

Retrograde Intubation

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KEYWORDS

• Intubation • Retrograde • Tracheal • Guidewire • Fiberoptic

Airway management in the emergency department is a critical skill that must be mastered by emergency physicians.¹⁻³ It is one of the most vital initial steps in pediatric and adult resuscitation. Failure to obtain and maintain an adequate and protected airway for oxygenation and ventilation results in poor outcome. Rapid-sequence induction with oral-tracheal intubation performed by way of direct laryngoscopy is generally the preferred initial method of airway control. It has been shown to be highly successful in the hands of skilled practitioners.^{4,5}

In approximately 1% to 6% of cases, initial oral-tracheal intubation may be difficult if not impossible due to a variety of circumstances,⁶⁻³⁸ including acquired or congenital anatomic abnormalities or distortions, traumatic facial or neck injuries, uncontrolled hemorrhage or emesis, and foreign bodies. When these limitations cannot be overcome by technique or experience, an alternative method or device must be used for a rescue airway. These alternative methods and devices have been well described in the literature and include numerous alternative laryngoscope designs (direct, flexible, fiberoptic), various endotracheal tubes and guides, lighted wands, laryngeal mask airways (LMAs), esophageal tracheal tubes, hollow stylet or transtracheal jet ventilators, retrograde guided intubation, and percutaneous or surgical cricothyrotomy or tracheostomy.^{6,8,12,21,37,39-69}

Many courses and texts have been developed to address the use of the growing numbers of airway adjuncts. It is unlikely that anyone is able to become expert in the use of all of these devices; however, it is essential that all practitioners have a repertoire of techniques or equipment immediately available to them in the event of the failed airway. Percutaneous or surgical cricothyrotomy has generally been accepted as the definitive method of airway management in this situation.⁷⁰⁻⁸⁸ Retrograde guided oral or nasal intubation is an easily learned and maintained skill set and may be a rapid, less invasive alternative to a surgical airway in many settings.^{6,8,30,57,63,70,89-95}

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INDICATIONS AND CONTRAINDICATIONS

Retrograde intubation is a well-described technique. It encompasses several methods of translaryngeal guided nonsurgical airway access to facilitate orotracheal or nasotracheal intubation. It has been used in awake, sedated, obtunded, or apneic patients when other methods have been unsuccessful, unavailable, or contraindicated.^{91,96} It has been used in the management of anticipated and unanticipated difficult airway scenarios.^{8,30,35,57,63,70,91,92,97–102} It has also been shown to be successful in adult and pediatric patient populations.^{30,103,104} It has been performed in the supine, prone, and sitting positions with the neck extended or in neutral position.¹⁰⁵

Retrograde intubation is contraindicated in the presence of unfavorable anatomy in the area of the cricothyroid (nonpalpable landmarks, pretracheal mass, severe flexion deformity of the neck), laryngotracheal pathologic conditions (tracheal stenosis, malignancy, upper airway mass or foreign body), significant coagulopathy, and infection.

CLASSIC TECHNIQUE

Retrograde endotracheal intubation was first described by Butler and Cirillo¹⁰⁶ in 1960 as a means to remove the tracheotomy tube from the operative field in neck surgery. A catheter was passed cephalad through the tracheostomy site and out through the mouth and was sutured to an endotracheal tube. The tube was then simply pulled into position. Waters,¹⁰⁷ in 1963, described passing small plastic tubing through the cricothyroid membrane in a similar retrograde fashion and then using it as a guide to intubate patients who had deformities of the jaw.

Since then, there have been several variations proposed for primary airway management. The most common involves the use of a commercially available retrograde intubation kit (Cook Retrograde Intubation Set with Rapi-Fit Adapters, Cook Critical Care, Bloomington, Indiana). The kit contains a syringe with an 18-gauge introducer needle and the needle catheter sheath, a 50-cm flexible J-tipped wire, a radiopaque guiding catheter, and a needle holder (**Fig. 1**). Following sterile preparation of the anterior neck, lidocaine is administered in the inferior area of the cricothyroid membrane in appropriate patients. Transtracheal anesthesia should also be used. A small amount of liquid is drawn up into the syringe, and an initial percutaneous puncture through the cricothyroid membrane is made with the introducer needle and catheter at a 30° to 40° angle to the skin in a cephalad direction. The free flow of air bubbles in the syringe confirms entry into the trachea. Holding the catheter in place, the needle and syringe are removed and the J-tip of the wire is passed up the trachea until it can be retrieved from the mouth or nose with fingers or forceps. A black proximal positioning mark on the wire should be visible at the skin access site, ensuring that enough is exposed orally or nasally to facilitate the subsequent passage of the guiding catheter and endotracheal tube from the other end. The catheter sheath at the skin is removed and the wire is clamped at this site to stabilize its entry into the skin at the cricothyroid membrane. The guiding catheter is advanced antegrade over the wire, by way of the mouth or nose, into the trachea until tenting is noted at the cricothyroid access site. The endotracheal tube is then passed over the wire and guiding catheter into position below the level of the vocal cords. The needle holder is unclamped, and the wire and guiding catheter are removed from above the endotracheal tube. As the last portion of the wire is removed, the endotracheal tube is further advanced into final position. The balloon cuff is inflated, and endotracheal tube placement is verified in the standard fashion (**Fig. 2**).

This procedure may be undertaken without the benefit of the Cook Retrograde Intubation Set, using standard supplies found in most emergency departments,

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