Managing Awake Intubation

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INTRODUCTION

In the emergency department (ED), awake tracheal intubation is an important yet rarely utilized airway management technique.[1,2] Awake intubation involves using meticulous topical anesthesia, with or without sedative medications, to perform tracheal intubation. The goal is to maintain airway reflexes and spontaneous breathing during the procedure. The procedure has its disadvantages, including the time it takes to perform and the challenge of managing an awake patient's experience and movements. Awake intubation contrasts with rapid sequence intubation. Rapid sequence intubation uses induction and neuromuscular blocking agents to rapidly induce sedation and paralysis, facilitating endotracheal tube placement. Emergency physicians should consider awake intubation in patients with difficult airways or challenging physiologic characteristics, with a primary goal of avoiding cannot oxygenate/cannot ventilate scenarios.[3-7] A clinician may perform awake intubation using a flexible endoscope, either nasally or orally, or an oral rigid video laryngoscope. A 2018 systematic review and meta-analysis demonstrated no difference in success between awake endoscopic and awake video laryngoscopic approaches in the operating room setting.[8]

Although awake intubation is an important airway management skill, evidence supporting its use is limited, particularly in ED settings. Published case reports describe successful awake intubations in the ED for various difficult airway scenarios.[9,10] In a multicenter observational cohort of patients undergoing intubation in 25 North American academic EDs, awake intubation comprised only 0.4% of ED intubations, with a first-attempt success of 85%.[1] It was most commonly performed in airway obstruction scenarios, such as angioedema. Clinicians used flexible endoscopes in 78% of awake intubations in this cohort, achieving a first-attempt success of 92% through the nasal route and 57% through the oral route. Rigid video laryngoscopy was used in only 11% of awake procedures, with a first-attempt success of 89%. The most frequent adverse event reported during awake intubation was hypoxia, occurring in 12% of patients.[1]

Although this procedure is rare in ED settings, the compelling potential benefits in certain patients highlight the importance of emergency physicians being familiar with the indications for and approach to awake intubation. However, emergency physicians currently report widely varying levels of confidence with awake intubation techniques.[11] We will discuss key tenets of managing awake intubation in the ED, drawing on established literature and years of combined practice, with a focus on the awake aspect of the procedure rather than specific intubation techniques.

ASSESSMENT

Patient Selection

Patient selection relies heavily on clinician judgment, and it is important to note that the indications and contraindications for awake intubation are relative. In Table 1, we list these indications and contraindications. Such techniques in ED settings are intended for a minority of patients, likely less than 2% to 3% of all ED intubations. Emergency physicians should consider awake intubation in patients with a documented history of difficult intubation, as well as those with an anticipated difficult intubation or mask ventilation based on physical examination. The American Society of Anesthesiologists recommends considering awake intubation when a difficult intubation is anticipated and one of the following applies: anticipated difficulty ventilating with a face mask or supraglottic airway; anticipated intolerance of brief apnea; or anticipated difficult cricothyrotomy.[7] Physiologic considerations, including severe acidemia, are also pertinent.

It is widely accepted that awake intubation should be considered in patients with upper airway obstruction, such

Table 1. Awake intubation indications and contraindications.

Indications	Contraindications
• Operator prediction or history of difficult tracheal intubation or difficult mask ventilation • Anatomic obstruction of the airway (eg, angioedema, limited mouth opening, Ludwig angina, etc) • Difficult physiologic airway (eg, metabolic acidemia, right ventricular failure, etc) • Face, neck, or upper airway trauma • Cervical spine trauma or disease • Any patient in which the ability to maintain oxygenation during the intubation procedure is deemed difficult	• Extant inability to protect airway • Patient not cooperative/compliant • Active emesis, hematemesis, hemoptysis, oral hemorrhage • Patient requires emergent tracheal intubation to facilitate rapid diagnosis or treatment (eg, multiply injured trauma patient) • Critical hemodynamic instability • Uncompensated hypercapnia

as angioedema or Ludwig angina. However, awake intubation techniques are only appropriate in patients who can maintain their own airway patency and spontaneous ventilation. Ideally, patients should be able to follow commands, so those requiring more than anxiolysis to cooperate are not suitable candidates. Even in the hands of experienced operators, awake approaches generally take 15 minutes or longer to perform. Thus, when severe respiratory compromise or agitation renders a patient unable to cooperate with an awake approach, rapid sequence intubation or delayed sequence intubation, with a concurrent setup for cricothyrotomy, termed a double setup, is preferred.[12,13]

