

The Airway Gazette

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Awake Intubation (Part II)

The official
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We enthusiastically encourage submissions. Submitted material for publication should conform to published guidelines (please see prior Gazette issues at www.samhq.com).

Please send manuscripts to the Editor-in-Chief by the 15th day of March, June, September, or December (~45 days prior to issue publication). Authors must give citation to material obtained from other published sources before publication in the Gazette.

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Editorial Expressions

The Airway Gazette welcomes all airway enthusiasts to read its latest edition. The current issue is a continuation of the previous one, with topics further expounding upon awake intubation. Dr. Felipe Urdaneta is the guest editor for this issue and the editorial board of the Gazette thanks him for his contributions.

Dr. Christina Riccio presented the FIRST EVER webinar from the Society for Airway Management on combating hypoxemia with nasal positive pressure ventilation. You can check out the recording at [DocMatter.com](https://www.docmatter.com).

SAM welcomes its new members and congratulates them on becoming part of the special interest group determined to advance airway management worldwide.

This issue also presents many interesting articles including ketamine for awake intubation by Dr. Matthew Gunst. The article highlights the merits and demerits of ketamine over other commonly used sedatives for awake airway management. We have included a review of the awake intubation in children jointly written by Drs. Paul Baker and Narasimhan Jagannathan. The article details the types of equipment and technique of supraglottic airway aided awake intubation in children. In the question and answer series with an airway expert, the gazette brings an interview with our own Dr. Katherine Gil regarding how she would do it. Finally, a summary of the discussion of a compelling case by Dr. John Sakles at the DocMatter forum. The case highlights the approach and management of a rapidly worsening angioedema in the emergency department.

The Society is proud to announce its 2021 annual scientific meeting and workshop on an interactive virtual platform. The meeting will TAKE PLACE from September 24-26, 2021. Please visit www.samhq.com for continuing updates on the first virtual SAM meeting.

As a continuation of our journey to theme-based issues for readers, the next issue will FOCUS around supraglottic airway devices. Please continue to support the SAM and submit manuscripts to the editorial board at samhqglobal@gmail.com.

Regards,
Praveen Maheshwari, MD
Editor-in-Chief



WELCOME TO THE SOCIETY FOR AIRWAY MANAGEMENT'S NEWEST MEMBERS!

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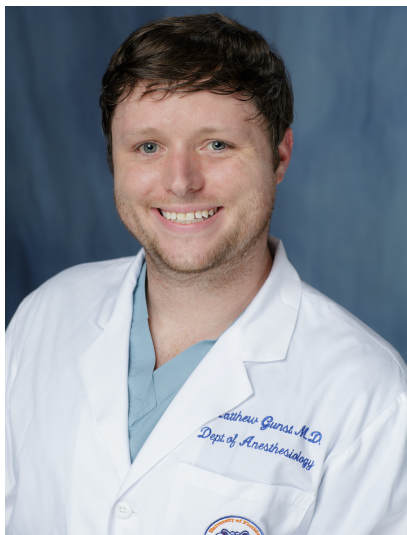
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Ketamine Sedation for Awake Intubation: A Double-Edged Sword?

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Asking advanced airway providers for their sedation recipe in patients necessitating awake intubation is akin to asking artists their favorite color. Providers will have a preferred technique for sedation and probably topicalization, and they will typically adjust and modify each based on clinical and patient circumstances. The truth is that there are many paths to success in awake intubation with a flexible intubation scope (FIS) and there is no “right” answer (although many readers may say otherwise).¹ Patient compliance and comfort often are vital throughout the procedure. In critical airway scenarios— patients necessitating endotracheal tube placement with known or suspected difficult airways— preserving airway patency and respiratory function are primary concerns. Difficult airway algorithms recommend supplemental oxygen delivery and continuous capnography during airway management to ensure adequate oxygenation and ventilation in patients who have had some sedation level for the procedure or who are facing potentially imminent airway failure.

Ketamine is a unique intravenous anesthetic, providing dissociation and analgesia without compromising respiratory efforts in appropriate doses.² However, with larger doses, ketamine’s notoriety for increasing secretions and decreasing patient compliance have led to many providers preferring

alternatives. Despite these side effects, ketamine can be a valuable tool for airway management in awake patients, mainly because these side effects are less common when lower sedative doses are utilized.

Benefits: Ketamine Versus Other Sedatives

Commonly-used medications such as opioids, benzodiazepines, and propofol can suppress respiratory function and cause over-sedation leading to hypercarbia or hypoxemia in patients at risk due to concomitant respiratory problems or ongoing narcotic usage. While opting for small doses of opioids or benzodiazepines can limit their respiratory suppression, these medications are often given in conjunction with one another, compounding their respiratory-compromising effects.

