Operative Techniques in
Thoracic and
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Techniques for Lung Procurement for Transplantation Following Donation After Circulatory Death

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Donation after circulatory death (DCD) is an evolving method for lung transplantation with potential for increasing the limited donor pool. Satisfactory outcomes have been reported from early experience with this technique. DCD lung procurement requires a systematic approach for efficient utilization of resources. It is important to minimize the ischemic time during lung procurement. We have presented our management protocol, surgical techniques used and results from the Alfred Hospital in Melbourne, Australia.
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Donation after circulatory death (DCD) represents a large pool of donors for lung transplantation (LTx). Currently, suitable DCD donors used by our institution include patients who are having withdrawal of life-sustaining treatment (WLST) based on futility, with death expected within 90 minutes of withdrawal of active treatment, and donation after brain death (DBD) patients who go into cardiac arrest before planned donation (Maastricht category III and IV patients). Standard contraindications to lung donation apply. Prior cardiac surgery is not an absolute contraindication in our experience. Specifically, patients who are not in an intensive care unit (ICU) or those in whom death is highly likely to occur more than 90 minutes after WLST are not considered suitable for DCD donation. Consent for donation is sought from next of kin by a ICU medical specialist. Following consent, specific tests such as blood for serology, cross matching, and arterial gases are obtained to assess the suitability of the donor lungs and allow matching with potential recipients. Invasive tests such as heparin administration and bronchoscopy may or may not be permitted before WLST or death depending on local institutional guidelines.

The operating room (OR) staff, along with the thoracic and abdominal organ retrieval teams, are notified 4 hours before the withdrawal of active treatment in a potential donor. Approximately 30 minutes before WLST, a meeting of the organ retrieval teams is held in the OR complex to discuss the clinical details of the potential donor and the logistics involved in organ procurement. ICU staff manage the patient and WLST (typically by removal of the endotracheal tube) as per local standards of practice. Death is declared by an ICU specialist on cessation of circulation for 5 minutes, as evidenced by the absence of pulse on arterial trace for 5 minutes with or without the absence of electrical activity on electrocardiogram monitoring. The donor is transported expeditiously to the OR, ideally within 10 minutes of the declaration of death.

All steps from the transport of the patient from the ICU to cannulation of the pulmonary artery are standardized, as shown in the section Technique, to institute pulmonary flush solution as soon as practical. However, there is evidence that there is a safe margin of at least 60 minutes following a donor systolic blood pressure being less than 50 mm Hg for administration of pulmonary flush. The surgical technique is similar in principle to that of the well-established lung donation technique from brain-dead donors (Figs. 1-12).

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Technique

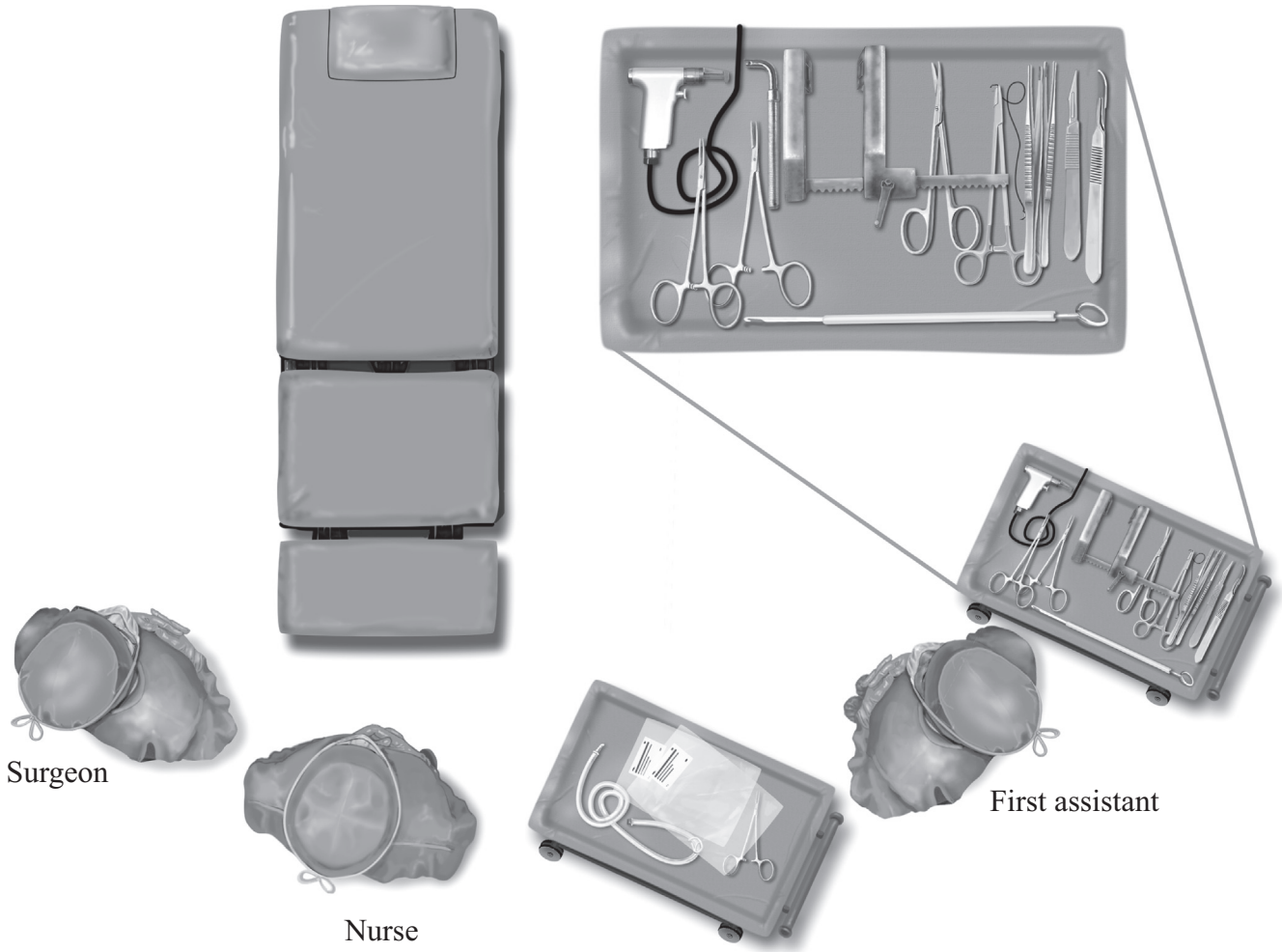

Figure 1 The thoracic surgical team sets up a separate trolley for the instruments that would be needed for a median sternotomy and the administration of pulmonary flush solution. These instruments include scalpel, sternal saw, Finochietto retractor, Metzenbaum scissors, 2 DeBakey forceps, a 4-0 prolene on a RB-1 needle (Ethicon Inc, Somerville, NJ) loaded on a needle holder, a snugger for securing the cannula, number 11 knife, 2 fine hemostats, a right-angled cannula, and tubing for the administration of Perfadex solution (Vitrolife, Gothenburg, Sweden) into the PA. This trolley is placed on the right-hand side of the first assistant who passes the instruments directly to the operating cardiothoracic surgeon. This avoids any delay in passing on the instruments in a busy operative field where both the thoracic and the abdominal teams are in a hurry to avoid any prolongation of the warm ischemic time. Withdrawal of treatment is only done when both the thoracic and abdominal teams have scrubbed and have set up their instrument trolleys with the scrub nurse. PA = pulmonary artery.