teaching compared with other colleagues using a highly sophisticated SimMan simulator in a course on the treatment of medical emergencies.

We do not agree that PowerPoint lectures are in general ‘not entertaining’. However, for teaching of drug effects we did set up the new course concept using a simulator because we wanted to implement interactive training. Morgan showed that students significantly rated simulator training as a ‘Valuable Learning Experience’ compared with students who had been taught using a videotape on the same learning content.4

The authors are indeed enthusiastic teachers. As the teachers in both groups were the same two people there should be no bias in the intervention. When reforming medical education at our university all new courses had been set up by interdisciplinary faculty. We thought it would be inappropriate to go back one step. As Brown mentioned and we had already stated in our article, unfortunately there was no third non-interdisciplinary group.

The statement of Brown and Kessell that simulators are expensive is too general. We agree that one has to calculate the initial cost, maintenance and personnel costs. Simulators in the field of medicine are available from €2005 up to full-scale patient simulators for €200 000. The low-fidelity simulator we used in our course cost €7000 and is now 7 years old. Maintenance of the simulator cost €1000 during this period. The simulator can be run by one of the two teachers in the described course. As an advanced life support simulator is probably available at any medical school, the use of the simulator would not produce significant additional costs compared with the training without simulator.

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Novel use of an arterial cardiopulmonary bypass cannula as a tracheal tube

Editor—An 8-month-old, 5.66 kg patient with tracheal stenosis was scheduled for an urgent cartilage patch tracheoplasty. The patient was an ex-premature infant born at 26 weeks, with a history of bronchopulmonary dysplasia, retinopathy of prematurity, and PDA ligation. She had previously undergone a cricoid split to treat subglottic stenosis. Subsequently, she had two episodes at home described as ‘choking’ followed by apnea and cyanosis, requiring mouth-to-mouth resuscitation. Despite the presence of audible inspiratory stridor at rest, the patient did not show any signs of respiratory distress and was not tachyphneic. Rigid bronchoscopy was attempted the day prior to the tracheoplasty. There were no problems with inhalation induction or emergence from general anaesthesia, but the surgeon was unable to pass a 2.5 mm rigid bronchoscope, and the anaesthesiologist was unable to pass a 2.5 mm tracheal tube.

General anaesthesia was again induced with sevoflurane in oxygen via mask, and supplemented with a propofol infusion. The airway was secured with a size 1.5 Laryngeal Mask Airway (LMA®; Oxon, UK).1 The patient maintained spontaneous ventilation via the LMA during attempts to place an arterial line, and remained haemodynamically stable. Our aim was to maintain oxygenation, recognizing that spontaneous ventilation under anaesthesia, through a high resistance airway would predictably result in hypercarbia, until the stenosis was corrected. However, once the patient was positioned for surgery, with the neck hyperextended, the LMA did not provide an adequate airway. The LMA was removed and replaced with a 6 Fr arterial cardiopulmonary bypass cannula (Medtronic Inc., Minneapolis, MN, USA) (Fig. 1). As could be expected, high airway pressures (60 cm H2O) were required in order to produce adequate chest expansion. While ventilating through this high resistance airway (respiratory rate 30 per min, peak pressure 60 cm H2O, zero PEEP), oxygenation remained satisfactory, but predictably, the patient became hypercarbic and developed a significant respiratory acidosis. An arterial blood gas done while on an FiO2 of 1.0 revealed PaO2 25 kPa, PaCO2 13.0 kPa, HCO3 - 26.9 mmol litre−1, and a pH of 7.04.

After the trachea was incised, the tracheal cannula was removed and replaced with a 3.5 mm ID cuffed wire-reinforced tracheal tube (Bivona Medical Technologies, Inc., MN, USA) (Fig. 1). Following the insertion of the tracheal tube, we noted a high-frequency jet sound at the vocal cords, which we identified as a high resistance airway. Once the tracheal cannula was removed, the LMA was inset, and the patient could be ventilated with a pressure of 40 cm H2O, without the need for intubation. The patient’s oxygenation improved, and the patient’s arterial blood gases were satisfactorily monitored. The patient’s postoperative course was uneventful and she was discharged on the fourth postoperative day.