Ketamine has a distinctive property among anesthetic agents in that it tends not to depress respiratory function and causes minor depression of airway reflexes.³ There are many reasons why providers would want to maintain spontaneous respiration during airway management. By using ketamine at sedation-level doses, patients can be made comfortable while maintaining patent airways, and intact respiratory reflexes;^{4,5,6} the latter being particularly important for reflux/aspiration-at-risk patients who often can be anesthetized topically with a spray-as-you go method.

Most of the non-ketamine sedatives or their combinations cause direct cardiac depression and vascular dilation. Nevertheless, stable hemodynamics may be maintained while providing sedation— in the hands of experienced providers. Ketamine has the unique property that allows it to stand out from other sedatives by its ability to not adversely affect hemodynamics in critically ill patients. Although it is a direct myocardial depressant, catecholamines' indirect release typically provides hemodynamic stability, particularly in sedative doses. In cardiovascular at-risk patients, ketamine is often a safe alternative to narcotics, because ketamine's sympathomimetic effects can allow for increased sedation with the concern of hemodynamic collapse being less likely.

Lastly, opioids can also provide analgesia which may help patients already in pain or assist with awake intubation techniques. Ketamine provides analgesia as well, allowing for patients that are more amenable to techniques. For patients with difficult airways and risk of cardiovascular collapse, ketamine use can result in less respiratory depression, sustenance of cardiovascular support, and extra time to maneuver with a FIS. In choosing ketamine over other medications, providers can increase the safety window.

Combination pharmacological therapy is commonplace in difficult airway management. No single anesthetic successfully realizes appropriate levels of sedation, anxiolysis, and patient compliance in all cases. Ketamine

has been evaluated in many circumstances as an adjunct, from its combination with benzodiazepines (to prevent the memory of “bad trips”) to partnering it with dexmedetomidine, a selective alpha-2 agonist. The combination of dexmedetomidine and ketamine has been shown to provide better sedation and hemodynamic parameters than dexmedetomidine alone.⁷ Ketamine’s hemodynamic benefits and additional sedation can limit the sympatholytic effects from dexmedetomidine. Another mainstay of combination pharmacological therapy for sedation is ketamine with propofol. “Ketofol,” as it is casually referred to, can provide the deep sedation from propofol while allowing for the maintenance of respiratory function and hemodynamics.⁸ These combination therapies show that with its hemodynamic stability and respiratory function preservation profile, ketamine can be a wonderful addition to other anesthetics.

Ketamine Side Effects

However, ketamine has its drawbacks. Secretions may increase if patients are not given a preemptive antisialagogue commonly given for awake intubation regardless of sedative use. In a critical scenario, having the FIS view blocked by secretions can complicate the technique. Furthermore, the necessity to constantly remove the scope for cleaning is annoying, especially when time is of the essence. Blocked views can lead to adverse outcomes. Since ketamine preserves airway reflexes, it does not stop patients from coughing with airway manipulation or reacting to the gag reflex. The use of an antisialagogue as a desiccating agent (e.g. glycopyrrolate at least 20 minutes beforehand) is considered standard of care by many advanced airway providers. It can limit the increase in secretions seen with ketamine enough to allow for ease of use with the FIS.

Ketamine does have the potential to calm and relax patients, facilitating airway manipulation. However, ketamine does not have this effect on everyone. Patients with known psychological trauma may be adversely affected by even low-dose ketamine. Patients with physiologic alterations necessitating awake airway manipulation but uncooperative and agitated, are nightmares for airway managers. Advanced airway providers should do their best to evaluate patients and their history before relying on ketamine as a sedative agent.

Final Ketamine Thoughts

In conclusion, ketamine may not be a silver bullet in the realm of airway management. However, its characteristic and sometimes unique properties give it the potential to be a reliable tool and valuable adjunct for airway providers. The maintenance of spontaneous, negative force

inspirations and sometimes preservation of airway reflexes may be vital in many patients requiring awake airway management. Providers must be knowledgeable about their sedatives' pharmacologic properties, the physiologic status of the patients' respiratory and cardiovascular systems when these medications are applied, and what would work best for each individual. Ketamine should be in all providers' arsenals as a very potential option for sedation for awake intubation.

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Awake Intubation for Children

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Awake intubation is a low-risk, under-utilized, highly successful technique for the management of patients with a difficult airway.¹ The same principles used for adults generally apply to children. Children and adolescents make up approximately 25% of the world's population, and many of these individuals would cooperate for awake intubations. Younger children can also tolerate awake intubation while using local anesthesia, a conduit such as a supraglottic airway (SGA), and occasionally, sedation.

The article aims to provide a brief overview of the practical aspects of awake intubation, emphasising pediatric patients presenting for general anesthesia.

