REFERENCES

1. V. Patil, G L. Barker, R J. Harwood and N M. Woodall. *Training course in local anaesthesia of the airway and fibreoptic intubation using course delegates as subjects.* BJA 2002 89 (4): 586-93.
2. Fu S. Xue, et al. Spray-As-You-Go *Airway Topical Anesthesia in Patients with a Difficult Airway: A Randomized, Double-Blind Comparison of 2% and 4% Lidocaine.* Anesth Analg 2009; 108:536-43.
3. Latorre, F; Otter, W; Kleemann, P.P; Dick, W.; Jage, J. *Cocaine or phenylephrine/lignocaine for nasal fibreoptic intubation?* EJA Nov 1996 (13) 6 p 577-581.
4. Chung D C, Mainland P, Kong A. Anesthesia of the airway by aspiration of lidocaine. Can J Anesth 1999 / 46: 3 / pp 215-219.
5. Graham DR, Hay JG, Clague J, Nisar M, Earis JE. *Comparison of three different methods used to achieve local anesthesia for fiberoptic bronchoscopy.* Chest 1992; 102: 704-7.
6. Webb AR, Fernando SSD, Dalton HR, Arrowsmith JE, Woodhead MA, Cummin AR. *Local anaesthesia for fibreoptic bronchoscopy: transcricoid injection or the "spray as you go" technique?* Thorax 1990; 45: 474-7.
7. QY. Yang, FS. Xue, X Liao. *Topical anaesthesia of the airway using Trachlight™ and MADgic® atomizer in patients with predicted difficult tracheal intubation.* BJA 2007; 99(6):920-921.
8. Williams KA, Barker GL, Harwood RJ, Woodall NM. *Combined nebulization and spray-as-you-go topical local anaesthesia of the airway.* BJA 2005; 95(4):549-553.
9. Ban C. H. Tsui, Cunningham K. *Fiberoptic Endotracheal Intubation After Topicalization with In-Circuit Nebulized Lidocaine in a Child with a Difficult Airway.* Anesth Analg 2004; 98 (1286–8).
10. Netter F: Atlas of Human Anatomy. Ciba-Geigy Corporation, 1989.
11. Brookman CA, Teh HP, Morrison LM: *Anticholinergics improve fibreoptic intubating conditions during general anaesthesia.* Can J Anaesth 1997; 44:165–7.
12. Parkes SB, Butler CS, Muller R: *Plasma lignocaine concentration following nebulization for awake intubation.* Anaesth Intensive Care 1997; 25:369–371.
13. Curran J, Hamilton C, Taylor T: *Topical analgesia before tracheal intubation.* Anaesthesia 1975; 30:765–768.
14. Kundra P, Kutralam S, Ravishankar M: *Local anaesthesia for awake fibreoptic nasotracheal intubation.* Acta Anaesthesiol Scand 2000; 44:511.

12 June 2009

Regional and Topical Anaesthesia for Endotracheal Intubation

VR Nurbadh

Commentator: S Ramsander

Moderator: M Soni

Department of Anaesthetics

CONTENTS

using course delegates as subjects. British Journal of Anaesthesia 89 (4): 586±93 (2002)

Patil et al nostril topicalization with 2.5 ml of 5% lidocaine solution containing 0.5% phenylephrine, then spray as you go technique with 4% lignocaine to a maximum dose of topical lidocaine limited to 9 mg kg. Despite their exclusion of anitsialogogiues and anxiolytics, they found this technique acceptable

- Ban C. H. Tsui, Cunningham K. *Fiberoptic Endotracheal Intubation After Topicalization with In-Circuit Nebulized Lidocaine in a Child with a Difficult Airway.* Anesth Analg 2004; 98 (1286–8)

This case report describes the successful fiberoptic intubation of an uncooperative child with a difficult airway administering 4% end-tidal sevoflurane and simultaneously delivering 4% nebulized lignocaine via a small-volume nebulizer that was connected to the inspiratory limb of the circle system via a T-piece adapter. The implication being, that an in-circuit nebulization system to deliver topical lignocaine may facilitate fiberoptic-assisted intubation in anaesthetized, spontaneously breathing children with compromised airways.

CONCLUSION

It is clear that no consensus exists and that further studies will be required.

The "ideal" anaesthetic method should be the one that is simple, effective, safe and works best in the anaesthesiologist's "educated“ hands within the available resources.

It may even be a combination of these techniques provided that it is performed with a careful preparation, patience, gentleness, and above all, a close communication with the patient.

IDEAL TECHNIQUE?

