Anesthesiology
66:69–71, 1987

Comparison of Intubation Techniques in the Awake Patient: The Flexi-lum® Surgical Light (lightwand) *Versus* Blind Nasal Approach

DONALD J. FOX, M.D.,* TIMOTHY CASTRO, JR., M.D.,* ALAN J. RASTRELLI, M.D.†

An endotracheal intubation in a patient who has anatomic variations is often difficult technically. Several techniques have been devised to circumvent the need for direct laryngoscopy in these patients.[1–4] A blind nasal technique, with the patient either awake or anesthetized but breathing spontaneously, can be used. More recently, the lightwand (Flexi-lum® surgical light, Concept, Clearwater, FL) has been described as an alternative technique.[3,5–8] A recent report compares the lightwand technique with direct vision orotracheal intubation,[8] but comparative studies have not been performed to evaluate relative efficacy, speed, or incidence of complications for the lightwand *versus* the blind nasal approach to endotracheal intubation.

METHODS

Twenty-three patients undergoing procedures for which awake endotracheal intubation was deemed appropriate (one cervical laminectomy, 21 lumbar laminectomies, and one Harrington rod procedure) were randomly assigned to one of two groups. In Group 1 the tracheas were intubated with the blind nasal method after topical anesthesia to the oropharynx, 4% cocaine spray (5 ml) to the nasal cavities with serial dilatation using nasal airways lubricated with lidocaine gel, followed by transtracheal injection of 2% lidocaine. Group 2 patients underwent similar preintubation preparation, but the endotracheal tube was inserted orally with the lightwand. Sedation was induced with the drug of the anesthetist's choice. Anesthetist participation in the study was limited to residents with at least 6 month's experience in performing endotracheal intubations.

All patients breathed 100% oxygen before each intubation attempt. The time required for intubation was considered to be from the time the mask was removed from the face to the moment that bilateral breath sounds were confirmed after intubation. When multiple attempts were required, times were considered additive. The number of attempts was recorded, as well as the occurrence of complications (table 1).

Patients excluded from our study included those with coronary artery disease, severe hypertension, a known coagulopathy, or a full stomach. The study was approved by our institutional clinical investigation committee, and informed consent was obtained.

The Flexi-lum® surgical light was inserted in the same manner as a stylet into an 8.0-mm endotracheal tube cut to 24 cm in length, with the distal 8–10 cm bent into a "hockey stick" configuration (fig. 1). The light tip was placed distal to the eyelet of the endotracheal tube and checked to assure adequate function. After the airway was appropriately anesthetized, the tongue was grasped firmly with a gauze sponge and pulled gently forward. With room lights dimmed, the lightwand was turned on and inserted into the posterior oropharynx. A glow noted in the lateral neck indicated that the tip of the endotracheal tube lay in the vallecula. If the tip entered the esophagus, there was a marked diminution in the light's brightness. When the tip was correctly positioned just superior to the larynx in the midline, a marked glow was noted in the anterior neck. At this point the endotracheal tube was slid off the lightwand in the same manner as with a standard stylet. Breath sounds were checked bilaterally in the usual manner, and the endotracheal tube was secured.

With the blind nasal approach, an uncut/unstyletted 7.0-mm or 8.0-mm endotracheal tube was used in male or female patients, respectively. The airway was anesthetized as noted earlier. The tip of the endotracheal tube was lubricated with water-soluble lidocaine gel and gently advanced to the posterior nasopharynx. With the head and neck in the "sniffing" position, the tube was advanced until it was poised above, but not touching, the vocal cords. Proper position was evidenced by "fogging" of the en-

* Senior Resident in Anesthesiology.

† Staff Anesthesiologist.

Received from the Anesthesia and Operative Service, Department of Surgery, Letterman Army Medical Center, Presidio of San Francisco, California. Accepted for publication August 7, 1986.

The opinions or assertions contained herein are the private views of the authors and are not to be construed as official or as reflecting the views of the Department of the Army or the Department of Defense.

Address reprint requests to Technical Publications Editor: Letterman Army Medical Center, Presidio of San Francisco, California 94129-6700.

Key words: Equipment: lightwand. Intubation, endotracheal: techniques.

TABLE 1. Mean Time and Number of Attempts for Blind Nasal and Lightwand Intubations

	Mean Time (s)	Range (s)	Average Attempts (number)	Patients (number)
Group 1 (blind nasal)	119.7	23–312	3.1	10
Group 2 (lightwand)	37.9 ($P < 0.01$)	17–85	1.1 ($P < 0.05$)	13

dotracheal tube with respirations and breath sounds emitting from the proximal end. By observing the rise and fall of the patient's chest, the endotracheal tube was advanced during inspiration. If unsuccessful, the tube was partially withdrawn, the head repositioned, and another attempt made. As with the lightwand, when the endotracheal tube was successfully inserted, bilateral breath sounds were noted.

