Methods: We performed a retrospective cohort study of patients in the Lung Transplant Outcomes Group who received a bilateral lung transplant at our institution between 2004-2012 for idiopathic pulmonary fibrosis (IPF), chronic obstructive pulmonary disease (COPD), or pulmonary arterial hypertension (PAH). Patients with LV ejection fraction <50%, sarcoidosis, cystic fibrosis, or previous lung transplant were excluded. Thoracic echocardiograms performed during evaluation for transplant listing were analyzed by trained sonographers, blinded to other clinical information. PGD was defined as grade 3 PGD (PaO2/FIO2 ≤ 200 with allograft infiltrates) at 48 or 72 hours after reperfusion. The association between E/e’ and PGD was assessed with multivariable logistic regression. Results: Eighty-seven of 170 patients had interpretable E/e’ ratios (mean 6.7 ± 2.5). The median age was 57 [IQR 51, 60] years and 33 (38%) were female. Thirty-eight (44%) had COPD, 43 (49%) had IPF, and 6 (7%) had PAH. In unadjusted analysis, worsening diastolic function was associated with an increased odds of PGD (OR per one SD increase in E/e’ 1.76, 95% CI 1.07, 1.97, p=0.03). After adjusting for recipient age, body mass index, pre-transplant mean pulmonary artery pressure on right heart catheterization, and pre-transplant diagnosis, higher E/e’ remained an independent risk factor for PGD [OR per one SD increase in E/e’ 2.06, 95% CI 1.11, 3.80, p=0.02]. Conclusion: LV diastolic dysfunction is independently associated with PGD. We postulate that the chronically unloaded LV in the setting of advanced lung disease, worsening of LV relaxation due to a perioperative proinflammatory state, and acute volume loading during transplantation may result in higher left-sided filling pressures and pulmonary edema that may contribute to PGD.

Outcomes of High Emergency for More Than 1000 Lung Transplant Recipients Results of the Cohort of Lung Transplantation (COLT) Study

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Purpose: Lung transplantation (LT) is considered as a therapeutic option for patients with end-stage respiratory failure. COLT is a prospective cohort set up in order to identify predictive biological markers of chronic lung allograft rejection (CLAD), the main complication of LT. The continuing significant number of patients who die while on a waiting list for lung transplantation (LTx) prompted the French organ transplantation authorities to set up in 2007 a dedicated graft allocation strategy (High-Emergency), for patients with an abrupt worsening of their respiratory function. The objective is to study the clinical outcomes of High Emergency Lung Transplantation (HELT) from the COLT Lung Transplant recipients.

Methods: In September 2014, COLT comprised 1071 lung transplant recipients. From October 2009 to September 2014, 840 (76%) patients underwent bilateral lung transplantation, 25 (2%) lobar transplantation, 35 (3%) cardio-pulmonary and 171 (16%) mono-lung transplantation. 179 (17%) patients were transplanted in High Emergency. The mean follow-up is 2.5±1.3 years.

Results: The median time on waiting list was 184±266 days but waiting time under the high emergency status was 7.2+/−9.4 days. HE LT patients (n=179) and non HE LT patients (n=892) were comparable in term of pre-transplant data (sex, BMI, FEV1) except for age, the HE LT group being younger (38.1+/-14.3 vs 48.7+/-15.0 year, p<0.005) and for primary disease, with more cystic fibrosis, and idiopathic pulmonary fibrosis in the HE LT group. Donor data were comparable in both groups. HE LT patients significantly received more blood products (p<0.05), were ventilated longer (p<0.05), and more frequently dialyzed (p<0.05). The actuarial survival rates of non HE LT patients were respectively 84.4% (n=602) and 79% (n=410) at 1 and 2 years. Concerning HE LT patients, the actuarial survival rates were respectively 74% (n=117) and 67% (n=73) at 1 and 2 years.

Conclusion: This clinical analysis of 1071 lung transplantations shows encouraging results of High Emergency procedure. Our data demonstrate that the new Lung Transplantation allocation rules implemented in France since 2007 (HELT) allows a rapid organ procurement for patients at imminent risk of death, and is feasible with an acceptable survival (74% at 1 year).

17 Frailty Is Associated With Pre-Operative Delisting and Death in Lung Transplant Candidates

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Purpose: Frailty is associated with morbidity and mortality in other solid organ transplant populations. It is under-examined in lung transplant, however. We measured frailty prevalence, construct validity, and association with delisting or death before transplant in candidates for lung transplant.

Methods: We performed a preliminary analysis of lung transplant candidates from four U.S. centers enrolled in the Lung Transplant Body Composition prospective cohort study. Frailty was assessed by the Fried Frailty Index (FFI; range 0-5, higher score denotes poorer functioning) as well as the Short Physical Performance Battery (SPPB; range 0-12, lower score denotes poorer functioning). Because sarcopenia (low muscle mass) may underpin the frailty phenotype, we measured muscle mass by whole-body DEXA and calculated the appendicular skeletal muscle index (ASMI) in a subset of subjects. We evaluated construct validity by testing correlations between frailty measures and ASMI, forced vital capacity % predicted (FVC %), body mass index (BMI), age, six minute walk distance (6MWD), and Lung Allocation Score (LAS). To evaluate predictive validity, we determined the association between frailty measures and delisting or death on the waitlist with logistic regression.

