Evaluation Of Airway Blocks Versus General Anesthesia For Diagnostic Direct Laryngoscopy And Biopsy For Carcinoma Of The Larynx. A Study Of 100 Patients

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Abstract

BACKGROUND: A prospective randomised study of 100 patients divided into two groups was done to compare the effects of regional airway nerve blocks versus general anaesthesia to evaluate intra-operative hemodynamic changes and compare the level of post op analgesia and sedation in both groups. METHODS: In group I whole airway block including bilateral superior laryngeal nerve block with bilateral glossopharyngeal block and recurrent laryngeal nerve block was given and in group II general anaesthesia was given. RESULTS: The mean duration was 27±5 minutes in all cases, all patients were of ASA grade 3 or 4. Baseline and pre operative values of pulse and blood pressure were noted and were recorded at 0, 5, 7, 9, 10 and 15 minutes. Post operative sedation and VAS scores were recorded at 0, 5, 15 and 30 minutes initially and then hourly. Our study showed significant hemodynamic changes in group II with significant rise in mean arterial pressure and pulse rate during perioperative period. Whereas in group I there was a stability in mean arterial pressure and pulse rate perioperatively. The post op analgesia was significantly higher in group I and lasted longer as compared to group II and patients were less agitated and calm as assessed by the sedation score. In group II patients most of the patients required post op nebulisation as compared to group I where no patient needed nebulisation. CONCLUSION: In conclusion we suggest that regional airway block for anesthesia in the short procedures of upper airways and also in cases of predicting difficult airway cases for securing the safe airway can be very useful alternate to the general anesthesia.

INTRODUCTION

Laryngoscopy and endotracheal intubation is the commonest method of securing a definitive airway for administering anaesthesia in ENT procedures like direct laryngoscopy guided biopsy in suspected carcinoma glottis and subglottis patients. However it is associated with tachycardia and hypertension. Transitory hypertension and tachycardia are of no consequence in healthy individuals, but either or both may be hazardous to the patients with hypertension, myocardial insufficiency or cerebrovascular disease. The choice of anesthesia becomes more of a concern in such patients because most of them are old, frail and with one or more associated systemic illness like hypertension, diabetes, ischemic heart disease etc. Recent developments in regional anesthesia have resulted in a number of innovative and refined options to practitioners, often allowing regional techniques to be used for patients with presumed difficult airways. However, not every surgery can be performed under regional anesthesia. In addition, even in the hands of the most skilled regional anesthesiologist, blocks are subject to a certain rate of complications or failure. In addition, there are many situations in which the anesthesiologist is called on to secure an airway in less than ideal circumstances. Expertise with regional anesthesia of the airway allows intubation in awake patients with suspected difficult intubation, upper airway trauma, or cervical spine fractures. Therefore, it is essential that every regional anesthesiologist be skilled in the administration of general anesthesia and especially in the management of the difficult airway. One major decision must be made with every procedure will the patient be intubated while under general anesthesia, or does the patient need to be awake during intubation? Intubation under general anesthesia (even with inhalational induction and spontaneous respiration) carries the inherent risk of losing control of the difficult airway. For this reason, many anesthesiologists, on recognition of a difficult airway, elect to perform an awake intubation using either fiberoptic laryngobronchoscopy or awake direct...
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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 anesthesia 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 fiberoptic bronchoscope and endotracheal tube.

METHODS

In the present study all pts(n=100) were examined preoperatively and investigated as per the routine preanaesthetic assessment and given ASAgrade III or IV because of old age, severe compromised airway and respiratory system, severe generalised debilitated conditions and predicting difficult airway due to laryngeal pathology with obstructed airway. After obtaining written informed consent premedication given with inj. Glycopyrrolate 4µgm/kg and inj. Midazolam 1-2 mg i/v and ketamine gargles done with 30 mg ketamine with normal saline 5 min prior to procedure. The patients were familiarized with Visual Analogue Scale pain scoring system 0 -10 cm scale where 0 = no pain and 10 = worst possible pain for postoperative pain assessment and written informed consent for block was obtained. sedation was assessed with the sedation score as follows

1 = irritable ,anxious patient
2 = calm and comfortable , not sedated.
3 = calm and sedated but arousable on command.
4 = deep sedated and difficult to arouse.

