

## Retrograde Laryngeal Block: A New Technique for Awake Intubation Compared With Conventional Regional Airway Block

Research Article

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### Abstract

**Introduction:** Retrograde laryngeal block is a new technique that blocks complete supraglottic and glottic area by introducing catheter retrograde from trachea to these regions.

**Methods and Materials:** This is a clinical trial conducted on two groups each containing 15 patients, who were candidate for awake intubation. The first group (A) underwent conventional method of airway block, by multiple injections of local anesthetic. The second group (B) underwent retrograde laryngeal block as a new method of regional airway anesthesia. In this method the catheter is inserted from cricothyroid membrane through a flexible guide wire, and then local anesthetic drug will be administered by direct vision of tip of the catheter by employing glide scope. The catheter has three separate orifices; each will stay on distinct area of either supraglottic and glottis area which can be adjusted at any level through this area that is considered to be blocked.

**Result:** Both groups had hemodynamic stability during performing block. In group A we had two incidences of laryngospasm due to pain of multiple needle insertion; in group B we had no incidence of laryngospasm (P=0.1). In group A we had 5 patients with partial airway block which needed further intervention during awake intubation but in group B all the cases had complete and perfect airway block (P=0.001). Patients comfort was better in group B with single injection than group A with multiple injections (P=0.005).

**Discussion:** The advantage of this method is single injection and high quality of block performance in comparison with the other technique. It can be conducted for the patients with neck pathologies that make conventional airway block impossible.

**Conclusion:** This method can be applied in patients with neck pathologies that make conventional block impossible.

**Key Words:** Retrograde; Block; Airway; Catheter; Cricothyroid Membrane.

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## Introduction

Airway management of patients with predicted difficult airway remains a challenge for the anesthesiologist. The standard approach for these situations is awake tracheal intubation [1-4]. Awake intubation is a safer method than induction of anesthesia with intravenous anesthetics and neuromuscular blockers but it

requires more time and experience [2-6]. Predicted difficult airway is present in patients with anatomic abnormalities like congenital syndromes or pathologic situations like burn. Other possibilities of difficult airway include pathologies of base of the tongue, limitation of mouth opening, and great grades of Mallampati [7-8]. In the case of predicted difficult airway the safest method is keeping the patient on spontaneous ventilation while attempting to intubate the patient [6-8]. In order to perform awake intubation we need to provide adequate topical airway anesthesia avoiding undesirable sympathetic and parasympathetic outflow which would cause excessive salivation, gag and cough reflexes, these responses make intubation difficult [8-18]. Regional airway block is used to perform direct laryngoscopy and intubation, flexible fiberoptic laryngoscopy, and diagnostic bronchoscopy [16-20]. Translaryngeal tracheal block, bilateral superior laryngeal nerve and glossopharyngeal nerve blocks beside topical anesthesia of the oral mucosa is the conventional method for this purpose which provides satisfactory regional anesthesia of airway with excellent efficacy [18-19]. Retrograde laryngeal block is a new method of regional airway anesthesia, which provides complete airway analgesia. In this method airway block is done by inserting a catheter from cricothyroid membrane over a guide wire, after applying topical anesthesia. The catheter has three lumens with three distinct orifices, each is located either in supraglottic area, glottis or subglottic area. By administration of local anesthetic from the catheter all these regions will be anesthetized completely.

## Materials and Methods

This study was conducted on 50 patients ASA class 1 or 2 who were candidate for awake tracheal intubation for any indication of elective laparotomy in an Iranian general hospital.

Before employing in the study all the patients were informed from the content of the study and ethical consent was accepted by all of them. All the patients were between ages 20-60 years old. Inclusion criteria were predicted difficult intubation. Exclusion criteria included ASA classes other than 1 and 2, and patient's refusal. The patients were divided in to two groups by arrow allocation either of each undergone routine method of airway regional block by multiple injections [A], or the new method by single injection [B].

All the patients were monitored carefully before applying any anesthetic technique and intravenous lines were fixed for them. The monitoring devices included ECG monitoring, pulse oximetry and non invasive blood pressure measurement in 5 minutes intervals. All the patients received supplemental oxygen by simple mask whenever possible before and during performing the regional airway block.

In group A, bilateral superior laryngeal block was done by applying 3 ml lidocaine 1.5% through a 25 gaged needle in each side, then bilateral glossopharyngeal nerve block was done by applying 5ml lidocaine 1.5% through a 25 gaged needle in each side, finally a 20 gaged catheter was passed through the cricothyroid membrane and 3ml lidocaine 4% was administered from this catheter, before inserting the glide scope the tongue was anesthetized by 2-3 puffs spray of lidocaine 10%.