- Graham DR, Hay JG, Clague J, Nisar M, Earis JE. *Comparison of three different methods used to achieve local anesthesia for fiberoptic bronchoscopy.* Chest 1992; 102: 704-7.

Graham et al compared transtracheal, spray as you go, and nebulization, and concluded that transtracheal was superior.

- Webb AR, Fernando SSD, Dalton HR, Arrowsmith JE, Woodhead MA, Cummin AR. *Local anaesthesia for fibreoptic bronchoscopy: transcricoid injection or the "spray as you go" technique?* Thorax 1990; 45: 474-7.

Patients receiving transcricoid lignocaine coughed less than the patients receiving lignocaine through the bronchoscope despite receiving a lower total dose of lignocaine.
Cricothyroid puncture was not associated with any complications and was not unpleasant for the patients.

- QY Yang, F. S. Xue, X. Liao. Topical anaesthesia of the airway using TrachlightTM and MADgic® atomizer in patients with predicted difficult tracheal intubation British Journal of Anaesthesia 2007 99(6):920-921.

Yang et al demonstrated favourable intubating conditions using a light wand with they incorporated an atomizer.

- Williams KA, Barker GL, Harwood RJ, Woodall NM. *Combined nebulization and spray-as-you-go topical local anaesthesia of the airway.* British Journal of Anaesthesia 2005 95(4):549-553.

In his series of 25 subjects, Williams et al concluded that a combined method of nebulization and direct application of lignocaine to the airway was acceptable to this small group of unsedated subjects. It produced good conditions for fibreoptic intubation.

- V Patil, G. L. Barker, R. J. Harwood and N. M. Woodall. *Training course in local anaesthesia of the airway and fibreoptic intubation*

INTRODUCTION

William MacEwen
1880

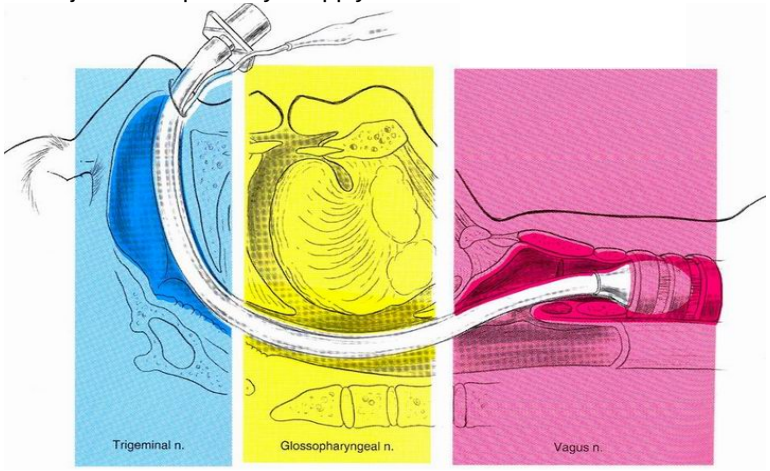
"On its introduction there was evince considerable excitement, accompanied by a spasmodic fit of coughing which lasted for about a couple of minutes. In order to gain the patient's confidence, he was asked to hold with his own hand the portion of the tube which projected from his mouth, and told that he was at liberty to withdraw it if he felt it necessary half an hour afterward he withdrew the tube..."

In recent years, there have been many advances in airway management. One major decision must be made with every procedure: will the patient be intubated while under general anaesthesia, or does the patient need to be awake during intubation? Intubation under general anaesthesia (even with inhalational induction and spontaneous ventilation) carries the inherent risk of losing control of the difficult airway. For this reason, many anaesthesiologists, on recognition of a difficult airway, elect to perform an awake intubation using either fiber optic laryngobronchoscopy or awake direct laryngoscopy.

Direct laryngoscopy in an awake, unprepared patient can be extremely challenging. Excessive salivation and gag and cough reflexes can make intubation difficult, if not impossible, under awake conditions. In addition, the stress and discomfort may lead to undesirable elevations in the patient's sympathetic and parasympathetic outflow. Several highly effective topical and regional anaesthesia techniques have been developed to subdue these reflexes and facilitate intubation. Each of these techniques has the common goal of reducing sensation over the specific regions that will be encountered by the fiber optic bronchoscope and endotracheal tube.

