COMPARISON STUDY OF COUGH SUPPRESSION DURING FLEXIBLE BRONCHOSCOPY USING LOCAL ANAESTHESIA IN DIFFERENT TECHNIQUES- (10% LIGNOCAINE SPRAY + 2% LIGNOCAINE AS YOU GO) VERSUS (4% LIGNOCAINE NEBULISATION + 2% LIGNOCAINE AS YOU GO)

Koushik Muthu Raja Mathivanan[1], Rajashree Vijayakumar[2], Kasthuri Mahendran[3], Dhanasekar Thangaswamy[4], Rajagopalan Balakrishnan[5]

[1]Assistant Professor, Department of Chest and TB, Sri Ramachandra Medical College and Research Institute, Chennai.
[2]Second Year Postgraduate Student, Department of Chest and TB, Sri Ramachandra Medical College and Research Institute, Chennai.
[3]Bachelor of Science (Allied Health Sciences), Sri Ramachandra Medical College and Research Institute, Chennai.
[4]Associate Professor, Department of Chest and TB, Sri Ramachandra Medical College and Research Institute, Chennai.
[5]Professor, Department of Chest and TB, Sri Ramachandra Medical College and Research Institute, Chennai.

ABSTRACT

BACKGROUND

Anaesthesia for bronchoscopy poses unique challenges for the pulmonologist. By definition, bronchoscopy is an endoscopic technique to visualise the inside of the airways, it is a pivotal diagnostic and therapeutic tool in Pulmonary Medicine. Rigid bronchoscopy is usually done for diagnosis and treatment of intra and/or extra luminal obstruction in the airway for adults and children. With the development of fibreoptic and advanced electronic technology, the flexible bronchoscope has replaced the rigid bronchoscope for most diagnostic and some therapeutic indications. Rigid bronchoscopy requires general anaesthesia, however, flexible bronchoscopy can be performed with conscious sedation supplemented with local anaesthesia.

The aim of the study is to-

1. Assess the effect of local anaesthesia on cough suppression during flexible bronchoscopy, when given by two different methods.
2. Compare the degree of cough and patient comfort while using "10% lignocaine spray + 2% lignocaine as you go technique, versus 4% lignocaine nebulisation + 2% lignocaine as you go technique."

MATERIALS AND METHODS

It is a prospective study done on 50 consecutive patients undergoing diagnostic flexible bronchoscopy from December 2016 to February 2017. The study groups were assembled by block randomisation technique to receive lignocaine (local anaesthesia) as either "as you go" and "spray" or "as you go" and "nebulisation". Institutional Ethics Committee clearance was obtained prior to commencement of the study.

RESULTS

The study involving 50 patients and statistical analysis illustrated that in 2% lignocaine as you go + 10% lignocaine spray "no cough" and "mild cough" is 18 out of sample 25, which is 72%. Hence, "10% lignocaine spray + 2% lignocaine as you go" is better than "4% lignocaine nebulisation + 2% lignocaine as you go" technique. There was no significant arrhythmias in any of the patients. The dose of lidocaine is 400 to 500 mg (8 mg/kg), 1% = 10 mg/mL, hence 2% in a 50 kg man = maximum of 20 mL. Therefore, medication with "10% lignocaine spray + 2% lignocaine as you go" technique is safer and comfortable for all bronchoscopic patients.

CONCLUSION

In our study, the combination of "10% lignocaine spray in posterior pharyngeal wall and 2% lignocaine as you go" markedly reduces cough during flexible bronchoscopy without causing significant desaturation especially when invasive diagnostic procedures are performed.

KEYWORDS

Flexible Bronchoscopy, Local Anaesthesia, Lignocaine Nebulisation, Lignocaine Spray.

