Successful blind digital intubation with a bougie introducer in a patient with an unexpected difficult airway

James M. Rich, CRNA, MA

A critical aspect of providing safe general anesthesia is the preoperative assessment of the patient's airway. Adequate ventilation and oxygenation are essential for the well-being of the patient. Numerous assessment tools and airway management algorithms have been published to help the anesthesia provider make safe decisions and protect the patient (1–6).

Despite careful evaluation of the airway preoperatively, the provider can be presented with an unanticipated difficult airway to manage. Therefore, after induction of anesthesia and before a paralytic muscle relaxant medication is administered and a potential "point of no return" has been reached, the prudent practitioner again assesses the airway. The airway is tested to ensure that bag-mask ventilation (BMV) is easily attainable before a muscle relaxant is administered. If it is not possible to utilize BMV, the patient is awakened and a secure airway obtained under local anesthesia and sedation with the patient breathing spontaneously.

This case report describes a patient who presented with minimal indicators of a difficult intubation and good BMV after induction of anesthesia. Difficulties were then encountered. Many maneuvers have been described to obtain a successful intubation of the trachea in this situation (7). This report describes another novel technique that might be applied.

CASE REPORT

A healthy nonobese adult man presented for a fluoroscopic genitourinary procedure. Using the 6-D method of airway assessment (8, 9) *(Table),* the only outlier in his airway examination was decreased extension of the atlanto-occipital joint. Following induction of anesthesia with intravenous propofol, BMV was confirmed. A muscle relaxant, rocuronium, was administered, and direct laryngoscopy and intubation of the trachea were attempted, but these were unsuccessful. Only soft tissue with no identifiable airway anatomy could be seen (Cormack and Lehane grade 4) (8).

Prior to attempting intubation with an intubating LMA-Fastrach (8), a digital intubation technique in combination with a bougie introducer (SunMed endotracheal tube introducer, SunMed, Largo, FL) was attempted *(Figure)*. Standing at the side of the patient (face to face), the left index and long fingers were inserted into his mouth and along the tongue to a depth that made it possible to digitally identify the epiglottis, the rima glottis,

