MICHAEL HUBBLE, NREMT-P

Seated orotracheal intubation

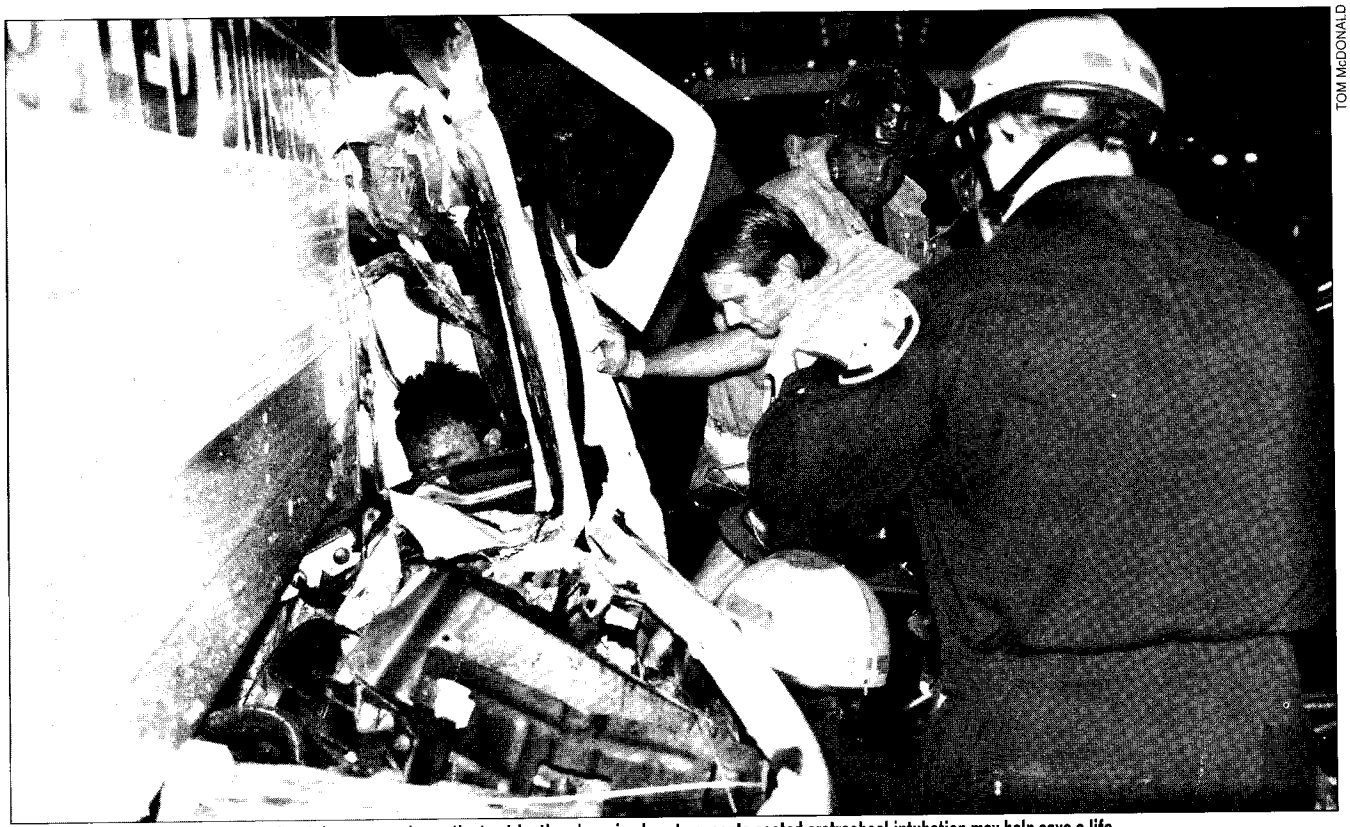
An ambulance and rescue truck are dispatched to the scene of a motor vehicle collision. On arrival, a survey of the scene reveals a single-car collision where a small compact car left the roadway and struck a tree. There are no scene hazards present. Two feet of damage is noted to the front end of the vehicle, suggesting an impact speed of approximately 35 mph. Closer inspection of the vehicle reveals a starburst windshield and a markedly deformed steering wheel. There are approximately 15 inches of dashboard intrusion into the passenger compartment. The young male driver is found unrestrained and slumped over the steering wheel. His legs are pinned by the wreckage and are inaccessible.