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BACKGROUND

Bronchoscopy is a common diagnostic and therapeutic procedure performed by thoracic surgeons or interventional pulmonologists to diagnose and/or treat a variety of pulmonary conditions.[1] Current British Thoracic Society (BTS) guidelines suggest that sedation in incremental doses should be offered to all patients undergoing diagnostic FB[1,2] except where there are contraindications. Flexible

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Corresponding Author:
Dr. Rajashree Vijayakumar,
No. 40/2b, Flat A, 1st Main Road,
Nutech Arav Indira Nagar, Adyar, Chennai-600020.
E-mail: shree25692@gmail.com
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bronchoscopy can be used for most diagnostic and therapeutic procedures. Rigid bronchoscopy maybe necessary for selected procedures (e.g., removal of airway, foreign bodies, treatment of tracheal stenosis, placement of silicon airway stents).[3] Virtual Bronchoscopic Navigation (VBN) is a promising navigational bronchoscopy method has a low overall complication rate of 1.0% and does not directly induce or cause severe complications.[4]

Flexible Bronchoscopy- It is the primary endoscopic procedure in pulmonary diseases due to its flexibility, easy manipulation and helps examination of the airways under local anaesthesia. The working channel is of adequate diameter to help in aspiration of secretions for diagnostic purpose. Patients' ventilation is assured by airflow around the bronchoscope. However, the success of diagnostic as well as therapeutic bronchoscopy requires adequate anaesthesia to suppress cough and relieve patient anxiety.

Patients should be able to cooperate with the procedure and follow commands. Sedation helps in patient comfort and tolerance to the procedure.[5] Most flexible bronchoscopies are performed after patient premedication with sedative agents and the use of bronchoscopically-instilled lidocaine for local anaesthesia of the upper airway, larynx and tracheobronchial tree. Indeed, local anaesthesia has been shown to improve patient's comfort, particularly by reducing pain during the procedure. Combined "as you go" with a 10% lignocaine "spray" and 4% lignocaine "nebulisation" allows a reduction in the dose of supplemental local anaesthesia (as you go). Furthermore, it probably provides a better antitussive effect. Such a combination continues to be used, especially if the physician is concerned about cough.

Lignocaine- Mechanism of Action- Lidocaine stabilises the neuronal membrane by inhibiting the ionic fluxes required for the initiation and conduction of impulses, thereby effecting local anaesthesia action. Lidocaine has wide safety profile and short half-life.[6]

10% of lignocaine spray is applied in posterior pharyngeal wall. In our own experience with some patients, spray technique is more comfortable. Careful attention must be given to the total dose of lidocaine delivered before and during the procedure.[6] Instillation of lignocaine spray as you go causes adequate local anaesthesia of lower airways.[7] Activation of the cough center in the brain stem causes the respiratory muscles to induce cough, the bronchial smooth muscle to cause bronchoconstriction and subsequently the airway submucosal glands to secrete mucus. The control of coughing is of paramount importance for the quality of a bronchoscopy as this facilitates ease of viewing the bronchial tree and obtaining good biopsy samples. Contamination with blood and bronchial secretions due to cough decreases the diagnostic yield of BAL fluid. Moreover, excessive cough can substantially increase the risk of complications or even prevent the performance of invasive procedures during the bronchoscopic examination.

Coughing during TBB raises intrathoracic pressure leading to an increased risk of pneumothorax. Moreover, 25% of patients consider cough, the worst side effect of bronchoscopy and reduction of cough with lignocaine (local anaesthesia) either as spray or nebulisation can substantially influence their willingness to repeat the examination.[8]

Patient Group- It is a prospective study done on 50 consecutive patients undergoing diagnostic flexible bronchoscopy from December 2016 to February 2017. The study groups were assembled by block randomisation technique to receive lignocaine (local anaesthesia) as either "as you go" and "spray" or "as you go" and "nebulisation."

Intubated patients were excluded from the study.

Indications for bronchoscopy, haemoptysis (n=9), infection (pneumonia, consolidation) (n=31), pleural effusion (n=3), malignancy (biopsy) (n=4) and bronchiectasis (n=3). Transnasal FB was performed in the semi-recumbent position.

Inclusion Criteria

After obtaining informed consent, patients undergoing diagnostic flexible bronchoscopy with indications of persistent cough, hoarseness of voice, haemoptysis, pneumonia, consolidation, collapse (chest x-ray and CT findings) and other miscellaneous causes were included in the study.

Exclusion Criteria

Patients not willing for the study.
Patients on mechanical ventilation.

