Exceptional LAS Requests in Eurotransplant

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Purpose: A total of 180 lung transplantations (LTx) were performed at a single center in Saudi Arabia. 92% of our donors were marginal. The criteria of deceased brain dead donors represent unique differences that bring unique challenges. This report highlights the challenges, management strategies and outcomes.
Methods: The LTx Program at King Faisal specialist hospital was established in 2000. Over the last 9 years the program has witnessed rapid growth. Retrospective review of 180 patients and their donors that underwent LTx at our center between January 2010 and September 2019.
Results: The most common indication for LTx was pulmonary fibrosis (40%), followed by cystic fibrosis (CF)-related bronchiectasis (24%), non-CF-related bronchiectasis (21%), chronic obstructive pulmonary disease (4%), sarcoidosis (3%), Microtithiasis (3%).Regarding Lung donors (LDs) 92% of our lungs were marginal. 10% age >55 years, 16% PO2 <300 mmhg, 32% abnormal CXR, 22% Purulent secretions on bronchoscopy, 83% Prolonged ventilation more than 5 days with a mean duration of mechanical ventilation (MV) of 9+/-7 (days). Bacterial colonization was noted in 74% of LDs, including multidrug-resistant bacteria such as acinetobacter (31%), klibsiellae (24%) and pseudomonas (12%). Over the last 5 years extracorporeal membrane oxygenation (ECMO), was used in 21.5% of our LTx as a rescue strategy for grade 3 primary graft dysfunction with 30 days survival of 92% and 1 year survival 88%. *Ex vivo* lung perfusion was used to expand our pool of LDs, 9 successful cases from 20 attempts were performed over the last 5 years. In spite of the liberal utilization of marginal donors and prolonged post lung transplantation mechanical ventilation {Median (range)} 11 (1-145 days), length of ICU stay 14 (3-145) and length of hospital stay 36 (12-168), our 30 days, 90 days, 1 year, 3 years and 5 years survival rates were 94.3%, 89%, 87.5%, 76% and 62.5% respectively which is comparable to the international standards.
Conclusion: Shortage of good donors forced us to use extended criteria to transplant moderate and high risk patients. The selective use of Ex vivo and ECMO helped to achieve comparable results. Marginal donors even with bacterial colonization can be successfully utilized for LTx.

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Prone Ventilation in Brain-Dead Organ Donors Acutely Increases Oxygenation and Results in More Lungs Transplanted

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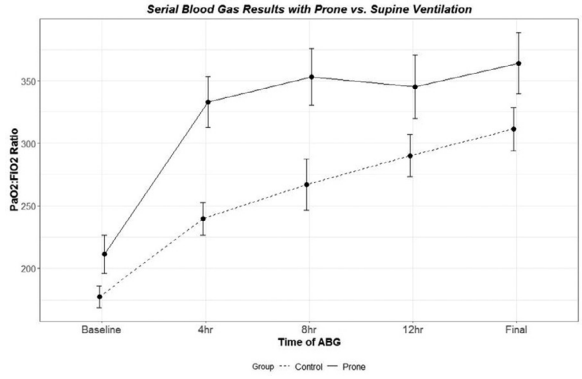
Purpose: A PaO2/FiO2 ratio (PFR) above 300 is a primary donor criterion for lung transplantation. Absence of cough and respiratory drive in the brain-dead (BD) donor results in basilar atelectasis, contributing to V/Q mismatching and hypoxemia. We hypothesized that ventilating BD donors in the prone position would result in better V/Q matching, increased PFR, and more lungs transplanted.
Methods: All BD donors at our OPO are treated with a lung-protective ventilation strategy, recruitment maneuvers and repeated fiberoptic bronchoscopy (FOB). Since June 2018, a prone ventilation protocol was instituted for donors meeting the eligibility criteria: 12-70 years old, basilar atelectasis on X-ray or CT, and a PFR <300 after the first FOB. Eligible donors were placed in the prone position for at least 12 hours with all routine treatments continued. PFR was measured at four, eight, and twelve hours, as well as prior to procurement, and change calculated from baseline (ΔPO_2). The control group consisted of 81 hypoxemic donors treated with routine care in the supine position in the two years prior.
Results: In 14 months, 27 donors met eligibility criteria and were enrolled. Median baseline PFR was 222 mm Hg (IQR 181-270) compared to 187 (116-250) in controls (p=0.06). PFR increased more after four hours of prone ventilation (102 vs. 54 mm Hg, p=0.01), to 348 mm Hg (269-409) versus 264 (156-339) with supine ventilation. At 12-hours, there was a trend for PFR to remain higher: 351 (260-434) vs. 280 (157-358, p=0.13). Final PFR was 385 mm Hg (328-424) vs. 289 mm Hg (219-440, p=0.09) although ΔPO_2 was comparable. However, more lungs were transplanted in the prone group (14 of 27 donors, 52%) compared to 23% in the control group, an effect persisting after adjusting for baseline PFR (OR 3.0, 95% CI: 1.2-7.8, p=0.02).
Conclusion: Prone ventilation acutely improved oxygenation in hypoxemic BD organ donors with basilar atelectasis relative to those managed in the supine position and resulted in more lungs transplanted.



