Patients with rheumatoid arthritis (RA) pose a unique challenge to the anesthetist. The manifestations of RA may include cervical spine instability, limited range of motion, and temporomandibular joint involvement limiting mouth opening. Therefore, securing the airway while maintaining the head and neck in a neutral position is of particular concern to the anesthetist. While this is most commonly accomplished using an awake fiberoptic technique, the following case is presented as a safe and efficient initial alternative to the primary use of fiberoptic bronchoscopy in the appropriate patient population.

**Keywords:** Awake fiberoptic intubation, cervical spine instability, fast-track laryngeal mask airway, rheumatoid arthritis, temporomandibular joint.

The “gold standard” of direct visualization of the glottic opening in an established difficult airway is accomplished with the fiberoptic bronchoscope; however, this technique is not without technical difficulties. Johnson et al compared data collected on 45 patients undergoing fiberoptic bronchoscopy for awake orotracheal intubation. The intubation procedures were videotaped for each patient and evaluated by an otolaryngologist. The results of the study concluded that in more than half of the intubation attempts (24 patients or 53.3% of the sample group), the endotracheal tube (ETT) did not enter the trachea during the first attempt. The authors concluded that the right arytenoid and interarytenoid soft tissues are the pharyngeal structures that most often interfere with passage of the ETT during fiberoptic intubations.

There are a multitude of indications for awake fiberoptic intubation. Examples include upper airway obstruction (tumor, abscess, and prior surgery), mediastinal mass, subglottic stenosis, congenital upper airway abnormalities, immobile cervical vertebrae, arthritis, traction, and verification of the position of a double-lumen endobronchial tube.

Rheumatoid arthritis (RA) has numerous systemic manifestations to be noted by clinicians prior to anesthesia. Patients with severe RA may have multisystem involvement outside the typical extremity joint destruction. Extreme RA may involve the synovial membranes of the cervical spine. Patients may have atlantoaxial subluxation (C1-C2 instability) necessitating cervical spine radiographs prior to surgery. In severe cases, transient ischemic attacks may be indicative of cerebral artery impingement. Another concern to the anesthetist is cricoarytenoid arthritis with laryngeal cartilage involvement usually noted by hoarseness or stridor caused by narrowing of the glottic opening. In addition, the temporomandibular joint may be compromised, limiting mouth opening.

Rheumatoid arthritis is a systemic autoimmune inflammatory disease characterized by inflammation of the lining surfaces of the joints, pericardium, and pleura referred to as synovitis and serositis. The hallmark feature of the disease is persistent symmetric polyarthritis (synovitis) that affects the hands and feet, although any joint lined by a synovial membrane may be involved. Systemic involvement may lead to weight loss, low-grade fever, and malaise. The severity of RA may fluctuate over time, but chronic RA most commonly results in the progressive development of various degrees of joint destruction, deformity, and decline in functional status.

**Case summary**

A 45-year-old male presented to surgery for left shoulder hemiarthroplasty. On physical examination and evaluation, the patient was found to suffer from advanced RA with spondylosis and decreased range of motion of all joints, in particular, the neck. Approximately 1 year before surgery, the patient had radiographic evaluations of the cervical spine that demonstrated mild instability of the C1-C2 vertebrae. Normal neck position while standing was head forward and down, self-described as “constantly looking at the ground.”

The patient smoked 1.5 packs of cigarettes per day for 15 years. Medications included celecoxib, methotrexate, and oxycodone, as needed. The patient...
had no known drug allergies. Prior surgeries included bilateral hip and knee replacements under epidural anesthesia without incident. The patient had no history of heartburn or reflux disease. The patient weighed 68 kg and was 180.34 cm tall.

When asking the patient to demonstrate neck mobility, it was noted that he had severely limited range of motion. He could lift his chin approximately 1 inch from his normal “downward-looking” head position (at an estimated 45° angle to his chest), and lateral movement was impossible without shoulder turn. Evaluation of the airway revealed excellent mouth opening, with no apparent temporomandibular joint limitations, and poor dentition, but no loose teeth. The entire tip to base of the uvula was visualized on mouth opening along with the hard and soft palate, meriting a Mallampati classification of I. The patient was able to subluxate the lower jaw approximately 1 cm. We discussed with the patient the necessity for an awake intubation related to his inability to flex or extend his neck to any significant degree. The patient expressed understanding and agreed to proceed.

The operating room setup included fiberoptic scope with light source in place, gum elastic bougie, cricothyrotomy tray, and laryngoscope. The case also was discussed with a general surgeon who was on standby should the need for an emergency tracheotomy arise.

The patient was given 2 mg of midazolam intravenously (IV) in the holding room. Following this, a superior laryngeal nerve block was performed using 2 mL of 1% methylparaben-free lidocaine laterally. A transtracheal block was then performed using 5 mL of 2% methylparaben-free lidocaine. The oropharynx was anesthetized with benzocaine spray twice with a 2-second spray (200 mg for each spray). The patient was very cooperative during all of the above nerve block procedures.

