mechanical trauma to the airway, and ventilatory compromise.\textsuperscript{1-3}

Other reports of ventilatory compromise after insertion of gastric tubes focus on the reduction of delivered tidal volumes. This reduction in tidal volume may be caused by a gastric tube that has been placed in the trachea past the ETT cuff with resulting decreased competency, allowing volume to escape.\textsuperscript{3} Further, negative pressure applied to a misplaced nasogastric tube also has been implicated as a cause of decreased ventilation.\textsuperscript{5,6}

We have presented a case of a gastric suction tube impeding ventilation caused by knotting around the ETT. We believe that multiple manipulations of the OGT may have led to knotting. Recognition of entanglement of the OGT with the ETT was diagnosed by the concomitant tube motion when traction was applied to the OGT. The inability to pass a suction catheter through the ETT further confirmed ETT compromise and the need for intervention. This complication, ETT–OGT entanglement, needs to be recognized and managed expeditiously. Possible treatment options include the passage of an tube exchanger catheter through a patent lumen, removing the ETT and sliding a new one over the exchanger catheter, using direct laryngoscopy to cut the tube off the ETT,\textsuperscript{4} or, as in our case, extubation and reintubation.

References


Emergent Lung Separation for Management of Pulmonary Artery Rupture

Jerome M. Klafta, M.D.*, Jeffrey P. Olson, M.D.†

PULMONARY artery (PA) rupture is an unusual but often lethal complication associated with pulmonary artery catheterization.\textsuperscript{1,2} Management of PA rupture may include lung isolation in patients requiring intubation to protect the contralateral lung and to decrease bleeding in the affected lung. Inasmuch as some airway bleeding is inevitably present, the mechanics of achieving lung isolation can be difficult using fiberoptic bronchoscopy. This case report describes an innovative, available technique that can facilitate lung isolation. We intubated the left mainstem bronchus in a patient with a ruptured right PA and copious airway blood using a technique combining bronchoscopy and fluoroscopy.

Case Report

A 66-year-old man with a history of non-insulin-dependent diabetes, hypertension, and atrial fibrillation status post-ablation was undergoing a diagnostic right and left heart catheterization for complaints of shortness of breath and peripheral edema. Shortly after inflation of the balloon of the pulmonary artery catheter, which was positioned in the right lung, the patient experienced hemoptysis and hypotension. The presumptive diagnosis of a right pulmonary artery rupture was made.
CASE REPORTS

Fig. 1. C-arm radiograph showing fiberoptic bronchoscope through endotracheal tube with tip positioned in the left mainstem bronchus.

We were called emergently to the cardiac catheterization laboratory, where, on our arrival, the patient was conscious and spitting up blood. He became increasingly hypotensive and progressively less cooperative as preparations were made to secure his airway. As his consciousness waned, succinylcholine, 100 mg, was given intravenously. Although large amounts of blood were noted in his posterior pharynx, his trachea was intubated with a styletted 7.5 endotracheal tube (ETT) without difficulty. The patient's hemodynamic status deteriorated into pulseless electrical activity within minutes, and resuscitative efforts including chest compressions, intravenous epinephrine, and volume replacement were initiated. As the patient regained a blood pressure (a femoral arterial sheath was being transduced), we attempted without success to selectively intubate the left mainstem bronchus by manipulating the ETT under fluoroscopic guidance. A bronchoscope was then used, but blood in the airway prevented adequate visualization. In a third attempt, fluoroscopy was used once again, but this time to guide the radiopaque bronchoscope (Fig. 1) into the left mainstem bronchus. The bronchoscope was easily placed and served as a stylet for the ETT, which was then positioned just proximal to the left upper lobe orifice.

The patient was transported emergently to the operating room for an exploratory right thoracotomy where a tear in the right upper lobar pulmonary artery was repaired. The nondependent lung remained collapsed with adequate one-lung oxygenation and ventilation during the procedure; the estimated blood loss was 2,500 cc. After the bleeding site was repaired, the ETT was withdrawn into the trachea, and two-lung ventilation was reinstituted. The patient was extubated on postoperative day 2. He did not suffer a myocardial infarction as determined by cardiac enzymes and electrocardiograph, and he recovered without obvious neurologic sequelae.

Discussion

Our case illustrates a technique for emergent lung isolation in the presence of significant airway bleeding. PA rupture was responsible for the bleeding in this case, but there are numerous other causes of massive hemoptysis including infections, neoplasms, cardiovascular disorders, and trauma.