MANAGEMENT

Approach

We approach awake intubation with meticulous topical anesthesia, generally without, but occasionally with, light sedative administration. Dense topical anesthesia preserves voluntary motor function of the vocal cords while reducing undesirable coughing and laryngospasm.[14] As a general rule, we avoid moderate or deep sedation without paralysis in ED intubations. Oversedation can diminish airway reflexes and patency while yielding undesirable intubating conditions due to preserved muscle tone. Additionally, we recently reported that a ketamine-only dissociation approach to intubation, or ketamine-only breathing intubation, is uncommon in ED settings and is associated with lower success and higher complications than rapid sequence intubation or awake approaches.[15,16] If a patient is incapable of cooperating due to agitation, awake intubation is unlikely to be successful, and we do not recommend ketamine administration in dissociative doses to achieve compliance.

Regardless of the awake approach chosen, attention to team communication and procedural preparation is paramount. From the outset, apply supplemental oxygen and ensure continuous patient monitoring with pulse oximetry and cardiac monitoring in case of patient deterioration. Lastly, it is imperative to have a well-articulated backup plan, which might include a double setup for cricothyrotomy. The emergency physician must maintain mental readiness to switch to alternative intubation methods if awake intubation is unsuccessful.[12]

Patient Coaching

We cannot overemphasize the critical role of mentally preparing the patient for awake intubation. It is our practice to explain the rationale for the procedure in clear and plain language and to describe what the patient will experience in a gentle, calm, and reassuring tone. A calm, reassuring physician demeanor, combined with clear patient coaching throughout the procedure, significantly improves the patient's ability to tolerate and cooperate with awake laryngoscopy.

Equipment

In Box 1, we summarize the equipment required to achieve topical anesthesia and perform an awake intubation procedure. Gauze is used to dry oral secretions, enhancing the absorption of topical local anesthetic medication. We use an atomization device (MADgic

Box 1. Awake intubation equipment.

- Gauze 4" × 4" pads
- Oropharyngeal atomization device (eg, MADgic Laryngo-Tracheal Mucosal Atomization Device, Teleflex)
- Tongue depressor
- 10 mL Luer lock syringe
- Large bore hard suction catheter
- Intubating oral airway, if oral approach is planned (eg, Williams, Ovassapian, Berman)
- Intubating equipment (flexible endoscope, hyperangulated or standard geometry laryngoscopes, stylet, endotracheal tubes)

Box 2. Awake intubation medications.

- Topical vasoconstrictor, if nasal approach is planned: oxymetazoline 0.05% or phenylephrine 0.25 to 1%
- Anticholinergic antisialogogue: glycopyrrolate 0.3 mg administered intravenously or atropine 0.5 mg administered intravenously 15 min before the procedure if possible
- Topical anesthetic: 4% aqueous or cream lidocaine
- Sedative medication, as necessary: midazolam 1 mg or ketamine 20 mg aliquots administered intravenously

Laryngo-Tracheal Mucosal Atomization Device; Teleflex) with a standard 10 mL Luer lock syringe to atomize 4% aqueous lidocaine for targeted mucosal delivery. The malleable nature of this device allows precise administration of atomized topical anesthetic to the pharyngeal and glottic structures. Additionally, a tongue depressor facilitates delivery of 4% lidocaine cream to the base of the tongue, when feasible. A large-bore hard suction catheter attached to wall suction is necessary. For oral endoscopic approaches, we use an intubating oral airway (eg, Williams, Ovassapian, or Berman). These optimize alignment for endoscope and tube delivery and serve as a bite block. Clinicians should prepare flexible endoscopes, hyperangulated or standard geometry video laryngoscopes, stylets, and endotracheal tubes based on the planned approach.

Premedication

Box 2 summarizes the medications required for topical anesthesia and systemic medications that may facilitate awake intubation. For nasotracheal approaches, we administer a topical vasoconstrictor medication such as oxymetazoline 0.05% or phenylephrine 0.25% to 1% nasally to reduce the risk of epistaxis and ease tube passage through the nasal cavity. Antisialagogue medications are administered ideally 15 minutes before the procedure to dry secretions. This increases the effectiveness and duration of topical anesthesia and reduces the chance that oral secretions will obscure the endoscopic camera.[17] We prefer glycopyrrolate 0.3 mg administered intravenously, though atropine 0.5 mg administered intravenously may also be used.

