

Prioritizing Heart Procurement in Organ Donors after Circulatory Death does not Jeopardize Lung Transplant Outcomes

Background:

Organ donation after circulatory death (DCD) has become a standard in liver, kidney and lung transplantation. Based on recent innovations in ex-vivo heart preservation, some heart transplant centers have now started to accept DCD heart allografts. As the heart has an only limited tolerance to warm ischemia, changes to the DCD organ procurement procedures are necessary. These changes entail delayed ventilation and prolonged warm ischemia for the lungs. It is unclear if this negatively impacts lung allograft function.

Methods

A retrospective analysis of DCD lungs transplanted between 2012 and May 2021 at the Medical University of Vienna was performed. Group 'heart+lung' consisted of cases where the heart was procured by a cardiac team for subsequent normothermic ex-vivo perfusion (EVP). A control group ('lungs') was formed by cases where only the lungs were explanted. In 'heart+lung' group cases, the heart procurement team placed their cannulas after circulatory death and a hands-off time, collected donor blood for EVP and performed rapid organ perfusion with Celsior solution. Subsequently the heart was explanted. Up to this point the lung procurement team did not interfere. No concurrent ventilation of the lungs or perfusion of the pulmonary artery was performed. After the cardiac procurement team left the table, ventilation was initiated and lung perfusion was performed directly through both pulmonary arteries using two large bore foley catheters. This study analysed procedural explant times, postoperative outcomes, PGD, length of mechanical ventilation and ICU stay as well as early survival.

Results

A total of 50 DCD lungs were transplanted. In 6 cases (12%), the heart was also procured ('heart+lung'). In 44 cases (88%), only the lungs were explanted ('lungs'). Basic donor parameters were comparable between groups. Median time from circulatory arrest to lung perfusion (24min vs 13.5min; $p=0.012$) and skin incision to lung perfusion (14min vs 5.5min; $p=0.003$) were significantly longer for 'heart+lung' procedures. However, this did not affect post-transplant PGD scores at 0 h ($p=0.767$), 24 h ($p=0.755$), 48 h ($p=0.866$) or 72 h (0.800). At 72 h after transplantation, none of the lungs in the 'heart+lung' but 1 (2.4%) in 'lungs' group were in PGD3. Median length of mechanical ventilation (41.5 h vs 41 h; $p=0.988$), ICU stay (9 d vs 5 d; $p=0.688$) and total hospital stay (28.5 d vs 24 d; $p=0.301$) were also comparable. The only in-hospital mortality was 1 patient in the 'lungs' group (2.3%).

Conclusion

Although prioritized DCD heart explantation is associated with delayed ventilation and significantly increased warm ischemic time to the lungs, early post lung-transplant outcomes are unchanged. Prioritizing heart perfusion and explantation in the setting of DCD procurement can be considered acceptable.

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