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Selected Topics: Difficult Airways

LUDWIG'S ANGINA

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CASE REPORT

Part 1

A 32-year-old man presents with 3 days of progressive jaw pain, localizing the area below his tongue, and 2 h of progressive difficulty breathing. Upon arrival by paramedics, he is sitting upright with his neck extended in the "sniffing dog" position. The patient is unable to speak and is having difficulty with secretions; he is panicked and cannot provide additional history.

The patient's vitals are: temperature 39.1°C (102.3°F), blood pressure 145/92 mm Hg, heart rate 123 beats/min, and respiratory rate 36 breaths/min. His tongue is elevated and protruding from his mouth, with significant induration and tenderness extending from the submental area inferiorly to the thyroid cartilage. He is in moderate respiratory distress due to upper airway obstruction, with drooling and difficulty handling secretions.

Clearly, this patient's airway is in jeopardy. What parameters (historical factors, physical examination findings, other clinical data) would you use in your decision as to whether the airway needs definitive management immediately by the Emergency Department (ED) personnel or whether another service should be consulted emergently for assistance?

Dr. Erik Barton: One of the scariest scenarios an emergency physician might encounter is a patient with a dynamic airway obstruction caused by an allergic reaction, inflammation, or hemorrhage. These airway emergencies may become rapidly progressive, resulting in sudden deterioration of the patient. With the case of suspected Ludwig's angina that is presented, rapid assessment and intervention are needed to prevent such an outcome. This is a patient who should not be allowed to leave the department without first obtaining a definitive airway.

As an ED attending, I would opt to have the most experienced intubator available for this case. For teaching hospitals, that duty would rest on the most senior resident or the attending. For smaller, non-teaching hospitals, making the decision to call for anesthesia or surgery back-up without delaying immediate intervention might be warranted. In either case, one would need to be prepared for an immediate cricothyrotomy in the event the patient experiences complete airway obstruction. I might go as far as identifying the cricothyroid membrane and marking it with a pen, scrubbing the neck with Betadine, and even using some local lidocaine anesthesia over the incision site (i.e., a "double setup") if I thought that this outcome might be highly likely.

This patient seems to be breathing fairly well on his own, although he is having difficulty with secretions and cannot speak. I would immediately place him on a high-flow non-rebreather mask to maximize his oxygenation. The next step would be to determine whether an attempt at an oral intubation with direct laryngoscopy is warranted. The technique of laryngoscopy typically relies on placing the patient on his back and using the laryngoscope blade to displace the tongue to the left and forward into the floor of the mouth. This maneuver is signifi-

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cantly limited by submental mass lesions, such as infection or inflammation, even if the patient is sedated and paralyzed. Therefore, an assessment as to the difficulty of intubation and whether to even attempt this route should be determined quickly. This decision should be based on the experience of the intubator and the patient's physical features, such as jaw size, neck length, and degree of deformity caused by the infection. Additionally, I would quickly look at the degree of mouth opening the patient could attain and assess a Mallampati if possible. These measures would help me decide whether an attempt at oral intubation might be successful. Based on the data presented, I would infer that both the degree of submental swelling and poor visualization due to tongue displacement would prevent me from being successful with an oral intubation attempt. Additionally, use of a bag-valve-mask (BVM) device might be unsuccessful if the patient became apneic or paralyzed with that degree of obstruction. Therefore, I would avoid using a "standard RSI" (rapid sequence intubation) approach and consider other options.

One option might be to sedate the patient, attempt to topically anesthetize the oropharynx, and take an "awake look" with a laryngoscope to see if oral intubation might still be successful. This is a good technique to consider when one is unsure about going straight to an RSI procedure due to concerns about the ability to visualize via this route. Again, however, as this case is presented, I would most likely dismiss this option and avoid risking any manipulation of the airway with an awake laryngoscopy if I did not think I could get past the tongue with the degree of swelling present.