Topical Anesthetic Medication

Meticulous upper airway anesthesia is crucial for successful awake intubation. When attention is paid to this step of the procedure, we find that adjunctive sedative medications are often unnecessary. We favor 4% lidocaine in aqueous and cream preparations as our topically applied local anesthetic of choice due to its familiarity, availability, and ability to provide dense anesthesia. Lidocaine is incompletely absorbed through the mucosal route, and we

Box 3. Summary of awake intubation: nasal endoscopic approach.

- Mentally prepare the patient (discuss the intubation process and what to expect)
- Apply supplemental oxygen and position the patient
- Ensure all equipment and medications for the awake procedure, planned backup procedure, and surgical airway are available and prepared
- Administer antisialagogue, preferably 15 min prior to topical anesthetic application: glycopyrrolate 0.3 mg administered intravenously or atropine 0.5 mg administered intravenously
- Administer vasoconstrictor medication to bilateral nares: oxymetazoline 0.05% or phenylephrine 0.25% to 1% (Figure 1)
- Insufflate 2 mL of lidocaine 4% cream, by patient "snorting," to coat the nasal passage (Figure 2)
- Suction and pad dry the mouth with gauze, if possible
- Apply 2 mL of 4% lidocaine cream to the posterior tongue using a tongue depressor, if possible (Figure 3)
- Anesthetize the posterior oropharynx to the level of the epiglottis and vocal cords using a flexible atomizer (eg, MADgic Laryngo-Tracheal Mucosal Atomization Device, Teleflex) with 2 to 4 mL of lidocaine 4% aqueous solution, if possible (Figure 4)
- Gently insert a lubricated gloved fifth digit into the nasal passage to dilate the nare (Figure 5)
- Gently insert a lubricated endotracheal tube (eg, 6.5 or 7.0) into the nasal passage, to a depth of 12 to 14 cm (Figure 6)
- Introduce the endoscope into the endotracheal tube and navigate to the tube tip
- Consider having an assistant pull on the patient's tongue with gauze or perform a jaw thrust to expand the pharyngeal space
- Identify and approach the larynx (Figure 7)
- Administer 1 to 2 mL of lidocaine 4% aqueous via the endoscope working channel, using a "spray-as-you-go" technique, to anesthetize the vocal cords and surrounding tissues
- Administer 1 to 2 mL of lidocaine 4% aqueous via the working channel directly over/into the glottic opening while the patient is instructed to deeply inhale (expect coughing)
- Enter the trachea with the flexible endoscope and stop once you reach the carina (Figures 8 and 9)
- Direct the patient to inhale and advance the endotracheal tube over the endoscope while rotating the tube 90 degrees counterclockwise
- Visualize the endotracheal tube situated in the trachea while withdrawing the endoscope (Figure 10)
- Inflate the cuff, and confirm tube placement in the trachea in standard fashion (ie, capnography) (Figure 11)
- Promptly administer a sedative medication (eg, propofol, etomidate, ketamine)
- Secure the endotracheal tube and connect to the mechanical ventilator

Box 4. Summary of awake intubation: oral endoscopic approach.

- Mentally prepare the patient (discuss the intubation process and what to expect)
- Apply supplemental oxygen and position the patient
- Ensure all equipment and medications for the awake procedure, planned backup procedure, and surgical airway are available and prepared
- Administer antisialagogue, preferably 15 min prior to topical anesthetic application: glycopyrrolate 0.3 mg administered intravenously or atropine 0.5 mg administered intravenously
- Suction and pad dry the mouth with gauze, if possible
- Apply 2 mL of lidocaine 4% cream to the posterior tongue using a tongue depressor, if possible
- Anesthetize the posterior oropharynx to the level of the epiglottis and vocal cords using a flexible atomizer (eg, MADgic Laryngo-Tracheal Mucosal Atomization Device, Teleflex) with 2 to 4 mL of lidocaine 4% aqueous solution, if possible
- Consider use of an intubating oral airway (eg, Williams, Ovassapian, Berman)
- Insert the tube into the oral airway and gently insert the oral airway into the mouth (or load tube on endoscope if not using an oral airway)
- Introduce the endoscope into the endotracheal tube and navigate to the tube tip.
- Consider having an assistant pull on the patient's tongue with gauze or perform a jaw thrust to expand the pharyngeal space
- Identify and approach the larynx
- Administer 1 to 2 mL of lidocaine 4% aqueous via the endoscope working channel, using a "spray-as-you-go" technique, to anesthetize the vocal cords and surrounding tissues
- Administer 1 to 2 mL of lidocaine 4% aqueous via the working channel directly over/into the glottic opening while the patient is instructed to deeply inhale (expect coughing)
- Enter the trachea with the flexible endoscope and stop once you reach the carina
- Direct the patient to breathe in deeply and advance the endotracheal tube over the endoscope while rotating the tube 90 degrees counterclockwise
- Visualize the endotracheal tube situated in the trachea while withdrawing the endoscope
- Inflate the cuff, and confirm tube placement in the trachea in standard fashion (ie, capnography)
- Promptly administer a sedative medication (eg, propofol, etomidate, ketamine)
- Secure the endotracheal tube and connect to the mechanical ventilator

