

Effect of nebulized Lignocaine in reduction of total dose of topical anesthesia during flexible bronchoscopy

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ABSTRACT

OBJECTIVES:

The primary objective of the study was to observe the effects of nebulized Lignocaine in reducing total dose of topical anesthesia during flexible bronchoscopy; the secondary objective was to observe the difference in two groups in terms of relief of cough and patient discomfort.

METHODS:

Prospective, randomized, double-blind study. This study was conducted at Abbasi Shaheed Hospital Karachi Medical Unit III from July 2009 to January 2010. All adult patients, meeting inclusion criteria were selected by computerized randomization to receive either 4ml of 2% Lignocaine or 4ml of saline as placebo through nebulization over 15 min prior to bronchoscopy by face mask. Bronchoscopist was blinded to use of drug/placebo. Sedation (Midazolam) was given to patients according to the requirement (anxiety, restlessness and non-co-operation). Any amount of Lignocaine used via bronchoscopy was observed. The bronchoscopist graded the perception of cough, while patient's discomfort was documented on pre provided grading scale by patient after 2 hours (zero: no discomfort and 10: highest discomfort).

RESULTS:

Eighty patients were included, 40 in each group; 46 (57.5%) were males. Mean age of males was 49.52 ± 17.82 and of females 39.47 ± 15.69 years. Topical Lignocaine used in Lignocaine group ranged from 2 ml to 14 ml with mean dose of 6.6 ± 3.078 ml, whereas in placebo group it ranged from 0 to 14 ml with mean dose of 7.9 ± 3.815 ml ($p=0.341$). Midazolam was used in 5% patients in Lignocaine group as

compared to 30% patients in placebo group. Total amount of Lignocaine used in Lignocaine group was 264 ml as compared to 580 ml used in placebo group. Total amount of Midazolam used was 10 mg in Lignocaine group as compared to 54 mg in placebo group. The mean cough perception by patient was 3.6 in Lignocaine group and 5.5 in placebo group ($p=0.007$). In Lignocaine group, the mean patient's discomfort was 4.2 as compared to 5.6 in placebo group ($p=0.863$).

CONCLUSION:

Nebulized Lignocaine provided adequate anesthesia and such patients required less topical Lignocaine during bronchoscopy. Moreover, patient tolerance of procedure showed a trend towards improved tolerance although the differences in these were statistically insignificant. Amount of Midazolam used in Lignocaine pre nebulized patients was less.

INTRODUCTION:

Fibreoptic bronchoscopy is widely employed by chest physicians around the world for past 30 years; still practice of flexible bronchoscopy remains unstandardized¹. There are no specific pre-procedure drugs and techniques. Topical anesthesia for flexible bronchoscopy can be achieved by various drugs but Lignocaine is commonly used because of wide margin of safety^{2,3}.

During flexible bronchoscopy, Lignocaine is administered as 2% gel, 4% for gargles, 10% spray in oropharynx and as nebulization for anesthesia of pharynx and vocal cords and finally 2% solution through the bronchoscope. Nebulized Lignocaine has been shown to produce equivalent anesthetic effect compared to endobronchial administration with comparatively lower serum levels^{4, 5, 6}. Moreover some researches also suggests that nebulization with Lignocaine can be used to alleviate bronchoconstriction and cough^{7,8,9}. Nebulized Lignocaine has been shown to produce equivalent anesthetic effect compared to endobronchial administration with comparatively lower serum levels^{5, 6}. Moreover some researches also suggests that nebulization with Lignocaine can be used to alleviate bronchoconstriction and cough^{7,8,9}.

Most of the studies have compared nebulization with other methods of topical anesthesia in relieving clinical symptoms. But very few data is available regarding any effect on duration of procedure, dose of sedatives and the total dose of Lignocaine required.

The purpose of our study was an attempt to bridge up this flaw, by observing the additional anesthetic effect of nebulized Lignocaine in terms of relieve of cough and discomfort and reduction in the total dose of lignocaine and sedative being administered.