Another consideration might be a retrograde wire intubation. This method uses the Seldinger method of threading a wire through a needle into the anterior airway (usually at or below the cricothyroid membrane) retrograde out the mouth or nose. The wire is then used as a "guide" to thread the endotracheal tube (ETT) into the trachea. It is a useful technique when there is significant upper airway distortion that may prevent visualization and intubation by the oral or nasal route. However, the retrograde wire method is rarely rapid and typically requires sedation and positioning of the patient. The wire often needs to be "fished out" of the posterior oropharynx or nares. Thus, it is typically not a method used in a crash airway situation, but is instead most useful when the patient is still able to be sufficiently oxygenated either on his own or with a BVM device. I would avoid attempting an oral intubation using other devices such as fiberoptic-laryngoscope combinations, laryngeal mask airway, Combitube, or lighted stylettes. The degree of swelling, tongue displacement, and upper airway distortion would significantly minimize success with these devices.

So now we need to consider alternative intubation techniques that could be successful in this patient. As long as the patient continues to oxygenate and does not progress to a complete obstruction, then a less invasive approach may be considered before resorting to an immediate surgical cricothyrotomy.

One approach would be to consider a blind nasotracheal intubation (BNTI). Although this technique is no longer routinely taught in many Emergency Medicine residency programs, it is still a potentially useful adjunct in cases where oral intubation cannot be performed. I would allow an experienced nasal intubator to attempt BNTI with a smaller diameter tube (i.e., 6.0 mm I.D.) and as gently as possible. The advantage to this route would be that potentially it could be done quickly while maintaining the patient's upright position of comfort. If time permits, adequate topical anesthesia and vasoconstriction of the nasal mucosa may prevent discomfort and epistaxis.

In my opinion, a better alternative to BNTI would be a fiberoptic intubation via the nasal route. Fiberoptic laryngoscopy and intubation is being taught more commonly in residency programs, and emergency physicians are becoming increasingly adept at performing this procedure. Again, this route could be undertaken with the patient in the upright position with minimal manipulation of the airway. One distinct advantage to fiberoptic visualization over BNTI is that the endotracheal tube (ETT) can be "guided" into the airway. Significant upper airway distortion may be present with this patient's underlying disease process, which may prevent the blind placement of an ETT. Thus, fiberoptic visualization and nasal intubation would be my technique of choice for the patient described in the case. For individuals who have not learned fiberoptic laryngoscopy, an immediate call to the anesthesiologist to assist with the intubation would be warranted as long as the patient's condition permits.

For an emergency physician, the most difficult part of performing a cricothyrotomy is making the decision to do it. Too often this decision is made well after the patient is severely hypoxemic and unable to be adequately ventilated. The best chance of survival rests on making this decision while the patient is still oxygenating and after a limited number of attempts at other techniques. Patients often undergo prolonged intubation attempts using the same technique that has already proven unsuccessful. Quickly determining that a particular intubation route is unsuccessful (i.e., three attempts by an experienced operator) will prevent delaying a cricothyrotomy that is truly necessary.

In summary, I would consult the anesthesiologist and surgeon to assist if they were readily available to respond the ED and I felt that I needed backup or did not have adequate equipment. If my assessment of difficulty of the

airway determined that I could not successfully intubate orally, I would quickly move to attempt a nasal fiberoptic visualization and intubation in this patient. I may consider a retrograde wire if that failed and the patient was able to remain adequately oxygenated. If both of those techniques failed and the patient became progressively dyspneic, I would perform a cricothyrotomy.

