The Incidence of Chronic Lung Allograft Dysfunction after Cadaveric Lobar Lung Transplantation is Comparable to Conventional Lung Transplantation

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Background

- Cadaveric lobar lung transplantation (L-LTx) is developed to overcome donor-recipient size mismatching. [1]

EXAMPLES OF LOBAR LUNG TRANPLANTATION [1]

- Controversial short- and long-term outcomes following L-LTx has been reported compared to conventional lung transplantation (C-LTx). [2]
- The ischemia-reperfusion injury is associated with primary graft dysfunction (PGD) and increased mortality in LTx recipients. [3]
- The reported higher incidence of PGD following L-LTx may particularly be an important contributor to the development of chronic lung allograft dysfunction (CLAD). [4] However, this question remains unanswered for the lung-transplant community.

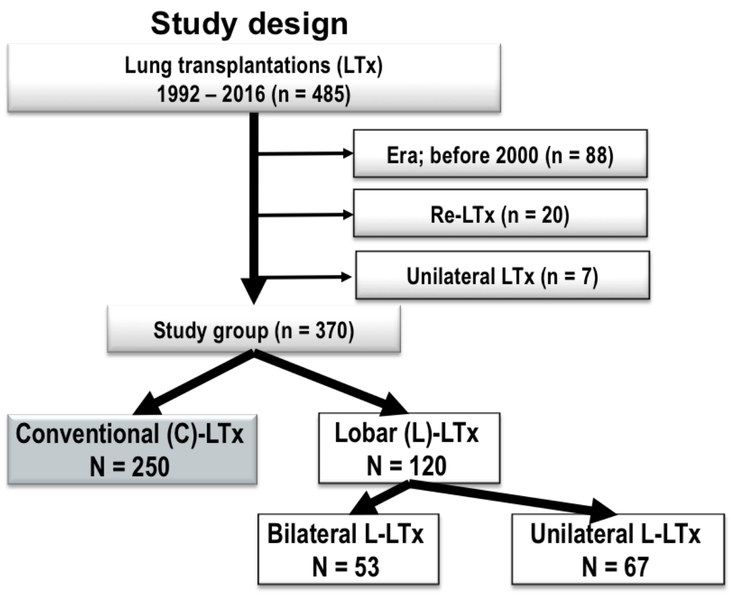
References:

1. **Inci I, et al. Ann Thorac Surg. (2013)**
2. **Eberlein M, et al. World J Transplant. (2017)**
3. **Carter YM, et al. Semin Thorac Cardiovasc Surg. (2008)**
4. **Lobo LJ, et al. Transplantation. 2014**

Hypothesis & Purpose

- We hypothesized that the incidence of CLAD does not differ between Lobar and Conventional LTx.
- The aim of this study was to compare the incidence of CLAD and long-term outcomes between L-LTx and C-LTx.

Methods



Results

Recipient sex and the underlying diagnosis were significantly different between Conventional- and Lobar-LTx.

Patients' characteristics			
Parameters	**C-LTx (n = 250)**	**L-LTx (n = 120)**	**P-value**
Age (years), median (IQR)	51 (33-60)	45 (26-59)	0.14
Sex			
Male; n (%)	149 (60)	49 (41)	*0.001
Female; n (%)	101 (40)	71 (59)	
Diagnosis; n (%)			
Cystic Fibrosis	81 (32)	46 (38)	
COPD	89 (36)	21 (18)	*0.001
IPF	37 (15)	38 (32)	
PPH	15 (6)	5 (4)	
Others	28 (11)	10 (8)	
BMI, median (IQR)	21 (18-25)	20 (18-25)	0.28
CRP (mg/L), median (IQR)	6 (2-18)	8 (3-24)	0.23
Time from listing to LTx (days), median (IQR)	196 (78-333)	162 (60-279)	0.12

C-LTx, conventional lung transplant; L-LTx, lobar lung transplant; IQR, interquartile range; COPD, chronic obstructive pulmonary disease; IPF, idiopathic pulmonary fibrosis; PPH, primary pulmonary hypertension; BMI, body mass index; CRP, C-reactive protein.