METHODS:

Study design:

Prospective, randomized, double-blind study.

Study duration & setting:

This study was conducted at Abbasi Shaheed Hospital Karachi Medical Unit III from July 2009 to January 2010.

Sample selection:

All adult patients, not on intravenous sedation or with no history of allergy to Lignocaine, who were not intubated, undergoing diagnostic bronchoscopy via transnasal route, were selected by randomization.

Procedure:

After approval from Research and Ethical committee of Abbasi Shaheed Hospital, the subjects were selected by randomization. These participants had to sign a consent form. The subjects were fasted for 4 hours before bronchoscopy. The administration of local anesthesia and procedure of bronchoscopy was performed at bronchoscopy suite with complete facilities of resuscitation. Bronchoscopy was performed in supine position via transnasal route. All the bronchoscopies were performed by a trained bronchoscopist. Pulse oximetry and vitals monitoring was done throughout the procedure. All the patients received supplemental oxygen 4 liters/min which could be increased to 6 liters to keep saturation of oxygen above 90%. Patients received 4 ml of 2% Lignocaine or 4 ml saline as placebo delivered through nebulization over 15 minutes immediately before bronchoscopy. Nasal anesthesia was achieved by 2% Lignocaine gel, 50 ml of 4%

lignocaine was given as gargles, 10% Lignocaine was given as spray (4 times) for anesthesia of pharynx before bronchoscopy in all patients. Lignocaine administered through bronchoscope was considered as additional Lignocaine, decision of which was on the patient's discomfort and was given as 2ml 2% solution at the level of vocal cords, carina, left and right main bronchus. The total dose of midazolam used (the dose was titrated in each patient according to the level of anxiety or agitation) was recorded as well as total dose of Lignocaine used was documented. At the end of the procedure the bronchoscopist (same in each patient and trained) graded his perception of cough on a grading scale comprising of 10 units where zero was considered as no cough and 10 as maximum frequency of cough. Two hours after the procedure patients were asked about tolerability of the procedure on 10 units grading scale (zero: no discomfort and 10: highest discomfort).

STATISTICAL ANALYSIS OF DATA:

Analysis was performed using software (Statistical Package for Social Sciences, version 15). The mean and standard deviation were calculated for age, additional amount of lignocaine and midazolam used for lignocaine and placebo group, perception of cough and patient's discomfort. The differences were analyzed for significance by using Independent sample t-test.

RESULTS:

Patient characteristics

Our patient sample included 80 consecutive patients seen at Abbasi Shaheed Hospital Karachi for an elective bronchoscopy. There were 46 (57.5%) males (mean age 49.52 ± 17.82 years) and 34 (42.5%) females (mean age 39.47 ± 15.69 years). These were randomized into either Lignocaine group or placebo group. The patients in both groups were similar in indications for fiberoptic bronchoscopy, including infections (60%), tumor (20%), and hemoptysis (20%). Bronchoalveolar lavage (BAL) was done in 62 patients (32 in Lignocaine group), while BAL and endobronchial biopsy both were done in 18 patients (8 patients in Lignocaine group).

Medication dosages

Topical Lignocaine used in Lignocaine group ranged from 2 to 14 ml with mean dose of 6.6 ± 3.078 ml, and from 0 to 14 ml with mean dose of $7.9 \text{ ml} \pm 3.815$ in placebo group ($p=0.341$). Midazolam was used in 5% patients in Lignocaine and 30% in placebo group ($p 0.000$). Total amount of Lignocaine used in Lignocaine group was 264ml as compared to 580ml used in placebo.

Bronchoscopist evaluation

After the procedure, the bronchoscopist was asked to report perception of cough on pre-printed scale. In Lignocaine group, the mean cough perception was 3.6 ($p 0.007$), whereas the perception of cough by bronchoscopist was 1-5 in 80% of patients. In placebo group, mean cough perception was 5.5 ($p 0.08$), whereas perception of cough by bronchoscopist was 1-5 in 55 %.