Patients were asked to continue bronchodilator till the day of operation and nebulized in the morning on day of operation with ipratropium bromide, salbutamol, budacort in normal saline. Standard ASA monitoring applied in the form of NIBP, ECG, SPO2, all pts were subjected to airway block in group I ( n=50) anesthesia for direct laryngoscopy for staging and classification of carcinoma of the larynx. History of coagulopathies, history of epilepsy or convulsions, hypersensitivity to local anaesthetics or any contraindications to local anesthetics were ruled out. Group I patients were given bilateral glossopharyngeal nerve block, bilateral superior laryngeal nerve block and transtracheal or recurrent laryngeal nerve block and group II patients were given conventional general anesthesia after preoxygenation for 5 minutes and induction with sodium thiopental 5 mg/kg and suxamethonium 1.5 mg/kg followed by intubation with a smaller size no 5ID portex cuffed endotracheal tube . Maintenance was done with O₂ ,N₂O and tramadol 50 mg and non depolarising muscle relaxant inj atracurium 0.5 mg/kg bolus followed by supplements with 0.1 mg/kg anticipating short procedure. No inhalational agents were used . at the end of procedure neuromuscular blockade was reversed with inj neostigmine 7 glycopyrrolate on wt basis. extubation was done when full reflexes were there and adequate muscle tone. Mean time to duration of procedure was 27 min ± 5 min.

TECHNIQUE FOR THE AIRWAY BLOCKS

BILATERALGLOSSOPHARYNGEAL NERVE BLOCK:-

ANATOMY AND TECHNIQUE :-

The oropharynx, soft palate, posterior portion of the tongue, and the pharyngeal surface of the epiglottis are innervated by the glossopharyngeal nerve. Block 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. The glossopharyngeal nerve travels anterior along the lateral surface of the pharynx, and its three branches provide sensory innervation to the posterior third of the tongue, the vallecula, the anterior surface of the epiglottis (lingual branch), the walls of the pharynx (pharyngeal branch), and the tonsils (tonsillar branch). Logically, blockade of this nerve bilaterally would result in anesthesia of those structures.

The glossopharyngeal nerve can be anesthetized using either intraoral or extraoral (peristyloid) approaches. In the present study extra oral or peristyloid approach was selected to achieve better pt’s cooperation. To perform the peristyloid approach to the glossopharyngeal block, the patient was placed supine and a line was drawn between the angle of the mandible and the mastoid process. Using deep pressure, the styloid process was palpated just posterior to the angle of the jaw along this line, and a 1.5 inch 23 G , needle was inserted against the styloid process in depth of 2-2.5 cm. The needle was then withdrawn slightly and directed posteriorly off the styloid process. As soon as bony contact was lost, 5 mL of local anesthetic solution 0.25% bupivacaine was injected
after careful negative aspiration for blood. Same procedure was repeated on opposite side.

**SUPERIOR LARYNGEAL NERVE BLOCK**

The internal branch of the superior laryngeal nerve (a branch of the vagus nerve) provides sensory innervation to the base of the tongue, posterior surface of the epiglottis, aryepiglottic fold, and the arytenoids. Regional anesthesia of the superior laryngeal nerve can be accomplished by exploiting the anatomic course of the nerve as it arises from the vagus nerve and descends to the larynx. The internal branch originates from the superior laryngeal nerve lateral to the greater cornu of the hyoid bone. In most patients, the nerve should pass approximately 2–4 mm inferior to the greater cornu of the hyoid bone. From here, it pierces the thyrohyoid membrane and travels under the mucosa in the pyriform recess.

After topicalization, technique for superior laryngeal nerve block involves bilateral injections at the level of the greater cornu of the hyoid bone. The patient was placed supine with the head extended as much as possible. The patient’s skin was cleaned with an appropriate antimicrobial solution (eg, betadine). The cornu of the hyoid bone was located below the angle of the mandible. It was easily identified by palpating outward from the thyroid notch along the upper border of the thyroid cartilage until the greater cornu was encountered just superior to its posterolateral margin. The nondominant hand was used to displace the hyoid bone with contralateral pressure, bringing the ipsilateral cornu and the internal branch of the superior laryngeal nerve toward the anesthesiologist.

A 1.5-inch, 23-gauge needle was inserted in an anteroinferomedial direction until the lateral aspect of the greater cornu is contacted. If the needle was then walked downward toward the midline (1–2 mm) off the inferior border of the greater cornu, the thyrohyoid membrane was pierced and the internal branch alone was blocked. If the needle is retracted slightly after contacting the hyoid, both the internal and external branches of the superior laryngeal nerve were blocked. The syringe was then aspirated, and if aspiration is negative for air and blood, 2 mL of local anesthetic (2% lidocaine) without epinephrine injected. Same procedure repeated on opposite side. If aspiration resulted in air, the needle tip was likely in the larynx and needed to be retracted. If blood was encountered, the needle may have encountered a blood vessel. Given the proximity of the carotid artery, it was advisable to withdraw the needle, reassess the landmarks, and reattempt the procedure. But in none of my pts bleeding occurred during block. Two milliliters of local anesthetic should reliably bathe the internal branch of the superior laryngeal nerve, given its proximity to the hyoid bone. If this volume is injected outside the thyrohyoid membrane, it is likely to block the external branch of the superior laryngeal nerve as well. Isolated external superior laryngeal nerve branch blockade may result in cricothyroid muscle weakness, which eliminates its function as an airway dilator. The motor input of the recurrent laryngeal nerve is spared, however, and therefore does not result in clinically significant change in laryngeal inlet diameters.