Dr. Aaron Bair: The initial and perhaps most important question to address in this case is: how long can this patient safely await definitive airway management? In other words, does this person need to be intubated now (i.e., crash airway), in 10 min, or can he wait for transport to the operating suite (presumably within the next several hours)? It is important to realize that the most common early complication in cases of Ludwig's angina is loss of airway patency. Our patient in this discussion is demonstrating clear signs of airway compromise manifested by both his posture and inability to handle secretions. Aggressive early airway management is imperative in this case. Unfortunately, our management alternatives are limited in this scenario. Additionally, the more unstable the patient becomes, the fewer management options we have left to choose from. The following considerations are fundamental to the management of this type of case. First, *an oral approach is **not** a reliable option*. The upward displacement of the tongue in the case of severe Ludwig's angina makes gaining sufficient oral access for laryngoscopy nearly impossible. Although the associated trismus often can be overcome with induction and paralysis, an attempt to intubate the individual described in this case using a rapid sequence intubation before assessing the larynx could prove disastrous. Likewise, any oral rescue device (i.e., Laryngeal Mask Airway® or Combitube®) also will be unsuccessful due to the lack of oral access. Secondly, a *nasal approach may be worth considering*. Remember, the posterior pharynx is variably involved in such cases. Although an attempt at blind nasal intubation is risky, as it could lead to precipitous loss of the airway if attempts cause hemorrhage or abscess rupture, fiberoptically assisted nasal intubation in an awake, cooperative patient may be optimal. However, this option pre-supposes sufficient time (at least 15–20 min) for preparation of equipment and the patient. Even more time will likely be required if a consultant needs to be summoned to the ED to participate in the management. Optimal patient preparation would involve administration of antisialogogues (i.e., glycopyrrolate or atropine) and consideration of judicious anxiolysis. It is worth emphasizing that a "panicked" or uncooperative patient is not a good candidate for fiberoptic airway management. Finally, a *surgical airway is likely to be necessary*. These patients will often be managed with a tracheostomy in the operating suite. However, should the patient precipitously obstruct while in the ED, then the only management option is to access their airway below the level of the obstruction (i.e., surgical or percutaneous cricothyrotomy). The method chosen is largely a matter of provider preference, depending on experience and the tools at hand. Keep in mind that control of the surgical incision is paramount in any invasive airway undertaken in a patient who is awake enough to struggle. In the event that this patient requires urgent cricothyrotomy and is still able to swallow, any incision through the skin or cricothyroid membrane is easily lost if not well stabilized (i.e., by a tracheal hook) at all times.

Given the anticipated course of this patient, we must take the above considerations into account and weigh our options carefully. The possibility of precipitous obstruction, and the time to definitive tracheostomy in the operating suite, must be judged against the relative risks of early non-invasive attempts at airway management in the ED. Clearly, if this patient requires interfacility transfer, the management strategy will need to be different than if he is merely traveling a short distance to the operating room. Similarly, the management options may be still further constrained by provider inexperience. All three of the previously discussed intubation techniques (i.e., blind nasal, fiberoptically assisted nasal, and cricothyrotomy) are infrequently used in many EDs. As such, provider lack of familiarity with these techniques may further reduce the strategic alternatives that might be useful in such a case. Consideration of this, or similar cases, may merit discussion at an institutional level regarding preparedness for difficult airway management in the ED. The pertinent issues of provider skill development, as well as institutional readiness with respect to equipment maintenance, should be addressed well in advance of such a critical patient presentation.

Part 2

The patient seems to be fatiguing, and his oxygen saturation is 82% on supplemental oxygen via non-rebreather. A Head and Neck Surgeon is consulted but is taking call from home and will not be available for at least 30 min. You decide to proceed with a surgical airway. Discuss your specific approach to this procedure.

Dr. Barton: The patient has now demonstrated that he is unable to maintain adequate oxygenation, defined as an O_2 saturation $<90\%$, despite initial efforts. This is most likely due to an increase in the upper airway obstruction caused by the submental space infection, and this forces the move to an immediate surgical airway below this area. Attempting another technique at this point, with further manipulation of the airway via the

nasal or oral route, would only prolong the period of hypoxemia and increase the risk of respiratory arrest.

