

Bilateral lung transplantation from a left ventricular assist device supported donor



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Retrieved bilateral lungs in a LVAD-supported donor.

CENTRAL MESSAGE

LVAD-supported donors should be considered for bilateral lung transplantation and not automatically declined when offered.

Left ventricular assist device (LVAD)-supported donors have often been declined for lung transplantation. Lung injury, major bleeding, and pulmonary hypertension due to previous heart failure are legitimate concerns. We present a case of bilateral lung transplantation from a donor supported by a HeartMate 3 (HM 3) LVAD. An informed consent and institutional review board approval were waived, considering the donor was brain dead and the family consented for research studies.

CASE REPORT

A 37-year-old female patient who had an HM 3 (Abbott) implanted 3 years previously was diagnosed with subdural hemorrhage and declared brain dead. The respiratory history was unremarkable, and the oxygen tension was 448 mm Hg. Radiograph of the chest and the computed tomography scan showed severe cardiomegaly, in situ LVAD, and mild bibasilar atelectasis (Figure 1). During the procurement, the sternotomy was postponed until the abdominal team had finished their dissection and were ready for cold-organ preservation. Re-entry of the sternum was achieved safely, but the device was embedded into the chest wall, prompting extension of the incision to a hemi-clamshell to allow for further dissection. The pulmonary artery was exposed. Direct measurement of pulmonary artery pressure and transpulmonary gradient were performed and were within normal range. The right atrium and the outflow graft were surgically vented. The aorta was crossclamped, and the heart with the attached device were explanted. The lungs were flushed with low-potassium dextran solution and standard lung donor procurement was performed. The dissection resulted in a minor parenchymal injury

that was repaired with pledgeted sutures and a surgical sealant. Donor incision to clamp was 4 hours and clamp to explantation was 70 minutes (Figure 2).

The lungs were allocated sequence #126 to a 62-year-old female patient with chronic obstructive pulmonary disease and lung allocation score of 33.18, who had been on the waitlist for 10 months. The lungs were implanted through a clamshell off-pump technique. The ischemic time was 295 minutes for the right and 411 minutes for the left lung. There were no air leaks or signs of primary graft dysfunction. The recipient was discharged on day 18 with no complications.

DISCUSSION

Reports detailing the recovery of lungs with old-generation LVADs have been published.¹⁻³ One bilateral lung transplant was described in Europe³ and none in the United States from a donor with HM 3. Lung recovery in the setting of previous LVAD implantation has its own challenges due to the risk of injury to the heart, lungs, outflow graft, and driveline.⁴ Several important considerations should be made. First, the recovery team should have expertise in performing redo-sternotomy. Necessary surgical equipment should be requested in advance, such as an oscillating saw. A second consideration is the communication

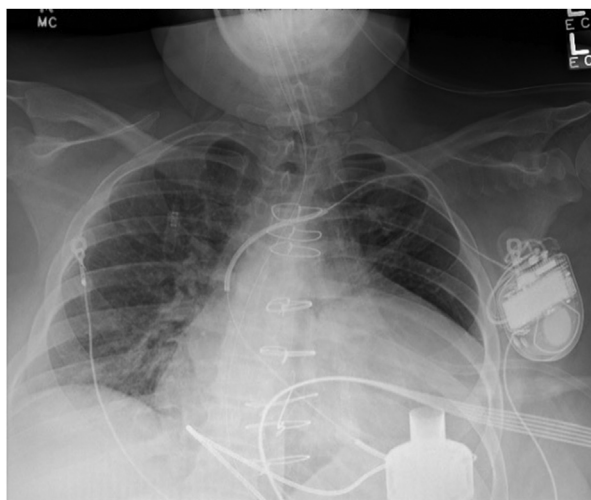


FIGURE 1. Radiograph of the donor's chest shows dilated heart with a HeartMate 3 device.

with the abdominal team informing about the potential risks. Full abdominal dissection with control of the abdominal aorta and portal vein is suggested in case there is an injury to the heart/outflow graft and quick crossclamping is required. During the exposure in the chest, combining sternotomy with a left thoracotomy is an option if additional exposure is necessary. Mediastinal off-pump dissection can minimize the ischemic time. Early exposure of the pulmonary artery is advised in case of major injury requiring urgent crossclamp and lung perfusion. Meticulous unrushed dissection of the heart, LVAD, and lungs can proceed after the crossclamp is on. Ischemic time should not be a concern over the risk of injury. The recipient surgery is delayed until the lungs have been explanted safely. Other specific considerations are the type of device previously implanted. The smaller size of the HM 3 device in comparison with previous generations may facilitate device explantation due to no abdominal pocket dissection. However, the ventricular apical location of the main rotor complicates the mobilization from the pericardium and the left lung. In this case, an extension of the sternotomy incision with a left thoracotomy, hemi clamshell, was necessary to complete dissection. The driveline mobilization is another potential pitfall. We suggest preoperative briefing with the abdominal team



FIGURE 2. Recovered lungs with lysed dense adhesions.

that can be less familiar with driveline dissection to avoid inadvertent injury.

Decision-making regarding acceptance of the organs from a VAD-supported donor entails the evaluation of potential injuries after the recovery procedure, but also the recipient characteristics and status. As with every donor, it is important to weigh the risks of the donor with recipient characteristics. In this case, our patient had a low lung allocation score and had been on our waitlist for 10 months; therefore, given the excellent donor lung function, we thought that meticulous lung donor recovery would lead to a good outcome.

In conclusion, lung recovery from LVAD-supported donors is challenging but feasible and these donors should be considered for lung transplantation and not automatically declined when offered for selected recipients.

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