Nasotracheal Intubation Using Fiberoptic Bronchoscopy in Infants and Children

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Nasotracheal intubation with the aid of a fiberoptic bronchoscope (FB) has been used in cases of difficult intubation since its introduction by Murphy[1]. However, several problems exist in applying this method to infants and children under general anesthesia. First, ventilation during the procedure is difficult because of the smallness of the endotracheal tube (ETT) relative to the size of the FB, and second it is difficult to visualize the vocal cords with a small FB through a narrow orophrynx, especially with movement of the anatomic landmarks due to rapid respiration. Stimulation of the pharynx or larynx by the FB or ETT may induce bucking and/or laryngospasm, while under deep anesthesia, respiration may be depressed. We have overcome these problems by immobilizing patients with a muscle relaxant and controlling ventilation during the procedure. Respiratory management and the intubation method differs according to the size (internal diameter, I.D.) of the ETT appropriate for the individual patient.

(1) I.D. 6.0 mm or more: In this group of patients, the procedure is carried out as it is in adults[2,3] except that the patients are anesthetized and ventilation is controlled. After assuring smooth, controlled ventilation by mask and bag under inhalation anesthesia, a muscle relaxant is given. Following a period of hyperventilation, an ETT is passed through either nostril into the oropharynx, and the anesthetic machine and ETT are connected via a FB adapter (Anesthesia Fiberoptic Bronchoscope Swivel BE 105-8, Instrumentation Industries, USA.). The patient is ventilated through the ETT while the other nostril and the mouth are kept closed by an assistant. If the patient can be ventilated easily by this method the FB (Olympus FB 3C-10, diameter 3.8 mm, the smallest FB with an aspiration side hole) is threaded into the ETT via the FB adapter into the oropharynx and when vocal cords are visualized, it is advanced between them as far as the carina. Then the ETT is advanced over it into the trachea (fig. 1). Because the adapter is air tight, there is no difficulty in achieving adequate ventilation while the FB is in place.

(2) I.D. 6.0–4.5 mm: For patients in this group the space between the wall of the ETT and the FB is limited. Therefore adequate ventilation cannot be given via the ETT with the FB in place when the FB is threaded through the ETT, so two ETT's are used. The first ETT is inserted via one nostril into the nasopharynx and the patient is ventilated through it during the procedure. The second ETT is for endotracheal intubation, and the tracheal intubation is performed in the same manner as in the first group (fig. 2). As soon as the trachea is intubated, ventilation is changed over to this ETT.

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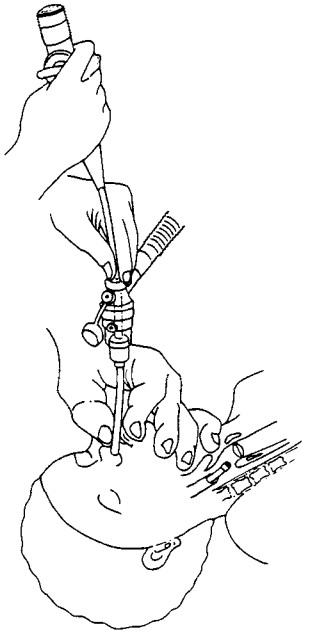

Fig. 1.

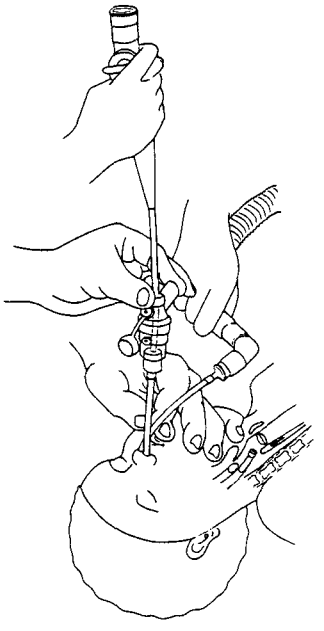

Fig. 2.

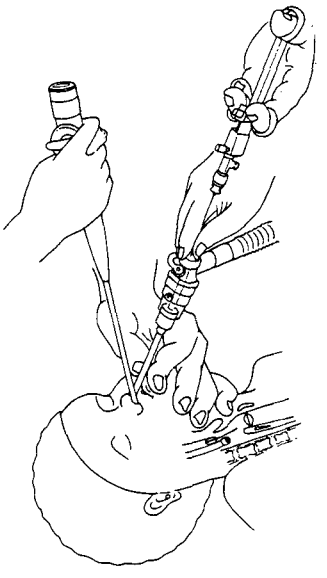

Fig. 3.

(3) I.D. less than 4.5 mm: In this group, threading the FB into ETT per se is difficult if not impossible, because of the small size of the ETT. To circumvent this, the FB and ETT are threaded through separate nostrils, a method originally developed by Alfery et al.[4] and Gouverneur et al.[5]. An ETT with an FB adapter is inserted via one nostril into the oropharynx, and the patient is ventilated through it. The FB is inserted through the other nostril to the point where the vocal cords can be seen. Then the ETT is advanced into the trachea under direct visualization. The ETT is directed using a performed stylet or a flexible guide wire introduced through the FB adapter (fig. 3).

To date, we have intubated more than 20 infants and children using these methods. Intubation by this technique was easier and less hazardrous than without muscle relaxation. Once ventilation was well-controlled by mask and bag, the management during the procedure was uneventful. This technique also is applicable in adults in whom endotracheal intubation has failed after the induction of anesthesia and administration of a muscle relaxant.

References

1. Murphy P: A fiber-optic endoscope used for nasal intubation. Anesthesia 22:489–491, 1967
2. Roberts JT:* Nasal intubation techniques, Fundamentals of tracheal intubation. Edited by Roberts JT. New York, Grune & Stratton, 1983, pp. 93–103
3. Arai T, Nagaro T, Nitta K: Management of the difficult endotracheal intubation; advantages of the Miller blade and a facilitated nasotracheal intubation with a fiberoptic bronchoscope. Masui 36:1112–1116, 1987 (abstract in English)
4. Alfery DD, Ward CF, Harwood IR, Mannino FL: Airway management for a neonate with congenital fusion of the jaws. Anesthesiology 51:340–342, 1979
5. Gouverneur JM, Veyckemans F, Licker M, Verellen G, Gribomont BF: Using an ureteral catheter as a guide in difficult neonatal fiberoptic intubation. Anesthesiology 66:436–437, 1987