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Disparities in the Lung Allocation Score Due to Geography Have Not Changed Since November 2017

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Purpose: Differences in geographic donor lung availability affect waitlist outcomes. We hypothesized that the lung allocation score (LAS) at transplant and waitlist time would vary based on local donor lung availability and that broader geographic sharing since November 2017 would improve these disparities.
Methods: Using UNOS data, we conducted a retrospective cohort study of 23,414 lung transplant recipients from January 1, 2006 - December 31, 2018. Local lung availability was defined as the ratio of donor lungs to waitlist candidates in the local donation service area. We calculated the local lung availability for candidates prior to November 25, 2017. We used mixed multivariable linear regression and Poisson regression, adjusting for time dependent LAS changes, to examine the relationship between local lung availability, LAS at transplant and waitlist time. We used Wilcoxon rank-sum to compare LAS at transplant before and after November 2017.
Results: Compared to recipients in the top quartile with greatest local lung availability, recipients in the lowest quartile were transplanted with a LAS 6.2 points higher (95% CI: 5.6-6.9, p <0.001) and waited significantly longer, 186 days (95% CI: 178-194) compared with 93 days (95%CI: 88-97), p <0.001. This difference varied by transplant type, with single lungs recipients transplanted with a LAS 2.0 points higher in the lowest quartile (95%CI: 0.9-3.0, p < 0.001) compared with the top and double lung recipients transplanted with a LAS 8.8 points higher (95% CI: 8.0-9.6, p<0.001) in the lowest quartile compared with the top. At centers in the lowest quartile of local lung availability, the LAS at transplant did not meaningfully change after November 2017 (44.1 ± 15.2, compared to 45.7± 16.3, p=0.042), however the waitlist time did decrease from 206 days (95%CI: 192-222) to 155 days, (95% CI: 133-176), p <0.001. The LAS at transplant and waitlist time for recipients did not change at high local lung availability centers (50.7 ± 19.6 compared to 51.3 ± 19.6, p=0.38, and 74 days (95%CI: 66-81) compared to 61 days (95%CI: 52-70), p=0.66).
Conclusion: Prior to November 2017, low local lung availability was associated with longer waitlist times and higher LAS at transplant that were much more pronounced for double lung recipients. Since expanding allocation to 250 miles, meaningful differences in LAS at transplant have not yet been observed.

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Exceptional LAS Requests in Eurotransplant: Analysis of an 8-year Effort to Improve Lung Allocation for Precarious Patients

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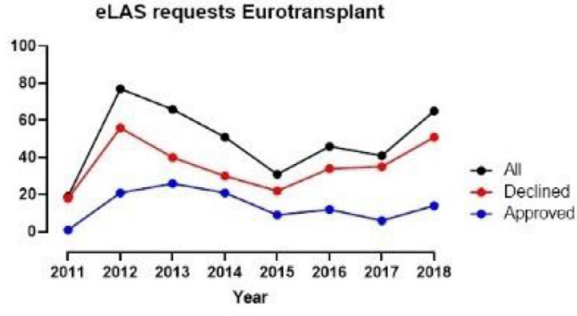
Purpose: Following introduction of the lung allocation score (LAS) in 2011, Eurotransplant member centers can apply for an exceptional LAS (eLAS) if the calculated LAS insufficiently reflects the perceived transplant benefit for a patient, specifically in case of primary pulmonary hypertension group 1 and 4; combined lung+non−renal transplantation; rare diseases; or extracorporeal support. Each eLAS proposal is evaluated by a LAS Review Board, consisting of ≥3 lung transplant experts, which subsequently declines or approves the eLAS request in consensus of ≥3 votes. In case of a lower than accepted score, predefined business rules to assign LAS percentiles are used.