Awake oral intubation

Awake intubation has historically been performed unmodified in neonates without sedation or muscle relaxant, typically with direct laryngoscopy. This practice is no longer recommended, particularly in preterm neonates or term infants because of poor first-pass success and traumatic consequences, which have been attributed to inexperienced trainees intubating these babies without accompanying medication. For these

reasons, it is recommended that direct laryngoscopy intubation should include sedation and muscle relaxants.²

The Goals for Awake Intubation

The objective of awake intubation is to provide safe, smooth intubation in conscious, well-oxygenated, cooperative patients who are adequately anesthetized with minimal secretions, reduced autonomic reflexes, and absent pharyngeal and laryngeal reflexes. Under these conditions, patients can breathe spontaneously and protect their reflexes with intact neurological symptoms and signs that can be monitored throughout the intubation. There are very few contraindications to awake intubation. These include declined consent, local anesthetic allergy, uncooperative patients, soiled airways, limited mouth opening, obstructive airway lesions, and inexperienced clinicians.

Declined consent is sometimes due to apprehension. Consent can often be obtained after gentle, thorough explanations of the advantages of awake intubation regarding patients' circumstances, and complications that might occur from non-awake intubation attempts. Histories of local anesthetic allergy require investigation to determine causes such as needle phobia, previous local anesthetic overdoses, or inadvertent intravascular injections. Some uncooperative patients or guardians may change their minds when offered reassurances, explanations, and local anesthetic/sedation options.

The primary indication for awake intubation is for patients with predicted difficult airways, particularly where oxygenation following the loss of consciousness cannot be guaranteed. Other secondary indications include histories of difficult airways, risks of aspiration, at-risk hemodynamic states, necessities for neurological examination after intubation, and inadequate airway management training.

Airway management after induction of anesthesia is not recommended for children with predicted difficult intubation and difficult ventilation. Under these circumstances, the safest course for airway management is the awake technique with or without sedation.

Awake Intubation with Local Anesthesia and Inhalation Induction

Awake insertion of a supraglottic airway (SGA) after topical lidocaine anesthetic is applied to the airway can provide a safe and reliable conduit for oxygenation, flexible bronchoscopic insertion, and tracheal intubation in neonates. This technique was first described in 1994 for a 3.6 kg neonate with Goldenhar syndrome, requiring an elective tracheostomy.³ Once the laryngeal mask airway (LMA®) was successfully placed after local anesthesia;

it became a conduit for a 1.8 mm external diameter flexible bronchoscope (FB). Two size 3.0 mm external diameter endotracheal tubes (ETTs) with detached connectors were forced end-to-end and fitted onto the flexible bronchoscope. After the distal ETT was successfully advanced down the trachea by the FB, the proximal ETT was used to hold both ETTs in place while the LMA and FB were withdrawn. Capnography was used to confirm the position of the distal ETT, after which the proximal ETT was disconnected, the distal ETT connector was reattached, and the patient was administered an inhalation induction of anesthesia.

Various modifications of this technique have been used for children with predicted difficult airways. The following is a step-by-step approach for oral awake intubation through an SGA as described by Jagannathan et al.⁴

Step 1. Antisialagogue (glycopyrrolate 0.01 mg/kg) and lidocaine 3 mg/kg are the basis for topicalization. Remember that lidocaine administrations are additive, and the total cumulative dose should be carefully calculated for each child to avoid local anesthetic toxicity. Lidocaine can be applied as jelly using a gloved finger to the pharynx, **(Figure 1)** or via a pacifier (the pacifier is injected with 2% lidocaine jelly, and needle holes allow the child to suck and release the lidocaine). **(Figure 2)** Lidocaine can also be given via an atomizer (DeVilbiss or Mucosal atomizer device) **(Figure 3)**, and if necessary, lidocaine can be sprayed onto the larynx through an epidural catheter placed in the working channel of the FB. **(Figure 4)**



Figure 1: Lidocaine 2% jelly applied digitally to an infant's pharynx



Figure 2: Lidocaine jelly injected into a pacifier



Figure 3: Atomizers (DeVilbiss EZ-100® and mucosal atomizer device (MAD®))

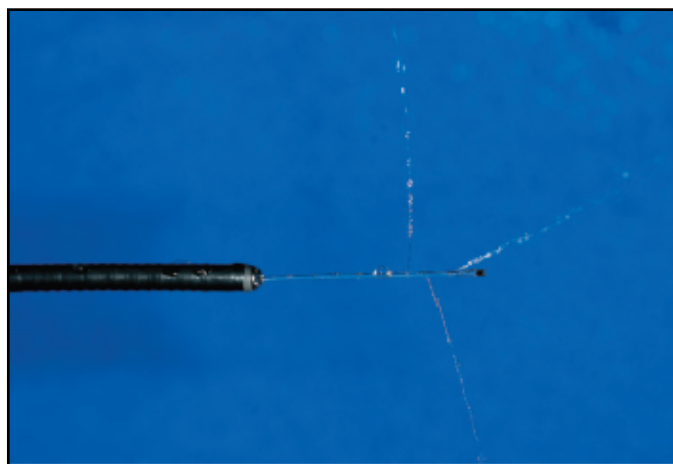


Figure 4: Lidocaine spray via a flexible bronchoscope

Step 2. Insert the SGA. This can be a classic LMA® or an air-Q® SGA. The air-Q® SGA has a detachable 15mm connector and a short, relatively wide tube which helps tracheal tube advancement off an ETT-preloaded FB. **(Figure 5)**



Figure 5: Laryngeal mask airway, air-Q® SGA conduits for awake intubation

Step 3. Adjust the position of the SGA to optimize ventilation.