The difference in times between the two techniques was examined using Student's *t* test. The incidence of failed intubations and complications was evaluated using Chi-square analysis.

RESULTS

The trachea of one patient was unable to be nasally intubated; this patient was switched to the lightwand group. Results of this case of failed nasal intubation were not included in the blind nasal group findings. In addition, one patient was placed in the lightwand group because of an inability to extend the neck and a history of failed intubation attempts both by direct laryngoscopy and by nasal approach (due to small nares). Both of these patients were successfully intubated with the lightwand on first attempts in times of 23 s and 85 s, respectively.

Patients in the lightwand group required significantly fewer attempts per successful intubation (1.1 *vs.* 3.1, $P < 0.05$, table 1). When intubation by either technique was successful on the first attempt, there was no significant difference in time required for Group 1 or Group 2 patients (27.7 s *vs.* 37.9 s, respectively). However, because of the increased number of missed intubation attempts in the blind nasal group, the average time required for successful intubation was much shorter in the lightwand-intubated group (37.9 s *vs.* 119.7 s, $P < 0.01$, table 1).

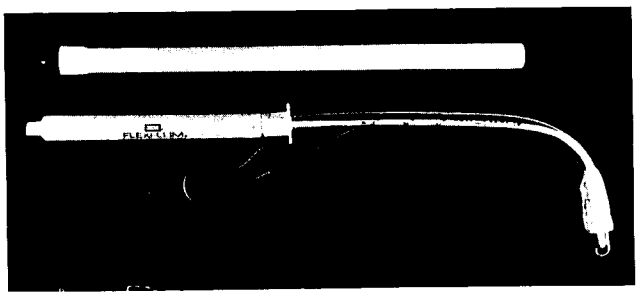

FIG. 1. Flexi-lum® surgical light and precut endotracheal tube. Note the "hockey stick" configuration.

No complications of endotracheal intubation occurred in lightwand-intubated patients. All nasal bleeding was recorded as epistaxis, regardless of severity. Seven of ten patients intubated nasally developed epistaxis ($P < 0.001$), with four of these cases described as "mild." Esophageal intubation was reported in three of ten patients using the blind nasal technique, and was not noted in the lightwand-intubated group.

DISCUSSION

We found that intubation of the trachea by the lightwand technique was an easily learned, safe, effective, and rapid alternative method for airway management. These findings are in agreement with the recent study by Ellis *et al.*, in which endotracheal intubation with the lightwand was compared with direct laryngoscopy.[8] Blind nasotracheal intubation is a technique that requires a fair degree of experience to attain proficiency. The anesthetist participants in our study all had far more experience with the blind nasal technique than with use of the lightwand. In fact, three of the participants had not performed a lightwand intubation prior to this study.

An important advantage of the lightwand over blind nasotracheal intubation is the fact that the lightwand can be used in an apneic patient. In the case of a missed intubation after induction of general anesthesia with muscle paralysis, it is not necessary to wait for the patient to awaken or to begin spontaneous respiration when the lightwand is used.

Less trauma occurred in lightwand-intubated patients. The most obvious reason for this is that the nares were avoided. The lightwand can be used for nasal intubation of the trachea, but we believe that this technique is too traumatic.[9] Another less obvious reason for fewer complications in the lightwand group is that far fewer attempts were required for successful endotracheal intubation with this technique. The fact that lightwand intubation is not a blind technique contributes to the lower incidence of tissue trauma, because it is unlikely that the endotracheal tube will be advanced in the absence of the appropriate physical findings (*i.e.*, a marked glow in the anterior neck that signifies proper position).

As we demonstrated in our study, the lightwand technique is well suited for the patient with a known difficult airway. Rayburn has reported success with this technique in patients who have unstable neck fractures, burn strictures of the neck, and congenital airway problems such as Treacher Collins and Pierre Robin syndromes.[6] The recent report by Ellis *et al.* notes that most lightwand intubations were able to be performed without having to flex the patient's neck or extend the head, and comments

that this technique may be preferable in cases of suspected or known cervical spine injury.[8] This has been our experience also, and in fact we frequently use the lightwand at our institution for the intubation of patients with cervical spine injuries.

