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Research Article

COMPARISON BETWEEN BRONCHOSCOPIC INTUBATION DONE UNDER LOCAL ANESTHESIA VS CONSCIOUS SEDATION

Pankaj Omar

Deptt of Anaesthesia RIIMS, Raipur

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ABSTRACT

Aims of Study: This study was planned to evaluate the efficacy, hemodynamic changes, patient comfort and safety during awake fiberoptic intubation done under combined regional blocks vs conscious sedation.
Materials and Methods: Eighty patients were included:36 (45%) were subjected to local anesthesia (LA) and 44 (55%) to conscious sedation. Patients of (ASA) Grade I–II, Mallampati Grade I–IV who were undergoing elective intubation were selected. In LA group nerve blocks given were- bilateral glossopharyngeal nerve block, bilateral superior laryngeal nerve block, and recurrent laryngeal nerve block before awake fiberoptic intubation using 2% lidocaine. Patients responded to a visual analogue scale (VAS) for cough, choking, dyspnea, nausea, vomiting, nasal symptoms, chest pain, and anxiety during bronchoscopy. Postbronchoscopy VAS included cough, fever, dyspnea, nausea, vomiting, nasal symptoms, and hemoptysis. Lastly, VAS for the tolerability of bronchoscopy and acceptance to repeat the procedure were answered. Operator VAS included cough, desaturations, easiness of the procedure, and success. Recovery times and cost were recorded.
Results: Procedure with LA was associated with minimal increases in hemodynamic parameters during the procedure and until 3 min after it. Patient comfort was satisfactory with 90% of patients having favorable grades in LA group. All other variables were almost comparable in both the groups.
Discussion: The most common cause of mortality and serious morbidity due to anesthesia is from airway problems. One third of all anesthetic deaths are due to failure to intubate and ventilate. Awake flexible fiberoptic intubation under local anesthesia is now an accepted technique for managing such situations. In awake patient's anatomy, muscle tone, airway protection, and ventilation are preserved, but it is essential to sufficiently anesthetize the upper airway before the performance of awake fiberoptic bronchoscope-guided intubation to ensure patient comfort and cooperation for which, in our study we used the nerve block technique.
Conclusion: A properly performed technique of awake fiberoptic intubation done under combined regional nerve blocks provides good intubating conditions, patient comfort and safety and results in minimal hemodynamic changes.

INTRODUCTION

The largest class of causes leading to serious morbidity and mortality in anesthesia are from airway complications.[1] It has been estimated that failure to intubate and ventilate constitute one‑third of all anesthetic deaths. The incidence of difficult tracheal intubation due to various reasons during routine anesthesia has been estimated to be 3-18%.[2,3] Newer technologies such as video laryngoscopes[4] and fiberoptic intubation[5] in which intubation can be done under vision have been introduced to tackle such situations. It can be performed either awake or under conscious sedation. The American Society of Anesthesiologists (ASA) and many European authors recommend awake fibreoptic intubation [6] where difficult intubation is anticipated, which can lead to the life‑threatening "can't intubate, can't ventilate scenario." As while awake patient can sustain ventilation and oxygenation without assistance, pharyngeal muscle tone, and phonation are preserved, can swallow its secretions thus keeping the pharynx clear and other alternatives to deal with the difficult airway can still be used. The stress and discomfort associated may lead to undesirable elevations in the patient's sympathetic and parasympathetic outflow thus it is essential to anesthetize the upper airway adequately and suppress the gag, swallow, and cough reflexes[7] prior to awake fibreoptic bronchoscope (FOB) guided intubation to ensure patient comfort. This can be achieved by either (a) Topical administration of local anesthetic (LA) or (b) blockade of neural supply to oropharynx and larynx. Trivedi and Patil in 2009 conducted a study[7,8] on 100 patients of laryngeal carcinoma randomly dividing them into two groups receiving combined regional blocks (Group 1) (bilateral glossopharyngeal block, superior laryngeal block, and recurrent laryngeal nerve block) or general anesthesia (Group 2). The results obtained showed a significant increase in mean arterial pressure and pulse rate in Group 2 as compared to Group 1. Postoperative analgesia was higher; patients were less agitated and calm, lesser requirement of postopewrative nebulization in Group 1 as compared

Corresponding author:* **Pankaj Omar
Deptt of Anaesthesia RIIMS, Raipur

to Group 2. Gupta *et al*.[9] in 2014 conducted study on 50 patients with cervical spine injury allocated in two groups one receiving airway anesthesia through ultrasonic nebulization of 10 ml of 4% lignocaine and other receiving airway nerve blocks (bilateral superior laryngeal, transtracheal, and recurrent laryngeal nerve). Nerve block group showed less time taken for intubation, less number of coughing/gagging episodes, more vocal cord visibility and more ease of intubation and less use of extra LA as compared to the nebulized group. Thus taking into consideration the above studies and the life‐saving advantages of awake intubation, especially in difficult airway conditions this study was undertaken to evaluate the intubating conditions, patient comfort, and hemodynamic changes during awake orotracheal fiberoptic intubation done under common regional nerve blocks.

