Comparison between effectiveness of transtracheal block alone versus superior laryngeal nerve block and transtracheal block for awake fiberoptic intubation: A randomized controlled trial.

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ABSTRACT

Objective: To compare the effectiveness of trans-tracheal block alone versus bilateral superior laryngeal and trans-tracheal block in terms of occurrence of cough and gag reflex during awake fiberoptic intubation.
Study Design: Randomized controlled clinical trial
Place and Duration: Department of Anesthesia, Combined Military Hospital Rawalpindi over 10 month's from1st Sep 2017- 30th June 2018.
Methodology: After randomly selecting 60 patients with anticipated difficult airway for awake fiberoptic intubation, patients were divided into two groups (T and S) with 30pts each group. Group T were given only trans-tracheal block with 2%lignocaine 2ml; whereas patients in Group S were given bilateral superior laryngeal 2% lignocaine 1 ml each side along with trans-tracheal block. Our outcomes were: presence of cough, gag reflex and patient comfort.
Results: Out of 60 patients, in Group T, 10% patients had cough versus 7% patients in Group S (p value=0.640) during awake intubation. Similarly 7% patients in group T and 10% in group S had gag reflex (p-value=0.640). 83% patients in group T were comfortable with procedure and only 60% in group S (p-value=0.045).
Conclusion: Trans-tracheal block alone is as effective as combination of bilateral superior laryngeal blocks with trans-tracheal block in terms of occurrence of cough or gag reflex during awake fiberoptic intubation.
Keywords: Difficult airway, Fiber-optic intubation, Cough, Nerve blocks, Trans-tracheal block, Superior laryngeal block.

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INTRODUCTION

Difficult endotracheal intubation has been reported to be from 1-6% during direct laryngoscopy[1,2]. Inability to ventilate and oxygenate during anesthesia is associated with adverse effects including cardiac arrest, death or brain death[3-6.] Awake flexible fiberotpic endotracheal intubation is considered as gold standard for airway management in anticipated difficult airway[7,8].
Successful awake intubation requires adequate upper airway anesthesia because failure can result in serious patient discomfort and anxiety which in turn can lead to hypertension causing intracranial hemorrhage or myocardial infarction[9]. To make it more acceptable for patients, different techniques are used to anesthetize the upper airway[10,11]. These techniques are divided into two groups: topical anesthesia and blockade of neural supply to oropharynx and larynx[12]. Topical anesthesia is achieved via sprays, gargles, lozenges, impregnated swabs and even with nebulization of local anesthetics[13]. Upper airway nerves blockage include bilateral glossopharyngeal, bilateral superior laryngeal, and recurrent laryngeal nerve blocks[14-16].
Several studies have compared and shown the improved efficacy of upper airway blocks over topicalization for awake fiber optic

intubation[12,17]. A few studies have shown that trans-tracheal injection alone with topical anesthesia has been found to be more effective than atomization of local anesthetic[18]. With the combination of topical anesthesia with upper airway block, one can have the benefit of upper airway block with equal analgesia and patient comfort while avoiding risk of increased systemic absorption of local anesthetics with three blocks for airway anesthesia.

We conducted this study with an objective to compare the effectiveness of trans-tracheal block alone versus bilateral superior laryngeal nerve block with trans-tracheal block in awake fiberoptic intubation.

METHODOLOGY

After approval from hospital ethical committee, this prospective randomized controlled trial was conducted at Anesthesiology Department of Combined Military Hospital Rawalpindi from 1st Sep 2017 to 30th june 2018. A total of 60 patients having age more than 18 years, of both genders and having anticipated difficult airway were included in our study. Patients who did not give consent, were allergic to local anesthetic, asthmatic, epileptic, hemodynamically unstable, pregnant, full stomach, had deranged coagulation profile or either planned for emergency surgery were excluded from the study. All patients were randomly divided into two groups (T and S) by lottery method, with 30patients in each group. All patients were assessed pre-operatively in pre-anesthesia clinic by experienced anesthetists and were identified to have difficult airway. Counseling was done to all selected patients about the awake fiberoptic procedure, its advantages and disadvantages and informed consent was taken.