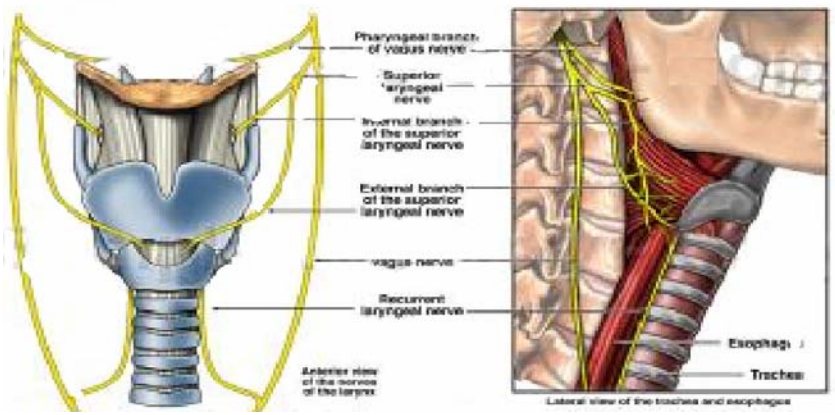
ANATOMY

Three major neural pathways supply sensation to airway structures:



Terminal branches of the ophthalmic and maxillary divisions of the **trigeminal nerve** supply the nasal cavity and turbinates.

The oropharynx and posterior third of the tongue are supplied by the **glossopharyngeal nerve**.



3.5 Structural injuries - surrounding structures, including the posterior tracheal wall and vocal cords can be damaged, especially if the needle is not stabilized during injection of the local anaesthetic, or not removed immediately.

3.6 Intravascular injection. Aspiration should be performed prior to the injection of local anaesthetic.

PALATINE & ANTERIOR ETHMOID NERVES

1. Anatomy and innervation:

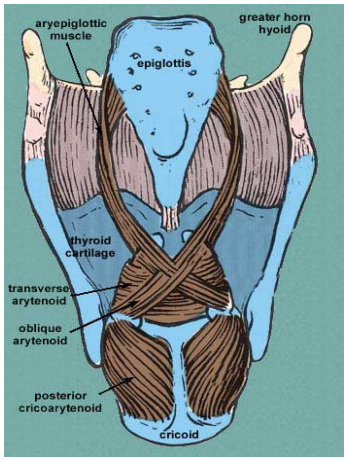
   The greater and lesser palatine nerves innervate the nasal turbinates and the posterior two thirds of the nasal septum.
   The anterior ethmoid nerve innervates the remainder of the nasal passage.

2. Technique:

   The sensory input of these nerves can be blocked by topical application of the local anaesthetic into nasal passages.
   This can be accomplished noninvasively by taking a cotton-tipped applicator soaked in local anaesthetic and passing it along the upper border of the middle turbinate to the posterior wall of the nasopharnx, where it is left for 5–10 minutes.

   If this proves inadequate, however, regional blockade of the palatine nerves can be accomplished by blocking the pterygopalatine ganglion from which both nerves arise.

   This is technically difficult, and not usually necessary as topicalization of this region is all that is needed.



3. Specific technique related complications:

3.1 Direct blockade of the recurrent laryngeal nerve is contraindicated. This is because it may result in the upper airway obstruction, since the recurrent laryngeal nerve provides motor innervation for all the muscles of the larynx except the cricothyroid. In contrast, unilateral blockade typically manifests only as transient hoarseness.

3.2 This technique is possibly contraindicated in patients with high risk of gastric aspiration, but is believed by most authorities to actually decrease the risk, by decreasing risk of coughing and gag reflex during intubation.

3.3 This block usually rapidly results in a fit of coughing, which should be considered in patients whom coughing is undesirable or contraindicated. This block is contraindicated in patients diagnosed with an unstable neck, because it induces coughing. During performance of the block, the patient should not talk, swallow, or cough, if possible.

3.4 Vascular injury – the needle does not need to be far off the midline of the cricothyroid membrane to encounter significant arterial and venous vessels. Pressure should be held over the injection site with an alcohol wipe after injection to prevent haematoma formation and subcutaneous emphysema

Branches of the **vagus nerve** innervate the epiglottis and more distal airway structures:

- ***superior laryngeal nerve***
  The internal branch of the superior laryngeal nerve provides sensory innervation to the base of the tongue, posterior surface of the epiglottis, aryepiglottic fold, and the arytenoids.
  The external branch of the SLN supplies the motor innervation to the cricothyroid muscle.
- ***recurrent laryngeal nerve*** provides sensory innervation of the vocal folds and trachea and motor function of all intrinsic laryngeal muscles except the cricothyroid supplied by the external branch of the superior laryngeal nerve.

