Are There More Lungs Available than Currently Meet the Eye?

Since lung transplantation became an accepted therapeutic intervention for end-stage lung disease, the number of patients on lung transplant waiting lists has grown exponentially. Currently, the number of patients waiting markedly outweighs the number of available donor lungs and has led to significant mortality rates for those on the waiting lists. Data from 2004 show that there were over 2,100 patients on active lung waiting lists in the United States. In that same year, only 1,065 lungs were procured from a total of 7,152 multi-organ donors (1). On average, since the year 2000, lungs have been able to be obtained from only 15% of organ donors annually, with the vast majority of potential lung donors refused due to “poor organ function” (2).

Numerous approaches have been used to increase the number of useable donor lungs, including donor awareness campaigns, the use of “extended criteria” donors (ECD), living lobar donation, and resuscitation of poor quality donor lungs by interventions for reversible problems (3, 4). Extended criteria donors were described by Sundaresan and colleagues (5) as those who are older than 55 yr, have a cumulative smoking history of greater than 20 pack-years, an abnormal chest radiograph, and PaO2 of less than 200 mm Hg during 100% FiO2. If any of the absolute criteria were not achieved.

Donors were considered “poor” if either one or more of the following criteria were met: age more than 55 yr, cumulative smoking history of more than 20 pack-years, history of pulmonary disease, severe chest trauma, more than 4 d on mechanical ventilation, and positive results from Gram staining of tracheal or bronchial/alveolar lavage fluids, and were categorized as “poor” if any of the absolute criteria were not achieved.

Donors with either an initial P/F ratio of less than 300 or infiltrates consistent with pulmonary edema or atelectasis, or both, were subjected to protocolized maneuvers to improve organ quality. These included bronchoscopic airway clearing of secretions, mechanical ventilator strategies, and diuresis. After initiation of active management, 53% (135/257) of donors initially considered “poor” were reclassified to “extended” or “ideal.” From this group, 39% (53/135) became actual lung donors, compared with only 10% of the “poor” donors evaluated during the four years before the protocol implementation. As a result, the authors observed an increase in the rate of organs offered to transplant centers from 21% to 57%, with the overall organ procurement rate increasing from 11.5% to 25.5%.

The authors evaluated not only the immediate effects of their protocol on donor lung use, but also determined that altering their donor management strategy did not appear to have an adverse effect on early surgical outcomes, providing follow-up data for at least one year after pulmonary transplantation. Secondary post-transplantation outcomes, including mean P/F at 24 h, number of days on the ventilator, duration of intensive care, total hospitalization, and results of pulmonary function testing one year after transplantation, did not differ in the four years after protocol implementation. Interestingly, the rate of bilateral lung transplantation nearly doubled from 19% (10/53) to 37% (45/121). Although 30-d survival was improved among patients undergoing transplantation during the period of active donor management, there was no significant difference in patient survival at one year.

The report is important primarily because of the results achieved with a relatively simple management protocol, which included both an educational component for the organ procurement organization, and basic interventions with alveolar recruitment measures previously reported for the management of patients with ARDS. It is intriguing that although the organ offer rates increased to over 50% of consented donors, transplant centers in the organ procurement organization (OPO) region accepted only 25%, indicating the potential for improving donor lung use even further than reported by this group. The methodical approach undertaken by the authors both to implement a new management strategy and to evaluate outcomes for both the donor and recipient provide an example to be followed in the ongoing effort of the Organ Transplant Breakthrough Collaborative to increase donor lung use nationwide.

This study raises another important question regarding the availability of donor lungs. Are there truly not enough lungs?
Although it is thought that the available supply is far less than the demand, this may not be so. We may simply not be utilizing enough of the available lungs. Some countries outside the United States boast average use rates of 50%, with survival and functional outcomes that compare favorably to the United States (9). It is likely that centers in high-use countries combine aggressive donor management strategies with acceptance of organs that previously had been considered too risky in other regions. It is interesting to note that there has never been a large-scale prospective study to assess adequately the criteria used to identify the “ideal donor.” As the demand for lung transplantation increases, such studies will be of great importance to understand better which organs are truly useable, and more importantly, which ones should be discarded.

The study by Angel and colleagues underscores the importance of using an organized approach to donor management, coupled with education of organ procurement organizations, to improve donor organ use. Those in the transplant field should take note of this approach, as we owe this not only to our patients, but also to those willing to offer the gift of life as organ donors.

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