Results: By FFI, 38% were frail (n = 133/351) and 12% by SPPB (n = 25/206). The strength and direction of correlations between the FFI and SPPB and other measures were as hypothesized. Worse frailty scores correlated with lower ASMI (FFI: -0.35; SPPB 0.18), lower 6MW (FFI: -0.26; SPPB: 0.36), and higher LAS (FFI: 0.32; SPPB: -0.54) (all p<0.05), but not with age, BMI, or FVC %.

Unadjusted analyses, each 1-point worsening in the FFI or SPPB was associated with ~1/3-increased odds of delisting or death before transplant (FFI: OR 1.37, 95% CI: 1.07-1.77; SPPB: OR 1.32, 95% CI: 1.13-1.55). After adjusting for age, gender, FVC %, BMI, creatinine, LAS, and center, the SPPB, but not FFI, remained significant (OR: 1.38, 95% CI: 1.02-1.88).

Conclusion: The FFI and SPPB exhibit reasonable construct validity as frailty measures in lung transplant candidates. Frail patients appear to be at increased risk of delisting or death prior to transplant. Further work will examine the relationship between pre-operative frailty and mortality after transplant. Refinement of the frailty construct may improve its prognostic utility in this population.

18 Association of Thoracic Muscle Cross-Sectional Area and Clinical Outcomes in Lung Transplant Candidates

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Purpose: Approximately two-thirds of lung transplant (LTx) candidates have reduced skeletal muscle mass, however its clinical significance remains undefined. The objective of this study was to assess the association of thoracic muscle cross-sectional area (CSA) from computed tomography (CT) with six minute walk distance (6MWMD), quadriceps training volumes, health related quality of life (HRQOL), and hospital length of stay.

Methods: Thoracic CT scans were analyzed from 169 LTx candidates who had available pulmonary rehabilitation data and HRQOL (Short-Form 36) at the time of transplant listing (2004-2009), and survived to transplantation. Thoracic skeletal muscle CSA (pectoralis, intercostal and paraspinal muscles) was quantified using a single slice at the carina utilizing the density range
for skeletal muscle (~29 to 150 Hounsfield Units; Slice-O-Matic software). One-way ANOVA was used to assess variance across muscle CSA quartiles, with a post test for linear trend. Multivariable linear regression was applied to characterize the relationship between CSA and exercise capacity (6MWD), quadriiceps training volumes, HRQL, and post-transplant hospital length of stay controlling for age, gender, BMI, and diagnosis.

Results: LTX candidates in the lowest CSA quartile (Q1; CSA 60 ± 9 cm²) vs. highest quartile (Q4; CSA 127 ± 15 cm²) were more likely to be female (86% vs. 5%), have lower BMI (22.4 ± 4.0 vs. 25.8 ± 3.8 kg/m²), and have COPD (60% vs. 19%), p < 0.01. 6MWD (Q1: 296 ± 113 vs. Q4: 390 ± 104 m), quadriiceps training volumes (Q1: 30 IQR [20-30] vs. Q4: 40 [30-60] reps* lbs), SF-36 physical function score (Q1: 16.7 ± 13.9 vs. Q4: 27.4 ± 18.0) and hospital length of stay post-transplant (Q1: 23 IQR [17-51] vs. Q4: 15 [14-43] days) improved linearly across quartiles, p < 0.05. A 10 cm² difference in CSA was associated with differences in 6MWD (8.2 m 95% CI 0.4-16.1), quadriiceps training volumes (2.5 lbs*rep 95% CI 0.4-4.6), SF-36 physical function score (1.6 95% CI 0.4-2.7), but no significant difference in hospital length of stay (-3 days 95% -7 to 1.5).

Conclusion: Thoracic muscle CSA can be applied as a novel measure of skeletal muscle mass, which is associated with exercise capacity, quadriiceps training volumes and HRQL. Thoracic muscle CSA may have utility in predicting post-transplant outcomes, but requires further study.

19 Body Mass Index Impacts Short, Intermediate, and Long-Term Survival in Lung Transplantation
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Purpose: The effects of extremes of weight are poorly understood in the setting of lung transplant (LTX) with challenges in nutrition, rehabilitation, as well as preexisting co-morbidities. We sought to assess the impact of donor and recipient body mass index (BMI) on short (0-90days), intermediate (91-365 days) and long-term (>365 days) LTX survival.

Methods: The United Network for Organ Sharing data registry was queried for first-time recipients of single or double LTX from a cadaveric donor transplanted between 1987-2013 for recipients age 18-80 years at the time of the transplant and had data on recipient and donor BMI categorized as underweight (15-18.4 kg/m²), normal weight (18.5-29.9 kg/m²), obese (30-34.9 kg/m²), or morbidly obese (35-40 kg/m²). Short- and intermediate survival was assessed using logistic regression of survival 0-90 days, as compared to <90 days post-transplant; and survival to 365 days, as compared to surviving 91-365 days. Multivariable Cox proportional hazards models adjusted for characteristics of the recipient, donor, and transplant.