**RECURRENT LARYNGEAL NERVE BLOCK**

The recurrent laryngeal nerve provides sensory innervation to the vocal folds and the trachea. Blockade of this nerve is necessary to provide comfort and prevent coughing while the endotracheal tube is being passed between the vocal cords or like in this study for rigid laryngoscopic biopsy for carcinoma larynx.

Technique for blocking the sensory input of the recurrent laryngeal nerve is the transtracheal block. In this technique, the cricothyroid membrane was located in the midline of the neck. It was located by palpating the thyroid prominence and proceeding in a caudad direction. The cricothyroid membrane was identified as the spongy fibromuscular band between the thyroid and cricoid cartilages. After sterile skin preparation, the overlying skin was anesthetized by raising a small skin wheal of local anesthetic. Then a 22 gauge needle on a 10-mL syringe with 4mL of 4% lidocaine was passed perpendicular to the axis of the trachea and pierced the membrane. While the needle was being advanced, the syringe was continuously aspirated. The needle was advanced until air was freely aspirated, signifying that the needle was in the larynx. Instillation of local anesthetic at this point invariably resulted in coughing. Through coughing, the local anesthetic was dispersed, diffusely blocking the sensory nerve endings of the recurrent laryngeal nerve.

**RESULTS**

In the present study we evaluated total 100 cases which were equally divided into two groups (group I n=50 and II n=50) on the age, weight, sex and the ASA grade basis(table 1)suggestive of no any significant statistical difference. In group I onset of sensory blockade was 12±2.4min and
duration was 56±4.5min (table 2)

We observed that the patients mean blood pressure at the time of start of induction was same in both groups but as the procedure continued ,group I showed a fall in mean blood pressure (95.3+_5.60 mmHg) to(90.23+_5.34 mmHg), (table3 chart 1) with the pain relief during the procedure. In group 2 the was initial fall in the blood pressure due to the induction with thiopental sodium from 94.3+_5.4 mmHg to 90.5+_6.12mmHg in the first 7 minutes after which it was increased to 97.8+_6.29 mmHg by the end of procedure, ie 30 minutes.

The intraoperative mean pulse rate changes in group I were from (90.8+_6.28 per min ) to (77.6+_2.98/min)and group II were (94.3+_5.6/min ) to(105.3+_9.34/min) (table 4,chart 2)which was statistically highly significant and showed better analgesia and patient comfort with group I as compared to group II. the post op analgesia using VAS score was also statistically highly significant in group I which started at 5 hours ( VAS SCORE 1.08+_0.13). in group II it was higher from the time patients were shifted to the recovery room (6.3+_0.16) and it remained till the patients were followed up for 12 hours ,but in group 1 it was 3.6+_1.34 (table 5,chart 3)

At the end of 12 hours rescue analgesia was given with inj Dynapar AQ 75 mg iv when VAS score>=3 in both the groups. The sedation scores were 2±0 in groupI throughout which suggest the patient remained calm and comfortable throughout the post op period whereas in groupII it was initially 3.6+_1.34 after shifting to the recovery due to sedative effects of general anesthetic agents and it changed to 1.5+_0.32(table 6,chart4) after 30 minutes when the effect of general anesthetics weared off and the patients were more uncomfortable and agitated due to the pain and associated discomfort.

The results were analysed by using unpaired student ‘t’ test

### Table 1. DEMOGRAPHIC DATA

<table>
<thead>
<tr>
<th>DATA</th>
<th>GROUP I</th>
<th>GROUP II</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGE YRS</td>
<td>63.3+_5.36</td>
<td>65.3+_4.78</td>
<td>0.17</td>
</tr>
<tr>
<td>WEIGHT KG</td>
<td>53.5+_4.37</td>
<td>51.9+_7.81</td>
<td>0.20</td>
</tr>
<tr>
<td>SEX(M:F)</td>
<td>7:3</td>
<td>6:6:3:7</td>
<td></td>
</tr>
<tr>
<td>ASA GRADE3:4</td>
<td>1:1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Not significant variation in groups.