Local Anaesthesia- The dose of lidocaine is 400 to 500 mg (8 mg/kg), 1% = 10 mg/mL, hence 2% in a 50 kg man = maximum of 20 mL. According to BTS guidelines, dose of 160 mg is sufficient to prevent cough.

In group A, topical anaesthesia was achieved with 10% lignocaine 4 puffs sprayed in posterior pharyngeal wall before the procedure and 10 mL of 2% lignocaine is administered as "as you go" during the procedure. In group B, 4% lignocaine administered 15 minutes before the procedure, 1 mL of 4% lignocaine solution is dissolved in 2 mL of normal saline and 10 mL of 2% lignocaine is administered as "as you go" during the procedure. The dose of supplemental local anaesthesia given was recorded for each patient. Intravenous sedation was not used in our patients.

MATERIALS AND METHODS

Anaesthesia and sedation- Bronchoscopy can be done in a special procedure suite in an operating room. Local anaesthesia can be given through the bronchoscope to help

to relieve cough and discomfort. In addition, in some cases, intravenous sedation can be given prior to the procedure.

Study Design- Pulse oximetry[9] was recorded continuously during the procedure and automated noninvasive blood pressure was monitored every 5 minutes. All patients received supplemental oxygen at 4 L/min. via nasal cannula, which was increased to 6 L/min. if required to maintain oxygen saturation above 90%.

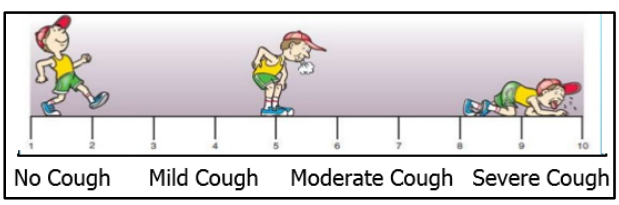
Immediately before FB, patients were given either 10% of lignocaine spray (4 puffs) in posterior pharyngeal wall or 4% of lignocaine in the form of nebulisation (1 mL of lignocaine with 2 mL of NS). Conscious LA was achieved initially with 2 mL of lignocaine as "as you go" followed by a further need of local, which were administered during the procedure at the bronchoscopist's discretion.

Our study included 25 patients in spray group and 25 patients in nebulisation group.

In spray group, 10% lignocaine 4 puffs is sprayed in posterior pharyngeal wall before the procedure and 10 mL of 2% lignocaine is administered as "as you go" during the procedure.

In nebulisation group, 4% lignocaine is administered 15 minutes before the procedure, 1 mL of 4% lignocaine solution is dissolved in 2 mL of normal saline and 10 mL of 2% lignocaine is administered as "as you go" during the procedure.

The cough severity of all the patients was assessed prior and after the procedure. The bronchoscopist, the respiratory therapist and the patients independently charted their perception of cough during the procedure on a 10 cm Visual Analogue Scale (VAS) where 0 represented no cough and 10 represented incessant cough. Two hours after the procedure the patients were asked to record their tolerability of the procedure on a 10 cm VAS. A higher score indicated greater levels of discomfort during the procedure.



Note- No cough (1-2), mild cough (3-5), moderate cough (6-8), severe cough (9-10).

Statistic Analysis- Group A- 2% lignocaine as you go + 10% lignocaine spray.

Group B- 2% lignocaine as you go + 4% lignocaine nebulisation.

According to Chi-square test-

H0- There is no significance difference between "group A and group B."

H1- There is significant difference between "group A and group B."

Sample size in each group is 25 and totally 50, the decision mode is taken at 5% level of significance.