Step 4. Remove the 15mm connector of the air-Q® SGA. Intubate with the FB and an appropriate size preloaded ETT. For an LMA®, which has a proportionally longer and narrower tube, use the technique described by Johnson et al with two ETTs.³ Correct tracheal intubation is then confirmed by capnography and auscultation that indicates bilateral air entry. After

confirmed intubation, administer general anesthesia by using intravenous (IV) or inhalation techniques.

Awake Intubation Equipment

The following equipment can be useful for awake intubation in children and adolescents:

1. Intubating oral airways for older children (Berman, Ovassapian, Williams). **(Figure 6)**
2. Endoscopy masks to support oxygenation during oral or nasal intubation. **(Figure 7)**
3. Newton cerebral wires (long atraumatic wires) suitable to insert down a 2mm working channel of a FB to aid tracheal intubation, particularly if a small diameter FB is not available. **(Figure 8)**
4. Specialized ETTs (Parker curve-tip) and SGAs. There are a variety of SGAs suitable for this purpose.⁵
5. Pediatric FB ideally suitable for nasal or conduit intubation. For older children, awake oral videolaryngoscopy or a combined FB and VL approach are options.



Figure 6: Intubating oral airways



Figure 7: Endoscopy mask



Figure 8: Newton cerebral wire

Nasal Intubation

Nasal intubation may be indicated if the oral cavity is occupied by a lesion or the mouth opening is severely restricted. Preparation starts with a topical mucosal vasoconstricting spray (Xylometazoline, phenylephrine) and lidocaine spray with an atomizer to the nostrils and the posterior nasopharynx. Introduce a nasopharyngeal airway down one nostril for oxygen and, if required, an inhalation agent to provide sedation. **(Figure 9)** Alternatively, use intravenous sedation, if required. A FB should be advanced through the contralateral nostril with a preloaded ETT for tracheal intubation.

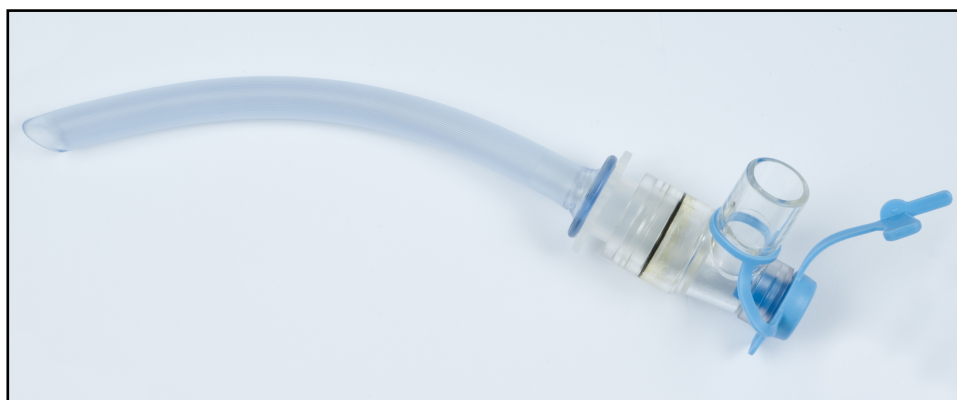


Figure 9: Nasopharyngeal airway for oxygen delivery

Sedation

Sedation may be indicated for older children but rarely for neonates and infants. The goal for sedation is to reduce anxiety and produce a sedated state without loss of patient consciousness or ability to communicate. Options for sedation include benzodiazepines (Midazolam), opiates (Remifentanyl), Dexmedetomidine, Ketamine, and/or Propofol. These

medications require careful and slow administration to achieve the desired effect. Sedation should not be a replacement for poor topical anesthesia.

Muscle Relaxants

Muscle relaxants or neuromuscular blockers (NMBs) can be safely used after sedation once the SGA placement is confirmed and ventilation is ensured. This might improve intubation conditions and reduce airway trauma, laryngospasm, and hypoxia. Contraindications for NMBs include severe distal airway collapse conditions such as those caused by tracheomalacia, bronchomalacia, and mediastinal masses.

Oxygen

Hypoxia is the most common cause of morbidity during awake intubations. Continuous low flow oxygen (2L/min) can be given through a swivel connector on an SGA, nasopharyngeal airway, or nasal high flow cannula (HFC). Oxygen can also be given through an endoscopy mask but this should not be used in conjunction with HFC. Avoid giving subglottic oxygen through the working channel of an FB or any other catheter because of the risk of barotrauma.