Treatment of the patient begins with manual stabilization of the c-spine and opening of the airway with the trauma jaw thrust maneuver. The patient is unresponsive and apneic. An oropharyngeal airway is inserted and is well tolerated by the patient. Bag-valve-mask ventilations are initiated with 100 percent oxygen. A rapid, thready pulse is palpated at the carotid artery, but there is no palpable radial pulse. Due to severe facial trauma, it is difficult to maintain a proper seal with the bag-valve-mask. Consequently, ventilatory support is inadequate. It is estimated that extrication will require between 15 and 20 minutes.

Management of the airway is paramount in the treatment of any patient. Patient assessment begins with the airway and further patient evaluation will not continue until after the airway is adequately controlled. Because of the rapidly devastating effects of hypoxia on the neurological and other organ systems, airway management represents one of the most serious treatment challenges faced by the EMS provider.

Despite the importance of aggressive and timely management of the airway, EMS providers are occasionally presented with patient situations that challenge their existing airway management skills and techniques. As presented above, one such challenge is managing the airway of a patient pinned in a seated position who will require lengthy vehicular extrication. To manage these difficult airways, it is important that new methods of airway control be investigated and then perfected through practice. Through an assortment of tools and techniques it becomes easier to address these occasionally difficult airways.

In the arsenal of emergency airway management techniques, the endotracheal tube is recognized as the ultimate in airway control. The first use of oral endotracheal intubation was recorded around 1000 A.D., when a "golden or silver . . . tubus" was inserted into the neck of a pig. The technique evolved over the years and was popularized by Sir William Macewen in 1878 as an anesthesia adjunct used during surgery.[1] Though



TOM McDONALD

When you're faced with a complicated and time-consuming patient extrication, knowing how to execute seated orotracheal intubation may help save a life.

endotracheal intubation became standard practice in the operating room, it was not until the 1960s that the technique became accepted in emergency medicine.[2] Another 10 years elapsed before the technique gained acceptance as a procedure routinely and successfully practiced by paramedics in the field.[3] Today, endotracheal intubation is considered the standard of care in prehospital airway management.

The indications for endotracheal intubation include:

- Relief of airway obstruction.
- Protection from aspiration.
- Correction of hypoxia and hypercarbia.
- Need for direct control of ventilatory rate and volume.
- Tracheal suctioning.
- Patient inability to protect airway.
- Failure of other methods to provide adequate airway control.
- Need for long-term ventilatory support.

The endotracheal tube provides several advantages over other airway devices. Because the tube effectively isolates the trachea, the risk of aspirating gastric contents or blood is dramatically reduced. Further, isolation of the trachea prevents gastric insufflation that sometimes occurs with other airway techniques. Ventilation through an endotracheal tube also eliminates the need to maintain an adequate seal with the bag-valve-mask. Consequently, ventilatory volume is more controlled and ensures delivery of 100 percent oxygen. A final advantage of the endotracheal tube is that it provides a route for the administration of certain medications when vascular access cannot be readily gained.

IMPLEMENTING SEATED INTUBATION

Despite the advantages of endotracheal intubation, in some circumstances securing the airway with an endotracheal tube may be problematic. Often, the EMS provider must adapt to unique situations, using techniques that will provide rapid and effective airway control — while simultaneously maintaining c-spine immobilization. Possible techniques that may be employed include nasotracheal, retrograde and digital intubation, percutaneous transtracheal ventilation, and use of lighted stylets. Another valuable technique that has received little attention in the literature is seated orotracheal intubation. By modifying the direct laryngoscop-

ic technique used by most EMS providers, this alternative method of intubation can be added to the spectrum of airway control maneuvers. This method is particularly suited to the needs of the seated patient when rapid extrication is not possible and standard intubation techniques cannot be used.