Inclusion & Exclusion Criteria

Bronchoscopy was scheduled on an elective basis. All participants were at least 18 years old. Patients who were unable or unwilling to fill the written consent and/or to respond to VAS within the first 4 days after the procedure, had a known allergy to lidocaine, midazolam, and/or GA,patients in whom the bronchoscopy was indicated for an emergency situation, or if the bronchoscopy was relatively or absolutely hazardous such as in patients with hypercapnic respiratory failure or with profound hypoxia (O2 saturation below 90% with or without supplemental O2 therapy) and patients with uncontrolled cardiac arrhythmias and/or ischemic heart diseases, pregnant women, and those who were below 18 years were excluded.

MATERIALS AND METHODS

After approval by the hospital ethical committee, a prospective observational study was done on 80 adult patients with ASA Grade I–II and Mallampati Grade I-IV. A written informed consent was obtained from each patient.

A preoperative evaluation including a complete airway evaluation (mouth opening, Mallampati grading, thyromental distance, and evaluation of dentition) was performed. Standard fasting guidelines along with anti‐aspiration prophylaxis with tablet Pantocid 40 mg was given. The patients were explained about the awake FOB guided intubation during preoperative assessment. Skin was cleaned for nerve blocks.

Superior laryngeal nerve block

After topicalization, superior laryngeal nerve block involving bilateral injections at the level of the greater cornu of the hyoid bone were given. The cornu of the hyoid bone was located below the angle of the mandible. A 1.5″, 23‐gauge needle was inserted in an antero infero medial direction until the lateral aspect of the greater cornu was contacted. The needle was 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 was blocked. The syringe was then aspirated, and if aspiration was negative for air and blood, 2 ml of LA (2% lidocaine) without epinephrine was injected. Same procedure was repeated on opposite side

Recurrent laryngeal nerve block

Technique for blocking the sensory input of the recurrent laryngeal nerve was the transtracheal block. Instillation of LA in to larynx invariably lead to coughing. Through coughing, the LA was dispersed diffusely blocking the sensory nerve endings of the recurrent laryngeal nerve[Figure 3].

Bilateral glossopharyngeal nerve block

The glossopharyngeal nerve was anesthetized using extraoral (peristyloid) approach.

In our study, the efficiency and adequacy of the blocks given were assessed by using Intubation scores which included (a) Vocal cord movements (b) Cough score (c) Limb movements. In our study of 90% patients had open vocal cords reflecting complete bilateral blockade of the superior laryngeal block with only 10%patients had open but moving cords reflecting partial block. 80% patients had no coughing episodes, whereas only 5% patients out of all had severe coughing due to retained sensitivity of laryngeal surface. 60% patients did not move their limbs while the procedure was being carried out; 20% patients moved their arms and legs slightly to moderately. Patients in whom the blocks were not effective were intubated under propofol (2 mg/kg) using FOB. Further comfort of the patient was assessed using 5‐point patient comfort score during the procedure, 3‐point comfort score after awake orotracheal intubation and patient satisfaction score was seen postoperatively also.

All patients in both groups were thoroughly examined clinically before the procedure. Patients were instructed to be NPO for at least 6 h before the procedure. Blood pressure, pulse rate, peripheral O2 saturation, and temperature were recorded before and during the procedure. Patients in the first group (LA group) were premedicated with atropine 1 mg i.m. 15 min before bronchoscopy. Bronchoscopy was performed in the endoscopy unit. LA (nerve blocks) was performed using lidocaine 2%with adrenaline. All patients received supplemental O2 4-6 l/min through nasal prongs throughout the procedure. Pulse rate, peripheral blood pressure, and O2 saturation were also monitored throughout the procedure[7]. For patients in the second group (conscious sedation group), the procedure was carried out in the operating theater. Premedication with atropine sulfate 1 mg intramuscular was given 30 min before and midazolam 1–2 mg was given just before the procedure. Continuous monitoring of ECG, noninvasive blood pressure, and O2 saturation were recorded. Induction of anesthesia was achieved by propofol and fentanyl. A period of a few minutes of controlled positive pressure, ventilation by nitrous oxide (N2O)/O2 each 1.5 l/min and sevoflurane 2.0 vol% was allowed through the anesthetic machine. After the procedure was accomplished, reversal of anesthesia was achieved by neostigmine 2.5 mg, with atropine sulfate 1 mg intravenously for those patients who received the muscle relaxant. The patient was transferred to the recovery room for 30–60 min, and then back to the ward according to the post anesthesia recovery score [9]. The time of recovery was recorded for each patient and compared with the LA group.