Conclusion

Awake intubation for children can be a safe technique if conducted by experienced pediatric practitioners who are familiar with advanced pediatric airway management techniques.

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SAM 2021 Annual Scientific Meeting and Workshop

Dear Colleagues,

The Society for Airway Management (SAM) anticipates an extraordinarily engaging, interactive **virtual** Society for Airway Management Annual Meeting from September 24-26, 2021.

The health, safety, and well-being of all individuals are paramount. Thus, the Meeting Co-chairs are excited to present to you – SAM 2021 – a virtual extravaganza of CME credited educational offerings and innovative airway management knowledge.

SAM remains committed to providing a meeting comparable to its previous high standards in an environment affording direct, virtual face-to-face interaction.

SAM 2021 will be indeed an international meeting, available for all registrants, at any point in time. Please visit www.samhq.com for continuing updates on this first virtual SAM meeting.

We look forward to welcoming and seeing everyone— safely, in September!

Tracey Straker, MD
Meeting Chair



John Sakles, MD
Meeting Co-Chair





Q and A Series with Airway Expert: Awake Intubation Interview

Katherine Gil, M.D.

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Interviewer: Praveen Maheshwari, M.D., Editor-in-Chief

Preface:

The following conversation with our Associate Editor, Dr. Katherine Gil. She has written several publications on awake intubation and chapters in the Hagberg and Benumof's Airway Management textbooks by SAM's previous Executive Director, Dr. Carin Hagberg.

Question: *How do you select patients for awake intubations?*

Dr. Gil: Normally, we base indications for awake intubation on a thorough history, physical examination, and pertinent laboratory findings that dictate a higher risk of detrimental effects for airway and state-of-consciousness management. The risks may adversely affect intubation, facemask ventilation, supraglottic airway [SGA] insertion, front-of-neck airway [FONA] access), the rescue of a failed intubation, consequences of sedation or general anesthesia, and alterations in a patient's physiological status.

The four most frequent indicators are:

1. Difficult airway (anatomical or physiological).
2. High aspiration risk.
3. Hemodynamic crisis.
4. Intolerance to oxygen desaturation.

Any marked severity of one of these or the simultaneous presence of more than one will usually point the way to awake intubation.

Additionally, surgical consultation may prompt indications for awake intubation in cases needing:

5. Avoidance of spinal motion in patients with unstable cervical spines.
6. Patients to self-position for surgeries. Examples: a) prone position planning for massively obese patients with anticipated labored lifting processes to accomplish correct placements within operating-table support structures, or b) prior patient histories of skin/tissue trauma due to these motions while asleep.

Question: *How do you prepare patients for awake intubation?*

Dr. Gil: After introducing myself to patients, if the result of their histories, examinations, and testing reveals indications for awake intubation as the best option, I take the following course of action. I detail the dangers of “non-awake” intubation as related to each patient’s particular difficulties. While smiling, I inform them of a great alternative, but first ask if they have ever had “numbing medicine” at the dentist, for stitches, etc. or at least injections for other reasons. I describe local anesthetic (LA) sprays and using tiny 22-23ga needles for further anesthesia. I advise them that sedation (when possible) may result in no memory of the event, and even the needle part may feel like a faint pinprick.

Lastly, I assure them of my experience, including over 1000 awake intubations. These were partly due to two neurosurgeons who wanted awake intubations for all neck surgery cases (even minor ones) for my team to maintain practice sufficiently to be very competent whenever this technique was vital to patients. Also, it helps to cite experience in related areas (while laughing humbly about patients not being in the hands of a rookie), such as writing articles and book chapters, teaching at international venues, and being Editor-in-Chief of the Society for Airway Management Airway Gazette. For rookies, I suggest they cite positive factors in their pasts.

In rare instances, my discussion with patients went even further. Once, a middle-aged, intelligent patient had absolute awake-intubation indication. He cited his previous awake intubation as the worst experience in his life and vehemently did not want another. I empathized and suggested reasons for that— inexperience, no drying agent, incorrect patient cooperation during topical LA, or not waiting for LA effects. I requested he listen to my description, and if still opposed, that would be fine. I explained the technique and gave him this offer: “If you remember today’s awake intubation as anything worse than a minor pinprick, I promise in writing that I will let you do the same thing to me without LA or sedation.” While laughing, I told him that luckily so nobody has ever done so. He laughed and gave his consent. After 4mg lorazepam, he could not remember the entire day and ended up happy. Fortunately, I am still intubation-free.