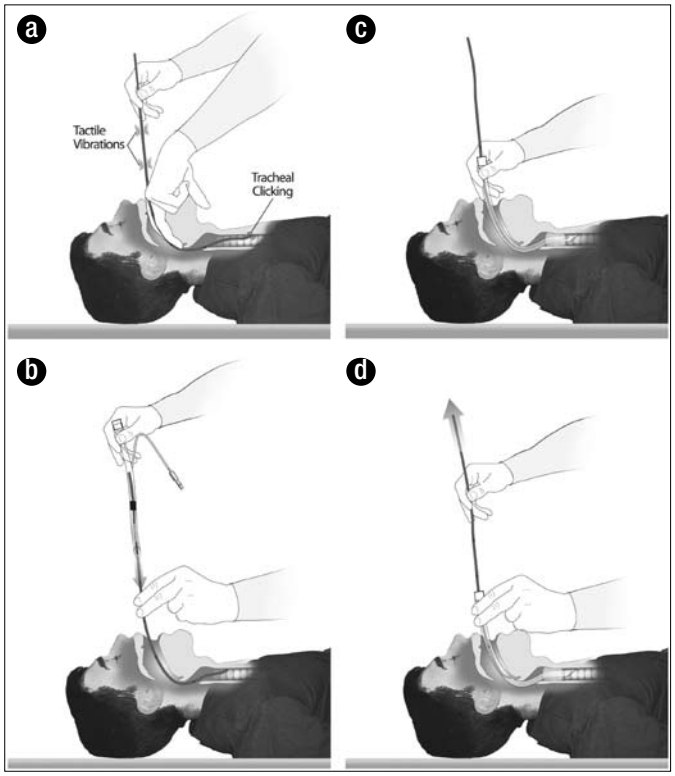

Figure. Bougie-assisted digital intubation. **(a)** After the epiglottis is identified by palpating it with the long finger of the left hand, the bougie is threaded through the glottis and advanced into the trachea. Tracheal clicking elicits tactile vibrations, which confirm tracheal placement of the bougie. **(b)** The bougie is withdrawn slightly so that the 25-cm mark is at the corner of the lip. The endotracheal tube is threaded over the bougie while the bougie is stabilized in place. **(c)** With the bougie held in place, the endotracheal tube is turned a quarter turn to the left and then advanced to an appropriate depth. **(d)** The tube is held in place while the bougie is withdrawn. Tracheal intubation is then confirmed using capnography or an esophageal detector device. Used with permission of J. M. Rich, CRNA, SLAM Airway Training Institute, Rowlett, TX (www.slamairway.com).

From the Department of Anesthesiology and Pain Management, Baylor University Medical Center, Dallas, Texas.

Financial disclosure: Jim Rich is the codesigner of the Sunmed endotracheal tube introducer and receives income from selling it through his airway education company, the SLAM Airway Training Institute, Rowlett, Texas.

Corresponding author: James M. Rich, CRNA, MA, Department of Anesthesiology and Pain Management, Baylor University Medical Center, 3500 Gaston Avenue, Dallas, Texas 75246 (e-mail: james.rich@slamairway.com).

Table. The 6-D method of airway assessment*

Sign of potential airway difficulty	Description	Quantitative or qualitative findings reported to be associated with difficulty	Acceptable findings not usually associated with difficulty
1. Disproportion	—Increased size of tongue in relation to pharyngeal size	—Mallampati class III or IV	—Mallampati class I or II
2. Distortion	—Airway swelling —Airway trauma (blunt or penetrating) —Tissue consolidation (e.g., secondary to radiation) —Neck mass —Neck hematoma —Neck abscess —Arthritic changes in the neck joints —Previous surgical airway	—Possibly difficult to assess —Blunt or penetrating airway trauma —Tracheal deviation —Neck asymmetry —Voice changes —Subcutaneous emphysema (crepitus) —Laryngeal immobility —Nonpalpable thyroid cartilage —Nonpalpable cricoid cartilage	—Midline trachea —No contractures of the neck —No surgical airway scar —Mobile laryngeal anatomy —Easily palpated thyroid cartilage —Easily palpated cricoid cartilage
3. Decreased thyromental distance	—Anterior larynx and decreased mandibular space	—Thyromental distance <7 cm (<3 finger breadths) measured from the superior aspect of the thyroid cartilage to the tip of the chin —Receding chin	—Thyromental distance ≥7 cm (~3 finger breadths) —No receding chin
4. Decreased interincisor gap	—Reduced mouth opening	—Distance between upper and lower incisors (i.e., interincisor gap) <4 cm (<2 finger breadths) —Mandibular condyle fracture —Rigid cervical spine collar	—Interincisor gap ≥4 cm (~2 finger breadths)
5. Decreased range of motion in any or all of the joints of the airway (i.e., atlanto-occipital joint, temporomandibular joints, cervical spine); atlanto-occipital range of motion is critical for assuming the sniffing position	—Limited head extension secondary to arthritis, diabetes, or other diseases —Previous neck radiation and/or radical surgery —Neck contractures secondary to burns or trauma	—Head extension <35° —Neck flexion <35° —Short, thick neck —Cervical spine collar or cervical spine immobilization	—Head extension ≥35° of atlanto-occipital extension —Cervical spine collar or cervical spine immobilization —Long, thin neck —No cervical spine collar or cervical spine immobilization
6. Dental overbite	—Large angled teeth disrupting the alignment of the airway axes and possibly decreasing the interincisor gap	—Dental overbite	—No dental overbite

*The 6-D method helps practitioners remember to check each of the six signs that can be associated with a difficult intubation. Each sign begins with the letter D like the word difficult. The potential for difficult intubation is generally proportional to the number of signs observed. Reprinted with permission from Rich, 2005 (8).

and posterior cartilages. With the fingers pressing the epiglottis against the pharyngeal wall, a bougie was passed along the axis of the long finger (stabilizing it between the index and long finger) and inserted through the glottis, where it elicited tracheal clicking, and was then advanced to a depth of 25 cm from the corner of the lip. The endotracheal tube was then passed over the bougie into the trachea, which was confirmed by capnography. The digital intubation required less than 1 minute.