consider the maximum safe topical dose of lidocaine administered mucosally to be 9 mg/kg lean body weight to avoid local anesthetic toxicity. This recommendation is consistent with the Difficult Airway Society guidelines.[18,19] Preparations of lidocaine 4% contain 40 mg of lidocaine per mL for liquids or per g for creams (mg/g). Thus, for a 70-kg adult, a safe topical dose is approximately 15 mL or g of 4% lidocaine. As with all procedures using local anesthetics, it is imperative to monitor for and recognize the rare occurrence of local anesthetic toxicity.

Topical local anesthetic medication is ideally applied directly or by atomization to dry mucosa for maximum

Box 5. Summary of awake intubation: oral video laryngoscopic approach.

- Mentally prepare the patient (discuss the intubation process and what to expect)
- Apply supplemental oxygen and position the patient
- Ensure all equipment and medications for the awake procedure, planned backup procedure, and surgical airway are available and prepared
- Administer antisialagogue, preferably 15 minutes prior to topical anesthetic application: glycopyrrolate 0.3 mg administered intravenously or atropine 0.5 mg administered intravenously
- Suction and pad dry the mouth with gauze, if possible
- Apply 2 mL of lidocaine 4% cream to the posterior tongue using a tongue depressor, if possible
- Anesthetize the posterior oropharynx to the level of the epiglottis and vocal cords using a flexible atomizer (eg, MADgic Laryngo-Tracheal Mucosal Atomization Device, Teleflex) with 2 to 4 mL of lidocaine 4% aqueous solution, if possible
- Gently insert the video laryngoscope in the midline
- Advance incrementally to approach the larynx and visualize the glottic opening
- Administer 1 to 2 mL of lidocaine 4% aqueous with a flexible atomizer, using a spray-as-you-go technique, to anesthetize the vocal cords and surrounding tissues
- Achieve a laryngeal view that is sufficient to pass a bougie or endotracheal tube.
- Gently insert the endotracheal tube with the appropriate stylet, taking care to visualize the tube tip throughout its approach, avoiding unnecessary pharyngeal contact
- Direct the patient to breathe in deeply, enter the trachea, and gently advance the endotracheal tube
- Inflate the cuff, and confirm tube placement in the trachea in standard fashion (ie, capnography)
- Promptly administer a sedative medication (eg, propofol, etomidate, ketamine)
- Secure the endotracheal tube and connect to the mechanical ventilator

Figure 1. Application of oxymetazoline 0.05% to the nares.

effectiveness. We apply 2 mL of 4% lidocaine cream to the base of the tongue using a tongue depressor. Either we or the patient hold the tongue in a protruded position for 2 minutes, allowing the medication to spread into the vallecula. Next, we atomize 4% lidocaine onto the dried mucosal surfaces of the pharynx. Finally, we direct our malleable atomization device caudally around the base of the tongue, atomizing 4% lidocaine onto the laryngeal structures. We find this to be highly effective. If nasal anesthesia is required, the literature suggests that patients prefer application of lidocaine gel over lidocaine spray; 4% cream can also be insufflated, or "snorted," into the nare.[20] During this step, the gentle insertion of the operator's gloved and lubricated little finger into the nasal passage helps dilate and prepare for comfortable acceptance of a nasal endotracheal tube. During endoscopic approaches, 4% lidocaine aqueous solution is administered in 1 to 2 mL aliquots in a "spray-as-you-go" technique through the device's working channel.[21,22] Percutaneous transcricothyroid injection of 4% aqueous lidocaine has been demonstrated to be well tolerated and effective.[23] Although we do not employ this technique routinely, it may be considered. Finally, nerve blocks of the glossopharyngeal nerve, superior laryngeal nerve, and recurrent laryngeal nerve in ultrasound-guided or landmark fashion have been described; however, we generally do not utilize specific nerve blocks, which require prior training and familiarity, in our awake intubation practice.[24]

Anxiolysis or Sedation

Clinicians may use sedative medication to facilitate awake intubation, but it is important to emphasize that sedatives

Figure 2. Insufflation of 2 mL of lidocaine 4% cream.

