

Modified retrograde intubation in a patient with difficult airway

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ABSTRACT

We report a modified technique of retrograde endotracheal intubation in a patient with limited motility at the atlanto-occipital joint, temporomandibular joint, and cervical spine, presenting for closure of a large oronasal fistula. Despite more recent advances in intubation techniques and technology, retrograde intubation still deserves a place in the anesthetist's armamentarium for the management of the difficult airway.

Keywords: Retrograde tracheal intubation, difficult intubation, difficult airway.

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Management of the difficult airway is still one of the most challenging problems for the anesthetist in his daily practice. Numerous techniques and devices are in current use, such as the Bullard laryngoscope, malleable stillette, light wand, blind nasal intubation, flexible fibreoptic bronchoscope, blind intubation through laryngeal mask (LM),¹ and recently fibreoptic guided intubation through LM.^{2,3} During the last decade the technique of retrograde tracheal intubation^{4,5} has lost some of its popularity, especially after the introduction of fibreoptic guided endotracheal intubation, LM, and intubating LM. Nevertheless we believe that it still has a role in certain circumstances. We report a case of successful intubation in a patient with significantly distorted airway anatomy, using a modified technique for retrograde intubation.

Case Report. A 46 year old Asian male, (165 cms, 67 kg) was scheduled for closure of a large oronasal fistula using a tongue flap. Five months earlier the patient had sustained severe multiple trauma after a road traffic accident. The injuries included a Le Forte III fracture (with loss of the right eye), cerebral contusion, cervical spine fracture,

fracture of the mandible, and thoracic trauma (hemo-pneumo thorax). The patient was tracheostomised at that time and subsequently successfully decannulated. He had a history of previous unsuccessful attempts at intubation in another hospital using LM and fibreoptic bronchoscope.

Preoperative examination and radiographic findings revealed the following: Decreased motion at the atlanto-occipital joint; Limited cervical spine mobility; Temporo-mandibular joint dysfunction - as a result of this, the patient's mouth opening was limited to less than 3.5 cm; Large oronasal fistula; Deviation of laryngeal inlet from the midline; Scar of previous conventional tracheostomy.

Decision to proceed with modified retrograde intubation was taken, bearing in mind the above factors, as well as our own experience with retrograde intubation in other patients. The intended procedure was explained to the patient and his consent obtained. Glycopyrrolate 0.4mg i.m. was administered 30 minutes before the procedure. On arrival in the operating theatre 2.5 mg midazolam was given intravenously. Standard intraoperative monitoring was attached. Oxygen was administered, and the head was placed on a pillow without flexion

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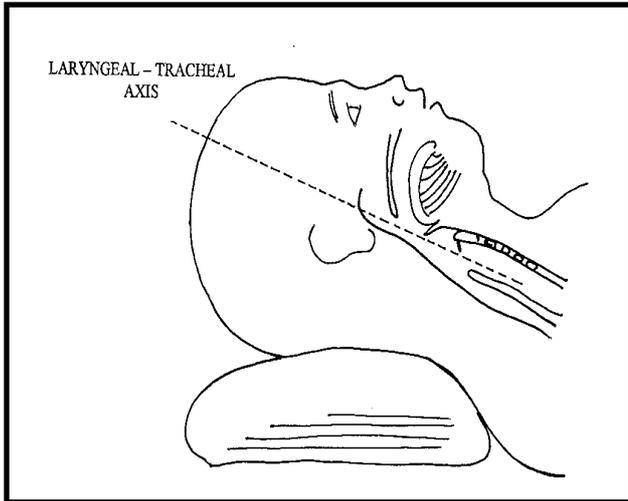


Figure 1 - The laryngeal and tracheal axes aligned in straight line with the head elevated and in neutral position.

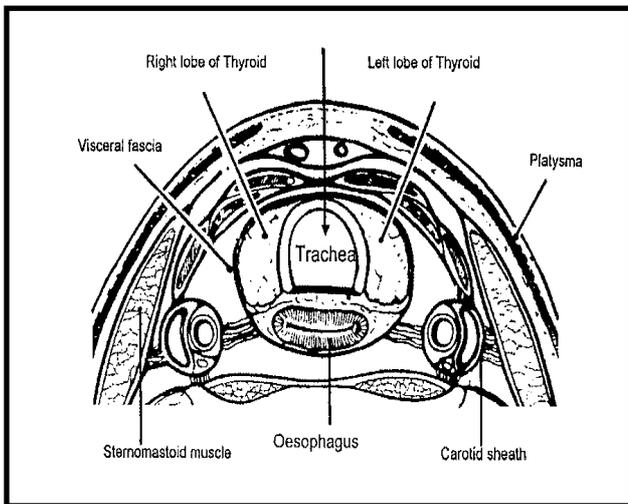


Figure 2 - Cross-section of anterior part of neck between 1st and 2nd tracheal rings. Arrow in the midline shows path of Touhy needle entering the trachea.