Sex	Patients
Male	36
Female	14
Total	**50**

Table 1. Sex Distribution of Patients

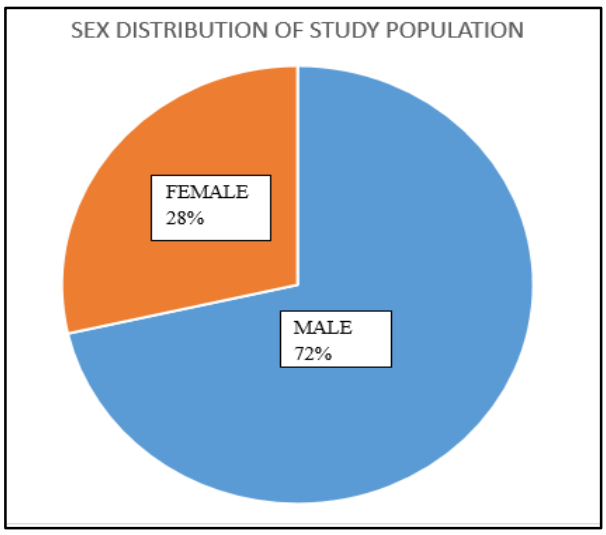
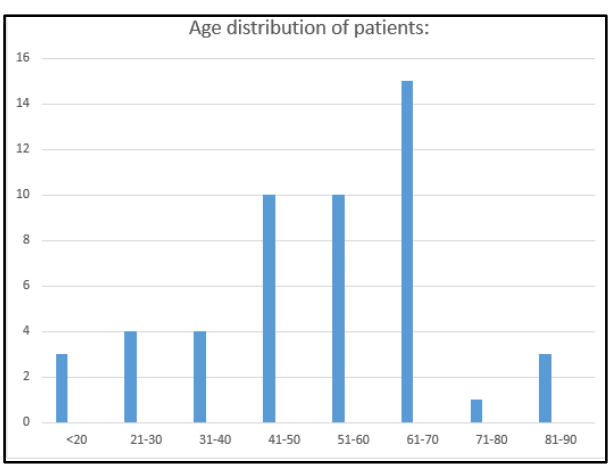


Figure 1. Sex Distribution of Study Population

Age (Years)	Number of Patients
10-20	3
21-30	4
31-40	4
41-50	10
51-60	10
61-70	15
71-80	1
81-90	3
Total	**50**

Table 2. Age Distribution of Patients



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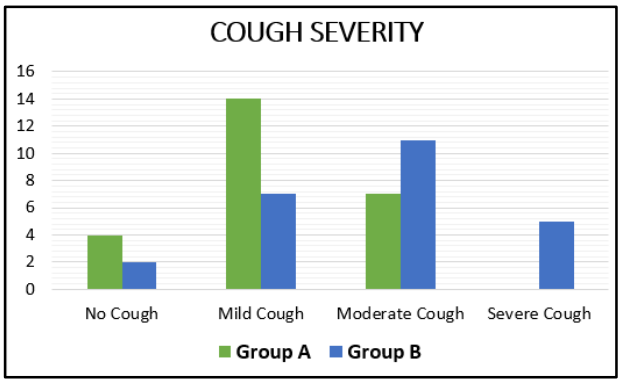

Figure 3. Cough Severity

Severity	Group A	Group B	Total
No cough	4	2	6
Mild cough	14	7	21
Moderate cough	7	11	18
Severe cough	0	5	5
Total	**25**	**25**	**50**

Table 3. Cough severity

Severity	Groups	Observed Frequency	Expected Frequency	(O-E)	$(O-E)^2$	$(O-E)^2/E$
No cough	A	4	3	1	1	0.33
	B	2	3	-1	1	0.33
Mild cough	A	14	10.5	3.5	12.25	1.17
	B	7	10.5	-3.5	12.25	1.17
Moderate cough	A	7	9	-2	4	0.44
	B	11	9	2	4	0.44
Severe cough	A	0	2.5	-2.5	6.25	2.5
	B	5	2.5	2.5	6.25	2.5
Total		**50**			**Chi-Square**	**=8.88**

Table 4. Computation of the Value of Chi-Square

Degree of freedom- (r-1) (c-1), (4-1) (2-1)=3.

Decision- At 5% level of significance, the critical value of Chi-square is 7.815 and the calculated value is 8.88.

In our study, according to Chi-square test- There is significance difference between Group A and Group B.

Ranking Table 5- As per ranking table acceptable result is "no cough" and "mild cough."