The major disadvantage of the lightwand technique is the need for an extra piece of equipment with the ever-present risk of equipment failure, which contrasts with the blind nasal technique and its lack of required apparatus. The need to dim the room lights may also be viewed as a disadvantage. However, we believe that the benefits of faster intubation, less trauma, and lack of a need for a spontaneously ventilating patient far outweigh the disadvantages. It should be remembered that other techniques for managing the difficult airway are either dependent on sophisticated equipment requiring frequent practice to maintain skills (*i.e.*, the fiberoptic laryngoscope) or more invasive methods such as the retrograde wire technique[1] or cricothyroidotomy.[4]

In summary, lightwand-guided endotracheal intubation has recently been compared with direct-vision laryngoscopic intubation of the trachea.[8] The lightwand technique was found to be similar to the direct laryngoscopic technique in efficacy, safety, and incidence of complications. We chose to compare the lightwand with blind nasal endotracheal intubation because the blind nasal technique is a frequently used alternative method, particularly when the patient has a known or suspected difficult airway. We found lightwand-guided endotracheal intubation to be superior to the blind nasal approach in terms of greater speed, fewer attempts, and reduced incidence of complications.

We recommend the lightwand technique as an easily learned, highly efficacious method for endotracheal intubation of the awake patient, as well as for management of the difficult airway.

References

1. Powell WF, Ozdil T: A translaryngeal guide for tracheal intubation. Anesth Analg 46:231–234, 1967
2. Raj PP, Forestner J, Watson TD, Morris RE, Jenkins MT: Technics for fiberoptic laryngoscopy in anesthesia. Anesth Analg 53: 708–713, 1974
3. MacIntosh R, Richards H: Illuminated introducer for endotracheal tubes. Anaesthesia 12:223–225, 1957
4. Boyd AD, Romita MC, Conlan AA, Fink SD, Spencer FC: A clinical evaluation of cricothyroidotomy. Surg Gynecol Obstet 149: 365–368, 1979
5. Berman RA: Lighted stylet. ANESTHESIOLOGY 20:382–383, 1959
6. Rayburn RL: 'Light wand' intubation (letter). Anaesthesia 34:667–668, 1979
7. Ducrow M: Throwing light on blind intubation. Anaesthesia 33: 827–828, 1978
8. Ellis DG, Jakymec A, Kaplan RM, Stewart RD, Freeman JA, Bleyaert A, Berkebile PE: Guided orotracheal intubation in the operating room using a lighted stylet: A comparison with direct laryngoscopic technique. ANESTHESIOLOGY 64:823–826, 1986
9. Stone DJ, Stirt JA, Kaplan MJ, McLean WC: A complication of lightwand-guided nasotracheal intubation. ANESTHESIOLOGY 61:780–781, 1984

Anesthesiology
66:71–73, 1987

Cervical Epidural Steroids in Reflex Sympathetic Dystrophy

R. DIRKSEN, M.D., PH.D.,* M. J. RUTGERS, M.D., PH.D.,† J. M. W. COOLEN, M.D.‡

Reflex sympathetic dystrophy, or algodystrophy, is the result of dysfunction of the spinal cord and neuraxis,[1,2] and/or dysfunction of the peripheral nerves.[3] Early signs and symptoms of reflex sympathetic dystrophy are burning pain, hyperpathia, allodynia, vasomotor, and sudomotor changes.[3,4] Weakness, atrophy, and trophic changes occur at a later stage of the disease. The three grades are: 1) clinical symptoms of classical causalgia, *i.e.*, severe pain, with severe vasomotor and sudomotor changes; 2) diffuse pain with mild vasomotor and sudomotor changes; and 3) borderline between normal response to trauma and the previous grades.[3] Without treatment, the condition passes through three stages[3,4] and is downgraded.

Stage I is characterized by pain, hyperesthesia, hyperalgesia, localized edema, muscle spasm, and tenderness. In this stage, regardless of grade, the syndrome is still considered as accessible to treatment. Therefore, it is imperative to recognize the syndrome in an early condition. Treatment consists of either blocking the sympathetic nerve supply by injecting the sympathetic chain and gan-

* Senior Clinical Research Associate (Anesthesiologist), Department of Anesthesiology, Radboud Ziekenhuis, Nijmegen.

† Senior Clinical Associate (Neurologist), Pain Clinic, Academic Hospital, Dijkzigt Rotterdam.

‡ Senior Clinical Associate (Anesthesiologist), Pain Clinic, Academic Hospital, Dijkzigt Rotterdam.

Received from the Department of Anesthesiology, Radboud Ziekenhuis, Nijmegen, and the Pain Clinic, Academic Hospital, Dijkzigt Rotterdam, The Netherlands. Accepted for publication August 12, 1986.

Key words: Anesthetic technique: epidural. Hormones: corticosteroid. Nerve: reflex sympathetic dystrophy.

Address reprint requests to Dr. Dirksen.