pro-inflammatory effects of CPB are temporary and do not affect progression to chronic rejection.

Limitations:

- Retrospective, single-center design with limitations in statistical power.
- Subtle variation in treatment strategies and practices over the time period may confound outcomes.

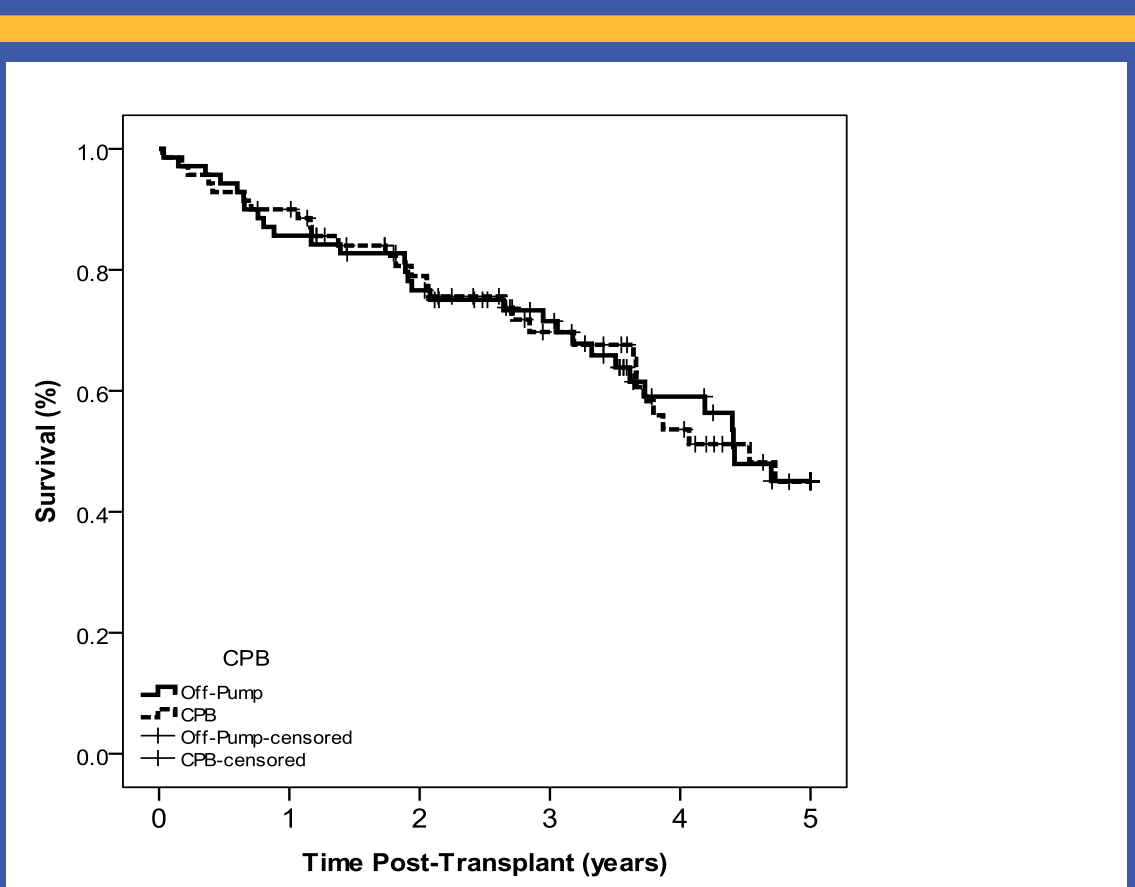
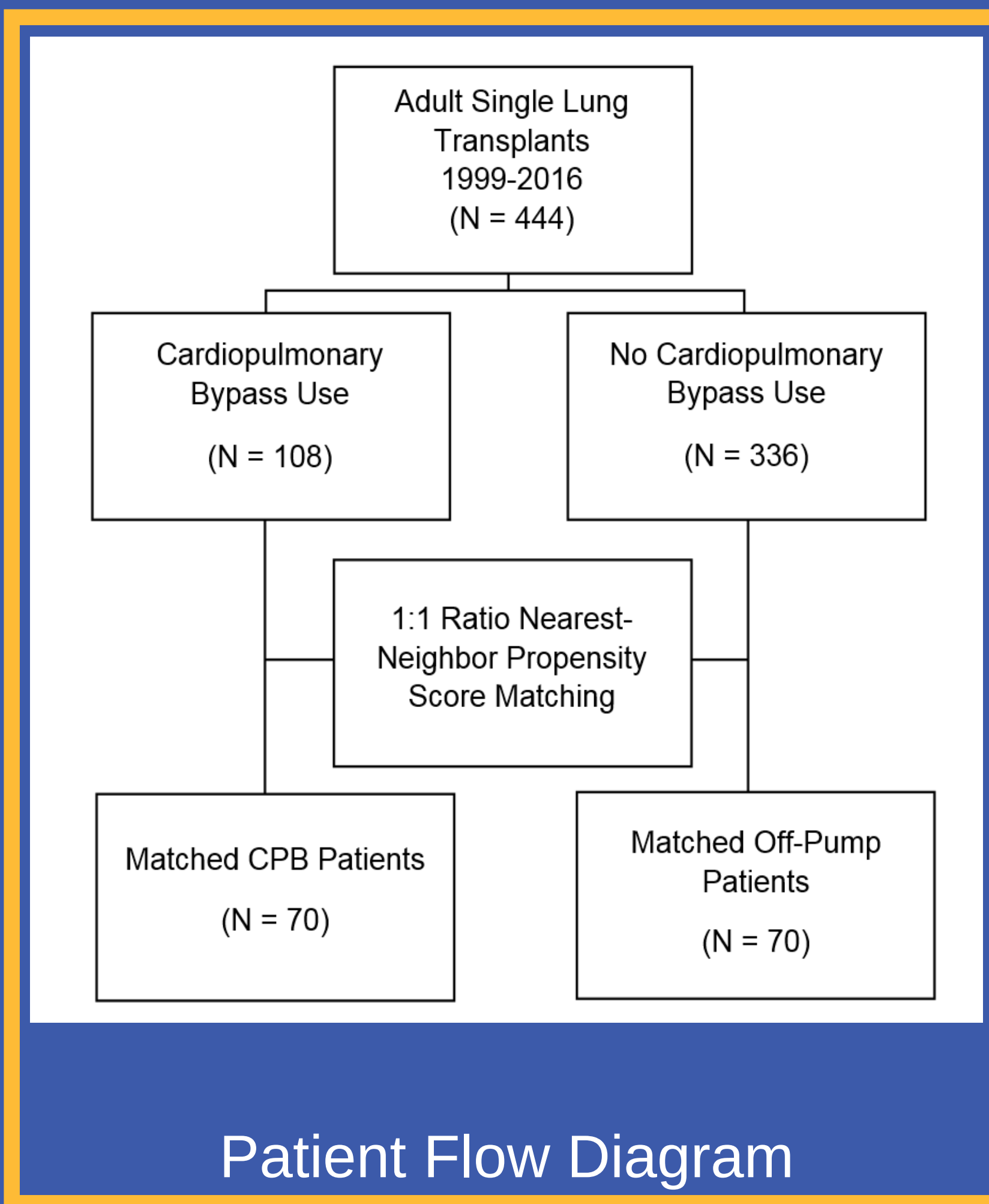
Conclusions