Severity Groups	No Cough	Mild Cough	Ranking Percentage
Group A	4	14	72%
Group B	2	7	36%

Table 5. Ranking Table

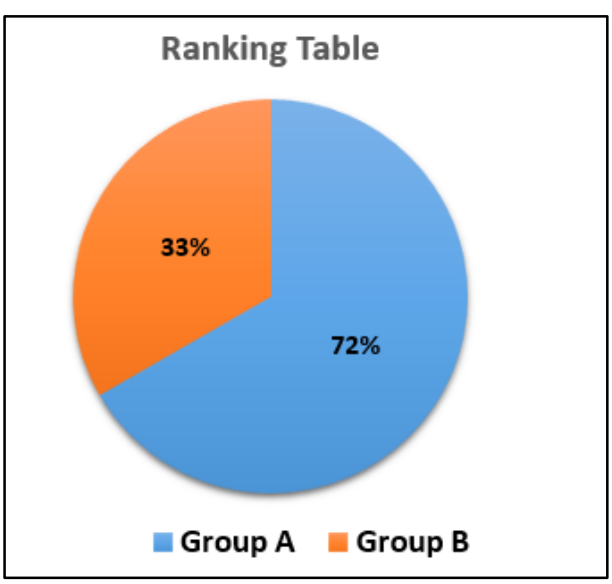

Table 5. Ranking Table

In our study, according to ranking table, "Group A" is better than "Group B."

RESULTS

Perception of cough by ranking table-

- In 2% lignocaine as you go + 10% lignocaine spray "no cough" and "mild cough" is 18 out of sample 25, which is 72%.
- In 2% lignocaine as you go + 4% lignocaine nebulisation "no cough" and "mild cough" is 9 out of sample 25, which is 36%.
- Cough is lower in spray group than in the nebulisation group.

There were no significant difference between two groups with regard to age, sex, indications for FOB, duration of procedure and desaturation.

DISCUSSION

In our study, the result arrived from sample of two groups, i.e. spray group and nebulisation are not same. Decision at 5% level of significance, the critical value of Chi-square is 7.815, calculated value is 8.88. Hence, calculated value is more than the table value, i.e. table 2, it means calculated value is out of acceptable region. Therefore, there is significant difference between 10% lignocaine spray + 2% lignocaine as you go and 4% lignocaine nebulisation + 2% lignocaine as you go.

As per ranking table 3, acceptable result is "no cough" and "mild cough." In 10% lignocaine spray + 2% lignocaine as you go "no cough" and "mild cough" are 18 out of sample 25, which is 72%. In 4% lignocaine nebulisation + 2% lignocaine as you go "no cough" and "mild cough" is 9 out of sample 25, which is 36%.

The above observation illustrated that "10% lignocaine spray + 2% lignocaine as you go" is better than 4% lignocaine nebulisation + 2% lignocaine as you go.

Therefore, medication 10% lignocaine spray + 2% lignocaine as you go is safer and comfortable for all bronchoscopic patients. Hence, it was observed in our study that patients who were given "10% lignocaine spray + 2% lignocaine as you go" technique of local anaesthesia tolerated the procedure better with reduced cough and without any other complications. This also helped in better yield of biopsy and bronchial wash samples. Previous study has been done for comparison of 3 methods - 4 mL of 2.5 percent cocaine by intratracheal injection by bronchoscopic injection and 4 mL of 4% lidocaine delivered by nebuliser 20 mins. before the procedure. Patients and bronchoscopist's scored the procedure using Visual Analogue (VAS) and severity scales. Subjective and objective measurement shows that 4 mL of 2.5% cocaine injected into the trachea produced excellent local anaesthesia for fiberoptic bronchoscopy.[10]

CONCLUSION

In our study, the combination of "10% lignocaine spray in posterior pharyngeal wall and 2% lignocaine as you go" markedly reduces cough during flexible bronchoscopy without causing significant desaturation, especially when invasive diagnostic procedures are performed. Local anaesthesia is of utmost importance while performing bronchoscopy as it ensures adequate visualisation of airways and proper acquirement of samples. It also increases patients comfort during the procedure by significantly reducing cough. Hence, in our study, we have analysed that the combination of 10% lignocaine spray and 2% lignocaine as you go technique is a simple yet effective way of achieving adequate local anaesthesia in therapeutic as well as diagnostic flexible bronchoscopy.

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