As previously mentioned, the most difficult part of a cricothyrotomy is making the decision to do it. There should be no hesitation when the patient has declared that he is in a failure-to-oxygenate and a failure-to-ventilate situation. Because the saturations are inadequate with the patient breathing on his own, then "bag-assisting" the patient may improve the situation while preparing for the cricothyrotomy. The use of a BVM device allows for a better seal around the mouth than a standard non-rebreather mask. The patient is allowed to breath through the device while positive pressure breaths are provided synchronously with the patient's own respiratory efforts. This small amount of positive-pressure support may help to overcome the degree of airway obstruction and improve oxygenation while preparing for the surgical airway. Preparing for a cricothyrotomy should not be delayed to see if such a maneuver works, however, as it should be assumed that the airway compromise will continue to progressively worsen.

If this patient is still awake and conscious despite the low saturations, then sedation will be required to perform a surgical procedure. Currently, there are several medication choices for procedural sedation. The most important consideration would be to keep the patient breathing for as long as possible to avoid worsening the hypoxic state before securing the airway. The most commonly used drug for sedation is midazolam, as it has proven to be an effective amnestic agent in relatively small doses (2–5 mg). However, midazolam can be very unpredictable and may cause respiratory depression or hypotension in some individuals. Etomidate is a very hemodynamically stable agent that has emerged as the preferred drug for RSI. It has a very rapid onset and lasts about 15–20 min. One-half the induction dose (0.1–0.15 mg/kg) has been used for sedation for a variety of orthopedic and surgical procedures. Etomidate has been associated with myoclonus, which can be severe and has been compared to seizure activity. Ketamine would be a good choice, as you can achieve deep levels of sedation without causing a decrease in respiratory drive. Additionally, there are some beta-agonist effects that may help patients with bronchospasm or hypotension. The use of ketamine is generally discouraged in patients with unstable cardiac disease or increased intracranial pressure, and an increase in oral secretions is often seen; small doses of atropine or glycopyrrolate (Robinul) may be administered to promote a drying effect. Propofol and methohexital are used less commonly for airway procedures, but may be the only option in some departments and can be used with caution.

Local anesthesia also should be used to minimize discomfort if the patient is awake. Identifying the landmarks and marking the site, prepping the skin, and injecting the lidocaine can be done with the patient in the upright position to avoid further obstruction of the airway in the supine position. This could be done just before, or simultaneously with the administration of the sedative agent. After sedation and preparation of the area, and with optimal BVM-assisted ventilation, the patient would then be placed supine for the procedure. At this point you have the choice of performing a formal "surgical" cricothyrotomy or a percutaneous approach. The decision to perform either of these procedures should be based on the physician's level of comfort and experience as well as the patient's physical factors.

Percutaneous devices are typically kits that use either a combination introducer/dilatator ("trocar-type") device or a modified Seldinger technique with a guidewire and an introducer needle. There is little advantage to these kits over formal cricothyrotomy with regard to procedure time, success rates, and incidence of complications. Additionally, there is an increased risk of trauma to the anterior airway using the trocar-type devices. The main advantage of these kits is the familiarity that physicians may feel in locating the airway and placing a device over a guidewire in a similar fashion to central lines, which are performed much more frequently in the ED. Most of these devices do not offer a definitive airway, however, as the tubes are uncuffed and may be relatively small compared to traditional tracheostomy tubes. These devices may offer a temporizing airway that later can be converted to a formal cricothyrotomy or tracheostomy in the operating room.

Formal surgical approaches to cricothyrotomy include the classic "no-drop" technique and the "rapid four-step method." The classic technique uses a linear incision over the anterior neck with localization of the cricothyroid membrane while maintaining control of the larynx using the non-dominant hand. The skin is incised down to the cartilage of the anterior airway and the cricothyroid membrane is identified. In my experience, this procedure is typically a bloody mess (in patients who are still alive) and the cricothyroid membrane is rarely seen but is instead located by palpation. A horizontal incision is made from one end of the cricothyroid space to the other, which can be 1–2 cm wide (compared to only ½–1 cm vertically), to create the biggest opening possible. A tracheal hook is typically placed on the inferior aspect of the tracheal cartilage to secure the larynx and a "Trousseau dilatator" used to widen the opening before insertion of a Shiley tracheostomy tube or ETT.