AIRWAY REFLEXES

The aforementioned nerves participate in several brainstem-mediated reflex arcs:

1. **Gag reflex** – triggered by mechanical and chemical stimulation of areas innervated by the **glosso-pharyngeal** nerve, the efferent motor arc being provided by the vagus nerve and its branches to the pharynx and larynx.
2. **Glottic closure reflex** – elicited by selective stimulation of the **superior laryngeal nerve**, and efferent arc is the recurrent laryngeal nerve. Exaggeration of this reflex is called **laryngospasm**.
3. **Cough** – the cough receptors located in the larynx and trachea receive afferent and efferent fibers from the **vagus** nerve.

Indications

Indicated primarily to obtund reflexes in patients with
airway compromise,
trauma to the upper airway, or
cervical instability,

where procedures that involve manipulation of the airway are necessary, these include;
awake laryngoscopy,
nasal intubation, and
fiberoptic intubation.

Preparation

1. **Explanation:** The adult patient is prepared by giving an explanation of the need for awake intubation, nasal endoscopy or other airway procedure, and will be more cooperative once they understand the rationale for any uncomfortable procedures that must be performed.

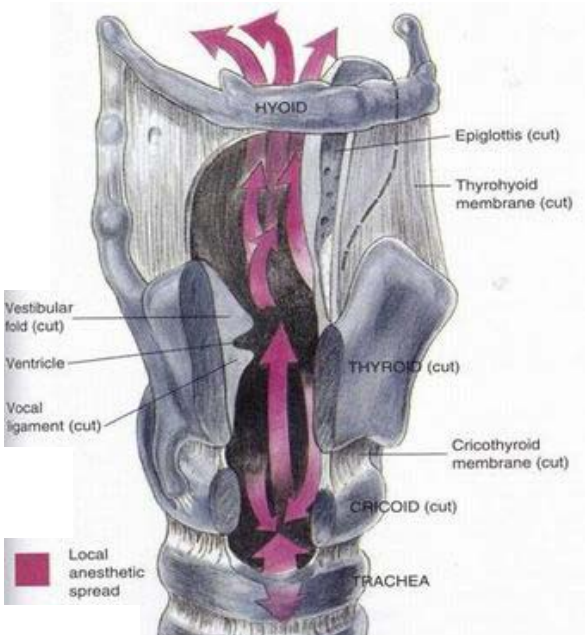
I refer to you to the following table which appears in the BJA in an article by Patil et al Entitled 'Detailed subjective description of endoscopy and intubation', which you may modify during your counselling depending upon your local practice:

There is obviously a degree of apprehension associated with anticipation of an awake intubation. Before consenting for an awake intubation you will need to understand what is involved, the risks of the procedure and exactly how you can expect to feel during and afterwards.
This method of airway anaesthesia has been used repeatedly on patients, by doctors who are competent at performing this technique.

Method
We observe a 6 hour fast before the procedure, but despite this it is advisable to ensure an empty bladder as the whole procedure may take an hour.
The procedure takes place in an operating theatre with full resuscitation facilities available.
You will be settled in the supine position with head elevated on a fairly comfortable operating table.
Monitoring will be applied ± NIBP, ECG and pulse oximetry.
Oxygen will be administered by nasal cannulae.
After a period of stabilization to give you time to settle down, a small cannula will be inserted into the back of your hand or the antecubital fossa, whichever you prefer. This is followed by the i.v. administration of glycopyrrolate 200±400 mg. Over the following 10 min the glycopyrrolate will produce a dry mouth.
Sedation may be used.
Early preparation includes the application of a vasoconstrictor to the nose, this is a little uncomfortable and sometimes makes the eyes water.
Nebulized, sprayed, or topically applied 2% lignocaine is used to begin anaesthetising the upper airway. Topical application of local anaesthetic spray to the airway tastes unpleasant, as lignocaine has a bitter taste and produces coughing or gagging.
If the endoscope is advanced too early, before satisfactory anaesthesia has been achieved, this can cause swallowing coughing, gagging or retching.
When the larynx ceases to react to further increments of local anaesthetic the tracheal tube is passed through the nose. A small tube is used, through the largest nostril or through the mouth. As it passes through the nose you may hear some clicking noise though this is uncommon. In general, the procedure is well tolerated.
The tracheal tube position is confirmed.
Following the procedure you will be aware of a dry mouth which may outlast the procedure and of nasal stuffiness similar to that which occurs in the early stages of a cold.

Then a 22- or 20-gauge needle on a 10-mL syringe with 4mL of 4% Lignocaine 4 % is used. Also, 1% or 2% lignocaine, with or without adrenaline is passed perpendicular to the axis of the trachea and pierces the membrane.
(Alternatively, a 20-gauge angiocath can be passed.)
While the needle is being advanced, the syringe is continuously aspirated.
The needle is advanced until air is freely aspirated, signifying that the needle is now in the larynx.