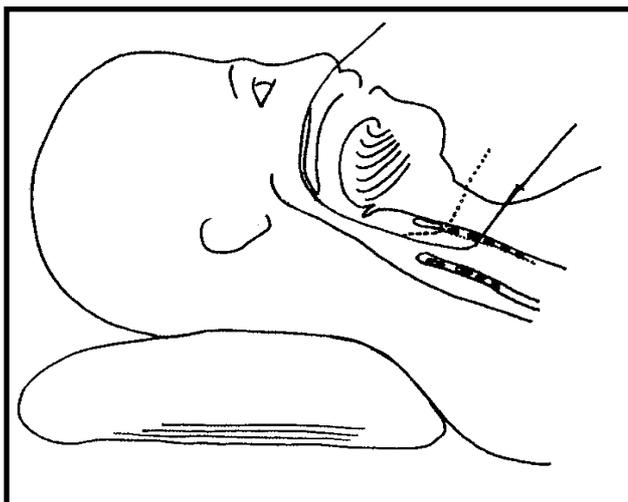


Figure 3 - Guide wire brought out through nose from entry between the 1st and 2nd tracheal rings. Dotted line shows path of guide wire more anteriorly through rima glottis if entered through the cricothyroid space.

or extension (neutral position). Anatomical landmarks such as the hyoid bone, thyroid cartilage, cricoid cartilage and sternal notch were identified. Topical anesthesia (lignocaine spray 10%) was applied to the nasal mucosa and the tongue. The posterior pharynx and hypopharynx were anesthetized with lignocaine spray 4%. Skin over the neck was cleaned with povidone iodine (Betadine). Bilateral superior laryngeal nerve blocks using 3ml of 2% lignocaine on each side was performed, to anesthetize supraglottic structures. Transtracheal injection of lignocaine 2% 3ml was used to anesthetize the glottis and upper trachea. Unlike in the original Waters' technique for retrograde intubation, we inserted an 18 gauge Touhey needle (attached to a saline filled syringe) between the 2nd and 3rd tracheal rings. Entry into the trachea was confirmed by aspiration of air. After cephalad angulation of the needle, an epidural catheter was threaded through it and delivered through the mouth. The Touhey needle was then removed. A fine bore suction catheter (27mm diameter, 40cm length) was inserted through the nose and retrieved at the mouth using a Magill's forceps. The end of the epidural catheter was threaded through the two distal side holes of the suction catheter and then tied together. The tip of the epidural catheter was brought out through the nose by gentle traction on the suction catheter at the nose. Subsequently a lubricated reinforced endotracheal tube was railroaded over the catheter into the trachea without any difficulty, and the catheter removed. Successful intubation was confirmed with capnography, movement of the reservoir bag with respiration, and auscultation of the chest. Anesthesia was started, and the operation proceeded. The duration of the intubation procedure was less than 10 minutes and the patient tolerated it extremely well. The same technique was used subsequently in the same patient for the second stage closure of the oronasal fistula.

Discussion. In recent years there are only few reports about retrograde intubation.⁶⁻⁸ To our knowledge entry point below the first tracheal ring has not been reported with this technique. We modified the original Waters' technique in two ways: 1. The patient was positioned without flexion or extension of the head; 2. The entry site was between the 2nd and 3rd tracheal rings.

In our opinion the above modifications offer some advantages: Neutral position of the head with the occiput raised on a small pillow brings the pharyngeal and laryngeal axes aligned in almost a straight line (Figure 1), which makes nasotracheal intubation easier. The "sniffing" position, with the head extended, is better for oral but not nasotracheal intubation.

Avoiding flexion or extension of the neck makes this technique useful in patients with unstable cervical spine or poor cervical spine mobility.⁹ Entry site between 2nd and 3rd tracheal rings

minimizes the chance of bleeding (Figure 2). The only vessel that may be encountered is the inferior thyroid vein, which is enclosed within the fascial layers of the neck. Even if there is bleeding, externally it will be confined within the fascial space and tamponaded by the adjacent structures. Inside the trachea, bleeding will be restricted by the cuff of the endotracheal tube. With the original entry site there is more potential for bleeding because the left and right crico-thyroid arteries and veins traverse the surface of the crico-thyroid membrane.^{7,10} Internal bleeding at this site is unlikely to be stopped by the cuff of the endotracheal tube, which is usually below, and externally there are no adjacent structures to provide a tamponading effect.

Advancing the endotracheal tube towards the 2nd/3rd-tracheal rings instead of towards the cricothyroid membrane will facilitate entry through the rima glottis towards its posterior, wider part (Figure 3). This will make it less likely to impinge on the vestibular folds, laryngeal sinus, vocal cords, epiglottis, vallecula or anterior laryngeal wall.¹¹

Entry between the 2nd and 3rd tracheal rings is well away from the vocal cords. In the case of any edema caused by trauma or infection, the possibility of it reaching the vocal cords and causing hoarseness or subglottic edema is less likely.^{7,12}

Care should be exercised with this technique to keep the needle in the midline. The technique should be avoided in patients with neck mass such as goitre, carcinoma of the thyroid, which distort the anatomy of the neck anteriorly. Presence of tracheal deviation is a relative contraindication to use this technique since the longitudinal axis of the trachea is altered. Initial fears of injuring the thyroid isthmus have not been substantiated in the light of the large experience with percutaneous tracheostomy, where the entry point is the same.¹³⁻¹⁶

Despite recent advances in the management of the difficult airway with the adoption of new techniques and technology, some older techniques still have a place in current practice. Factors such as lack of facility, experience, deviation of the glottis from the midline, can contribute to unsuccessful fibreoptic intubation.² In some patients insertion of laryngeal mask is difficult or impossible, especially if the angle between the oral and pharyngeal axes at the back of the tongue is less than 90 degrees.^{17,18} We consider

that the above technique of retrograde intubation may have a place in patients with maxillo-facial trauma, cervical spine fractures, or when other techniques for management of the difficult airway fail, and deserves to be a part of the anesthetist's armamentarium.

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