Managing the airway of the seated trauma patient begins with c-spine control and manual airway techniques like the trauma jaw thrust and trauma chin lift. Though still controversial, it is generally accepted that axial stabilization of the

The first use of oral endotracheal intubation was recorded around 1000 A.D., when a tube was inserted into the neck of a pig.

cervical spine will limit c-spine manipulation during intubation. Following c-spine control and manual airway maneuvers, the medic should hyperventilate the patient with 100 percent oxygen by bag-valve-mask prior to any intubation attempt. During hyperventilation, the intubation equipment should be assembled. An endotracheal tube, stylet, syringe, stethoscope, tape, laryngoscope and laryngoscope blade should be at the patient's side. For seated orotracheal intubation, the Macintosh blade is recommended. The Miller or Wisconsin blades may be substituted if desired, but may prove more difficult to use when attempting to obtain adequate visualization.

Once the patient is adequately hyperventilated with 100 percent oxygen , the EMS provider is ready to attempt intubation. There are two variations of the seated orotracheal intubation technique: the superior approach and frontal ap-

proach. The superior approach is technically similar to intubating the supine patient. The paramedic positions himself/herself behind the patient's head, typically in the back seat. The laryngoscope blade is held in the same manner as in supine intubation, except the rescuer is required to lean over the patient's head to obtain adequate visualization. Therefore, it may be necessary to maintain c-spine control from the front and to remove the roof of most cars prior to intubation. In addition, it may be possible to recline the seat to improve access to the patient. Care must be taken, however, to avoid manipulating the spinal column.

While a second rescuer provides manual c-spine stabilization, insert the laryngoscope, sweeping the tongue to the left. Without manipulating the c-spine, gently displace the mandible to visualize the glottis. Particular attention should be given to the direction the laryngoscope is pointed. With the patient in the seated position, movement of the laryngoscope is anterior and caudal relative to the patient (**Figure 1**).

It will be advantageous to use a stylet and for a second rescuer to gently provide posterior pressure over the cricoid cartilage (Sellick's maneuver) to enhance visualization of the cords. This technique will also occlude the esophagus, minimizing regurgitation and aspiration of gastric contents. Because of the risk of laryngeal injury and c-spine movement, care should be taken to avoid overzealous pressure with the Sellick's maneuver.

The frontal approach requires greater modification of technique. Hyperventilation, c-spine control and equipment preparation proceed as with the superior approach. Facing the patient, the rescuer places the laryngoscope in the right hand and in an inverted position (**Figure 2**). Depending upon how patient access is achieved, the rescuer positions himself in front of the patient or to either side (**Figure 3**). While a second rescuer maintains manual c-spine stabilization from behind, the laryngoscope blade is inserted and the tongue is moved to the patient's left. The rescuer then displaces the mandible by moving the laryngoscope anteriorly and

DALE STOCKTON (3)