Single lung transplantation can be safely performed using CPB in patients with terminal lung diseases and achieve equivalent short- and intermediate-term survival outcomes to patients undergoing single lung transplantation off pump.

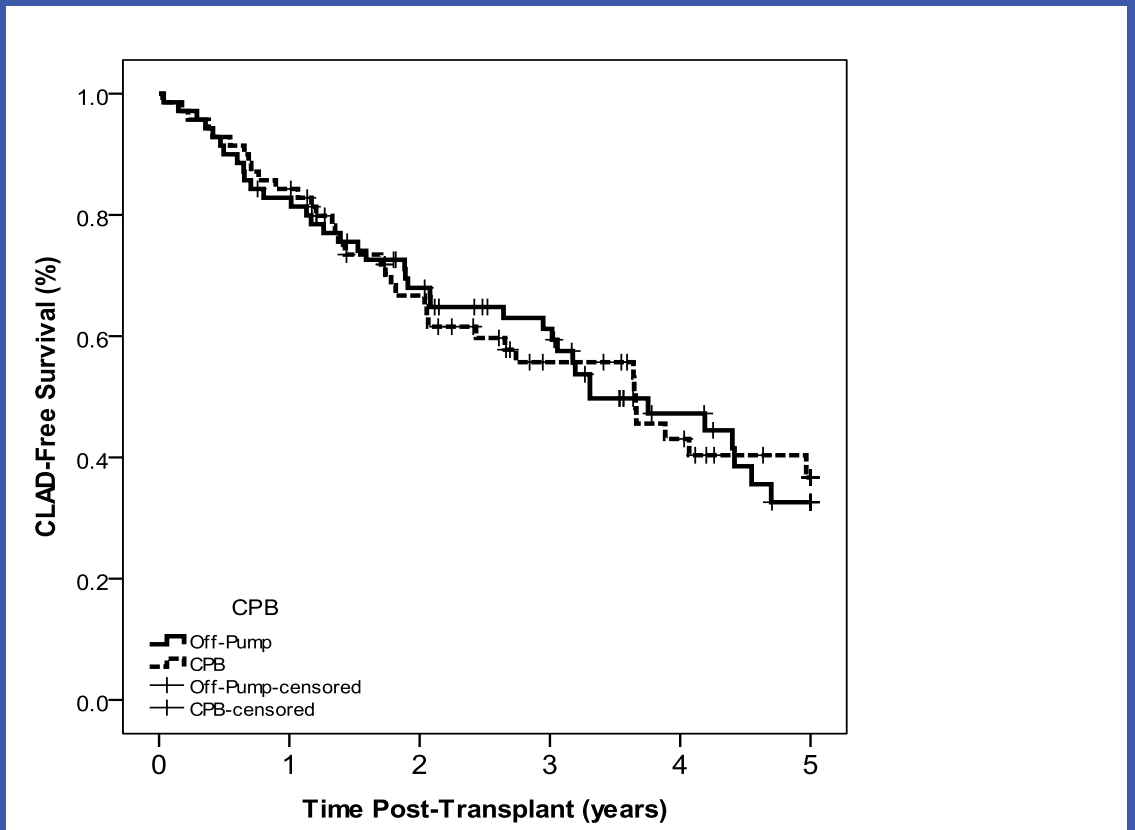
CPB does not affect long-term graft rejection rates and may be considered if necessary to facilitate safe procedural outcomes.

Disclosures

No authors for this presentation have relevant financial interests to disclose.



Survival by CPB Use (p=1.0)



CLAD-Free Survival by CPB Use (p=0.942)

Variables	Off Pump (N=70)	No CPB (N=70)	p-value
PGD @ 0-Hr			0.479
0/1	58 (82.9%)	54 (77.1%)	
2	8 (11.4%)	13 (18.6%)	
3	4 (5.7%)	3 (4.3%)	
PGD @ 24-Hr			0.248
0/1	66 (94.3%)	62 (88.6%)	
2	3 (4.3%)	3 (4.3%)	
3	1 (1.4%)	5 (7.1%)	
PGD @ 48-Hr			0.507
0/1	65 (92.9%)	62 (88.6%)	
2	2 (2.9%)	5 (7.1%)	
3	3 (4.3%)	3 (4.3%)	
PGD @ 72-Hr			0.843
0/1	65 (92.9%)	66 (94.3%)	
2	2 (2.9%)	1 (1.4%)	
3	3 (4.3%)	3 (4.3%)	
Tracheostomy	4 (5.7%)	6 (8.6%)	0.512
Postoperative ECMO	0 (0%)	0 (0%)	1.000
Mechanical Vent Time (days)	1 (1-1)	1 (1-1)	0.654
Intensive Care Unit LOS (days)	3 (2-4)	4 (2-6)	0.061
Total Hospital LOS (days)	12 (10-17)	12 (10-17)	0.905
30-day Mortality	1 (1.4%)	1 (1.4%)	1.000

CPB = cardiopulmonary bypass; ECMO = extracorporeal membrane oxygenation; LOS = length of stay; PGD = primary graft dysfunction.