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How to Resolve Large Atelectasis in Ex Vivo Lung Perfusion?

T. Okamoto,¹ H. Niikawa,² D. Wheeler,³ B. Soliman,¹ K. Ayyat,² G. Sunagawa,⁴ K.R. McCurry.⁵ ¹Transplant Center, Cleveland Clinic, Cleveland, OH; ²Pathobiology, Lerner Research Institute, Cleveland Clinic, Cleveland, OH; ³Pediatric Respiratory Therapy, Medical University of South Carolina, Charleston, SC; ⁴Biomedical Engineering, Lerner Research Institute, Cleveland Clinic, Cleveland, OH; ⁵Thoracic and Cardiovascular Surgery, Cleveland Clinic, Cleveland, OH.

Purpose: Donor lung atelectasis, especially if it is large, is sometimes resistant to standard recruitment maneuvers during donor management or procurement resulting in a persistently low P/F ratio. This results from the atelectatic area having a significantly lower compliance and higher critical opening pressure. Such difficulties can persist during ex vivo lung perfusion (EVLP) decreasing the rate of conversion to transplantable lungs. The aim of this study was to investigate the characteristics of atelectasis in donors and the optimal protocol of lung recruitment of large atelectasis in the context of EVLP.

Methods: The size of atelectasis during lung procurement was recorded in standard donors (n = 22) and rejected donors (n = 23). Rejected donor lungs with large atelectasis (average percent of atelectasis in lower lobe > 50%) were procured for research use and perfused in Swedish EVLP (n = 16). In the bagging group (n = 4), bagging technique was utilized to eliminate atelectasis in EVLP, if the conventional recruitment maneuver was not successful. In the selective ventilation group (n = 12), selective lower lobe recruitment was performed in the back table of donor hospital, by using a pediatric tracheal tube placed in lower lobe and delivering maximum 30 cmH₂O of PEEP to lower lobe. ABG, physiological parameters and transplant suitability of each lung were evaluated at 2 hour of EVLP.

Results: The average percentage of atelectasis was significantly higher in rejected donors than in standard donors (p < 0.05, 75.0 ± 5.2 vs. 22.0 ± 3.3%). There was a significant correlation between the size of atelectasis and P/F ratio of donor (R = -0.75, p < 0.0001) as well as between body mass index (BMI) and P/F ratio of donor (R = -0.50, p < 0.001). In all cases of the bagging group, atelectasis was not eliminated by conventional recruitment maneuver in EVLP and bagging maneuver resolved atelectasis, whereas all atelectasis was eliminated in the selective ventilation group. The selective ventilation group was associated with significantly higher rate of transplant suitability (p < 0.01, 83% (20/24) vs. 25% (2/8)) and better P/F ratio (338 ± 24 vs. 266 ± 81 mmHg) than the bagging group.

Conclusion: Donors with elevated BMI might have larger atelectasis, resulting in lower P/F ratio, compared with donor with normal BMI. Selective lower lobe recruitment in the back table is a safe and effective method of eliminating large lobar atelectasis before EVLP.

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Post-Lung Transplant Outcome & Risk Matching Between Donor & Recipient - Score-Based Analyses

K. Miyoshi, T. Kurosaki, S. Otani, S. Sugimoto, M. Yamane, T. Oto. Department of Thoracic Surgery/Organ Transplant Centre, Okayama University Hospital, Okayama, Japan.

Purpose: Pretransplant risk assessment for matching recipient and donor remains an empiric task mainly because there is no conclusive consensus for accurate donor evaluation policy. The aim of this study is to elucidate the impact of risk matching between donor and recipient on short to long-term outcomes after lung transplantation by using scoring systems for both recipients and donors.

Methods: 147 consecutive lung transplantations conducted between 1998 and 2015 at Okayama University Hospital were reviewed. Recipient severity and donor lung quality were graded by US lung allocation score and donor scoring system proposed by Oto et al (grading lungs on a scale of 0 to 18 points, Ann Thorac Surg 2007) respectively. Those scores were used to define pretransplant risk grades as follows: low risk recipient (LR) if LAS was <50; high risk recipient (HR) if LAS was ≥50; low risk donor (LD) if donor score was <5; high risk donor (HD) if donor score was ≥5. The impact of each score values and matching status on short and long-term outcomes were analyzed.

Results: HD transplant saw significantly higher grade of primary graft dysfunction (PGD) while HR patients did not. In the HR+LD group, a favorable short-term course (PGD grade and ICU stay) comparable to the LR+LD group was observed. However, as for long-term outcome, the HR+LD group had significantly worse survival. In the LR+HD group, however, there was a negative impact on PGD grade but no influence on long-term survival outcomes.

Conclusion: Donor risk might mainly influence not long-term but short-term graft performance while recipient risk is related to long-term survival outcomes. High-risk donor lungs (donor score >5) can be safely utilized if the matching to recipient condition is feasible.

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Lung Transplant from Donors After Previous Cardiac Surgery: Ideal Graft in Marginal Donor?

A. Pallechi,¹ D. Tosi,¹ P. Mendogni,¹ M. Montoli,¹ P. Tarsia,² V. Rossetti,² F. Valenza,³ M. Nosotti,¹ L. Santambrogio.¹ ¹Thoracic Surgery and Lung Transplant Unit, Fondazione IRCCS Ca' Granda - Ospedale Maggiore Policlinico, Milan, Italy; ²Pneumology Unit, Fondazione IRCCS Ca' Granda - Ospedale Maggiore Policlinico, Milan, Italy; ³Anesthesia and Intensive Care Unit, Fondazione IRCCS Ca' Granda - Ospedale Maggiore Policlinico, Milan, Italy.

Purpose: Lung transplant (Tx) has become the definitive therapeutic option for patients with end-stage lung disease, but the number of available donor limits this option. Despite the efforts to expand donor criteria, previous cardiac surgery (CS) is still considered a contraindication from large part of Tx centers. Previous CS could be a real risk factor for graft retrieval; thus, intrinsic technical challenges are expected. However, previous CS might not have necessarily damaged the lungs; on the other hand, the underlying cardiac disease could not have impaired lung function.

Methods: We report 4 cases of successful bilateral lung Tx from donors who had previous major CS. We review all donor data, procurement and Tx details, and features and outcomes of recipients. Two donors had valve replacement and 2 had coronary artery bypass. To note, the donors had one or more extended criteria but all were never-smokers. The first case required EVLP evaluation because assisted with VA-ECMO.

Results: Despite technical challenge (Figure 1), all procurements were uneventful, without lung damages or waste of abdominal organs related to possible catastrophic events. Two recipients required ECMO bridge to Tx. Table 1 shows the early and long-term courses.

Conclusion: Our experience showed that lung procurement from donor who had previous CS is feasible and those grafts demonstrated good short and long term functions. Technical and anatomical problems are not necessarily related to quality and function of the lung. Therefore, it would be more accurate to consider the graft rather than the donor, being possible to find an ideal lung in this category of marginal donor.