The duration of the procedure was recorded from the start of bronchoscope introduction till the device was out. Immediately after the procedure, the operator filled out a VAS of five points over a 10-cm scale. The concerned points were as follows: patient coughing as judged by the operator, desaturation events during the procedure, and easiness of the procedure. For the patient, VAS was recorded as soon as the patient regained full

consciousness till a maximum of 4 days after the procedure [6]. The points covered were divided into two groups:

The first are symptoms during the procedure, namely cough, choking, shortness of breath, nausea and/or vomiting, nasal symptoms, chest pain, anxiety just before or during the procedure, and satisfaction about the information given before the procedure.

The second group of VAS were concerned about the postbronchoscopy period and included postbronchoscopy cough, fever, shortness of breath, blood-tinged sputum, nasal symptoms, nausea and/or vomiting, and lastly the overall patient evaluation of the procedure and patient acceptance to repeat the procedure if strongly indicated.

VAS was plotted on a 10-cm horizontal line.
Any complications, regarding anesthetic methods used were recorded in both groups.

Statistical analysis

All data were tabulated and analyzed statistically using software SPSS 17.0 (It was acquired by IBM in 2009 and is one of the brands under IBM Software Group's Business Analytics Portfolio). Patient's characteristics (nonparametric data) were analyzed using the Descriptive analysis. The intra group comparison of the parametric data was done using the "Paired *t*‑test." $P < 0.05$ was taken as significant and $P < 0.001$ as highly significant. Results were analyzed and compared with previous done studies. Power of study was calculated to be above 90%.

RESULTS

A total of 80 patients were included in the study: 36 (45%) in the first group (LA group) and 44 (55%) in the second group (GA group). The demographic data for both groups, including age, sex, and weight, as shown in Table 1 which was comparable.

Table 1 Demographic Data

Parameters	Group A Mean ± SD	Group B Mean ± SD	P Value
AGE (years)	46.96	49.5	0.01
WEIGHT (Kg)	56.67	54.1	1
GENDER(M/F)	20/16	20/34	0.5

Table 2

Parameter	Group A	Group B	P Value
Baseline Pulse	78.4+-12.48	79+-12.5	NS
Two Min After Procedure	65.86+-7.8	73.36+-11.9	<0.001
Two Min After Intubation	72.1+-9.3	94.76+-14.09	NS
Baseline Mean BP	92.43+-7.8	89.86+-6.4	NS
Two Min After Procedure	85.54+-8.4	87.25+-6.3	NS
Two min after Intubation	95.16+-8.2	104.31+-6.4	NS
Average SPO2	96.06 +-1.74	92.43+-2.4	NS

Table two shows Comparison of haemodynamics at: Starting of the study, two minutes after the procedure and two minutes after the intubation. There was a gradual increase in HR, systolic BP (SBP), and diastolic BP (DBP) at each minute during FOB. Maximum changes were seen at the time of intubation from the basal value, which was significant and gradually normalized toward the basal levels. Changes in haemodynamic parameters were comparable and non significant among both the groups except the changes in pulse rate at two mins of the procedure.

Table 3 shows average time taken for intubation in both the groups. Average time takrn for bronchoscopic intubation was 1.33 min to 2.33 minutes in both the groups and the P value was insignificant among the groups.

Table 3 Time taken for intubation

Group A	1.33 ± 1.155
Group B	1.77 ± 1.357

P value is not significant

Table 4 shows patient satisfaction score which was better in LA group as compared to sedation group.