Upon arrival in the operating room, the patient independently moved to the bed. The patient was asked to place himself in the sitting position and to position his neck comfortably using a pillow for support.

With good mouth opening demonstrated, the patient was given another 2 mg of midazolam IV and 20 mg of ketamine IV with 0.2 mg of glycopyrrolate IV as an antisialagogue. A deflated #5 fast-track laryngeal mask airway (LMA) was introduced into the oropharynx after full mouth opening, and the patient was asked to swallow. The patient tolerated this procedure easily, and the LMA seated properly without incident. The LMA was inflated, and the patient was instructed to take a couple of deep breaths after the anesthesia circuit was connected to confirm placement of the LMA by capnography. After the ETCO₂ waveform was confirmed, the circuit was disconnected and the fast-track 7.5 ETT was advanced through the opening of the LMA while listening for breath sounds and observing the depth of the ETT. The patient was instructed to take a deep breath as the ETT was advanced through the glottic opening. The patient's breath was felt as the endotracheal tube passed through the glottic opening. The ETT passed through the fast-track LMA into the trachea on the first attempt. After connecting the anesthesia circuit to the ETT, ETCO₂ was once again confirmed. The patient was instructed to move his upper and lower extremities to display lack of neurological deficit due to C1-C2 instability. The patient did not attempt to fight the procedure at any point in the intubation process. Once movement of extremities was confirmed, general anesthesia was induced using 160 mg of propofol IV with 150 µg of fentanyl IV, and 40 mg rocuronium IV.

Because of the success of the superior laryngeal and transtracheal nerve blocks with the addition of topical anesthesia (benzocaine) to the oropharynx, the patient tolerated the intubation procedure with very minimal sedation. He was cooperative throughout the entire intubation process and easily followed all commands. The entire intubation process took approximately 2 minutes to complete.

The patient’s head was secured using a padded horseshoe neurosurgery device affixed to the operating room table in the position the patient had demonstrated as comfortable at the beginning of the case. The surgical procedure proceeded without incident. At the conclusion of the procedure, general anesthesia was discontinued. Residual paralysis was reversed with 2 mg neostigmine IV, and 0.4 mg glycopyrrolate IV. A full train of four and sustained tetany were noted by testing the obicularis occuli muscle. The patient was asked to open his eyes, take a deep breath, and move both lower and upper extremities. While spontaneously breathing at the conclusion of the case, the patient’s exhaled tidal volume was consistently 650 mL or greater with a respiratory rate of 14 breaths per minute. After eye opening and following all commands, the patient was extubated easily. He was transferred immediately to the postanesthesia care unit and oxygen via nasal cannula was started at 4 L/min. His initial postanesthesia care unit vital signs were as follows: blood pressure, 123/69 mm Hg; heart rate, 105 beats per minute; respirations, 18 breaths per minute; temperature (oral), 98.8°F; and SpO₂, 98%.

Discussion

We present this case to demonstrate the ease and
safety with which the patient was intubated awake using the fast-track LMA without the assistance or necessity of fiberoptics. Because of the severely limited range of motion and C1-C2 instability, it was imperative that the patient be able to: (1) cooperate with our commands, (2) position himself, (3) demonstrate movement of all extremities after the intubation procedure, and (4) before removal of the ETT, eliminate any question of neurological deficit before and after the surgical procedure.

Contraindications and potential complications for this type of procedure are full stomach, inability to open the mouth wide enough for the fast-track LMA to pass through the oropharynx, and inability of the patient to follow commands.

A recent study by Combes et al\textsuperscript{5} compared intubating 50 morbidly obese patients (body mass index (BMI), 42 ± 7) vs 50 lean patients (BMI, 23 ± 3) with the intubating LMA. The authors concluded that airway management with the intubating LMA was simpler in obese patients than lean patients with ventilation within 1 minute in all of the obese patients and within 2 minutes in the majority of the patient population (96%). Therefore, obesity alone should not be considered a contraindication to use of the intubating LMA.

Had the fast-track endotracheal tube been unable to pass through the glottic opening, we would have attempted a fiberoptic approach using the properly seated LMA as a conduit for fiberoptic bronchoscopy. If that attempt failed, it was our intention to proceed with a nasotracheal intubation.

Upon postoperative rounds the following morning, the patient was found to be sitting in a bedside chair with minimal discomfort to the shoulder. The patient’s only memory of the entire surgical experience was the initial nerve blocks in the holding room before the operative procedure.

REFERENCES


AUTHORS

J. David Parnell, CRNA, MS, has been in private anesthesia practice in Sevierville, Tenn, since November 2004, and he is vice president of Sevier Anesthesia Associates, P.C., Sevierville, Tenn. Email: parndks@hotmail.com

Jeff Mills, CRNA, MS, is the founder and chief executive officer of Sevier Anesthesia Associates, P.C., in Sevierville, Tenn, and he has been in private anesthesia practice for 21 years.