DISCUSSION

Digital intubation was recently reviewed by Christodoulou, Murphy, and Hung (10), who stated that it can be used as an acceptable alternative to direct laryngoscopy for tracheal intubation when the standard technique is contraindicated, has failed, or is not possible because of an equipment problem. With the exception of bougie-assisted digital intubation, they describe all the combined techniques used to facilitate digital intubation.

Because of the bougie's smaller diameter and malleability, it is easier to digitally insert through the glottis than is an endotracheal tube. Even when the supraglottic structures are digitally identified, it can be difficult to direct the unassisted tracheal tube through the glottic opening. The use of the bougie in this case made digital intubation rapid and simple. Also, it may have decreased potential airway trauma by obviating the need for further direct laryngoscopy. Persistent and repeated use of direct laryngoscopy during failed intubation may result in airway trauma with resultant morbidity and mortality (11). Bougie-assisted blind digital tracheal intubation may be a viable rescue intubation technique

in "can mask-ventilate" patients with difficult laryngoscopy secondary to blood, vomitus, abnormal anatomy, or equipment problems. This technique offers a potential solution for difficult intubation situations occurring in or out of the operating room by any practitioner trained in advanced airway management.

Acknowledgments

I'd like to thank Michael A. E. Ramsay, MD, FRCA, for editorial contributions.

1. Mallampati SR, Gatt SP, Gugino LD, Desai SP, Waraksa B, Freiberger D, Liu PL. A clinical sign to predict difficult tracheal intubation: a prospective study. *Can Anaesth Soc J* 1985;32(4):429–434.
2. Butler PJ, Dhara SS. Prediction of difficult laryngoscopy: an assessment of the thyromental distance and Mallampati predictive tests. *Anaesth Intensive Care* 1992;20(2):139–142.
3. Iohom G, Ronayne M, Cunningham AJ. Prediction of difficult tracheal intubation. *Eur J Anaesthesiol* 2003;20(1):31–36.
4. Benumof JL. The unanticipated difficult airway. *Can J Anaesth* 1999;46 (5 Pt 1):510–511.
5. American Society of Anesthesiologists Task Force on Management of the Difficult Airway. Practice guidelines for management of the difficult airway: an updated report. *Anesthesiology* 2003;98(5):1269–1277.
6. Rich J. SLAM universal adult airway flowchart. In Rich J, ed. *SLAM: Street Level Airway Management*. Upper Saddle River, NJ: Brady/Pearson Prentice Hall, 2007:1–17.
7. Benumof JL. Management of the difficult adult airway. With special emphasis on awake tracheal intubation. *Anesthesiology* 1991;75(6):1087–1110.
8. Rich J. Recognition and management of the difficult airway with special emphasis on the intubating LMA-Fastrach/whistle technique: a brief review with case reports. *Proc (Bayl Univ Med Cent)* 2005;18(3):220–227.
9. Mason AM, Rich J. Airway anatomy and assessment. In Rich J, ed. *SLAM: Street Level Airway Management.* Upper Saddle River, NJ: Brady/Pearson Prentice Hall, 2007:19–36.
10. Christodoulou C, Murphy M, Hung O. Blind digital intubation. In Hagberg C, ed. *Benumof's Airway Management Principles and Practice,* 2nd ed. Philadelphia: Mosby Elsevier, 2007:393–398.
11. Posner K, Caplan R. Medical-legal considerations: the ASA closed claims project. In Hagberg C, ed. *Benumof's Airway Management Principles and Practice,* 2nd ed. Philadelphia: Mosby Elsevier, 2007:1272–1282.