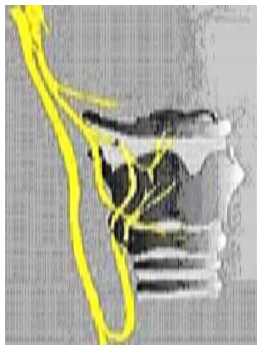
Instillation of local anaesthetic at this point invariably results in coughing.



Through coughing, the local anaesthetic is dispersed, diffusely blocking the sensory nerve endings of the recurrent laryngeal nerve and superior laryngeal nerve

RECURRENT LARYNGEAL NERVE

1. Anatomy and innervation:



The recurrent laryngeal nerve provides sensory innervation of the vocal folds and trachea, and motor function of all intrinsic laryngeal muscles except the cricothyroid, supplied by the external branch of the superior laryngeal nerve.
Blockade would abolish the gag reflex; prevent coughing and haemodynamic responses to laryngoscopy or bronchoscopy.

2. Technique:

Supine, with neck hyperextended.

After sterile skin preparation, the overlying skin is anaesthetized by raising a small skin wheal of local anaesthetic.

When oropharyngeal sensation returns to normal we recommend a warm cold-cure drink containing aspirin or paracetamol to deal with the nasal discomfort. This usually settles after 12±14 h.
Clearly in a procedure of this kind, it is essential that we exercise utmost caution. For this reason we are explicit about the risks.

Risks
Trauma to the airway from the nose to main bronchi, including bleeding or perforation and abscess formation.
Allergic reactions to lignocaine, glycopyrrolate or phenylephrine.
Drug toxicity due to lignocaine resulting in convulsions, myocardial depression or cardiac arrest.
Aspiration of gastric contents.
Infection: localized or systemic, due to hepatitis B, hepatitis C, HIV, TB, CJD and any other contaminating organisms.

With the exception of minor nasopharyngeal trauma, none of these complications has been observed during the preparatory stages. Doses of lignocaine applied to the airway are large (up to 9 mg kg±1). These have been found to be acceptable in patients undergoing bronchoscopy (Efthimiou J, Higenbottam T, Holt D, Cochrane GM. Plasma concentrations of lignocaine during ®breoptic bronchoscopy. Thorax 1982; 37: 68±71).
Awake fibreoptic intubation has been reported to be safe in patients at risk of aspiration (Ovassapian A, Krejcie TC, Yelich SJ, Dykes MHM. Awake fibreoptic intubation in patients at high risk of aspiration. Br J Anaesth 1989; 62: 13±16).

DRUG	DOSE/ROUTE	EFFECT	REVERSAL AGENT
Glycopyrrolate	0.2 – 0.4mg IV	Antisialogogue	none
Atropine	0.5 – 1.0mg IV	Antisialogogue	none
Dexmedetomidine	Loading 1mcg/kg/min 10min Infusion 0.2-0.7mcg/kg/min	Sedative	n/a
Fentanyl	10-100mcg IV	Opioid	Nalaxone
Alfentanil	100-1000mcg IV	Opioid	Nalaxone
Midazolam	0.5-4.0mg IV	Sedative	Flumazenil

2. **Antisialogogues:** Antisialogogues are invaluable adjuncts that will improve the effectiveness of topically applied local anaesthesia.

Antisialogogues and vasoconstrictors for the nasal mucosa (1% phenylephrine spray) should be used before any airway instrumentation, in the absence of contraindications to either.
To be most effective, they should be administered 30-45 minutes prior to application of the local anaesthetic (often in the holding area)
They decrease mucosal secretion production, increase the effectiveness of topically applied local anaesthetics by removing the barrier to mucosal contact, decrease drug dilution and are important to the success of these techniques.

Glycopyrrolate 0.4 mg given intramuscularly or intravenously helps to diminish secretions. Alternatively, atropine 0.5–1 mg may be used intramuscularly or intravenously to similar effect, Intramuscular administration is favored over intravenous administration to avoid undesired side effects such as tachycardia and, less commonly, psychosis (with atropine).

3. **Sedation:** It is important that the patient undergoing awake tracheal intubation be sedated, comfortable, and experience minimal anxiety.

For this purpose, it is best to use short-acting or reversible agents for sedation or agents that do not cause a considerable degree of respiratory depression.

Some examples of commonly used medication for awake intubation include midazolam, alfentanil, and fentanyl.
Similarly, dexmedetomidine does not cause respiratory depression and is suitable in this setting.

It is equally important that the anxiolytic be carefully administered by titration to a desired effect so that a close communication between the anaesthesiologist and the patient can be maintained during the awake tracheal intubation.

