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Digital intubation:
The Two-Fingered Solution to Securing an Airway

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Abstract
Digital intubation is a useful technique that is rarely taught in conventional airway management courses. With limited equipment and minimal training, a Special Operations Forces (SOF) medic can use this technique to intubate an unconscious patient with a high degree of success. The objectives of this report are to (1) learn the sequence of events for successful digital intubation, (2) recognize and appreciate the advantages and limitations of this technique, and (3) appreciate the requirements for establishing a unit-level training program.
Keywords: digital intubation, airway

Introduction
The prehospital combat environment is an area in which the risk to the patient's life is often the greatest. The responsibilities for the SOF medic to provide life-saving interventions (LSIs) in airway management, hemorrhage control, pneumothorax treatment, and systemic resuscitation are immense and profound. A recent study1 prospectively evaluated these LSIs in more than 1000 combat wounded casualties in Afghanistan and identified that airway procedures, including endotracheal intubation and surgical airways, were the interventions most likely to be performed incorrectly (8.6% of the time) and most likely to be omitted when indicated (53% of the time). Techniques of advanced airway management that are readily learnable and likely to be performed successfully in an austere prehospital environment are vitally needed. The prehospital medic's armamentarium for advanced airway management should include multiple strategies— assisted ventilation with a bag-valve-mask, placement of a supraglottic airway, endotracheal intubation, and placement of a surgical airway. The gold standard of transoral endotracheal intubation remains direct laryngoscopy (DL), but this requires the challenging task of visualizing the vocal cords clearly before passing the endotracheal tube (ETT). Anything that limits this view of the vocal cords also limits this technique; this includes a bloody airway, copious secretions, inadequate suction, poor lighting, and failure of laryngoscope equipment. In many situations, the availability of workspace around the head of the patient can also be severely limited. In all situations, medic inexperience with this difficult skill significantly limits the effectiveness of this approach. Knowledge of salvage or alternative strategies for establishing a definitive airway is important. Digital intubation (DI) is a long-established method of obtaining this definitive airway in an unconscious patient. This technique has generally been neglected in the medical and prehospital literature in favor of advanced airway management alternatives that often require enhanced technologies and more equipment. The technique of DI warrants consideration for the Special Operations Forces (SOF) medic since it provides many advantages, to include minimal equipment requirements and the ability to gain proficiency readily with training.

Advantages
DI circumvents many of the routine challenges of direct visualization for endotracheal intubation. Generally, the technique of DI involves using two fingers placed into the mouth to elevate the epiglottis and expose the tracheal opening. The second hand then advances the ETT into the trachea. For this procedure, limited equipment is required: an ETT, a syringe, and gloves. This is important on missions where weight is a factor or where fiberoptic or batteryoperated equipment may fail. DI allows for intubation in restricted spaces and from the side of the patient. This would be of benefit to a responder treating a casualty at point of injury or during patient evacuation across a variety of platforms. DI is a blind procedure that relies on tactile skills. Visualization of the vocal cords is unnecessary. Besides allowing for good light discipline, this avoids the too-common challenge of dealing with an airway with copious bloody secretions and limited or no suction capability.
DI requires a minimum of instruction to learn. In a study by Young et al.,2 22 emergency medicine providers were given a brief demonstration with verbal directions and then timed on their attempts at blind intubation. For the five intact cadavers used, successful intubation occurred 90.9% of the time. The time required for intubation was less than 21 seconds. In a similar study involving training with canine and cadaver models, emergency medical services providers had an 89% success rate over a 20-month period on actual prehospital patients, again with limited training or prior experience.