### Table 2:.- ONSET and DURATION AIRWAY BLOCKADE IN GR I

| Onset of airway blockade (min) | 12±2.4 |
| Duration of airway blockade (min) | 56±4.5 |

### Table 3. INTRAOPERATIVE HEMODYNAMIC CHANGES, MEAN ARTERIAL BLOOD PRESSURE CHANGES

<table>
<thead>
<tr>
<th>Time</th>
<th>GroupI</th>
<th>Group II</th>
<th>P value</th>
<th>Inference</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 min</td>
<td>95.3+_5.60</td>
<td>94.3+_5.4</td>
<td>0.36</td>
<td>NS</td>
</tr>
<tr>
<td>5 min</td>
<td>94.8+_6.43</td>
<td>92.4+_4.6</td>
<td>0.03</td>
<td>S</td>
</tr>
<tr>
<td>7 min</td>
<td>94.4+_4.78</td>
<td>90.5+_6.12</td>
<td>0.0006</td>
<td>HS</td>
</tr>
<tr>
<td>9 min</td>
<td>93.5+_8.68</td>
<td>95.6+_5.64</td>
<td>0.15</td>
<td>NS</td>
</tr>
<tr>
<td>10 min</td>
<td>92.8+_7.62</td>
<td>96.9+_7.77</td>
<td>0.009</td>
<td>HS</td>
</tr>
<tr>
<td>15 min</td>
<td>91.67+_4.72</td>
<td>97.2+_8.04</td>
<td>0.0001</td>
<td>HS</td>
</tr>
<tr>
<td>30 min</td>
<td>90.23+_5.34</td>
<td>97.8+_6.29</td>
<td>&lt;0.0001</td>
<td>HS</td>
</tr>
</tbody>
</table>

There was a stable mean arterial pressure in the group I as compared to group II which showed wide fluctuations in the blood pressure.

P<0.05= significant
S = significant
HS = highly significant
NS = not significant
The pulse rate was decreasing constantly after induction group I as compared to group II which showed a constant rise.

The patient’s sedation score was stable at 2 in group I as compared to group II which showed a lower sedation scores.

Significantly less complications of all types were seen in group I as compared to group II.
DISCUSSION

There has always been a debate with regional versus general anesthesia in patients undergoing head and neck surgeries. It becomes a particular concern when the regional anesthesia becomes the best available option in cases like carcinoma larynx with unknown growth extent. General anesthesia with intubation may become highly difficult and challenging in face of fragile growth which may bleed at the time of tube insertion and may completely block the airway which may render even mask ventilation difficult. The difficult airway algorithm which includes call for help in such a scenario may not be applicable in this case as we don’t have much time left after paralysing the patient.

Another way is to do awake intubation which can be highly stressful for these patients and will result in a fighting patient, which will deprove the surgical procedure and may raise the blood pressure to such an extent that it may lead to intracranial haemorrhage in old age patients. So we should expertise with the regional anaesthetic techniques particularly the upper airway block which may serve as boon to the anaesthesiologists.

As with any regional technique, practice will improve the success rate as well as ability of the practitioner to provide the blocks. Despite the simplicity of the techniques, one must always keep in mind that such anaesthesia blunts or eliminates sophisticated and highly effective airway protection reflexes, potentially leaving the patient at risk for aspiration or obstruction. As with other forms of regional anaesthesia, airway blocks will provide the anaesthetist with additional tools with which to better treat his/her patients. These tools will prove to be useful not only in the operating room setting, but also in emergency room and intensive care areas as well, and will add to the confidence and abilities of
the practitioner. Some patients may be unwilling or unable to undergo such injections. Common reasons include patient refusal, anticoagulation, and distorted anatomy due to tumors, arteriovenous malformations, surgical deformities, or reconstruction. In patients in whom injection is contraindicated or overly challenging, a less invasive technique for blocking the superior laryngeal nerve can be accomplished by using soaked pledgets. After topicalization, the patient is asked to stick the tongue out. The tongue is then grasped using a gauze pad. With a right-angled forceps (Jackson-Krause forceps) the anesthetic-soaked pledgets are placed in the pyriform fossae located on either side of the root of the tongue. After 5–10 minutes, a sufficient degree of anesthesia should be present for scopy. U. Bissinger, H. Guggenberger et al11 undertook a study to assess the practicality, success, and complication rate of retrograde-guided fiberoptic intubation (RGFI) in a larger series of patients with laryngeal carcinoma. The investigation was performed prospectively with 93 consecutive patients scheduled for laryngectomy. The RGFI technique was performed with the patient under continuous mask ventilation.

Such airway blocks may be highly useful in the era of fiberoptic intubation12 now for better operating conditions and post op analgesia for the patients. Glossopharyngeal nerve block, with radiological control, was used to relieve severe pain due to oropharyngeal carcinoma by monogmery et al13. Park et al evaluate the glossopharyngeal nerve block for post tonsillectomy pain.14 But its use should be advanced to anaesthesia procedures also. On the basis of above results, we advise airway blocks for ENT procedures like direct laryngoscopic biopsy for a better intraoperative hemodynamic stability and post op analgesia and securing a safe airway in predicting difficult airway patients and less complications related to general anesthesia. But still more randomised control trials should be done.

References
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