On the day of surgery all patients were prepared for surgery as per institutional protocols. After attaching all the required monitoring devices (pulseoximetry, NIBP, ECG) and achieving intravenous access , all patients were given injection glycopyrolate 0.2mg I/V, injection metoclopramide 0.08mg/kg and midazolam 0.01mg/kg I/V with supplemental oxygen via non rebreathing facemask. For anesthesia of nose and nasopharynx, two drops of xylometazoline 0.1% plus spray of 2ml of 1% lignocaine was given in each nostril. For orapharynx anesthesia,gargles with 2ml of 4% lignocaine was done. After that, in group T all patients were given transtracheal block with 2ml of 2% lignocaine where as in group B superior laryngeal block was performed with 2 ml of 1% lignocaine on each side and transtracheal with 2ml of 2% lignocaine by an anesthetist having experience more than five years in upper airway anesthesia. After waiting for 5mins after application of topical anesthesia and airway blocks, fiberoptic intubation was performed with 5.0-mm flexible fiberoptic bronchoscope (Model no. 11301BN1; Karl Storz GmbH & Co. KG, Germany) along with armored endotracheal tube of an internal diameter of 6.5 or 7.0 mm. To avoid the influence of operator on intubation, awake fiberoptic was done by our senior anesthetist who had performed more than 50 successful awake fiberoptics. Patient's profile along with presence of cough and gag reflex were recorded by independent observer (anesthesia assistant or trainee anesthesia) who was blind to group assignment. Patient's comfort was assessed as having comfortable or uncomfortable experience by asking about the experience 24-48hrs after procedure by resident anesthesia. Patients, who underwent tracheostomy were asked to write about the experience on paper. Time of intubation was recorded as the time taken from start of the bronchoscopy from the nostril to the confirmation of the endotracheal tube in the trachea with end-tidal capnography. Effectiveness of block was considered as absence of cough and gag reflex on passing the fiberoptic broncoscope and endotracheal tube through nasopharynx, oropharynx, larynx and trachea. Rest of the performa was filled by postgraduate trainee anesthesia present at the time of procedure.

Data Analysis: After collection, data was analyzed by using SPSS 21. Mean and standard deviation were calculated for quantitative values (age, time) while frequencies and percentages were calculated for qualitative values (gender, presence of cough and gag reflex, presence of patient's comfort). To compare the two groups, Chi square was calculated for qualitative variables and unpaired T-test for quantitative variable. P value <0.05 was considered statistically significant.

RESULTS

Out of 60 patients, 35(58%) patients were male and 25 (41%) patients were female. No statistically significant difference was found between two groups in terms of gender distribution. Mean age was 50+ 17. 53% patients in Group T and 47% in group S were older than 50years.The most common (35%) indication for awake fiberoptic was presence of malignant or benign mass in upper airway which included carcinomas of oral cavity, larynx, trachea and vocal cord growths. Other indications for awake fiberoptic intubation included mallampti 3 or 4(19%), limited mouth opening i-e <2finger breadths(11%), limited neck extension(21%) secondary to ossification of atlantoccipital joint or due to Philadelphia collar for cervical cord injury and multinodular goiter(13%) with tracheal deviation or retrosternal extension.

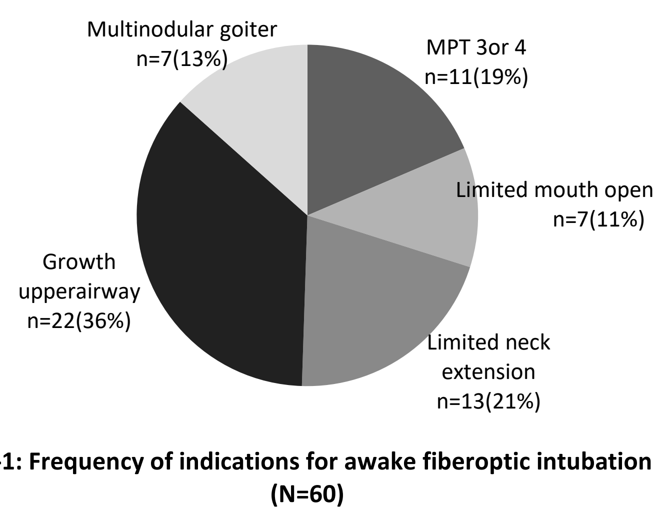

Fig-1: Frequency of indications for awake fiberoptic intubation (N=60)

No statistically significant difference was found between two groups in terms of presence of cough (P=0.640) and gag reflex (P=0.640). Only 3(10%) pts in group T and 2(6%) pts in group S had cough. Presence of gag reflex was also similar i-e 10% in group T and 6% in group S. However unlike gag reflex and cough, patient's comfort was more frequent in Group T than Group S with P=0.045. 83% (n=25) patients in group T were comfortable with procedure and only 60% (n=18) in group S.