Methods: A retrospective analysis of all eLAS requests in Eurotransplant from December 2011 until September 2019.

Results: Overall, 5183 lung transplants (deceased donors) were performed and 420 eLAS requests were made (Germany 52%, Netherlands 18%, Austria 18%, Belgium 13%), of which 116 (28%) were approved. Most eLAS requests concerned group B/Pulmonary vascular disease (44%), followed by group C/Cystic fibrosis or immunodeficiency disorder (28%), then group D/Restrictive lung disease (15%) and finally group A/Obstructive lung disease (11%); whereas 10 patients (2%) were not classified. The proportion of accepted eLAS requests significantly differed between countries (Germany 25%, Netherlands 37%, Austria 20%, Belgium 36%) (p=0.042). eLAS requests decreased in the Netherlands following its LAS introduction in 2014 (2011-2014 mean 13/yr vs. 2015-2019 mean 4.6/yr; p=0.060). However, since 2015 an overall annual increasing number of eLAS requests is seen, with doubling of the eLAS requests in 2018 vs. 2015, but no difference in acceptance rate (2015-2018: 22.4%) (Figure). Acceptance rates were 38% for Group B, 21% for Group C, 20% for Group D and 11% for Group A.

Conclusion: The observed variations require further investigation to optimize lung allocation for specific patient populations in Eurotransplant.



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Lung Transplantation from Controlled and Uncontrolled Donation after Circulatory Death Donors. Single Centre Experience

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Purpose: We started our uncontrolled donation after circulatory death (DCD) experience in 2014 with the first successful lung transplantation (LT). After a long period of local logistical reassessment, in 2017 we resumed the process managing both uncontrolled and controlled DCD. This cohort study reviews early outcome of our initial series of LT from DCD donors and matches it with the outcome of patients transplanted with graft from donation after brain death (DBD) donors in the same period.

Methods: This is a single-institution, retrospective study on data collected prospectively from adult patients who underwent bilateral LT at our Centre between 10/2017 and 07/2019. Our DCD procurement protocol consists of: 1) an in situ graft preservation with open-lung approach (cPAP); 2) non-rapid normothermic lung procurement isolated (only-lung uncontrolled setting) or during abdominal normothermic regional perfusion, namely without pleural topical cooling before the start of PA flushing (multiorgan controlled setting); 3) ex-situ assessment/evaluation with machine perfusion (EVLP or OCS) before LT.

Results: In the study period 51 subjects respected inclusion criteria (Table). Ten of these were from DCD donors (19.6%; 6 cDCD and 4 uDCD). The flow-chart shows the DCD experience (Image).

Conclusion: Our DCD program increased the LT number with an adequate early-intermediate outcome, despite extended periods of warm ischemia. Our results suggest that LT from DCD donors is feasible in controlled and uncontrolled setting, in isolated and combined organs procurement.

Variables	DCD group	DBD group
Number of lung transplantations	10	41
Donor		
Gender, male	9 (90%)	28 (68.3%)
Age, years, median (95% CI)	54 (47.3 to 60.1)	50 (37.7 to 53.0)
cDCD ISHLT-interval 1, minutes, median (95% CI)	12 (5 to 25)	NA
cDCD ISHLT-interval 3, minutes, median (95% CI)	176 (122 to 191)	NA
Time from PA flush to 1st lung reperfusion (without machine perfusion time), minutes, mean (95% CI)	640 (505 to 775)	435 (386 to 483)
Recipients		
Gender, male	23 (56%)	5 (50%)
Age, years, median (95% CI)	42 (24.9 to 51.5)	37 (31.7 to 48.4)
Disease: CF, COPD, IPF	7; 2; 1 (70%; 20%; 10%)	27; 4; 10 (66%; 10%; 24%)
LAS, median (95% CI)	40 (34.9 to 49.3)	40.5 (38.4 to 45.5)
Machine perfusion rate	100%	17.6%
Intraoperative ECMO	6 (60%)	20 (50%)
Postop. MV, days, median (95% CI)	2 (1 to 4)	1 (1 to 1)
30-day mortality rate	0%	0%
1-year mortality rate	0%	2%
Best FEV1, mean (95% CI)	82.7 (69.3 to 96.0)	90.1 (84.2 to 95.9)
Airway complication	2 (20%)	3 (7.3%)