treatment which consisted of specific coagulation factors (treated with solvent detergent for inactivation of viruses). Although in the absence of a positive history, this approach may be controversial, nevertheless in the event of abnormal bleeding, early replacement therapy may be required during or after surgery. Clearly this is unlikely to be appropriate in the absence of a diagnosis characterizing the coagulopathy.[3] Our results show the value of aPTT in detecting these coagulopathies, and we think that this test should be part of the preoperative evaluation in surgical or anesthetic procedures where bleeding may represent a major problem.

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Additional Safety Measures When Changing Endotracheal Tubes

To the Editor:—I was recently asked by the primary physicians of a 26-yr-old post–motor vehicle accident patient with a cervical spine fracture and multilobar pneumonia to change a 7.0-mm-ID nasotracheal tube that had been *in situ* for 2 weeks (since admission to the hospital) to an 8.0-mm-ID orotracheal tube because they were experiencing technical difficulties with tracheobronchial tree toilet and were concerned about the development of maxillary sinusitis. Halo and chest cast fixation caused the patient's head and neck to be rigidly fixed in 20° flexion. The epiglottis could not be visualized with direct laryngoscopy even when the patient was fully anesthetized and paralyzed. The method of changing the nasotracheal tube to an orotracheal tube in this case used two safety procedures that had been reported individually before, but to my knowledge had never been used together. The two procedures involved passage of a fiberoptic bronchoscope into the trachea alongside the existing tube,[1,2] and the passage of a jet stylet catheter (tube exchanger) through the old nasotracheal tube to be used for jet ventilation backup if the new orotracheal tube did not pass over the fiberoptic bronchoscope.[3,*]

The patient's lungs were ventilated with 100% oxygen; intravenous glycopyrrolate 0.2 mg was administered; and complete neuromuscular blockade was confirmed with a neuromuscular blockade monitor. A Williams Airway Intubator was passed into the oropharynx, and an Olympus LF-1 fiberoptic bronchoscope was passed through the airway intubator.[4,5] The existing nasotracheal tube was identified and with moderate difficulty the fiberoptic bronchoscope (which was jacketed on its proximal end with a endotracheal tube) was passed into the trachea through the anterior triangle bounded by the anterior commissure and the anterior convexity of the nasotracheal tube. A medium-sized Sheridan Tube Exchanger was then passed through a self-sealing diaphragm in the elbow connector to the nasotracheal tube and down the existing nasotracheal tube, until the tip of the tube exchanger could be visualized by the fiberoptic bronchoscope to be just above the tracheal carina. Passage of the tube exchanger through the nasotracheal tube caused the peak inspiratory pressure to increase from 26 to 29 cmH_2O, and the capnogram waveform was unchanged. The nasotracheal tube was then withdrawn over the tube exchanger and the orotracheal tube passed over the fiberoptic bronchoscope into the trachea. The fiberoptic bronchoscope was withdrawn, and during withdrawal the placement of the new orotracheal tube was confirmed to be three tracheal rings above the carina. After additional capnographic confirmation of tracheal placement of the endotracheal tube, the tube exchanger was withdrawn.

The value of this technique of exchanging endotracheal tubes lies in the staged and controlled withdrawal of an old endotracheal tube and reentry into the trachea with a new endotracheal tube. The use of the tube exchanger allows for jet ventilation if the new endotracheal tube does not enter the trachea.[3,*] Using wall pressure (50 psi), the jet ventilation tidal volume and minute ventilation through a medium-sized tube exchanger can totally support ventilation in adult patients.[6] Of course, the appropriate connection of the tube exchanger to the jet ventilator must be immediately available.[7] The presence of the fiberoptic bronchoscope allows for repeated attempts, if required, to pass the orotracheal tube over the fiberoptic bronchoscope after appropriate rotation of the orotracheal tube.[8–10] The suction port of the fiberoptic bronchoscope can also be used to insufflate oxygen and for jet ventilation as well.† Finally, cricothyrotomy or tracheostomy may be performed semielectively as long as oxygenation and ventilation are adequate by one or both means of jet ventilation (tube exchanger or fiberoptic bronchoscope).