Figure 3. Application of 2 mL of 4% lidocaine cream to the posterior tongue using a tongue depressor.

Figure 4. Anesthetizing posterior oropharynx using a flexible atomizer.

Figure 5. Dilation of nare using a lubricated gloved fifth digit.

Figure 6. Insertion of a lubricated endotracheal tube into nare.

Figure 7. Endoscopic identification of larynx and vocal cords.

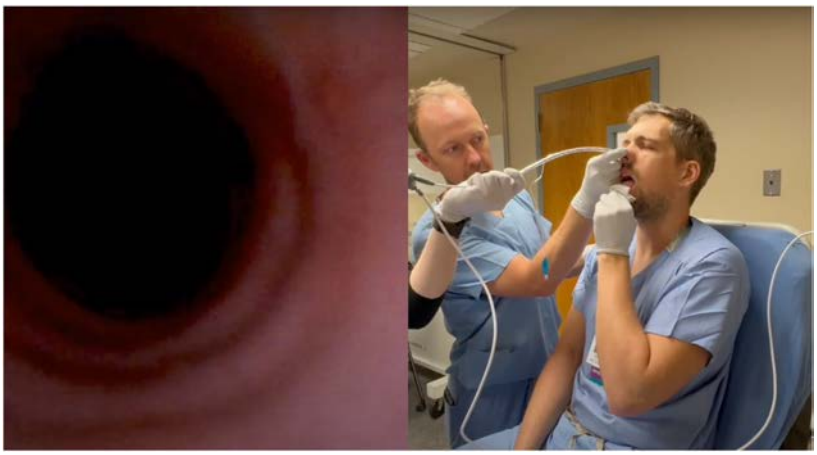

Figure 8. Endoscopic visualization of trachea.

Figure 9. Endoscopic visualization of carina.

Figure 10. Visualizing the endotracheal tube while withdrawing the endoscope.

Figure 11. Inflating the endotracheal tube cuff following withdrawal of the endoscope.

are not required in all patients if appropriate topical anesthesia is achieved.[19] The emergency clinician should strive to balance patient cooperation and tolerability with maintaining airway reflexes and spontaneous ventilation. The careful application of topical anesthesia will significantly reduce or eliminate the need for sedation. However, mild sedation or anxiolysis may be necessary if the patient is not tolerating the procedure despite meticulous administration of topical anesthetic medication. In this circumstance, aliquots of midazolam 1 mg or ketamine 20 mg may be administered intravenously and titrated to effect. We favor low-dose midazolam over ketamine due to its predictability. In our experience, the effects of ketamine, including dysphoria or induction of dissociation, are less predictable. Other options include droperidol, olanzapine, or dexmedetomidine. An important principle is that sedative medications should be administered only in the smallest necessary doses, with the primary goal of reducing patient anxiety to allow the procedure to progress.

The clinician can proceed with the intubation method of choice, such as flexible intubating endoscopy or video laryngoscopy, once adequate topical anesthesia and patient cooperation are obtained. In Boxes 3, 4, and 5, we outline our approaches for endoscopic nasal, endoscopic oral, and video laryngoscopic oral awake intubation techniques. Figures 1 to 11 depict the nasal endoscopic approach. Video E1 (available at http://www.annemergmed.com) is a video detailing the awake nasal endoscopic approach.

DISPOSITION AND AFTERCARE

After confirming tracheal tube placement visually and with capnometry, we administer a sedative agent, such as etomidate, ketamine, or propofol, at an intubating dose to rapidly induce sedation in the patient. Paralytic medications are not generally indicated. Following awake intubation, the clinician should ensure ongoing sedation, analgesia, and ventilator management as with any ED intubation. Patients should be admitted to an intensive care unit for ongoing care.

Proficiency with awake intubation techniques is important for emergency physicians, as it provides a valuable alternative to rapid sequence intubation for managing selected complex and challenging airway scenarios. Although emergency physicians will need to use awake techniques in only a minority of ED intubations, their role in preventing the cannot oxygenate/cannot ventilate scenario in selected patients with difficult airways is compelling. Clinicians should pay careful attention to patient selection and preparation, judiciously administer topical anesthetic medication, and regularly review and practice awake techniques to maximize successful awake intubation performance.

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