STANDARDIZATION OF TRANSPLANT PROCUREMENT PROCEDURES

To the Editor:

We read with interest the article by Pasque¹ and applaud the author's efforts to standardize thoracic organ retrieval. Organ procurement has been conducted by surgical teams from the geographically nearest transplant center on the Zonal Retrieval Scheme in the United Kingdom since 1995. This has significantly improved cost-effectiveness and enhanced the safety of surgical teams. We recommend a number of important additions to the organ retrieval procedure that we believe to be vital in facilitating organ preservation and improving recipient outcomes.

Cardiac output monitoring (usually by using a Swan–Ganz catheter) is extremely useful, if not indispensable, in the assessment and optimization of donor hemodynamic parameters, and we strongly recommend it as a routine.

We have also found individual pulmonary vein gas sampling to be useful in recognizing unilateral dysfunction, allowing a greater number of single lungs to be identified as suitable for transplantation.²

Extension of cardiac ischemic time even beyond 1 hour progressively increases early mortality,³ and therefore minimization is vital. To this end, we routinely pack and dispatch the donor heart before completion of the donor pneumonectomy.

The author suggests extubation of the donor followed by tracheal sta-

pling. Although we appreciate the need to prevent overdilation of the donor lungs (especially with airborne transportation), we have found that complete loss of airway pressure can precipitate recollapse of previously recruited areas of atelectatic lung. Laboratory evidence suggests that both atelectasis and overdilation are detrimental to postreperfusion function.⁴ We therefore advocate partial inflation immediately before tracheal division. Therefore as the endotracheal tube is slowly withdrawn, the stapling device is closed and fired, allowing control of the inflation volume.

Furthermore, the inclusion of the esophagus in the lung block poses an unnecessary risk of contamination of the operative field. Dissection of the trachea from the esophagus at the time of removal of the lung block is straightforward and without injury to the airway or esophagus.

The timing of organ retrieval procedures and the regular involvement of members of staff and hospitals unfamiliar with organ retrieval can propagate many errors in acquiring accurate information and ensuring full and complete communication. Procedural errors are also possible in such a complex and time-sensitive undertaking. We feel strongly that such errors could be avoided by the use of an appropriate procedural checklist for both retrieval and implantation surgical teams.⁵ An adaptation of the World Health Organization's surgical checklist has recently been adopted in the United Kingdom, and cardiopulmonary transplant-specific checklists might be of great value in ensuring best practice.

We once again congratulate Dr Pasque on an excellent and timely synopsis but believe that our supplementary points can further enhance patient safety and improve outcomes.

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doi:10.1016/j.jtcvs.2010.03.027

Reply to the Editor:

The stated goal of the publication of a proposed standardization of the thoracic organ procurement protocol was to stimulate enlightened commentary from leading international thoracic transplant centers, such as that found at the Freeman Hospital in Newcastle upon Tyne, United Kingdom. It is only with the input from such centers of excellence that the protocol can be optimized. Although the final adoption of a protocol on which everyone agrees is unlikely, the completion of this vital open-forum dialogue between centers at the very least educates the next generation of surgeons in regard to the major issues and the available technical options.

Although we have not found it necessary to insist on the placement of a pulmonary artery catheter in the overwhelming majority of cases as suggested by the Newcastle group, we have no problem with its routine application and most certainly have found it to be of critical importance in high-risk donors in whom optimal hemodynamic management or organ use decisions are in need of more quantified hemodynamic information. A best estimate of our current use of

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pulmonary artery catheters in cardiothoracic donors is well less than 10%.

We of course agree with the well-established efficacy of using individual pulmonary vein gas sampling to sort out unilateral from bilateral lung dysfunction when single-lung transplant recipients are available.

Perhaps it was not as clear from the written protocol as it could be, but we of course also always seek to shorten cardiac ischemic times by prioritizing the immediate transport of the heart to the respective implant center. From a practical standpoint, when both heart and lungs are being procured we routinely have 1 surgeon, upon removal of the heart, immediately package it for transport while the second surgeon administers the in situ retrograde pulmonary vein flush.