Patient comfort was assessed as comfortable or uncomfortable by an independent observer 24-48hrs after procedure. 10(16%) pts needed sedation other than midazolam. No patient was excluded from the study on the basis of failure to intubate. None of the patient showed signs of local anesthetic toxicity.

Table-I: Comparison of different Parameters after awake fiberoptic intubation in both groups (N=60).

Parameters	Group T (n=30)	Group S (n=30)	P value
Cough reflex	3 (10%)	2 (6%)	0.640
Gag reflex	3 (10%)	2 (6%)	0.640
Comfort	25 (83%)	18 (60%)	0.045

DISCUSSION

Success of awake intubation lies in two things i-e good patient pre-procedure counseling and good anesthesia of upper airway. Failure to achieve any of this can lead to catastrophic consequences. Upper airway nerve blocks (superior-laryngeal block, trans-tracheal block, glosso pharyngeal block) are considered as gold standard for upper airway anesthesia as they provide deep and rapid anesthesia but on the other hand they also require thorough knowledge of neck anatomy and special expertise to do it. And in incompetent hands they can result in nerve injuries, tracheal injury or accidental intravascular injections[14,15].

Several studies have compared efficacy of upper airway blocks with other methods for upper airway anesthesia[6,7]. In our study we compared combination of two upper nerve blocks with trans-tracheal block alone and found that with good topical anesthesia of naso and oropharynx, trans-tracheal block alone is as effective as combination of upper nerve blocks. According to our results, the difference between frequency of cough and gag reflex between two groups was not statistically significant (P=0.640). Similar results were shown in study of Bindu K Vasu et al [18] in which lower score (P=0.001) of cough and gag occurred in trans-tracheal group without superior laryngeal block. According to study by A R Webb and colleagues, who compared trans-tracheal with "As you go'' technique, the mean cough rate was lower in the trans-tracheal group (3.56 coughs/min) than the spray group (5.89, p < 0 .05).

In our study, we also found that patient comfort was also more in Group T (P=0.045) as compared to Group S. Only 5 patients in group T found the procedure uncomfortable in comparison to 14 patients in group S. Another study also reported patient comfort as high as 59.2% with trans-tracheal block alone as compared to 11% with local anesthetic nebulization group (P=0.009)[18]. This comfort with trans-tracheal block was also supported by Graham et al study. Most common reason for uncomfortable experience in Group S was found to be multiple needle pricks in neck.

Two most commonly used methods for upper airway anesthesia are nebulization or atomization of 2-4% lignocaine and combination of upper airway nerve blocks[12,18,19]. If used alone, nebulization and atomization of local anesthetics have higher risk of local anesthetic toxicity and failure[18]. Whereas with combination of upperairway nerve blocks the risk of nerve injuries increases. By combining good oral and nasopharynx anesthesia via gargles and nasal sprays of lignocaine with transtracheal injection alone one can provide as good anesthesia as combination of upperairway nerve blocks or nebulization with lignocaine.

However, in contrary to the study[17], in which trans-tracheal block was performed with 4ml of 4% lignocaine, we used 2ml of 2% lignocaine. But several studies have shown efficacy of both 2% lignocaine and 4% lignocaine for trans-tracheal injections[19,20,21].

LIMITATIONS

Like all other studies, our study also had certain limitations. One major limitation was small sample size and study with larger sample size is required for validation of results. Secondly, assessment of patient comfort was objective i-e done by anesthesia assistant in patients who underwent tracheostomy or laryngectomy. This could have been done via a feedback form filled by the patient on a later date. Thirdly, we did not study long term effects of these blocks so we cannot prove long term safety of these blocks.

CONCLUSION

Trans-tracheal block alone is as effective as combination of bilateral superior laryngeal blocks with trans-tracheal block in terms of occurrence of cough or gag reflex during awake fiberoptic intubation.

CONTRIBUTION OF AUTHORS

Ahmad F: Literature review, Designed research methodology, Conceived idea, Data collection, Data analysis, Data interpretation, Manuscript writing.
Ahmed N: Designed methodology, Literature search
Yasrab M: Data analysis, Data interpretation.
Mehboob S: Literature review, Data analysis.
Khurshid T: Literature review, Data analysis, Final approval
Shah H: Literature review

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