Although a balance of comfort and excessive sedation is a challenge, it is critical to ensure ventilation and oxygenation while minimizing the risk of aspirating stomach contents, particularly in patients who present with a full stomach. The risk of aspiration can be minimized by the administration of pharmacological agents, such as ranitidine, and metoclopramide, prior to intubation.

The cornu of the hyoid bone is palpated transversally with the thumb and the index finger on the side of the neck immediately beneath the angle of the mandible and anterior to the carotid artery. To facilitate its identification, the hyoid bone is displaced toward the side being blocked. One hand displaces the carotid artery laterally and posteriorly.

With the other hand, a *22 or 23 gauge - 25 mm needle* is "walked off" the cornu (cartilage) of the hyoid bone in an anterior caudad direction, aiming in the direction of the thyroid ligament, until it can be passed through the ligament.

At a depth of 1-2 cm, 2 ml of 2% lignocaine with epinephrine is injected (after negative air and blood aspiration) into the space between the thyrohyoid membrane and the pharyngeal mucosa. An additional 1 ml is injected as needle is withdrawn. The block is repeated on the other side.

3. **Specific technique related complications:**

3.1 Do not to insert the needle into the thyroid cartilage, since injection of local anaesthetic at the level of vocal cords may cause oedema and airway obstruction.

3.2 Haematoma formation from puncture during needle placement for injection, or vascular structure damage. Maintain pressure long enough to prevent haematoma or continued bleeding.

4. **Limitation:**

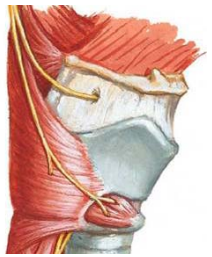
Glossopharyngeal nerve block is not adequate as a solo technique to facilitate intubation, but in combination with other techniques it is highly effective.

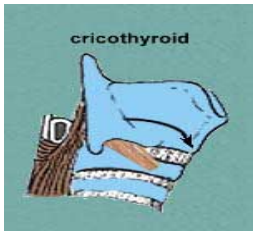
4. **Limitation:**

Glossopharyngeal nerve block is not adequate as a solo technique to facilitate intubation, but in combination with other techniques it is highly effective.

SUPERIOR LARYNGEAL NERVE

1. **Anatomy and innervation**:





The internal branch of the superior laryngeal nerve provides sensory innervation to the base of the tongue, posterior surface of the epiglottis, aryepiglottic fold, and the arytenoids. The external branch of the SLN supplies the motor innervation to the cricothyroid muscle.
The recurrent laryngeal nerve provides sensory innervation of the vocal folds and trachea, and motor function of all intrinsic laryngeal muscles except the cricothyroid supplied by the external branch of the superior laryngeal nerve.

2. **Technique:**

Anaesthetist is positioned on the ipsilateral side of the neck.

TOPICALIZATION

Topicalization of the airway is the spreading of local anaesthetic over a region of mucosa to achieve local uptake and neural blockade of that region. Topicalization is the simplest method for anaesthetizing the airway.

Adequate time allocation is needed to achieve optimal conditions.

1. **Agents**
The choice of the local anaesthetic agent largely depends on its availability, clinical efficacy, and safety.
Currently, lignocaine and cocaine are probably the most commonly used local anaesthetics for topical anaesthesia.

Fu et al concluded that both 2% and 4% lignocaine administered topically by a spray-as-you-go technique can provide clinically acceptable intubating conditions for awake FOI in sedated patients with a difficult airway. As compared with 4% lignocaine, however, 2% lignocaine requires a smaller dosage and results in lower plasma concentrations.

Cocaine compares favourably with lignocaine, because of its topical anaesthetic and vasoconstricting properties, making it useful for nasotracheal intubation. However, cocaine should be used with caution because of its addictive potential and possibility for abuse, as well as its inherent toxicity, particularly with higher concentrations.

Phenylephrine is available to us in our daily practice, to be used with good effect with lignocaine 2%.

2. **Modes of application**

2.1 Spray & aspiration
Local anaesthetic can be sprayed directly onto the desired mucosa, or may be aspirated.
In the aspiration technique, the patient lies supine, traction is applied to the tongue, and the anaesthetic solution is simply dripped on to the tongue without any attempt to direct it at specific anatomical landmarks.
Traction on the tongue is a most important maneuver in this technique as it modifies the act of swallowing and prevents the epiglottis from protecting the airway from aspiration.

2.2 Gel

Local anaesthetic gel can be placed on tongue blade and patient "sucks" on this for several minutes. Topically, peak onset is usually within 15 minutes.

