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Blind Nasotracheal Intubation Using Succinylcholine

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The technique of blind nasotracheal intubation with spontaneous respiration was developed by Magill[1] and Rowbotham in the 1920s to provide safe anesthesia for maxillofacial surgery. Magill observed that, with the patient supine and the head in the sniffing position, the course of the air passage from nostril to glottis was a curve. He also discovered that a rubber tube with a similar curve would follow that course and more readily enter the glottis than the esophagus.[2] With the anesthetic agents available at that time, tracheal intubation required much patience and practice. Few anesthesiologists mastered the technique.

With the introduction of succinylcholine in the 1950s, oral intubation became quick and easy.[3] Nasal tracheal intubation, especially the blind technique performed under light general anesthesia, became obsolete except for surgery in which the oral route was either difficult or undesirable.

In the 1980s use of the flexible fiberoptic bronchoscope has largely replaced awake blind nasal tracheal intubation for anticipated difficult intubations. Although some anesthesiologists believe that blind nasal tracheal intubation requires spontaneous respiration,[4–6] members of our department prefer the patient to be apneic and relaxed. In this article we report detailed results of 80 cases and our general experience with more than 20,000 cases of the past 20 years.

MATERIALS AND METHODS

Eighty consecutive unselected ambulatory patients, ASA physical status I or II, 13–40 years of age, scheduled for elective oral surgical procedures were studied. No change from our normal anesthetic technique was made. All patients gave informed consent for a general anesthetic and for completion of preoperative and postoperative questionnaires. They fasted from midnight and arrived at the suite 30 min before surgery. On arrival their age, weight, smoking habit, history of epistaxis, and presence of nasal obstruction, sore throat, cough, and hoarseness were recorded. The postoperative morbidity questionnaire was completed by telephone the following day.

Uncuffed clear plastic endotracheal tubes, 6.5 mm for men or 6.0 mm for women, were used throughout the study. Each tube had a radius of curvature 12–16 cm and was lubricated with a water-soluble lubricant without local anesthetic (Muko). No premedication was given, and no topical nasal vasoconstrictor was used.

Patient monitoring included electrocardiogram, pulse, and blood pressure recording. A number 23 butterfly needle was inserted into a peripheral vein. Gallamine 10–15 mg was administered iv, followed by methohexital 1.5–2.0 mg/kg and succinylcholine 0.75–1.5 mg/kg. The patient's lungs were ventilated by mask with 100% oxygen. Then the patient's head, supported in a U-shaped headrest, was extended at the atlanto-occipital joint by upward traction on the patient's chin. The lubricated endotracheal tube was passed along the floor of the right nostril, or the left nostril if the right one was known to be obstructed, into the oropharynx.

The anesthesiologist then observed the neck continuously as the tube was advanced toward the glottis. If anterior or lateral bulging was seen, the tube was withdrawn sufficiently for its direction to be adjusted. If the bulge was on the right, the proximal end of the tube was rotated in a counterclockwise direction and again advanced. If the bulge was on the left, it was rotated in a clockwise direction. If the tip had entered the vallecula, the head was flexed slightly; if it entered the esophagus, extension of the head was increased by additional elevation of the chin.

Railroading of the tip of the endotracheal tube over the tracheal rings was frequently sensed by the anesthesiologist. It was also observed in thin patients in particular. A single compression of the lower end of the patient's sternum immediately confirmed placement in the trachea. The pressure causes a rush of air through (not around) the tube, which can be felt by the anesthesiologist's ear against the proximal end of the tube. The anesthetic circuit was connected, and correct positioning of the tube was confirmed by auscultation of both lung fields.

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TABLE 1. Patient Characteristics

	N	Age (yr)	Weight (kg)	Nasal Obstruction	Expistaxis Past Month
Female	43	22 ± 6	56 ± 9	2	3
Male	37	23 ± 7	71 ± 11	6	4

Values for age and weight are mean ± SD, those for nasal obstruction and epistaxis are numbers of patients.

TABLE 2. Time to Intubation and Incidence of Epistaxis

Intubation	N	Time (s)	Epistaxis*
Very easy	21	80 (70–100)	3 (1 + 2)
Easy	35	104 (80–180)	12 (5 + 7)
Slight delay	17	124 (90–180)	11 (9 + 2)
Visual ± forceps	7	170 (140–240)	7 (2 + 5)

Time values are mean (range).
* Epistaxis during intubation: numbers in parentheses represent patients with significant bleeding + those with minor staining.

Blind tracheal intubation was not mandatory in these cases. Thus, we did not persist with tubes of different radii of curvature that might have increased the success rate. If blind intubation was unsuccessful with the maneuvers described, tracheal intubation was performed visually using a laryngoscope.

One observer made all recordings during intubation and completed the postoperative morbidity questionnaire. Time for intubation was recorded from start of the methohexital injection to auscultation of the chest to confirm tracheal intubation. The intubation was graded as "very easy" (through the glottis with no pause), "easy" (minimal pause for rotation of tube), "slight delay" (adjustment of head position, rotation of tube, with or without external manipulation of larynx), and "visual" (after failure to intubate blindly within three minutes). At follow-up the severity and duration of epistaxis, sore throat, and hoarseness were recorded.

RESULTS

Patient characteristics are shown in table 1. Eight patients gave a history of nasal obstruction. Only two of these had right-sided obstruction, although in 14 of the remaining 72 patients passage of the tube was easier through the left nostril than the right. Seven patients gave a history of epistaxis in the previous month.