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Perioperative Management of Patients Receiving a Lung Transplant

To the Editor:—Recently, Smiley *et al.*[1] described the use of independent lung ventilation following single lung transplantation for emphysema. Since 1989 we have provided perioperative care for 84 patients undergoing lung transplantation. Of these, 42 received a single lung, with 22 performed for end-stage emphysema. As the authors point out, the observed phenomenon of air-trapping with cardiovascular compromise had previously been the primary reason for considering emphysema a contraindication for single-lung transplantation. However, world-wide experience has demonstrated efficacy of the procedure in many patients,[2,3] and thus, at our institution, the most frequent lung transplant procedure has become single lung for emphysema.

Our accumulated experience has led us to believe that profound air-trapping in the native lung coupled with cardiovascular compromise is related primarily to two factors: 1) technical imperfections affecting the airway or venous anastomosis (producing a stiff, noncompliant transplanted lung), and 2) donor/recipient size mismatching. We have experienced this complication on two occasions, with one attributed to a stenotic left atrial cuff anastomosis and the other to a low donor/recipient predicted vital capacity ratio. The patient with pulmonary venous obstruction required retransplantation and has subsequently done well. In the second case we used differential ventilation postoperatively. Under this circumstance the transplanted lung was conventionally ventilated while the native lung was jet ventilated to minimize airway pressures. This patient subsequently died of an unrelated cause.

In our management of patients undergoing lung transplantation, we frequently use some form of differential lung ventilation (*i.e.*, high-frequency jet, continuous positive airway pressure, or oxygen insufflation applied to the nonventilated lung) to minimize intrapulmonary shunt. On two occasions we have used differential ventilation intraoperatively to improve secretion clearance and oxygenation during dissection of a lung in patients with cystic fibrosis. Under these circumstances the humidified gas jet mobilized tenacious secretions and improved oxygenation in patients who could not tolerate single lung ventilation.

Another facet of patient management we find important in minimizing hemodynamic and ventilatory complication is postoperative positioning. It is unclear from the case report whether this patient was supine or laterally positioned. It has been our experience that patients receiving a single lung transplant for emphysema or pulmonary hypertension do better with the transplanted side up, whereas the opposite is true for those with fibrosis.

Smiley *et al.*[1] appropriately pointed out the relative lack of information regarding anesthetic management for patients undergoing lung transplantation. We have recently described our experience with the first 51 lung transplants performed at our institution.[4] Our general approach to management of patients for single-lung transplantation differs in some respects to that described both by Smiley *et al.*[1] and others,[5,6] particularly with regard to placement of invasive monitors and selection of an endotracheal tube. We routinely place a pulmonary artery (PA) catheter *prior to* induction of anesthesia. While this approach may be more difficult due to orthopnea, tachypnea, and venous collapse, we believe that the benefit of central pressure monitoring during induction, initiation of positive pressure ventilation, intubation, and mechanical ventilation more than offsets the disadvantages. In addition, hypotension secondary to air-trapping, a phenomenon evident in the case report and one we have come to call "pulmonary tamponade," occurs, to some degree, in virtually every emphysematous patient, and prior to insertion of a PA catheter permits us to focus attention on stabilizing the patient's condition and initiating the surgical procedure, rather than on placing invasive monitors, during this vulnerable period. As pointed out by Smiley *et al.*,[1] periods of apnea may be required to restore cardiovascular stability. Knowledge of PA pressures along with hemoglobin oxygen saturation helps to determine what level of hypoventilation and hypercarbia can be tolerated without dramatic increases in PA pressure and systemic hypoxemia.

Differing opinions have been expressed regarding conventional endotracheal tubes with bronchial blocking balloon catheters or double-lumen endobronchial tubes for lung transplantation. Initially, we were placing a single-lumen endotracheal tube and bronchial blocker for left single-lung transplants; we now use a left endobronchial tube for both single and bilateral single procedures. Our surgical colleagues find this quite acceptable, and manually guide any required tube ma-