Another technique that has been described more recently is the rapid four-step method (RFST.) This method has been shown to be very quick and successful to perform, especially in patients with easily identifiable landmarks on the anterior neck. The steps include: 1) *palpation* of

the cricothyroid membrane with the non-dominant hand; 2) a horizontal stab *incision* through the skin and completely through the membrane simultaneously; 3) *hooking* the superior portion of the cricoid cartilage (caudad to the incision) with a tracheal hook and lifting the cartilage anteriorly; and finally 4) *intubating* the trachea with the Shiley tracheostomy tube or ETT. The advantages of this technique include a minimal amount of time from skin incision to penetration of the cricothyroid membrane and a more conducive route for intubation down the trachea by elevating the airway at the cricoid cartilage rather than the thyroid cartilage. The disadvantage to this approach would be any difficulty in identifying the cricothyroid membrane due to obesity, swelling, or deformity. In the patient described here, this approach may or may not work depending on the level of swelling noted below the submental space.

I would opt for one of the formal surgical approaches in this case to secure a definitive airway. Rapidly identifying the cricothyroid membrane and securing a cuffed tube in the trachea will offer the best airway protection from aspiration and ensure optimal oxygenation. Post-procedure, continued sedation and analgesia will be an important consideration for this individual to minimize pain and awareness. Paralysis also may be required for adequate ventilator management as the patient is being evaluated for further treatment.

Dr. Bair: In general, non-invasive airway management methods are used so successfully that cricothyrotomy has come to be viewed as a desperate method reserved for use in cases where multiple non-invasive attempts have failed. The relentless pursuit of a non-invasive airway and the resultant delay in the initiation of a surgical airway can readily result in hypoxic disaster. When used early in appropriate circumstances, cricothyrotomy can be lifesaving. However, among providers who take pride in their laryngoscopy skills, the main hurdle to performing cricothyrotomy is simply making the initial decision to forgo further attempts at laryngoscopy and to proceed with a surgical airway. Once this decision has been made there are a few fundamental considerations that still remain: 1) Will accessing the cricothyroid membrane be *effective*? In other words, will an incision at this level bypass the obstruction and solve the problem? If the obstructing lesion is further down in the airway, then performing a cricothyrotomy is a critical waste of time. 2) Will the patient's anatomy or pathological process make cricothyrotomy *difficult* to perform? Placement of the initial skin incision is based on palpating the pertinent anatomy. If adiposity, burns, trauma, or infection make this difficult then the strategy should be adjusted accordingly. 3) Which *type* of invasive technique will be most readily employed (i.e., open surgical or percutaneous)? This consideration takes into account provider preference based on previous experience and equipment availability. Cases that require invasive management arise infrequently, and as such it is unreasonable to expect that an individual provider will have extensive experience with multiple different techniques. However, it is imperative that anyone responsible for emergency airway management acquire and maintain technical proficiency in some form of invasive airway technique.

With regard to the case described here, we are given no specific details regarding the patient's habitus or the anatomy of his anterior neck. If he has readily palpable anatomy, then he should be a good candidate for an open surgical technique. The greatest advantage of an open approach is that it can employ a relatively large cuffed endotracheal tube, whereas percutaneous techniques generally rely on smaller lumen (often uncuffed) tubes. Additionally, logistical issues may be important when considering techniques. For example, if the need for an invasive airway is abrupt and unanticipated, the attempts to locate the infrequently used percutaneous kits may contribute to a sense of anxiety surrounding the procedure. In contrast, all of the necessary tools for the open cricothyrotomy technique described below can be carried, ready to use, in a coat pocket.

