

# The Management and Treatment of Recurrent Postoperative Laryngospasm

David L. Mevorach, MD

Department of Anesthesiology, Strong Memorial Hospital, University of Rochester School of Medicine and Dentistry, Rochester, New York

Laryngospasm is a common complication of airway management in anesthetic practice (1). It consists of a prolonged glottic closure reflex mediated by the superior laryngeal nerve. It often occurs with insufficient depth of anesthesia on endotracheal intubation, light anesthesia on tracheal extubation, or a combination of either of the preceding with an airway irritant such as blood, mucus, laryngoscope blade, suction catheter, surgical debris, or other foreign body. The management of laryngospasm described by many authors (2-4) consists of positive pressure ventilation, occasional small intravenous doses of succinylcholine or lidocaine, decreasing or increasing the depth of anesthesia, or tracheal reintubation with extubation after the patient is fully awake and thoroughly suctioned. Partial laryngospasm has some degree of air movement and may be difficult to distinguish from other causes of upper airway obstruction. Complete laryngospasm presents with no air movement and is a cause of postoperative negative pressure pulmonary edema (5,6). If there is a history of choking during sleep, a sleep evaluation and polysomnography may be indicated (7).

We present a case of awake recurrent complete postextubation laryngospasm and its management in an adult male after general endotracheal anesthesia for a mandibular advancement procedure.

## Case Report

A healthy, 43-yr-old man, 193 cm and 109 kg, was scheduled for bilateral mandibular osteotomy advancement for treatment of retrognathia. Preoperative airway examination revealed a large oral opening, adequate hyoid-mentum distance and a Mallampati Class II pharyngeal visualization. The patient reported that, during an appendectomy in 1984

(at another hospital), he had "stopped breathing during the operation." This anesthesia record was not available prior to surgery. The anesthesia team interpreted the patient's history to mean either intraoperative awakening or incomplete reversal of muscle relaxants had occurred with the prior procedure.

The patient was quite apprehensive in the preanesthesia holding area and was sedated with intravenous midazolam. Induction of anesthesia and endotracheal intubation were accomplished easily after the intravenous administration of propofol, fentanyl, and vecuronium. Surgery proceeded without complication and ended 3 h later. Neuromuscular block was reversed ½ h before the end of surgery, and the patient had four of four twitches from train-of-four simulation and full sustained tetanus at 100 Hz for five s. Desflurane was discontinued at 20 min and nitrous oxide 10 min before the end of the case. Oxygen, 10 L/min, was given for the last 10 min of spontaneous breathing, which consisted of 500- to 700-mL breaths at a rate of 12-20 breaths/min.

With the patient responding to commands for eye opening and head lift (which could be sustained >30 s), his pharynx was suctioned and trachea extubated. After two stridorous breaths, the patient pointed toward his throat, indicating that he was unable to breathe. Positive pressure ventilation was applied with bag and face mask without successful ventilation. Succinylcholine 5 mg and lidocaine 50 mg were given at this point, and with continuing positive pressure ventilation the laryngospasm was terminated. The patient, breathing spontaneously now, then moved himself to the stretcher for transport to the postanesthesia care unit (PACU) with the head of the bed at 45°. Once he was settled on the transport bed, the patient immediately went into complete laryngospasm again that was relieved by 5 min of positive pressure ventilation. Breathing spontaneously with supplemental oxygen by mask, the patient was then transported to the PACU.

Upon arrival in the PACU, our patient, awake, alert, and conversant, entered into complete laryngospasm for the third time. This time he struggled to breathe, and since we were unable to terminate the laryngospasm with positive pressure ventilation, we intubated the trachea after administering succinylcholine and sedated him with propofol. The ear, nose, and throat surgery senior resident was consulted for fiberoptic examination of the airway to rule out any pathology or injury. Her initial examination revealed a clean and dry pharynx and larynx without injury or foreign material. Since the patient had been struggling, a propofol infusion was begun and ventilation controlled mechanically. The anesthesia team considered starting a lidocaine infusion

Accepted for publication July 5, 1996.

