DIFFICULT tracheal intubation is well known to anesthesiologists. However, difficulties with extubation are not as common. A few cases of difficult extubation with differing etiologies have been reported. One case of a forceful extubation without detection of the cause of difficulty resulted in a fatality.¹

We present a case of a safely managed difficult extubation in which the etiology and resolution of the problem were determined by fiberoptic examination.

Case Report

A 25-yr-old woman was scheduled for internal fixation of a fractured mandible and applications of arch bars. Using a fiberoptic bronchoscope, a 7.0-mm oral/nasal endotracheal tube (Intermediate, Mallinckrodt, Westmeath, Ireland) was inserted through the right nostril without complications. A 16-French nasogastric tube was subsequently inserted through the left nostril. Anesthesia was maintained with isoflurane, nitrous oxide, and oxygen. Muscle relaxation was obtained with vecuronium bromide. The surgeon approached the fracture through the oral cavity. The fracture was stabilized by passing Kirschner wires from the distal spicule of the fractured mandibular process to the proximal mandible. This was followed by maxillo-mandibular fixation. No anesthetic or airway complications were encountered intraoperatively.

The decision was made to extubate the trachea after the patient was awake and responsive. Although the endotracheal tube was removed from the trachea with little resistance after deflation of the cuff, the patient began to cough vigorously, and the endotracheal tube could not be removed from the right nostril because of tightening of the pilot tube. After several attempts to remove the endotracheal tube, the pilot tube moved slightly inward and relaxed. Direct examination of the nasal cavity through the left nostril was unrevealing.

Discussion

Since 1973, 16 cases of difficult tracheal extubation have been reported.¹⁻¹⁶ Their etiologies were diverse and could be attributed to three basic mechanisms: (1) secondary to the surgical procedure, (2) cuff malfunction, and (3) tangled nasogastric tubes. Difficult extubation secondary to the surgical procedure often was caused by fixation of endotracheal or pilot tube to bony facial structures via Kirschner wires²⁻⁴ or screws.⁵ In one case, the endotracheal tube was partially cut during an oromaxillofacial procedure and became caught on the hard palate, making it difficult to remove.⁶ In another instance, a suture was placed from the pulmonary artery through the trachea into the endotracheal tube.¹

Cuff malfunction can be further divided into two groups: cuffs that remain inflated and those that deflate. Difficult extubations caused by failure of cuff deflation have been caused by kinking of the pilot tube by the retaining bandage,⁷ kinking⁸ or detachment⁹ of the pilot tube from its point of insertion into the endotracheal tube, and occlusion of the pilot tube by stretching during removal of the valve and balloon assembly.¹⁰ Difficult extubation with deflated cuffs have occurred as a result of folds in the deflated cuff below vocal cords¹¹⁻¹⁵ or swollen or tense vocal cords that resulted from traumatic intubation with an excessively large tube.¹⁴,¹⁵ The case presented here involved the third mechanism, tangling of the pilot tube with the nasogastric tube, which is similar to a case report by Fagraeus.¹⁶

Although the etiology of the difficult extubation was different in the cases reviewed, the situations were all potentially dangerous. In one, there was a fatal outcome when an endotracheal tube that had been sutured to a
pulmonary artery was removed. Bronchoscopy, if employed when resistance to extubation was first noted, might have changed the outcome. In another case, maxillomandibular fixation was released and intrabony maxillary suspension wires were removed to permit direct observation of a lacerated endotracheal tube that was caught upon the hard palate. The author commented that, had they performed fiberoptic examination, they could have found the cause and extubated the trachea without disrupting the surgical repair. In cases in which the cuff remained inflated, which was revealed by direct examination, extubation was performed safely after cuff deflation using a 16-G intravenous catheter or a 25-G needle. In another case, fiberoptic and roentgenographic examination revealed that the endotracheal tube was secured to facial bones with a screw. Withdrawal of the screw made safe extubation possible. The nature of the surgical procedure must be considered when the endotracheal tube cannot be removed after cuff deflation to prevent iatrogenic trauma from vigorous extubation attempts. Direct roentgenographic or fiberoptic examination must be performed to ascertain the cause and to determine the safest solution to the problem.

In the current case, the cause of the difficult extubation was a tangled nasogastric tube, which we expected when, on causing traction on the endotracheal tube, the pilot tube withdrew into the nostril. However, the possibility remained that the pilot tube was caught by the inferior turbinate or that the protuberant nasal septum was preventing normal extubation. Although the author of a similar case only speculated on the cause of the difficult extubation, because cutting the pilot tube made extubation possible, we performed fiberoptic examination. Removal of the nasogastric tube under fiberoptic visualization made safe extubation possible. Fiberoptic examination was particularly important in this case because the patient had undergone maxillomandibular fixation.

Repetition of this complication can be avoided. In nasotracheal intubations, a nasal intubation tube in which the pilot tube has a more proximal insertion should be used. If an oral/nasal endotracheal tube is used for nasotracheal intubation, the pilot tube should be pulled tight to prevent a loop from forming in the nasopharynx. Nasotracheal intubation followed by nasogastric tube insertion under fiberoptic visualization might ensure avoidance of the difficult extubation due to a tangled nasogastric tube.

References