Table 4 Patient satisfaction score

	Excellent	Non excellent
Group A	15	15
Group B	5	25

DISCUSSION

The use of fiberoptic tracheal intubation is well‑established since its very first description by Murphy in 1967 and has been extensively supported in the literature for managing the difficult airway.[10‑13] These include, but are not limited, to the following: Compromised airway, restricted or limited neck movement,[14,15] anatomic deformities, and in general anesthesia where intubation may become highly difficult and challenging in the face of the difficult airway. The difficult airway algorithm which includes a call for help in such a scenario may not be applicable in this case as we do not have much time left after paralyzing the patient.[16] An awake fiberoptic intubation allows the patient to maintain the tonicity of the airway muscles providing a degree of safety that may be lost in the anesthetized, paralyzed patient.[17,18] However, this can be highly stressful for these patients and will result in a fighting patient, which may raise the BP to such an extent that it may lead to intracranial hemorrhage in old age patients and risk for pulmonary aspiration. To lose the patients cooperation can significantly increase the danger of respiratory deterioration and make fiberoptic intubation more challenging. Keys to successful intubation include control of secretions by the use of an antisialagogue, adequate sedation to alleviate anxiety,[19,20] and adequate anesthesia to ensure patient comfort.[21]

Anesthesia for awake fiberoptic intubation can be accomplished by a variety of techniques, which include topical anesthesia with nebulized LA, gargles, lozenges, sprays, airway blocks, and LA through the working channel of FOB. Although the above‑mentioned techniques can be combined in various ways, we chose the combined regional nerve block technique exclusively to see its efficacy, hemodynamic effects, and patient comfort. Through this technique, we blocked the three major reflexes of the patients including gag reflex, cough reflex, and glottis closure reflex by blocking bilateral glossopharyngeal, bilateral superior laryngeal, and recurrent laryngeal nerve, respectively. In our study, we observed an increase in HR, SBP, DBP and mean arterial pressure during the procedure of fiberoptic intubation (maximum seen at the time of tracheal intubation) which later on settled until the 3rd to 4th min after intubation was done, which was similar to that observed by Ovassapian *et al.*[22] while performing nasotracheal intubation in awake patients under LA. In a study conducted by Trivedi and Patil[8] in 2009 in which they evaluated airway blocks versus general anesthesia concluded that hemodynamic changes were less in airway block patients. The mean time taken for endotracheal intubation was 2.12 ± 0.12 min. A study conducted by Gupta *et al.*[9] also showed

average time of 123.0 ± 46.7 s taken for awake intubation under regional nerve blocks. In our study, the efficiency and adequacy of the blocks given were assessed by using Intubation scores which included (a) Vocal cord movements (b) Cough score (c) Limb movements which showed successful application of block in around 80% of patients. The further comfort of the patient was assessed by using 5‐point patient comfort score during the procedure and 3‐point comfort score after a wake orotracheal intubation. Kundra *et al*.[23] in 2000 conducted a study which compared two methods of anesthetizing the airway for awake fiberoptic nasotracheal intubation which included nebulization with 4 ml of 4% lidocaine and the other received airway block (translaryngeal, bilateral superior laryngeal, and lidocaine‐soaked cotton swabs in the nose). It was seen that patients who received lidocaine nebulization for airway anesthesia had to undergo significantly higher stress during the insertion of an endotracheal tube through the glottis. The grimace scores, as well as the mean HR and BP in the nebulization group, were significantly higher during endotracheal tube insertion. Gupta *et al*.[9] conducted a study in 2014 which also showed that patient comfort was better in the nerve blocks group as compared with the nebulization group and also vocal cord visibility and ease of intubation as assessed by the bronchoscopist were better in the nerve block group as compared with the nebulization group. Trivedi and Patil[8] also showed that postoperative analgesia was better, patients were more calm and required less postoperative nebulization who were given airway block as compared to general anesthesia for taking a laryngeal biopsy. In our study also it was seen that 90% patients were quite comfortable during and even after awake fiberoptic intubation. Graham *et al*.[24] also reported that the bronchoscopist preferred transtracheal instillation of LA as compared to LA nebulization or LA instillation through the working port of FOB. Postoperatively also patients were asked about their experience with the procedure, using Patient satisfaction score ‐.45 patients were satisfied with the procedure. Our findings are consistent with the study of Ovassapian *et al*.,[22] in which 82% of patients had good comfort during awake asotracheal fiberoptic intubation. Such airway blocks may be highly useful in the era of fiberoptic intubation for better operating conditions and postoperative analgesia for the patients in elective, emergency as well as in intensive care settings. Our limitation of the study is like any other regional technique; practice will improve the success rate as well as the ability of the practitioner to provide the blocks. Thus, our clinical study concludes that awake fiberoptic orotracheal intubation done under adequate LA given by combined regional nerve blocks is associated with good intubating conditions and patient comfort with minimal effect on the hemodynamics.

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