Question: *What sedation, if any, do you use?*

Dr. Gil: One of the best anxiolytics is a good explanation. However, the administration of sedatives can make awake intubation much more pleasant for all patients. I often titrate anxiolytic increments of midazolam +/- fentanyl while observing their effects. I administer midazolam before I apply unpleasant-tasting LA or LA injections, so that patients may not remember the experience. Fentanyl provides sedation, analgesia, and antitussive effects. Sedative doses of ketamine can make it a stand-alone alternative by providing sedation and analgesia. It causes less respiratory depression and is chosen more often in at-risk patients. Dexmedetomidine is also an alternative with less respiratory depression. However, it is more expensive, has less analgesic effect, and its administration by infusion titration is a needier method. Remifentanyl and propofol are other agents administered by infusion. Supplementary sources of oxygen (including high-flow equipment) are beneficial. Continuous monitoring of pulse oximetry is essential. Capnography is useful when there is a pre-existing potential for untoward hypoventilation or when higher sedative doses are required. The dosages of sedatives in elderly patients frequently are decreased to 1/3–1/2 or less of titration numbers and drug totals, in comparison to younger patients. Finally, sedatives are often not administered to patients with pre-existing high risks of significant respiratory depression or hypotension.

LA dosages in 70 kg adults:

Midazolam: 0.5-1mg increments (0.5-2mg total).

Fentanyl: 25µg increments (25-100µg total).

Ketamine: 2.5-5mg increments (2.5-10mg total).

Dexmedetomidine: Loading dose: 1 mcg/kg IV infusion over 10 minutes.

Maintenance infusion: 0.6 mcg/kg/hour.

Question: *What blocks, if any, do you perform for anesthetizing the airway?*

Dr. Gil: For awake orotracheal intubation, the fastest and best total airway anesthesia involves giving an antisialogogue 20 minutes before performing a 3-minute triple LA block. That is a combination of glossopharyngeal nerve (GPN), superior laryngeal nerve (SLN), and transtracheal (TTB) blocks with local anesthetic (LA), a 23-minute total.¹ Patients are remarkably quiet during intubation. Usually, abnormal anatomy and coagulopathy are the only contraindications to external approaches to SLN blocks and TTBs.

Less commonly, I use inhalation of nebulized LA, but it adds 15 minutes. In those cases, 20 minutes after the antisialogogue, I need constant vigilance to ensure they are breathing only through a mouthpiece or a sealed mask for 15 minutes— to nebulize 5mL of 4% lidocaine fully. Then they will have total airway anesthesia. This method has two drawbacks. Firstly, it takes more time, 35 minutes. Secondly, some patients who breathe intermittently

through their nostrils may have incomplete blocks because some LA is nebulized to the atmosphere. If mask administration is not sealed, inspiratory atmospheric dilution has the same negative effect.

I can also effectively anesthetize the entire airway by utilizing intraoral sprays or gargles combined with 1mL pulses of 4% lidocaine (4mL total) through an epidural catheter, down the working channel of a flexible scope as it enters the trachea and advances further. Alternatively, with a spray-as-you-go method, I can instill pulses of 1mL of 2% LA during the initial oral insertion of the flexible scope until the final 4% pulses within the trachea.

I apply two sprays of 0.05% oxymetazoline for nasotracheal intubations per side at least two minutes apart while patients are upright or semi-reclined. If more horizontal, I use swabs to avoid toxic reactions. Subsequently, I insert 2% Lidocaine paste on two swabs per nostril to feel the nasopharynx width. Alternatively, I apply LA sprays to each side. This is followed by a 3mL of 1% lidocaine SLN block per side and a 4mL of 4% lidocaine TTB. Note: it is unnecessary to gargle or spray the oropharynx if the SLN is blocked.

What are the advantages (A) and disadvantages (D) of different blocks? I will preface the answer by saying that I have never seen a toxic reaction (they are exceedingly rare when staying under the British Thoracic Society Guidelines of maximum dosing).² Nor have I seen untoward reactions except for mild laryngospasm in two patients after intraoral sprays and mild bruising in another. Studies have shown that TTB plus topical LA methods had less coughing compared to the “spray as you go” method; and less gagging and laryngospasm than “aerosol/ nebulized” LA plus gargle methods. GPN, SLN, and TTB had fewer hemodynamic reactions and grimacing compared to nebulization alone.

(A) Glossopharyngeal n.— anesthetizes well via gargle or spray and prevents gagging. Warning: I never inject anything in the mouth, but for readers who want to do this, avoid fingers inside the mouths of awake patients with teeth.

(D) LAs taste bad. Even Chef Gordon Ramsay would cringe. Adding sweetener to Pacey’s paste (a great LA combination) helps slightly. In Beirut, they froze lidocaine, maple syrup, and sugar to make a relatively tasty LA lollipop in 2011.³

(A) Superior laryngeal n.— anesthetizes well internally when blocked by gargling or sprays, or externally by injection. It prevents laryngospasm. The injection approach is very helpful for prevention when given as the initial LA in patients having significant, repeated laryngospasm difficulties after past intraoral LA applications.