We appreciate the concern of the Newcastle group regarding the necessity of “partial inflation” of donor lungs before tracheal stapling. Our routine extubation before stapling is purely pragmatic in its application. It is simply the nature of the beast that the majority of the procurement procedures seem to be carried out in the middle of the night, in unfamiliar territory and with an unfamiliar anesthesia team. We have often found it hard enough just to get the donor extubated, let alone insist on a partial tube withdrawal with partial lung inflation. It is simply more pragmatic to just tell them to extubate the patient. We would also note that if any atelectasis does in fact occur, it occurs after the preservation measures (topical cooling and pulmoplegia infusion) have been carried out. Regardless, the lung fully deflates anyway when the airway is open and being anastomosed at the recipient implant procedure. In our experience, any sequelae resulting from the atelectasis that may have occurred from extubation before stapling has been negligible, if present at all.

The proximity of the esophagus to not only the airway but also the pulmonary veins, combined with the marginal exposure of the deep posterior mediastinum, prompted the development of

a thoracic procurement procedure that lessens the possibility of injury to these vital structures. No doubt that experienced operators, such as those from the Newcastle group, have no difficulty dissecting the lung block away from the esophagus as they describe. However, because the majority of the procurement procedures carried out in the United States over the last 2 decades were performed by inexperienced cardiothoracic fellows—and these too often without a qualified first assistant—we sought to make this part of the procedure safer by simplifying it. By simply dividing the esophagus, the operator is then enabled to dissect the entire lung bloc directly off of the spine—giving a wide berth to the vital airway and pulmonary veins. We do not believe that any significant contamination of the operative field occurs with this method—certainly no more than with the routine division of the trachea after stapling. We believe that the simplification of the procedure by this maneuver renders the highest likelihood of even a single operator under the worst of conditions delivering a perfect lung bloc to the implant team. The esophagus and aorta are of course easily resected from the lung bloc under direct, well-illuminated conditions on the back table in the implant operating room. We have used this technique in more than 1000 lung harvests and cannot recall a single problem of any kind related to the inclusion of the esophagus in the harvested double-lung bloc. We have to believe that we have avoided many injuries to the donor pulmonary veins and airway by less-experienced operators in the often hurried, poorly exposed, and poorly illuminated posterior mediastinal procurement environment.

The inclusion of a procedural checklist is another great suggestion by the Newcastle group and can only improve consistency in the procurement procedure, which was the primary aim of the manuscript in the first place.

Certainly none of the points proposed by the surgeons of Mr Dark’s

superb group pose any major problems in the standardization of the procurement procedure. They only serve to improve and clarify, making the standardized procedure more robust. Their suggestions are greatly appreciated.

Most important of all, the Newcastle group’s confirmation of the advantages of the establishment of a standardized protocol is appreciated. As they point out, the progress of many areas of the world toward the region-based sharing of transplant procurement responsibilities far exceeds that in the United States. The described advantages in efficiency, cost-effectiveness, safety, and patient outcomes provided by the adoption of their “Zonal Retrieval Scheme” should provide ample incentive for the adoption of a standardized procurement protocol in every nation where thoracic organ transplantation is undertaken.

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doi:10.1016/j.jtcvs.2010.03.025

HOW CAN WE PREVENT FUNCTIONAL MITRAL STENOSIS AFTER SURGERY?

To the Editor:

The recent report by Kubota and colleagues¹ gave new insight on the mechanism of “functional mitral stenosis (MS)” after mitral annuloplasty (MAP) for ischemic mitral regurgitation (IMR). Persistent subvalvular leaflet tethering in the presence of down-sized MAP causes functional MS, which is related to heart failure symptom after surgery. Down-sized MAP has been a standard procedure for IMR and believed to be safe and effective for 10 years. In 2008, Magne and colleagues² first reported functional MS after MAP. However, its mechanism was not clarified in this study. On the other hand, Kubota and colleagues examined subvalvular