Table 2 classifies the ease of intubation. Blind intubation was very easy or easy in 70% of cases and successful in 91%. Time for blind intubation varied from 70 s through 180 s. In the very easy and easy categories intubation time from picking up the tube to its entry into the trachea was usually less than 30 s. During intubation only one patient had epistaxis sufficient to warrant pharyngeal suction by the surgeon before insertion of the throat pack. In 77% of patients there was either no blood on the nasotracheal tube or only minimal staining. There was no significant epistaxis following tracheal extubation. Three patients had a bony posterior pharyngeal ridge. In all three the anesthesiologist was able to manipulate the tube past the obstruction into the oropharynx. No pharyngeal mucosal tears occurred.

Postoperative morbidity is recorded in table 3. Seventy-four of the 80 patients were available for follow-up. Postoperative sore throat occurred in 80% and was not related to difficulty in intubation. All cases of hoarseness were mild. Epistaxis was noted at home by 9.5% of patients. None of these patients gave a history of epistaxis, nor was there any correlation between postoperative epistaxis and epistaxis during intubation.

DISCUSSION

This study demonstrates that blind nasotracheal intubation using a muscle relaxant drug has a high success rate with a low complication rate. Although minor morbidity was common, the incidence of postoperative sore throat may be partly attributable to the use of a gauze throat pack in every case,[7] and to surgical manipulations in that area. Epistaxis was not a problem during intubation or extubation, but we used 6.5 or 6.0 mm uncuffed tubes. The advantages of using small uncuffed tubes are that they can be easily manipulated within the nostril and that they cause minimal mucosal trauma. If a throat pack is used to prevent aspiration of blood, secretions, or tooth fragments, uncuffed tubes are satisfactory for short surgical procedures for which intermittent positive pressure ventilation is not required. For longer procedures, including all maxillofacial surgery, a cuffed nasotracheal tube is desirable, although trauma to the nasal mucosa is more likely.

Most cuffed endotracheal tubes are designed for orotracheal intubation. When such a tube is passed through the nose, the point at which the pilot tube joins the main tube lies within the nostril. We have observed that, during nasal tracheal intubation with cuffed tubes for maxillofacial surgery, this rough area often causes epistaxis during

TABLE 3. Postoperative Morbidity Related to Ease of Intubation

Intubation	N	Epistaxis	Sore Throat	Hoarseness
Very easy	21	1 (0 + 1)	17 (3 + 14)	3 (0 + 3)
Easy	31	4 (2 + 2)	23 (7 + 16)	6 (0 + 6)
Slight delay	16	2 (0 + 2)	14 (1 + 13)	4 (0 + 4)
Visual ± forceps	6	0 (0 + 0)	5 (1 + 4)	2 (0 + 2)

Numbers in parentheses represent patients with significant symptoms + those with minor symptoms.

manipulations to redirect the tip toward the glottis, and that the upper and lower edges of the cuff may also traumatize the nasal mucosa. Therefore, when a cuffed tracheal tube is used, we recommend application of a vasoconstrictor to the nasal mucous membrane before induction of anesthesia.

A posterior nasopharyngeal ridge, caused by a prominent body of the atlas vertebra,[8] may obstruct passage of the tube from the nose into the oropharynx. Rotation of the tube through 180° may negotiate the tip over the ridge. If this fails, a finger can be inserted through the mouth and up behind the soft palate to lift the tip over the ridge as an assistant advances the tube.

Even with gentle manipulation the tip of the endotracheal tube occasionally tears the oropharyngeal mucosa. Our incidence in more than 20,000 cases has been less than 1:3,000. In each case the tear was left open, a systemic antibiotic was administered, and recovery was uneventful.

Although several authors claim that spontaneous respiration is essential for blind nasal tracheal intubation,[4-6] others find that muscle relaxant drugs make it easier because laryngospasm does not occur.[9] With spontaneous respiration success rates vary from 53%[10] to 92%.[11,12] With muscle relaxants success rates vary from 76%[13] to 96%.[14] Our experience using succinylcholine for 20 years confirms these latter results. The classical method of blind nasal tracheal intubation described in textbooks is to listen through the tube as it is advanced through the orophaynx. The anesthesiologist directs the tube toward the area of loudest breath sounds. To do this the anesthesiologist's head is turned away from the patient. Careful observation of the neck is only recommended when the tube does not enter the larynx.[5]

The alternative method is to observe the neck continuously during advancement of the tube.[15] If anterior or lateral bulging is seen, the tube should be withdrawn sufficiently for its course to be readjusted in the direction of the glottis. Thereafter, maneuvers for redirecting the tip of the tube are the same whether the patient is breathing or apneic.

Although blind nasal tracheal intubation may no longer be the method of choice for anticipated difficult intubations, there are circumstances in which it may be a valuable technique. In patients who have upper central dental crowns or bridge work, blind nasal intubation avoids the use of a laryngoscope and thus the risk of dental trauma with potential subsequent litigation. When a muscle relaxant is used, blind nasal intubation is often as quick and as easy as visual oral intubation. If the laryngoscope light fails, the technique provides an alternative to illumination using a flashlight.[16] Furthermore, when the patient has already received a muscle relaxant and orotracheal intubation proves unexpectedly difficult, the blind nasal route is often surprisingly easy. However, the technique is not indicated in anticipated difficult tracheal intubation caused by airway obstruction from tumors or infections.

To achieve consistent success with blind nasal tracheal intubation, practice and experience are essential. The anesthesiologist should position the patient's head correctly, and visualize the anatomic course the tube must take to the glottis. The tube itself must be well lubricated, firm enough to maintain its curvature, and small enough in diameter to be easily rotated within the nostril.

In summary, our data showed that blind nasal tracheal intubation in paralyzed patients can usually be accomplished without difficulty. Because of its usefulness in situations wherein problems of airway management are unanticipated, we believe that blind nasal tracheal intubation using muscles relaxants is a technique that should be familiar to anesthesiologists.

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