In group B, topical anesthesia of cricothyroid membrane was done by applying 2ml lidocaine 1% through a 25 gaged needle. Then a 16 gaged needle was inserted from this membrane in to the trachea among which a guide wire was passed 40cm in length, the guide wire was introduced trans laryngeal in to mouth were was visualized by employing glide scope. The glidescope was located there after topically anesthetizing the tongue by 2-3 puffs spray of lidocaine 10%. Then the three lumen catheter 30 cm in length was advanced through the wire up to the supraglottic area, when the tip of the catheter was located, the orifice of the second lumen was beside the glottis and the orifice of the third lumen was located in subglottic area. The guide wire was removed and 3-4ml lidocaine 1.5% was administered from each lumen. The entrance of the local anesthetic in to the supraglottic area and glottis was visualized by the glide scope and it was obvious that the subglottic area received the desired drug too.

After completion of airway block all the intubations were done employing glide scope and by a cuffed endotracheal tube with 7.5mm intra diameter.

Any hemodynamic changes during laryngoscopy were recorded exactly for each patient. And any adverse movement of the patient as a result of block failure was recorded too. In any situation of block failure and patients fighting during the procedure the patient was oxygenated by supplemental oxygen and fentanyl 2 µg was administered to them by caution and then intubation was performed. The day after the surgery when all the patients were fully awake and comfort, they were asked about their comfort and any experience of pain during the procedure of intubation.

## Results

In group A mean age was  $32.08 \pm 6.42$  and in group B mean age was  $31.64 \pm 6.10$ . There were 11 male and 14 female in each study group.

Both groups had hemodynamic stability during performing airway block.

Neither of the patients in each group had increased heart rate or blood pressure more than 20% of the base line during intubation in both groups.

In group A we had two incidences of laryngospasm due to pain of multiple needle insertion; in group B we had no incidence of laryngospasm [P=0.1].

In group A we had 5 patients with partial airway block which needed further intervention during awake intubation but in group B all the cases had complete and perfect airway block, which was statistically significant [P=0.001].

Patients comfort was better in group B with single injection than group A with multiple injections, which was statistically significant [P=0.005].

## Discussion

Airway management of patients with predicted difficult airway remains a challenge for the anesthesiologist. The standard approach for these situations is awake tracheal intubation [1-4]. awake intubation is a safer method than induction of anesthesia with intravenous anesthetics and neuromuscular blockers but it requires more time and experience [2-6]. Predicted difficult airway is present in patients with anatomic abnormalities like congenital syndromes or pathologic situations like burn. Other possibilities of difficult airway include pathologies of base of the tongue, limitation of mouth opening, and great grades of Mallampati [7-8]. In the case of predicted difficult airway the safest method is keeping the patient on spontaneous ventilation while attempting to intubate the patient [6-8]. In order to perform awake intubation we need to provide adequate topical airway anesthesia avoiding undesirable sympathetic and parasympathetic outflow which would cause excessive salivation, gag and cough reflexes, these responses make intubation difficult [8-18]. Regional airway block is used to perform direct laryngoscopy and intubation, flexible fiberoptic laryngoscopy, and diagnostic bronchoscopy [16-20]. Translaryngeal tracheal block, bilateral superior laryngeal nerve and glossopharyngeal nerve blocks beside topical anesthesia of the oral mucosa is the conventional method for this purpose which provides satisfactory regional anesthesia of airway with excellent efficacy [18-19].

One disadvantage of this technique is multiple injections which is undesirable in awake patient. Also with multiple injections the incidence of complications like hematoma or intravascular injections will be more than applying one injection [21-22]. On the other hand even when done by an expert anesthesiologist the failure rate would be more in methods of multiple injections than single injection. When the patient has pathologies like neck masses it is difficult to define the anatomical land marks to perform nerve blocks [19-23]. an important side effect of airway topical anesthesia is due to highly probability of absorption of local anesthetic agent from oropharyngeal structures [20-22] in this new

method of regional airway block the totally administered dose of the drug is less than that is used in routine method.

Retrograde laryngeal airway block is a new method of regional airway anesthesia, which provides complete airway analgesia. In this method airway block is done by inserting a catheter from cricothyroid membrane over a guide wire, after applying topical anesthesia. The catheter has three lumens with three distinct orifices, each is located either in supraglottic area, glottis or subglottic area. By administration of local anesthetic from the catheter all these regions will be anesthetized completely. The advantage of this method is single injection and high quality of block performance in comparison with the other technique. And the most important advantage is that it can be conducted for the patients with neck pathologies that make conventional airway block impossible.

The side effect of this new method like the conventional method of airway block is the risk of aspiration in full stomach patients as a result of loss of airway reflexes by applying nerve blocks [22].

This new method may extend the opportunity of continuous airway anesthesia in patients who need to be intubated post operatively in critical care units by remaining the catheter in place for further administration of local anesthetic. Further studies are recommended with method to confirm this advantage of retrograde regional airway block providing continuous airway anesthesia.

## Conclusion

Retrograde laryngeal airway block is a safe and practical method of regional airway anesthesia providing acceptable condition for awake intubation.

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