Once the decision has been made to use an invasive airway, preparations need to proceed expeditiously. The patient will be maximally oxygenated, either with non-rebreather facemask or bag-valve mask. If given sufficient time, the anterior neck will be prepared with Betadine and locally anesthetized. With respect to surgical technique, I prefer the RFST for cricothyrotomy. From a position at the head of the bed, the steps proceed sequentially: 1) **Palpate and identify the anatomy**. The key landmarks of the anterior neck need to be rapidly identified. The "v" notch of the thyroid cartilage is generally the most prominent feature of the local anatomy in a mature male. Once the notch is identified, the cricothyroid membrane is readily palpated by moving inferiorly approximately one fingerbreadth. The cricothyroid membrane will be appreciated as the indentation caudal to the thyroid shield. Of note, the hyoid bone can be mistaken for the thyroid cartilage in cases where the anatomy is obscured by soft tissue. Avoiding misplacement of the initial incision often requires distinguishing both the hyoid bone and thyroid cartilage. If the key landmarks are unable to be identified by palpation through the soft tissue, then a skin incision will need to be made to permit accurate identification. 2) **Incision**. Once the pertinent palpable anatomy is identified, the cricothyroid membrane is incised. If the anatomy is fully appreciated through the intact skin, then I prefer to incise the skin and cricothyroid membrane simultaneously with a single horizontal incision of approximately 1.5 cm in length. For

this type of incision I use a #20 scalpel, which yields an incision that requires little widening once used to puncture the skin and cricothyroid membrane. It should be recognized, however, that if the anatomy is not readily palpable through the skin, then an initial vertical incision should be created to allow subsequent palpation of the anatomy and identification of the cricothyroid membrane. In either situation, the cricothyroid membrane is incised horizontally with the #20 blade, which is maintained in the airway while a tracheal hook (preferably a blunt hook) is placed parallel to the scalpel blade on the caudal side of the blade. The hook is then rotated inferiorly to control the cricoid ring. The scalpel is then removed from the airway. At no time during this procedure is the incision left without instrument control of the airway. This is particularly important in a scenario where the patient still has the ability to gag or swallow. If the larynx were to be uncontrolled and then moved relative to the skin incision, the newly created stoma could be lost—with devastating consequences. Additionally, it is important to emphasize that this is a technique that relies exclusively on palpation of key structures. There will inevitably be enough bleeding to obscure visualization of the anatomy. No time should be wasted using suction or manipulating the overhead lighting! 3) **Traction**. The tracheal hook that has been rotated caudally and is now controlling the cricoid ring is now used to lift the airway toward the skin incision and provide modest stoma dilatation. It is notable that the direction of hook pull is reminiscent of the "up and away" direction employed with laryngoscopy. The amount of traction force required for easy intubation (18 Newtons) is significantly lower than the force that is associated with breakage of the cricoid ring (54 Newtons) (1). Utilization of the hook in this direction generally provides sufficient widening of the incision to obviate the need for further dilatation (i.e., Trousseau dilatator). Furthermore, such placement both controls the cricoid ring and effectively reduces the possibility of intubating the pre-tracheal potential space. As an aside, this pre-tracheal potential space will readily accept the over-zealous insertion of a misguided endotracheal tube. This causes further problems as insufflation of a pre-tracheal tube distorts the anatomy of the anterior neck with subcutaneous emphysema. 4) **Intubation**. With adequate control of the airway using the hook placed on the cricoid ring, an endotracheal tube is readily placed into the airway and secured. Confirmation techniques proceed in the usual fashion.

Journal of Emergency Medicine: Thank you very much for your insightful remarks. Any last comments?

Dr. Barton: Dr. Bair raises some important issues regarding this case. Emergency physicians have become very successful at non-surgical endotracheal intubations and, in fact, the current data from the National Emergency Airway Registry demonstrate that we are over 95% successful using standard RSI techniques. More challenging airways are now being managed using a variety of difficult airway and "rescue" devices, both in the hospital and the pre-hospital setting. To this end, the national cricothyrotomy rate has dropped to approximately 1% of all intubations performed in EDs (2,3).