2.3 Soaked swab

Anaesthetic-soaked cotton can be applied to targeted mucosal surfaces for 5–15 minutes to effect selective blockade of underlying nerves.

Vasoconstrictors such as adrenaline (1:200,000) or phenylephrine (0.05%) can be added to the solution to reduce mucosal bleeding.

These are soaked in either viscous or aqueous solutions of local anaesthetic and then left for 5–15 minutes on the region of mucosa that requires anaesthesia. The cotton acts as a reservoir for the anaesthetic agent, producing a dense block.

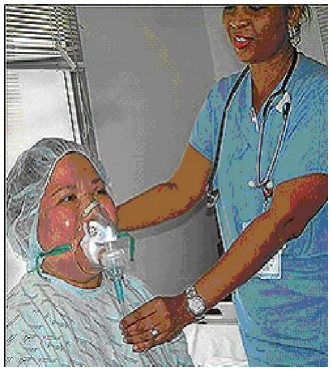
This technique is especially effective in the nasal passages.

2.4 Gargle

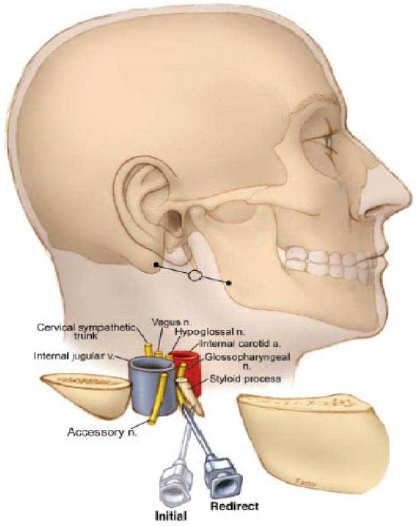
Viscous lignocaine 2-4 ml may also be used as a gargle (swish and swallow) for approximately 30 sec.

2.5 Inhalation

Inhalation of aerosolized local anaesthetic is another simple technique to achieve oropharyngeal anaesthesia.



To perform this technique, local anaesthetic is added to a standard nebulizer with a mouthpiece or face mask attached. The patient is then asked to inhale the local anaesthetic vapor deeply. After a period of approximately 15–30 minutes, the patient should have inhaled a sufficient



Using deep pressure, the styloid process is palpated just posterior to the angle of the jaw along this line, and a short, small-gauge needle is seated against the styloid process.

The needle is then withdrawn slightly and directed posteriorly off of the styloid process.

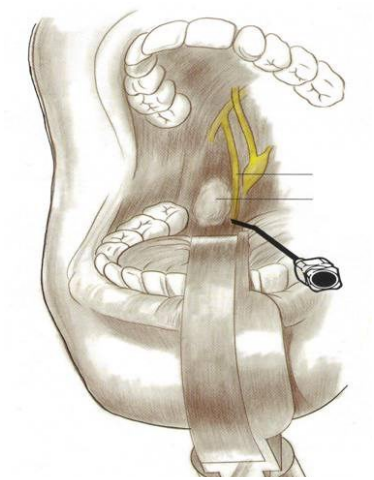
As soon as bony contact is lost, 5–7ml of local anaesthetic solution are injected after careful aspiration for blood.

3. **Specific technique related complications**:

Because of the high vascularity of the palatoglossal arch, accidental vascular injection is an ever-present risk. Careful aspiration helps to reduce this risk, but it cannot be avoided entirely. In addition, significant absorption of local anaesthetic can be expected in this region. The addition of adrenaline to the local anaesthetic solution helps to vasoconstrict the blood vessels in the region, reducing absorption as well as assisting in the diagnosis of intravascular injection by heart rate monitoring.

As with any injection into a highly vascular region, this technique may be contraindicated in patients with coagulopathies or anticoagulation.

This block has been reported as painful, and may result in a persistent hematoma.



The palatopharyngeal fold (posterior tonsillar pillar) is identified, and a tongue depressor, held with the non-dominant hand, is introduced into the mouth to displace the tongue medially (contralateral side) creating a gutter between the tongue and the teeth.

A 25g spinal needle is inserted into the membrane near the floor of the mouth at the base of the cul-de-sac and advanced slightly (0.25-0.5 cm).

An aspiration test is performed. If air is aspirated, the needle has passed through the membrane (through and through). If blood is aspirated, the needle is redirected more medially.

Then, 2 ml of 1% Lignocaine can be injected into the anterior tonsillar pillar 0.5 cm lateral to the base of the tongue. This most readily blocks the lingual branch.
This block has been reported as painful, and may result in a persistent hematoma.