Donor height was significantly higher compared to recipients in the Lobar-LTx group.

Donor characteristics			
Parameters	**C-LTx (n = 250)**	**L-LTx (n = 120)**	**P-value**
Age (years), median (IQR)	48 (33-59)	45 (34-57)	0.61
Sex			
Male; n (%)	134 (54)	96 (80)	*0.001
Female; n (%)	116 (46)	24 (20)	
Donor P/F ratio (kPa), median (IQR)	45 (33-55)	46 (36-56)	0.36
Donor – Recipient size mismatch			
Donor height (cm), median (IQR)	170 (165-180)	180 (172-185)	*0.001
Recipient height 9cm), median (IQR)	170 (163-176)	164 (158-170)	

C-LTx, conventional lung transplant; L-LTx, lobar lung transplant; IQR, interquartile range; P/F, PaO2/FiO2; cm, centimeters.

Lobar-LTx were associated with increased intraoperative ECLS usage, longer operation time and ICU stay, increased renal replacement therapy, complication rate and PGD3 at 48h.

Perioperative outcomes			
Parameters	**C-LTx (n = 250)**	**L-LTx (n = 120)**	**P-value**
Preoperative ECLS use; n (%)	16 (6)	13 (11)	0.1
Intraoperative ECLS use; n (%)	108 (43)	76 (63)	*0.001
Total operation time; minutes (median, IQR)	400 (346-465)	440 (374-510)	*0.006
Mechanical ventilation; days (median, IQR)	1 (1-2)	1 (1-4)	0.08
ICU stay; days (median, IQR)	3 (2-8)	5 (2-17)	*0.012
CVVH; n (%)	21 (8)	19 (16)	*0.03
Postoperative complication, any; n (%)	95 (38)	59 (49)	*0.03
PGD scoring; n (%)			
PGD grade 3 @ 0h	33 (28)	21 (31)	0.88
PGD grade 3 @ 24h	12 (10)	15 (22)	0.1
PGD grade 3 @ 48h	12 (10)	17 (25)	*0.049
PGD grade 3 @ 72h	12 (10)	16 (24)	0.08

C-LTx, conventional lung transplant; L-LTx, lobar lung transplant; ECLS, Extra corporeal life support; IQR, interquartile range; ICU, intensive care unit; CVVH, continuous veno-venous hemofiltration; PGD, primary graft dysfunction.

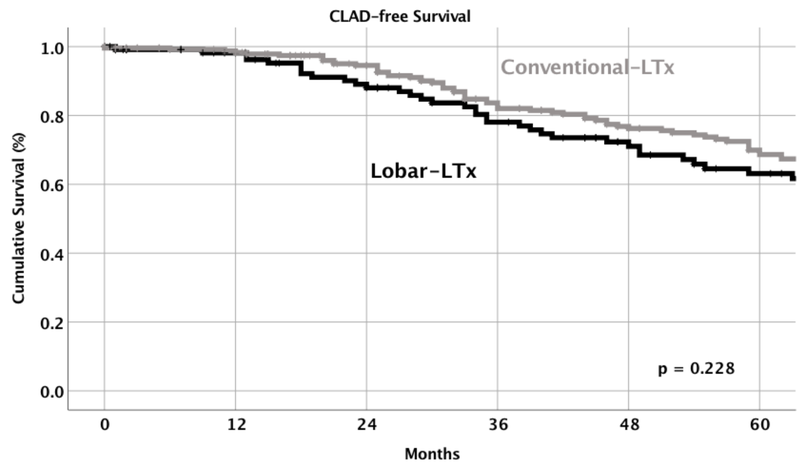
Recipient age, lobar LTx, intraoperative ECLS use, ICU stay and dialysis were risk factors of mortality