(D) In some obese patients, finding the hyoid cornu landmark for this block can be impossible. However, in these cases, I have always successfully performed field blocks in the areas where the injections would have been appropriate, according to other neck landmarks. Aspiration and bracing of

the syringe-needle-system are imperative to avoid intravascular injection or injury from inappropriate, wayward positioning.

Warning: after the block, if a patient starts coughing as if having aspirated, it is probably true. Once for elective cervical surgery, a young patient and her father (the dentist) both denied her long-standing gastric-reflux history after questioning by two of us. We first applied the intraoral GPN block spray. Then, after bilateral SLN blocks came 10-15 minutes of non-stop coughing, settling down only a little. Instead of a TTB, we switched to spray-as-you-go in a “rapid-sequence sort of way” to rapidly insert the tracheal tube and immediately inflate its cuff as soon as it was deep intratracheally. Upon scope removal, we watched a pea fly a meter into the air out of the tube. We spent the next 10-15 minutes suctioning other vegetables during general anesthesia, with spontaneous ventilation. Fortunately, she had no untoward consequences. She put on clear fluids for three days before her next appearance for this cancelled surgery.

(A) Transtracheal block— anesthetizes the tracheal exceedingly well. Other than planned FONA in patients, it is the fastest procedural way to practice and confirm finding the cricothyroid space in humans. I have only seen 100% success rates because one can walk off cartilage if encountered. Finding this space is sorely inaccurate. Successful physician location of the cricothyroid space in humans have rates of only 18-30% (varying with the presence or absence of different gender or obesity factors).⁴ Ultrasound is an excellent but slower identifier. In 17,500 patients with transtracheal puncture, Gold's review study found a complication rate of 1/10,000 (apart from small trickles of blood).² This finding was in contrast to studies finding that patients who received only topical LA had more hemodynamic changes, poorer reactions to intubation, and more complications. They indicated the probable cause to be inadequate LA.²

(D) Angiocatheters are more likely than thoroughly-braced 22ga needles to puncture the posterior tracheal wall. Warning: do not use 25ga needles that make it difficult to inject quickly enough in the trachea and more likely to bend.

Finally, SLN and TTB blocks have much fewer complications in comparison to practices of regional anesthesia.

Question: *What is your most preferred technique for awake intubations?*

Dr. Gil: I can accomplish awake technique by using flexible scopes; video, rigid, or optical laryngoscopes; SGAs; and optical stylets. Alternative methods include:

- Intubation with a combination of at least two of the devices listed, blind tracheal intubation.
- Retrograde intubation.
- Digital intubation (very rarely).

My most preferred technique is using flexible scopes because they are associated with the—

- 1) best rate success rate in the most-difficult airways,
- 2) most accurate confirmation of intratracheal placement,
- 3) best combination ability with all the other devices listed and with other airway tools,
- 4) unique ability to be conduits for LA or drug administration.
- 5) least amount of trauma in the most-difficult airways,
- 6) least amount of cervical spine motion,
- 7) fastest time to intubate the most difficult airways; second-fastest for difficult ones,
- 8) most diagnostic ability,
- 9) fastest learning curves for most difficult airways (to achieve $\geq 97\%$ success)
- 10) highest successful rescue rate after failed intubation by any other devices, in comparison to the reverse (where other devices have a lower successful rescue rate after failed intubation by flexible scope attempts— assuming equal airway operator competency with the compared devices).

Conclusion

It is good to know that practicing to become skillful with a flexible scope (even cheap disposables) will complete the most professional and competent airway operator's armamentarium for taking care of all patients, not just for easy to moderately difficult airways. Performing asleep airway examinations and elective intubations increase this practice. Academic internet sites, mannequin use, and workshops provide the steps and tips for awake intubation and LA methods.

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DocMatter Discussion: Case of the Month- Angioedema

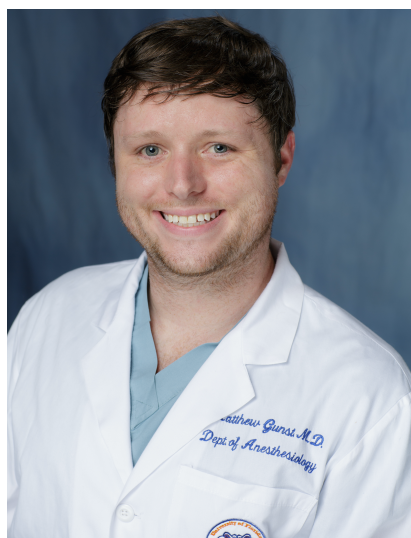
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Summary of the discussion from DocMatter.com

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This month Dr. John Sakles presented a challenging airway scenario on the SAM DocMatter discussion forum. A 55-year-old female with a past medical history of hypertension presented to the Emergency Department with a two-hour duration of rapidly progressing tongue and lip swelling. Initial vitals were stable, and the physical examination revealed a markedly swollen lower lip and tongue, as well as new-onset altered phonation. Concerned for angioedema, the patient was administered intramuscular (IM) epinephrine, intravenous (IV) diphenhydramine, and IV methylprednisolone. Awake fiberoptic intubation was planned, but the patient deteriorated while attendants were on the phone with the consultants, who were 30 minutes away. She developed stridor and hypoxia on room air due to the significant increase in her airway swelling.