Results: 22090 LTX recipients met inclusion criteria. Compared to recipients in the normal weight category, underweight recipients had improved short-term survival (OR=1.23, 95% CI=1.07-1.4; p=0.004) and obese recipients worse (OR=0.88, 95% CI=0.78-0.99; p= 0.03). Obese recipients were less likely than normal weight recipients to survive 1-yr (OR=0.84; 95%CI=0.75,0.94; p=0.002). Recipients from obese donors were less likely to survive to 1-yr than recipients of lungs from normal weight donors (OR=0.81; 95%CI=0.71,0.91; p<0.001). Long-term conditional survival analyzed found differences in survival by recipient BMI (p<0.001) & donor BMI categories (p=0.048). Proportional hazards models found that obese recipients had increased mortality hazard compared to normal weight recipients (HR=1.15; 95% CI=1.07,1.23; p<0.001). Multivariable Cox model demonstrated elevated mortality in underweight (HR=1.13; 95%CI=1.01,1.26; p=0.03) and obese recipients (HR=1.14; 95%CI=1.04,1.26; p=0.007).

Conclusion: In a population based analysis, BMI heavily influences LTX survival for short, intermediate, & long-term. Underweight recipients may not have the physiologic reserve necessary to obtain optimum results while those with elevated BMI have challenges that may be attributed to their obesity.

20 Heart Transplantation From Donors Outside Standard Acceptability Criteria Using Ex-Vivo Normothermic Perfusion: The End of Donor Shortage?

Purpose: Utilization of the organs from high-risk donors may increase the number of orthotopic heart transplants (OHTx), however, with possible detrimental effect on outcomes. The Organ Care System (OCS) (TransMedics, MA, USA) allows organ evaluation during normothermic perfusion and reduces the cold ischemic time below 100 minutes with potential benefit for post-transplant results when transplanting extended criteria allografts. In this study we analyze the results of OHTx from donors outside standard criteria following ex vivo perfusion.

Methods: Between February 2013 and September 2014 (n=40) patients underwent heart transplantation at our institution using the OCS as a method of graft preservation and assessment. Fifteen patients received organs from standard criteria donors (group I) and 25 from extended criteria donors (group II) with at least one of the following risk factors; LV EF ≤50%, LV hypertrophy (LHV); interventricular septum in diastole >14 mm, donor cardiac arrest, coronary artery disease or donor death due to cocaine.

Results: Donor age: 41±11 (17-59 yo) gender F/M: 22:57/75%. Transport time was ≥2.5 hours in 19 donors. Seven donors had reduced LVEF ≤50%, seven had LHV, two donors died due to cocaine overdoses, ten had a previous cardiac arrest; 30±9 min and six palpable coronary artery disease.

Both groups (standard & extended criteria) were statistically comparable regarding recipient characteristics. Ex vivo perfusion parameters; lactate trend, haemodynamic data and ischemic times were also unaffected. No significant differences were observed on postoperative outcome. There was a trend towards less duration of mechanical ventilation in hours in the extended criteria group 56 (21; 125) vs. 100 (41; 336) (p=0.074). At follow up of 268 ± 64 days, biventricular graft function was comparable.

30-days, 90 days and 1-year survival (group I vs. II) was also similar: 92.9 vs.91.3; 84.4 vs. 87.5 and 84.4 vs. 81.6% (log rank p=0.832).

Conclusion: Transplantation of hearts from extended criteria donors with moderate left ventricular dysfunction, donor cardiac arrest, left ventricular hypertrophy or coronary artery disease is safe and feasible with normothermic ex vivo preservation as a method of graft assessment pre-implantation and therefore should be considered in times of donor shortage.

21 Technique of Adult Heart Procurement in the Donation After Circulatory Death Multi-Organ Retrieval Scenario
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Purpose: We describe our experience and technique of Donation after Circulatory Death (DCD) heart retrieval in the context of the multi-organ procurement process. The recent success of distantly procured DCD heart transplantation makes it imperative to refine the technique for rapid heart retrieval without jeopardizing other organs, particularly the liver given its vulnerability to ischaemia associated with a prolonged donor agonal phase.

Methods: 8 DCD hearts were procured under separate research and clinical transplant protocols at St Vincent’s Hospital Sydney, between June 2013 and October 2014. The hearts were retrieved for ex-vivo resuscitation on the TransMedics™ Organ Care System (OCS). Three of the 4 clinical cases were transplanted successfully.

After confirmation of donor death, a median sternotomy and laparotomy were concurrently performed. The heart and systemic venous system were immediately decompressed by cannulation of the right atrial appendage and rapid collection of blood for priming the OCS followed. The descending thoracic aorta was clamped and purse strings for the cardiac and pneumoplegia canulæ placed. Upon completion of blood collection, the inferior vena cava was transected and left atrial appendage incised. Antegrade cardioplegia, consisting of Modified...