To perform the peristyloid approach to the glossopharyngeal block, the patient is placed supine and a line is drawn between the angle of the mandible and the mastoid process.

quantity of local anaesthetic to achieve a reasonably good level of topical anaesthesia throughout the oropharynx and trachea.

Focused aerosolized local anaesthetic from an atomizer is ideal for nasal intubation. A number of disposable commercially available syringe-powered atomizers are available but are deficient in achieving small particle size unless outfitted with a side-stream air/oxygen flow to enhance dispersion by virtue of the Venturi principle.

For these techniques, lignocaine in concentrations of 0.5%–4% has been suggested; however, quicker and denser blockade is achieved by using concentrations in the range of 2–4%. This technique has a proven clinical track record of safety; however, little data are available regarding the blood levels of local anaesthetic that are achieved using these techniques or regarding metabolism of swallowed local anaesthetics.

Parkes et al.[14] showed plasma concentrations of 0.29–0.45 mg/L in healthy volunteers after inhalation of 10% lignocaine solution. Because these levels were well below the generally accepted 5 mg/L safe level, it can be inferred that inhaling a 2–4% lignocaine for 15–30 minutes should be safe in most patients, particularly as a stand-alone technique.

The major advantage of this technique lies in its simplicity and lack of discomfort. In addition, very little working knowledge of the anatomy of the region is required for its successful implementation.

Although this technique may seem ideal, it does have some drawbacks that limit its usefulness.
The main disadvantage is that the density of the anaesthesia achieved throughout the airway is highly variable.

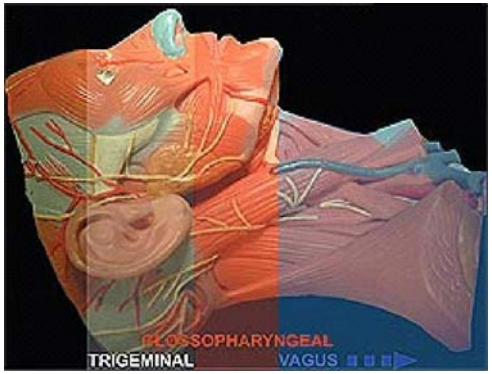
Many patients still experience an intact cough reflex, which can make intubation technically challenging. The rate of onset of this technique is highly dependent on patient compliance.
Many patients who need an awake intubation are incapable or unwilling to take deep breaths.

Also, inhalation of local anaesthetic vapors can lead to central nervous system depression in patients whose mental status may already be depressed owing to other disease processes.

It should be emphasized that Topicalization alone may be inadequate for awake tracheal intubation in some patients as the stretch receptors at the root of the tongue which cause the gag reflex are submucosal and are not easily blocked and have to be supplemented by nerve bocks.

NERVE BLOCKS

The essential nerve blocks include those to:

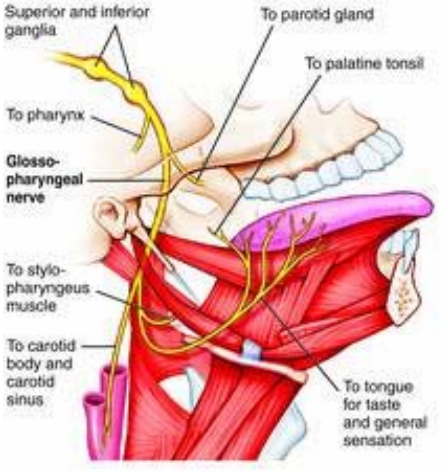


The mouth, oropharynx and base of tongue innervated by branches of glossopharyngeal nerve;

The hypopharynx, larynx and trachea innervated by branches of vagus nerve; and

The nasal mucosa and nasopharynx innervated by branches of trigeminal nerve.

GLOSSOPHARYNGEAL NERVE



1. **Anatomy and innervation:**

   The glossopharyngeal nerve travels anterior along the lateral surface of the pharynx.
   Its three branches provide sensory innervation to:

   the posterior third of the tongue, the vallecula, the anterior surface of the epiglottis via the lingual branch;
   the walls of the pharynx via the pharyngeal branch; and
   the tonsils via the tonsillar branch.

Blockade of the glossopharyngeal nerve facilitates endotracheal intubation by blocking the gag reflex associated with direct laryngoscopy as well as facilitating passage of a nasotracheal tube through the posterior pharynx.

Topicalization not completely effective in obliterating the gag reflex.

2. **Technique:**
   Intraoral approach is performed with the anaesthetist standing contralateral to the side to be blocked, and the patient's topicalized mouth wide open.