Patient's evaluation

Patient's evaluation was also assessed on pre-printed scale. In Lignocaine group, the mean patient's discomfort was 4.2 (p 0.863) whereas patient's discomfort was 1-5 in 70 % (28 patients). In placebo group, the mean patient's discomfort was 5.6 whereas patient's discomfort was 1-5 in 45% (18 patients).

DISCUSSION:

Bronchoscopic procedures have been done for more than half a decade but we don't have standardized protocol¹. Lignocaine is a safe medication with few side effects. Nebulization has been shown to produce equivalent anesthetic effects when compared to endobronchial routes with a low plasma level^{5,6,18} and studies have shown that patients prefer nebulized route^{5,12}.

This study demonstrates no additional benefit of nebulized Lignocaine in reducing the total amount of topical Lignocaine administered for bronchoscopy. Indeed more patients in nebulized Lignocaine group received extra amount of topical Lignocaine. Similar results were observed by Stolz-et al¹¹. Foster and Huriutz¹³ demonstrated that nebulized Lignocaine can reduce the requirement for supplemental topical anesthesia administered through bronchoscope. Similarly Gjonaj et al¹⁹ reported that 50% of patient receiving nebulized Lignocaine did not require additional drug. However all these studies had small sample sizes and was performed without combined sedation. Data on the effectiveness of nebulized Lignocaine during flexible bronchoscopy is limited; some studies have limited sample size¹⁰, others have used opioids which can mask the effects of Lignocaine on cough suppression and relatively contraindicated in diseases like COPD^{11, 12}. Isaac et al

compared nebulized Lignocaine with cricothyroid injection and direct spray-as-you-go technique, found out that nebulized Lignocaine was successful in 96% of patients and was safe and effective; although cricothyroid injection provides better anesthetic conditions but it was unpleasant with increased chances of bleeding in patients with coagulopathies¹². Foster et al demonstrated a reduction in the supplemental Lignocaine doses required for flexible bronchoscopy if nebulized Lignocaine was previously administered¹³. Graham et al compared nebulized Lignocaine with intratracheal injections and spray-as-you-go technique, observed that intratracheal injection was effective over both, although most of the patients found it unpleasant¹⁴. Keane et al compared nebulized and sprayed topical anesthesia for fiberoptic bronchoscopy concluded similar efficacy of both although sample size of this study was small.

In addition the administration of nebulized Lignocaine does not significantly improve patient's discomfort and perception of cough by bronchoscopist as also shown by Stolz et al. Gjonaj et al reported a 50% reduction in perception of cough as well as patient's discomfort. This difference could be due to demographic difference.

This study demonstrated a significant difference in the additional amount of intravenous midazolam usage between the two groups something not reported in medical literature previously.

Gove et al¹⁰ reported a reduction in duration of procedure with combination of nebulized Lignocaine and intravenous diazepam. To our knowledge, this is the first study assessing the value of additional nebulized Lignocaine in patients receiving combined topical and intravenous sedation to reduce the extra usage of benzodiazepine.

Despite the fact that the results are statistically significant, it is difficult to judge the clinical significance of this finding especially because of small number of patients in both groups. Larger studies of similar nature may help.

ACKNOWLEDGEMENTS:

The authors would like to thank Dr.Wasif Durrani, Dr. Shumaila Asmat and Dr.Waqas for their help in data collection and Mr. Rehan Malik for his technical support.

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TABLE 1:

VARIABLES	LIGNOCAINE GROUP	PLACEBO GROUP	P VALUE
Additional amount of lignocaine used(ml)	6.60±3.078	7.90±3.815	0.341
Midazolam dose (mg %)	0.25±1.104	1.35±2.179	0.000
Perception of cough	3.6±1.79	5.5±2.38	0.007
Patient's discomfort	4.20±1.96	5.60±2.085	0.863