Although pulmonary artery catheterization carries risks associated with central venous access, passage of the catheter, and catheter residence, perhaps the most dreaded complication is PA rupture. The incidence of this complication has been estimated to be as high as 0.1–1.5%, with risk factors including hypothermia, anticoagulation, and pulmonary hypertension. Reported mortality rate from PA rupture ranges from 53–70%. Management schemes for this clinical problem include the application of ipsilateral positive end-expiratory pressure, endobronchial tamponade, double-lumen ETT placement, internal balloon tamponade of the affected pulmonary artery with the balloon of the PA catheter, and surgical options such as unilateral PA occlusion, lobectomy, or pneumonectomy.

Critical to the management of massive hemoptysis is identification of the site bleeding. In our case, the fact that the PA catheterization was being performed under fluoroscopic guidance allowed immediate identification of the affected side. The urgent need for airway control in this case did not leave time to obtain and place a double-lumen ETT. Once the airway was secured and cardiopulmonary resuscitation could be discontinued, isolation of the right lung (left mainstem intubation) was attempted. Blind advancement of an ETT will rarely result in a left mainstem intubation, but rotating an in situ endotracheal tube 180° while turning the patient's head to the right has been shown to improve the success rate to about 92%. Even with fluoroscopic guidance, this maneuver failed, perhaps because of the somewhat suboptimal positioning of the patient. Placement of a bronchial blocker under bronchoscopy and fluoroscopy has been described in cases in which significant airway bleeding was not a problem.

We took advantage of the radiopaque nature of the fiberoptic bronchoscope to fluoroscopically guide it into the left mainstem bronchus. Once placement was accomplished, left mainstem intubation required only that the ETT be slid off the bronchoscope and its tip be positioned proximal to the left upper lobe orifice. With this approach, impediments to visualization through the bronchoscope (blood, secretions, edema) can be overcome, precluding a need for reliance on blind techniques.

In conclusion, we describe fluoroscopically guided bronchoscopy in achieving lung isolation in the presence of significant airway hemorrhage. Because significant blood or secretions in the airway can decrease the effectiveness of fiberoptic bronchoscopic visualization, and because C-arm fluoroscopy is readily available in most operating rooms and cardiac catheterization labo-
Succinylcholine Resistance in a Patient with Juvenile Hyaline Fibromatosis
Anis S. Baraka, M.D., F.R.C.A.(Hon)*

Succinylcholine resistance is a rare phenomenon that may occur in patients with increased plasma cholinesterase1-3 or in myasthenic patients4-6. The present report describes resistance to succinylcholine in a patient with juvenile hyaline fibromatosis (JHF), who had normal cholinesterase values and normal neurologic and neuromuscular functions.

Case Report

A 47-year-old man, 84 kg, who suffered since childhood from multiple soft-tissue masses, up to 5 cm in diameter and scattered all over the body presented. Histopathology after excisional biopsy revealed darkly stained fibroblasts scattered in hyalinized tissue. The case was diagnosed as JHF.

The patient was operated on in our institution at least 10 times during the past 40 yr for excision of the JHF nodules. Originally, general anesthesia was inhalational N2O0.5 supplemented either by ether or by halothane. When succinylcholine was introduced into our practice, anesthesia was induced with thiopental followed by succinylcholine. However, succinylcholine administration was always followed by inadequate jaw relaxation, despite the administration of repeated doses. The patient was labeled as resistant to succinylcholine.

In the present hospital admission, the patient was scheduled for laparoscopic cholecystectomy. Review of his old chart disclosed several anesthesia notes referring to resistance of the patient to succinylcholine. Preoperative analysis of the plasma cholinesterase activity, using benzoylcholine as a substrate, showed normal values. The plasma cholinesterase was 3.84 U/ml (normal values: 4.65–12.2 U/ml), dibucaine number was 87.3%, and fluoride number was 74.6%. Neurologic examination, nerve conduction studies, and electromyography did not detect any abnormalities.

The patient was premedicated with promethazine, 25 mg, meperidine, 75 mg, and atropine, 0.6 mg. Before induction of anesthesia and throughout surgery, neuromuscular transmission was monitored by Datex® (Helsinki, Finland) electromyography. The ulnar nerve was stimulated supramaximally (train-of-four) at the wrist every 20 s while displaying the resulting integrated electromyographic response of the adductor pollicis muscle. The patient was monitored continuously.

References

* Professor and Chairman.

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Address reprint requests to Dr. Baraka: Professor and Chairman, Department of Anesthesiology, American University of Beirut, Beirut, Lebanon. Address electronic mail to: abaraka@aub.edu.lb

Key words: Disease: juvenile hyaline fibromatosis. Muscle relaxants: succinylcholine; resistance.