Address correspondence and reprint requests to David L. Mevorach, MD, Assistant Professor of Anesthesiology, Department of Anesthesiology, Box 604, Strong Memorial Hospital, 601 Elmwood Ave., University of Rochester School of Medicine and Dentistry, Rochester, NY 14642.

with attempted tracheal extubation in 2-3 h, when a colleague suggested bilateral superior laryngeal nerve block. This was performed with 6 mL 1% lidocaine, using the technique described by Scott (8). Propofol infusion was stopped and the patient resumed spontaneous ventilation. His trachea was extubated 30 min later without any further episodes of laryngospasm. Three weeks later, the patient had no memory of these incidents or any problems with surgery.

## Discussion

Our patient presented preoperatively with a history that he had "stopped breathing during the operation." A day after our experience with his recurrent laryngospasm, we telephoned his previous anesthesiologist in another city and discovered that our patient had experienced repeated laryngospasm postoperatively with a previous surgery that had resolved with positive pressure ventilation and small doses of succinylcholine. Certainly, earlier contact with his former anesthesiologist would have left us less surprised by the day's events, although we do not think it would have changed our management of the clinical situation.

An excellent study of the incidence of laryngospasm by Olsson and Hallen (1) found a mean incidence of 8.6/1000 in adults and a higher incidence of up to 27.6/1000 in children. Respiratory infection dramatically increased the incidence of laryngospasm in children. Topical application of 4% lidocaine to the larynx at the time of intubation has been shown to decrease the incidence of laryngospasm in tonsillectomy patients (9). Laryngospasm has been described with the elongated uvula (10), as sleep-related (7) and evoked by distal esophageal afferents (11).

While laryngospasm is often discussed in many standard texts, none presents a complete plan for management of severe postoperative recurrent laryngospasm (2-4). We think the management should include the standard protocol of positive pressure ventilation, lidocaine, and succinylcholine, with or

without reintubation. Use of a bilateral superior laryngeal block will interrupt the reflex arc, allowing extubation of a trachea that might have remained intubated and dissipation of whatever stimuli are causing the laryngospasm. The addition of bilateral superior laryngeal nerve block can be useful, but could disguise damage to the recurrent laryngeal nerve that would leave the adductors of the vocal cords unopposed. In cases of severe repeated postoperative laryngospasm, fiberoptic pharyngeal and laryngeal examination should be used to rule out pathology. If a superior laryngeal nerve block is then used, vocal cord function should be assessed after the block has dissipated.

## References

1. Olsson GL, Hallen B. Laryngospasm during anaesthesia: a computer-aided incidence study in 136,929 patients. *Acta Anaesthesiol Scand* 1984;28:567-75.
2. Jerome EH. Recover of the pediatric patient from anesthesia. In: Gregory GA, ed. *Pediatric anesthesia*. New York: Churchill Livingstone, 1989:619-46.
3. Stehling LC. Management of the Airway. In: Barash PG, Cullen BF, Stoelting RK, eds. *Clinical anesthesia*. Philadelphia: JB Lippincott, 1992:685-709.
4. Stone DJ, Gal TJ. Airway management. In: Miller RD, ed. *Anesthesia*. New York: Churchill Livingstone, 1994:1403-36.
5. Halow KD, Ford EG. Pulmonary edema following postoperative laryngospasm. *Am Surg* 1993;59:443-7.
6. Holmes JR, Hensinger RN, Wojtys EW. Postoperative pulmonary edema in young athletic adults. *Am J Sports Med* 1991;19:365-71.
7. Aloe FS, Thorpy MJ. Sleep-related laryngospasm. *Arq Neuropsiquiatr* 1995;53:46-52.
8. Scott DB. *Techniques of regional anaesthesia*. Norwalk, CT: Appleton & Lange, 1989.
9. Staffel JG, Weissler MC, Tyler EP, Drake AF. The prevention of postoperative stridor and laryngospasm with topical lidocaine. *Arch Otolaryngol Head Neck Surg* 1991;117:1123-8.
10. Shott SR, Cunningham MJ. Apnea and the elongated uvula. *Int J Pediatr Otorhinolaryngol* 1992;24:183-9.
11. Bauman NM, Sandler AD, Schmidt C, et al. Reflex laryngospasm induced by stimulation of distal esophageal afferents. *Laryngoscope* 1994;104:209-14.