Technique

The step-by-step sequence for DI is as follows:

- Remove ETT (6.5- to 7.5-mm internal diameter for adults) from package and check cuff integrity.
- With stylet in place, curve ETT into a U-shape (Figure 1).
- If right-handed, stand or kneel on the left side of the patient.
- Place a bite block (a 1-inch roll of tape or similar device) at the side of the mouth and between the teeth to prevent bite injury
- Using the dominant hand, grasp the tongue with gauze and extract the tongue.
- With palm downward toward the tongue, place the index and middle fingers of the nondominant hand into the back of the throat and lift the epiglottis anteriorly to expose the glottic opening (Figure 2).
- Splay the two fingers on the epiglottis to provide a channel for the ETT.
- Advance the ETT in the groove between the fingers and advance into the trachea (Figure 3).
- Inflate the balloon.
- Confirm placement with auscultation.
- Secure the airway.

Of note, in narrow airways or based on provider preference, a gum elastic bougie (Eschmann stylet) can be placed first, with the tube advanced over this guide (Figure 4). The essential steps of the procedure can be summarized with the mnemonic DIGIT (Table 1).

Recommendations for Training

As with any skill, training and practice are essential. Fortunately, this skill is relatively easy to learn and retain. Familiarization can be obtained with online videos (http:// www.theairwaysite.com/video/videos.aspx?-videoID=8 and www.youtube.com/watch?v=WbQEJ52Qa-w) or with mannequin training. Proficiency can be gained with canine or cadaver models or with DIs in a controlled setting such as in an operating room with a patient undergoing elective intubation for general anesthesia.

Limitations

It is important to realize that the DI technique will not work in a semiconscious patient, where emesis will be induced and the airway further compromised. It also is more likely to fail if the patient has a restricted mouth opening or if the individual performing the intubation has short fingers. DI should be used only in circumstances where a definitive airway is warranted and DL is unavailable or unsuccessful. In the event of failure to establish an airway with DI, a surgical airway should be performed.

Complications

The most likely outcome for this procedure, done correctly on an unconscious patient, is success. The most common complication is esophageal intubation. Promptly identified, a misplaced ETT can remain in the esophagus temporarily while a second attempt at intubation is made. This strategy might facilitate passage of the second ETT into the trachea. A second failure to intubate the trachea should prompt strong consideration for performing a surgical airway. Following successful tracheal intubation by either technique, the esophageal tube can be used temporarily (with a gently inflated balloon) to prevent emesis, or to allow for gastric suctioning, if available. In all cases, an ETT misplaced in the esophagus should be removed once definitive airway access is obtained, and prior to transport or transfer, to prevent confusion. Other potential complications include inducing emesis in nonparalyzed patients with intact gag reflex, iatrogenic upper airway trauma, and the potential for hand injury for the intubator. One study by White4 identified an increased incidence of left mainstem intubations when the ETT is advanced too far into the airway. He suggested that the unusual preference of the ETT to pass into the left bronchus to be a result of the curvature of the ETT delivered by a typically right-handed intubator positioned the left of the patient. Awareness of the possibility of malposition to either bronchus should prompt in all cases careful auscultation of the chest following intubation and repositioning as necessary.

Conclusion

DI is a useful technique for securing an airway in austere environments and represents a viable option for medics in the field. With limited equipment and minimal training, a high rate of successful intubation of unconscious patients can be expected. Video, mannequin, and live training exercises are important for gaining and maintaining proficiency.

Disclosures

The authors have nothing to disclose.

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4. White SJ. Left mainstem intubation with digital intubation technique: an unrecognized risk. Am J Emerg Med. 1994;12:466–468. CPT Cashwell completed his master's degree in nurse anesthesia from the University of Alabama at Birmingham in 2002 after working for several years as a civilian paramedic. He was deployed to Afghanistan as a nurse anesthetist with the 628th Forward Surgical Team (FST). SGT Wilcoxen has spent 10 years on active duty, including the last 3 with the 75th Ranger Regiment. He has experience as an emergency medical technician with a civilian rescue squad. He served in Afghanistan in an austere location as a Special Operations medic. LTC Meghoo completed his residency in general surgery at William Beaumont Army Medical Center in 2005. He has spent the last 7 years as a general surgeon at Landstuhl Regional Medical Center. He was deployed to Afghanistan with the 628th Forward Surgical Team.

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