FIGURE 1

FIGURE 3

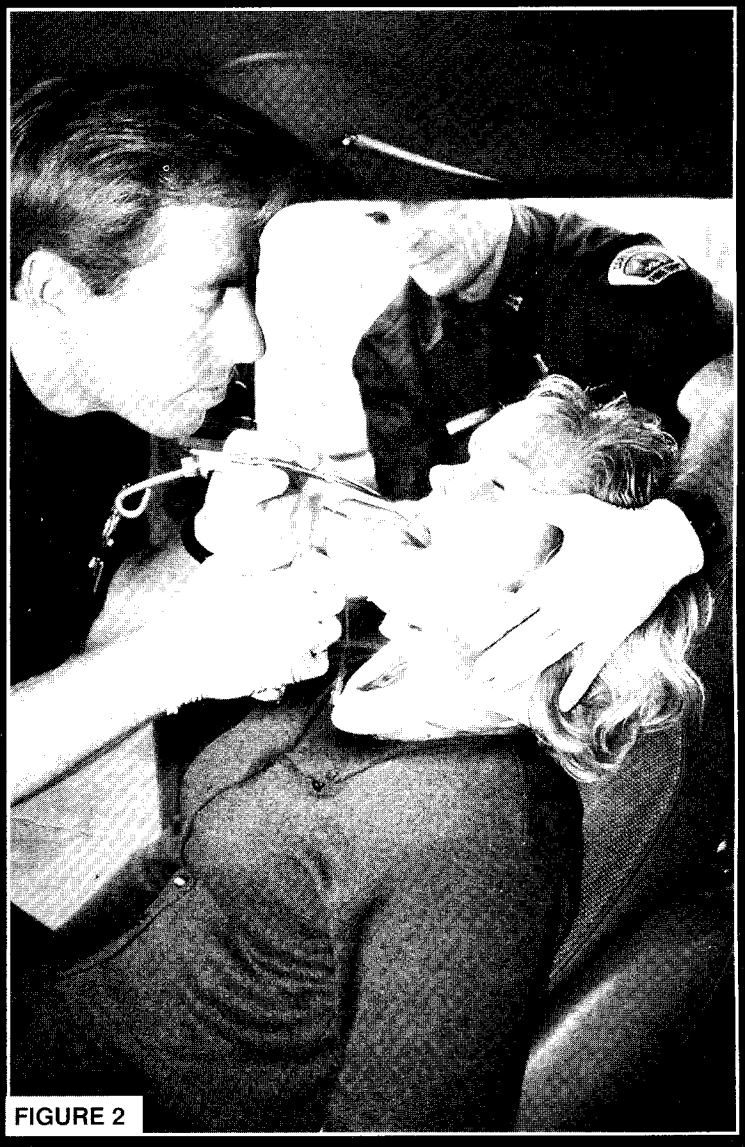


FIGURE 2

caudally relative to the patient. Again, the Sellick's maneuver and a stylet may facilitate visualization and passage of the endotracheal tube.

AUSCULTATION IS KEY

As with any intubation technique, it is imperative that the chest and abdomen be auscultated to ensure proper positioning of the tube following placement. Auscultating along the posterior lateral wall, near the axilla, will provide the best indication of proper tube positioning. Once tube placement has been confirmed, the patient may be ventilated with 100 percent oxygen. The tube should then be adequately secured by whatever technique the rescuer has adopted. Several commercial devices are available that provide excellent tube stabilization while simultaneously functioning as bite blocks.

Managing a seated patient's airway starts with c-spine control and manual airway techniques like the jaw thrust.

Some of the advantages of seated orotracheal intubation of the trauma patient over other intubation methods include:

- Definitive control of the airway prior to extrication.
- Use of familiar equipment routinely available to EMS providers.
- Minimization of cervical spine manipulation.
- It is a rapid, simple and effective technique.

While other airway management techniques offer some of the same benefits as seated orotracheal intubation,

they have some limitations as well. For example, while percutaneous transtracheal ventilation (PTV) reduces manipulation of the cervical spine, it requires special equipment to provide sufficient ventilatory pressure. This method has also been associated with poor gas exchange and can only be used as a temporary airway.[4] Further, nasotracheal intubation is difficult in the nonbreathing patient and retrograde intubation requires a J-wire, which may not be readily available.[4,5] For these reasons, seated orotracheal intubation may be the preferred technique.

The complications of seated orotracheal intubation include all those of any orotracheal intubation, like esophageal intubation, right mainstem bronchial intubation, vagal response and laryngeal injury. By employing proper form, though, seated orotracheal intubation may be performed with minimal complications.

SUMMARY

Airway management is the EMS provider's initial focus in patient care. Consequently, emergency personnel must be familiar with a variety of airway management procedures. All methods of airway control have their benefits as well as limitations. Each procedure should be evaluated based upon the situation, patient's condition, consultation with medical control, and skills and equipment of the rescuer. By expanding the repertoire of available techniques, it becomes easier to identify suitable airway control procedures for unique patient situations. E

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