In response to Dr. Sakles' inquiry for suggested management, Dr. Saeed Rehman suggested preoxygenation with high flow nasal cannula (HFNC) to buy additional time for airway manipulation and potential use in apneic oxygenation before and during fiberoptic intubation under propofol

induction. Dr. Sakles commented that HFNC was a great tool for maintaining oxygenation during the airway management period but was concerned about inducing a patient with propofol or even giving a small amount that might potentially cause complete airway collapse due to progressive edema. Dr. Marcelo Ramos responded that he was concerned about the rapid deterioration and felt it necessitated immediate emergent front-of-neck-airway (eFONA) access, utilizing local anesthesia and the scalpel, bougie, and endotracheal tube (ETT) technique. Dr. Sakles agreed if the window to perform an awake fiberoptic intubation attempt had passed, there was no choice other than an eFONA technique.

Dr. Kevin McCann discussed a similar case he experienced involving a 45-year-old female who took an angiotensin-converting enzyme inhibitor (ACE-I) in error. This caused rapid onset perioral and lingual edema for which she was taken straight to the operating room (OR) for awake tracheostomy. Dr. McCann was concerned that consultants were at least 30 minutes away in Dr. Sakles' scenario and believed emergent cricothyroidotomy was indicated.

Dr. Roberto Larios also stated that he believed emergent cricothyroidotomy was indicated, using sedation with ketamine or dexmedetomidine and oxygenation by bag ventilation or bilevel positive airway pressure (BiPAP). Dr. Jayanand Mekwan thought that if time was available, then he would take the HFNC approach for awake intubation with ketamine sedation and a second provider ready for eFONA. Dr. Reuben Strayer raised concern about using ETT in FONA. He suggested using tracheostomy tubes, but Dr. Sakles pointed out that ETTs are more ubiquitous than tracheostomy tubes and would be easier to access in emergencies. Also, he said ketamine procurement was faster than dexmedetomidine setups. Dr. Matt Taylor suggested an attempt with Heliox if it was available. Although he called it a "leap of faith" to use, he believed it should improve oxygenation. Drs. Ricardo Zanlorenzi, Darren Bazini, and Sakles agreed that new-onset stridor immediately called for the eFONA technique. Dr. Sakles also agreed with Dr. Julio Cortiñas-Díaz concerning the use of smaller tubes that can be changed to larger ones later.

Dr. Katren Tyler reminded others that this case might be hereditary angioedema, and to consider fresh frozen plasma (FFP), tranexamic acid (TXA), and C1 esterase inhibitor concentrate therapy. She also recommended preparing for eFONA. Drs. Larios and Carlos Krochek brought up their experiences with tissue plasminogen activator (TPA)-induced angioedema, pointing out that these cases were typically unilateral. Dr. Seth Manoach raised the concern that there were no randomized controlled trials on emergent airway access (and there never would be). Still, he suggested a

local-anesthetic-coated supraglottic device for oxygenation during surgical airway management. Dr. Daniel Erdheim replied that he agreed with previous ideas for intubation and cast considerable doubt that a supraglottic device would be successful in the face of the severe degree of intraoral swelling.

At the end of the discussion, Dr. Sakles thanked everyone for their lively input and supportive comments. He believed that it was unsure if this rapidly progressive angioedema was caused by histamine release or due to bradykinin release secondary to ACE-I use. If there had been any sign of improvement with pharmacotherapy, he would have started an epinephrine drip. He would have begun with 2 units of FFP and 1 gram of TXA. The data might have been weak for these treatments, but the benefits outweighed the risks in this scenario. Dr. Sakles believed the window for awake airway management was likely closed, and that an eFONA technique was the best option given the patient's deteriorating vital signs. He would have maintained supplemental oxygenation with HFNO throughout the procedure and titrated ketamine slowly for sedation to permit patient cooperation. Then he would have made a vertical skin incision followed by a horizontal incision through the cricothyroid membrane, dilated it with his finger, and guided a bougie through the incision to pass an ETT into the trachea. Lastly, he would have secured the airway with ties and sedated the patient further before transport to the intensive care unit (ICU) with a large visible sign highlighting the case as a difficult airway.



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1. Adriani J, Mehta D, Naraghi M. Mixtures of local anesthetics: The Effectiveness of Combinations of Benzocaine, Butamben, and Tetracaine Topically. *Anesthesiology Review*. 1981; 12:15-19.



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