1 LMA® is the property of intavent Ltd.
Gary, IN, USA), which was advanced distal to the operative site. Ventilation improved dramatically with a $P_O_2$ 42.2 kPa, $P_CO_2$ 6.1 kPa, $HCO_3^-/CO_2$ 25.7 mmol litre$^{-1}$, and pH 7.36, with an $F_O_2$ of 1.0 and similar minute ventilation (respiratory rate 34, peak pressure 24 cm H$_2$O, PEEP 1 cm). The operation proceeded uneventfully, with stable haemodynamics throughout. At the completion of the case, the muscle relaxant was reversed, the patient awakened and extubated. The patient was observed in the operating room for 20 min, with no signs of respiratory distress or stridor present. The patient was then transferred to the intensive care unit (ICU) in stable condition. Approximately 30 min after arrival in ICU, the patient had a respiratory arrest, characterized by sudden apnea with subsequent desaturation and bradycardia. This apneic event was not preceded by any signs of airway obstruction or respiratory distress such as tachypnea or increased work of breathing. The patient responded quickly to resuscitation, but respiratory effort remained poor, therefore she was reintubated.

After operation, there were several failed attempts at extubation. On each occasion, the patient became apneic with subsequent desaturation and bradycardia. This apneic event was not preceded by any signs of airway obstruction or respiratory distress such as tachypnea or increased work of breathing. The patient responded quickly to resuscitation, but respiratory effort remained poor, therefore she was reintubated.

Although a 2.0 mm internal diameter tracheal tube is available, it is easily kinked or obstructed with secretions, and is not an ideal means of securing an airway. Instead, a one piece paediatric arterial cannula (Medtronic Inc., Minneapolis, MN, USA) of similar outer diameter was chosen. This device is less likely to kink because the distal end is flexible and reinforced with wire, similar to an armoured tracheal tube. More proximally, the cannula expands to a larger calibre, rigid plastic barrel which does not kink or obstruct, and can be attached to an anaesthesia circuit via a standard 15 mm connector. For the 6 Fr cannula used, the 15 mm connector from a 5.0 mm ID tracheal tube fit well, and allowed positive pressure ventilation via this unconventional airway device.

Although not designed to be an airway device, the arterial cannula worked well in this patient. We were unable to find any previous report of using an arterial cannula as a tracheal tube. Tracheal stenosis in small children is recognized to be particularly challenging, and when presented with difficult problems, we may need to be innovative in order to provide the best care for our patients.

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Laryngeal web as a result of Reinke’s oedema: a cause of difficult endotracheal intubation

Editor—Unsuspected laryngeal web may be a problem during endotracheal intubation. We report a difficult tracheal intubation caused by a laryngeal web in an adult patient. A 25-yr-old woman was admitted to our hospital for urgent Caesarean delivery. She had been diagnosed with Reinke’s oedema 4 yr before this but had been refused surgical treatment because her sister had died during surgical repair of Reinke’s oedema. She had a nose operation under local anaesthesia 2 yr previously. Except for hoarseness, her physical examination and laboratory evaluations were normal. The patient refused regional anaesthesia. Anaesthesia was induced with thiopental 5.0 mg kg$^{-1}$ and succinylcholine 1.0 mg kg$^{-1}$ to produce neuromuscular block. Her ECG and noninvasive arterial blood pressure were monitored throughout the anaesthetic with no abnormalities. Laryngoscopy was done with some difficulty and the view was Cormack and Lahane grade II. Tracheal intubation with a size 6.0 cuffed tube was performed with cricoid pressure. At the end of the operation, the patient was extubated fully awake. On the second postoperative day, an laryngeal web as a result of Reinke’s oedema: a cause of difficult endotracheal intubation

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