Once again, as we both have mentioned, the most important step in performing a cricothyrotomy is making the decision to do it in a timely manner before the patient experiences hypoxemic complications. Limiting attempts at non-invasive intubation by recognizing that this is one of those rare cases when the move to a surgical airway should be made quickly will be a lifesaving measure in this patient. The procedure itself is not complicated and can be performed successfully by almost any physician with some basic hands-on training. The procedural knowledge is typically well retained and may only require intermittent refresher courses throughout one's career.

Dr. Bair very eloquently described the RFST in greater detail as his procedure of choice. I agree that this can be the most expeditious manner in placing a surgical airway, and the data suggest that this approach has a high success rate. However, if the landmarks of the anterior larynx are not easily identifiable from the surface (due to, e.g., obesity, swelling, trauma), then quickly moving to a vertical midline skin incision down to the cartilage may be necessary to accurately locate the cricothyroid membrane and incise it. One important issue when using either technique is maintaining constant control of the larynx with either a hand or a tracheal hook so that the landmarks are not lost by bleeding, movement, or swallowing. Once the anterior tissue around the larynx has been dissected away, it becomes extremely mobile and more difficult to control if some form of traction is not maintained. Too many times a cricothyrotomy has become prolonged or unsuccessful because the landmarks were lost into a crevice of blood and tissue.

Fortunately, true airway emergencies are becoming less common as we become more proficient with RSI and other non-surgical techniques. In fact, many of the historical airways that were previously managed by primary cricothyrotomy (e.g., facial trauma, parapharyngeal masses, penetrating neck injury) are now routinely intubated non-surgically with high success. However, the importance of early recognition of the rare patient, such as this patient with Ludwig's angina, who mandates rapidly moving to a surgical airway, is the lesson one should take from this case.

Dr. Bair: This fairly complicated discussion can be summarized simply: this patient needs an invasive airway, and the provider needs to perform one quickly and efficiently. How best to accomplish this task will

depend on the experience of the provider. In general, I prefer the RFST for open cricothyrotomy. This technique was originally proposed as a simplified alternative to the standard technique. Additionally, I believe the RFST has several advantages over the No-Drop technique that merit elaboration:

1. *The Rapid Four Step Technique requires only one person to perform the procedure*. In contrast, the No-Drop technique requires *two* people (i.e., one operator and one assistant). The assistant is responsible for "not dropping" the tracheal hook as it stabilizes the trachea. This is required as the operator needs both hands to manage the Trousseau dilatator and endotracheal tube.
2. *The RFST can be readily performed from the head of the bed*. Imagine that you have decided to perform a cricothyrotomy after failed attempts at laryngoscopy with unsuccessful attempts at bag-valve-mask ventilation. With the RFST, you can reach over the head of the patient and perform the entire procedure without having to move yourself around to the side of the bed. Such movement may initially seem like a trivial concern; however, there is inevitably staff, monitoring equipment, ventilators, suction tubing, and oxygen tubing all trapping the intubator at the head of the bed. To move around to the side of the bed can sometimes be difficult and is inevitably time consuming. Furthermore, when such movement is done in haste it often results in the toppling of equipment and the disconnecting of vital monitors.
3. *The RFST requires only a simple hook and a scalpel.* The scramble for missing equipment can be, at best, uncomfortable and, at worst, life threatening. I routinely carry a scalpel and a hook in my coat pocket. Paranoid? Perhaps, but I know that I am reasonably well prepared to manage the precipitous loss of an airway in even the most remote areas of the hospital (e.g., computed tomography [CT] scanner, elevator, angiography suite).

Ultimately, all of this discussion regarding the finer technical details is irrelevant if hesitancy on the part of the provider results in significant delay in establishing a definitive airway. This hesitancy is readily overcome with technical proficiency. However, as an infrequently used technique, proficiency will require a concerted effort. I encourage anyone responsible for emergency airway management to pick a method, learn it, and practice it at regular intervals.

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