Use of a Short Flexible Fiberoptic Endoscope for Difficult Intubations

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THE flexible fiberoptic laryngoscope has become a standard tool for managing the difficult intubation. Such instruments typically have a working length in the range of 55–60 cm. Flexible fiberoptic endoscopes such as nasopharyngoscopes, for example, which have working lengths of 30 cm and smaller, have been considered unsuitable for tracheal intubation because of their short length. I report two cases wherein difficult tracheal intubation was accomplished with a 26-cm flexible endoscope when longer flexible endoscopes were unsuccessful.

Case Reports

Case 1

A 17-month-old girl with Cornelia de Lange syndrome (characterized by mental retardation and facial anomalies, including micrognathia) weighing 5.1 kg required replacement of a gastrojejunostomy tube. General anesthesia was administered with halothane, N₂O, and O₂. An intravenous catheter was placed, and 0.5 mg of vecuronium was given after assuring that the patient could easily be ventilated by mask. The anesthesiologist could not intubate the trachea after several attempts at laryngoscopy. The pediatric gastroenterologist then passed an Olympus (Olympus Corporation, Lake Success, NY) GIF-N30 pediatric gastroscope (working length, 95 cm; diameter, 5.3 mm; and 2.0-mm channel) via the left nares to provide visualization for guiding an orally inserted endotracheal tube. However, the larynx could not be visualized. At this point, a Macintosh 1 laryngoscope was inserted orally with the left hand, exposing the tip of the epiglottis. A Schott (Schott Fiber Optics, Inc., Southbridge, MA) LS-7 fiberscope, which had been modified by shortening the insertion portion to an overall length of 26 cm (fig. 1), was inserted orally with the right hand and navigated underneath the epiglottis until the tip of the insertion portion (diameter, 6.4 mm; 2.0-mm channel) was just proximal to the vocal cords. Oxygen attached to the suction channel at a rate of 4 l/min provided oxygenation and cleared secretions. A Cook (Cook Incorporated, Bloomington, IN) Amplatz extra stiff wire with atraumatic tip (0.038-inch diameter; 120-cm length) was passed through the suction channel into the trachea. The endoscope was removed, and a Sheridan (Sheridan Catheter Corporation, Argyle, NY) T.T.X. tracheal tube exchanger (size small) with surrounding 4.0 uncuffed endotracheal tube was then passed over the wire into the trachea.

Case 2

A 44-yr-old man weighing 62 kg was scheduled for craniotomy for aneurysm clipping. An arterial catheter was placed in the left radial artery. General anesthesia was induced with 50 μg fentanyl and 150 mg of sodium thiopental. The patient could be easily ventilated by

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Fig. 1. Shortened flexible fiberoptic endoscope shown alongside a Mallinckrodt 7.5-mm endotracheal tube for comparison.
mask, and 10 mg vecuronium was given. Over the next 50 min, two anesthesiologists and an otolaryngologist were unsuccessful at intubating the trachea using a variety of techniques, including Macintosh 5 and Miller 2 laryngoscopes, the Bullard laryngoscope, and the Olympus (Olympus Corp.) LF-1 fiberoptic laryngoscope. Intubation was readily accomplished with the short endoscope in a similar manner as described in case 1, except that the tip of the endoscope was passed into the trachea before passing the guide wire, an oxygen flow rate of 6 l/min was used, and a large Sheridan T.T.X. tracheal tube exchanger was used with a 7.0-mm endotracheal tube.

**Discussion**

The successful use of the fiberoptic intubating laryngoscope requires certain psychomotor skills made more challenging by its length and flexibility. In addition, blood and secretions can further obscure the already limited view through the endoscope. I found that making the insertion portion significantly shorter improves dexterity for controlling and maneuvering the distal end of the endoscope. It also frees the left hand to perform a laryngoscopy for a "combined technique." In this technique described by Ovassapian, an assistant uses a standard laryngoscope to expose the epiglottis, while the operator places the tip of the fibroscope next to or under the tip of the epiglottis. He states that the main advantage is to minimize the time for identifying the epiglottis, especially when the airway is compromised, secretions are plenty, and time is limited. In addition, it also may be useful when the operator's experience in the use of the fiberscope is limited. I believe the improved dexterity inherent in a much shorter endoscope and the ability of one operator to use the combined technique allowed success in the described cases in which the Olympus GIF-N30 and LF-1 were not successful.

The normal Schott 1S-7 fiberscope has a working length of 50 cm. It was shortened by removing the outer casing of the insertion portion proximally, exposing the components, and then cutting the working channel and angulation wires to length. The fiberoptic bundles, which are very flexible, were not cut but were coiled inside the control housing. This resulted in an intubating endoscope with an insertion portion with a length of 26 cm.

Dierdorf discusses short endoscopes such as nasopharyngoscopes, with working lengths of 25-30 cm, and states that they are not suitable for tracheal intubation because of their short length. When the length of the insertion portion is less than that of the corresponding endotracheal tube, one cannot use the standard technique of sliding the endotracheal tube over the endoscope. This problem was overcome by using a Sel-dinger wire technique. Stiles described a similar wire technique for a typical length adult endoscope that allowed the use of a smaller diameter pediatric endotracheal tube. Some endoscopes, including some nasopharyngoscopes, do not possess working channels and thus cannot be used in this manner. The use of a tracheal tube changer provided additional rigidity to the guide wire and allowed a smooth transition from the guide wire to the endotracheal tube, which prevented the tip of the advancing tube from "hanging-up" on the laryngeal inlet (fig. 2).

In summary, I report two cases wherein difficult tracheal intubation was accomplished with a 26-cm flexible endoscope using a wire technique when longer flexible endoscopes were unsuccessful.

**References**