Anesthesiology
63:457–458, 1985

Two-stage Fiberoptic Nasotracheal Intubation in Infants: A New Approach to Difficult Pediatric Intubation

P. Berthelsen, M.D.,* S. Prytz, M.D.,† E. Jacobsen, M.D.‡

Fiberoptic endotracheal intubation usually is thought to be impossible in infants.¹–⁵ The incompatibility of the relatively large diameter of the available fiberoptic endoscopes and the small infantile larynx normally precludes an over-the-scope endotracheal intubation. The present case history illustrates a new way of negotiating the problem.

REPORT OF A CASE

A 6-month-old, 7-kg male infant presented for intraocular surgery. The infant had mild intermittent inspiratory obstruction, and a diagnosis of laryngomalacia was proposed. Otherwise the infant appeared normal.

An O₂–N₂O–halothane sequence with orotracheal intubation was planned. It proved impossible, however, to maintain a patent airway when anesthesia deepened. Visualization or blind intubation of the trachea could not be accomplished even after paralysis. Further attempts were abandoned because airway management was quite difficult.

The operation was rescheduled 2 days later. In view of our first experience, we decided to use topical analgesia and perform nasotracheal intubation under direct visual control and spontaneous ventilation. After premedication with atropine, nicotine 4% was sprayed on the nasal mucosa. Percutaneous injection of 0.3 ml 4% lidocaine through the cricothyroid membrane was used to secure analgesia of the larynx and the upper part of the trachea. Divided, subanesthetic doses of ketamine (total dose 30 mg im) were used for sedation. A 4.5-mm ID endotracheal tube (14 cm long) was threaded over a fiberoptic laryngoscope (Olympus ENF-P*, 30 cm and 3.7 mm OD). The fiberoptic laryngoscope was passed through the nose and guided without difficulty between the vocal cords and into the trachea. As soon as the tip of the laryngoscope was in the middle part of the trachea, the 4.5-mm tube was advanced through the nasal cavity and gently impacted in the laryngeal orifice. The fiberscope was swiftly removed. A 2.5-mm OD rubber bougie was slipped through the 4.5-mm tube deeply into the trachea. The 4.5 mm tube was removed, and a 3.5-mm ID endotracheal tube then was threaded over the bougie into the trachea. Spontaneous ventilation was maintained throughout the procedure without problems.

After endotracheal intubation, anesthesia was induced with halothane in O₂/N₂O. Postoperatively, the infant was cared for in our intensive care unit, and when the infant was fully awake the trachea was uneventfully extubated.

The infant has returned three times for further eye surgery. In every instance the management has been identical to the one described, and nasotracheal intubation has been accomplished with ease.

DISCUSSION

The anterior inclination and the high position of the infantile larynx occasionally prevents the visualization of the laryngeal entrance. In our case, airway management was complicated by the presence of infantile laryngomalacia. Blind nasotracheal intubation with or without the use of a stylet is the ordinary way of handling difficult pediatric intubations.⁵

There are, however, many complications associated with the blind approach, and ultimately endotracheal intubation may not be achieved. Recently the technique employing a retrograde guide inserted through the cricothyroid membrane has been advocated for children. The method was successfully tested in a 30-month-old, 11-kg boy.⁴ While the approach certainly can be applied safely in larger children, we felt that it would be rather cumbersome and potentially dangerous in a 7-kg infant.

Flexible fiberoptic laryngoscopes are commonly used for diagnostic examinations of the larynx and trachea in infants and larger children.⁶,⁷ But over-the-scope nasotracheal intubation is impossible in children younger than 18 months old.¹–⁵ The relatively large diameter (3.2–3.7 mm) of the available instruments requires the use of a 4.0–4.5-mm ID endotracheal tube—a tube out of proportion to the neonate or infantile larynx. A case where a flexible fiberoptic bronchoscope was passed through one nostril for visualization of the larynx and an endotracheal tube through the other recently has been published.¹ The trachea of the patient, a 3.7-kg neonate with congenital fusion of the gums, was successfully intubated after 40 min of manipulating the head and the endotracheal tube under direct vision.

The above mentioned techniques all appeared inconvenient, and, as our patient would require repeated anesthetics in the first months of his life, an easier method was sought. The funnel-shaped entrance of the larynx suggested to us the possibility of gently wedging and retaining a 4.5-mm tube in the laryngeal orifice under visual control. The subsequent exchange of the larger intro-

---

* Senior Registrar, Department of Anesthesia.
† Senior Registrar, Department of Otolaryngology.
‡ Chief Anesthetist, Department of Anesthesia.

Received from the Departments of Anesthesia and Otolaryngology, Rigshospitalet (University Hospital), Blegdamsvej 9, DK-2100 Copenhagen ½, Denmark. Accepted for publication May 29, 1985.

Address reprint requests to Dr. Berthelsen.

Key words: Anesthesia: pediatric. Equipment: flexible fiberoptic laryngoscope.
ducer tube for an appropriate smaller endotracheal tube could easily be accomplished over a thin gum-elastic bougie.

A few minor technical points must be emphasized, because they may mean the difference between success and failure. Blood or secretions in the pharynx or larynx obscure the optics of fiberoptic scopes, especially when no suction ports are incorporated in the instruments. The use of cocaine in the nasal passage reduces the risk of bleeding from the mucous membranes, but it is most important to advance the fiberoptic laryngoscope into the trachea before the introducer tube enters the nose.

Premedication with atropine is a convenient way of limiting secretions in the upper airway and is especially indicated when ketamine is used for sedation.

It is most prudent to select topical analgesia and spontaneous ventilation in patients with possible airway problems. The translaryngeal injection of 4% lidocaine is an effective means of securing upper airway analgesia. It is important, however, that the local anesthesia is delivered solely into the lumen of the larynx and not submucosely where small amounts of fluid or blood may compromise patency of the airway.

In short, we feel that the proposed technique is safe and simple. It can be attempted even with minimal previous experience with fiberoptic laryngoscopes, provided it is done with the help of local anesthesia.

REFERENCES