Multivariate analysis of risk factors for mortality			
Variable	**Relative risk**	**95% CI**	**P-value**
Recipient age	1.022	1.011-1.034	*0.001
Lobar-LTx	0.651	0.467-0.907	*0.012
Intraoperative ECLS use	1.521	1.072-2.157	*0.018
ICU stay	1.009	1.004-1.014	*0.005
CVVH	1.81	1.086-3.016	*0.03

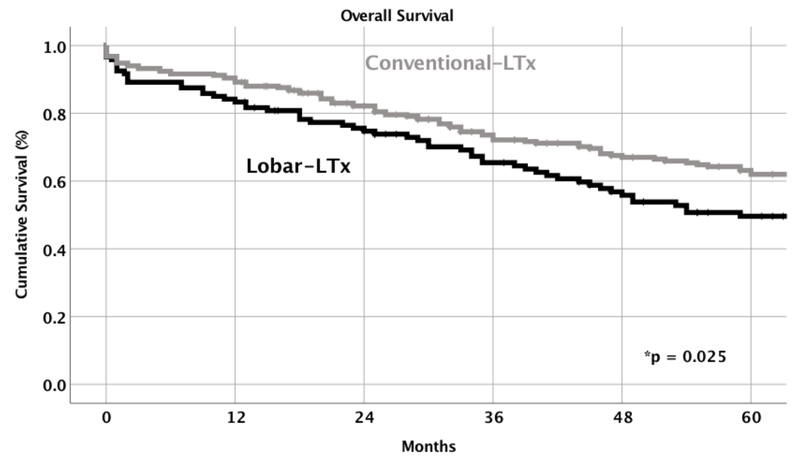
CI, confidence interval; LTx, lung transplantation; ECLS, Extra corporeal life support; ICU, intensive care unit; CVVH, continuous veno-venous hemofiltration.

Results

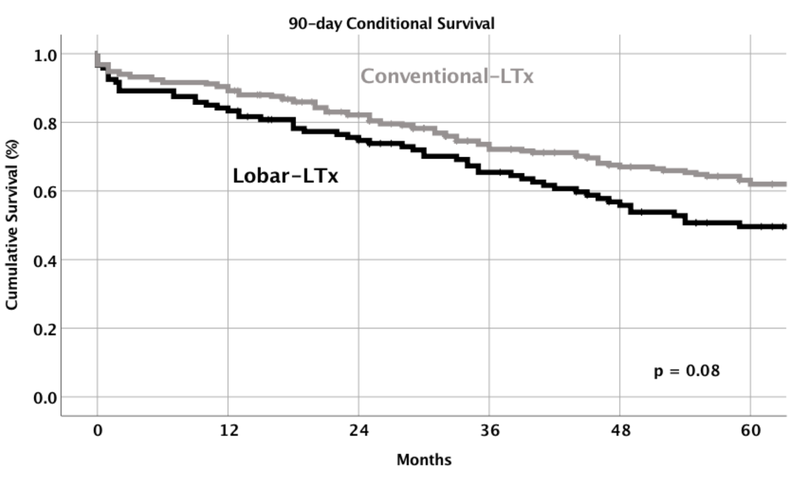
The incidence of CLAD was comparable between Conventional- and Lobar-LTx.



The overall survival was inferior in the Lobar-LTx group.



However, after excluding the 90-day mortality the overall survival became comparable between groups.



Conclusions

- CLAD-free survival was comparable between Conventional- and Lobar-LTx.
- Overall survival following Lobar-LTx was inferior compared to Conventional-LTx. This discrepancy disappeared after implementing the 90-day conditional survival into the cohort.
- Given the ongoing donor organ shortage, cadaveric Lobar-LTx is still a viable option, especially for small and urgently listed patients.

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Relevant Financial Relationship Disclosure Statement

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No financial relationships to disclose