Clinical Investigation

Fibreoptic bronchoscopy without sedation: Is transcricoid injection better than the "spray as you go" technique?

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ABSTRACT

Aim: The aim of the study was to compare transcricoid injection with "spray as you go" technique for diagnostic fibreoptic bronchoscopy, to perform the procedure without sedation and to record any complication or side effects. **Methods:** Sixty patients belonging to the age group 20–70 years, undergoing diagnostic bronchoscopy over a period of 6 months, were randomly selected and divided into two groups alternatively to receive 3 ml of 4% lignocaine by a single transcricoid puncture (group I) or 2 ml of 4% lignocaine instilled through the bronchoscope on to the vocal cords and further 1 ml of 2% lignocaine into each main bronchus (group II). Additional dose of lignocaine as required was given in both the groups. All patients were given intramuscular atropine 0.6 mg, 20 min before the procedure. Nebulisation with 3 ml of 4% lignocaine was given to all patients. The time from nasal insertion of the bronchoscope to reach the carina was recorded, and the total dose of lignocaine required in both the groups was calculated and compared. The cough episodes during the procedure, systolic blood pressure, and pulse rate were compared before the procedure and 5 min after the procedure in both the groups. A 0–10 visual analogue scale (VAS) was used to assess discomfort 30 min after the procedure. **Results:** The time to reach carina was more in group II (P<0.02), and cough episodes were also more in group II (P<0.05) than in group I. The vitals before the procedure were comparable in both the groups, but 5 min after the procedure the vitals were more stable in group I than in group II, and the total dose of lignocaine required in group II was more than in group I (P<0.001). However, the VAS score was comparable in both the groups. **Conclusion:** Transcricoid puncture for diagnostic bronchoscopies without sedation was associated with no complication and discomfort and required lesser dose of local anaesthetic with more stable vitals and good conditions for bronchoscopists.

Key words: Fibreoptic bronchoscopy, spray as you go anaesthesia, transcricoid injection

INTRODUCTION

At the end of past millennium, flexible bronchoscopy was regarded as one of the most frequently performed procedures by the physicians of multiple disciplines to inspect the airway.[1] In our institute, the fibreoptic bronchoscopies are performed by either the pulmonologists or the anaesthetist. At many places, fibreoptic bronchoscopies are still performed after topical anaesthesia only, without any sedation. This simplified approach is safe and results in decreased expenditures.[2]

In a retrospective study done by Colt *et al.*, intravenous sedation was reported in 50% of the procedures; however, this technique requires the use of adequate anaesthetic resources and is associated with a low but real morbidity and mortality. The intravenous sedation limits dynamic analysis of the airways such as vocal cords, presence of local or diffuse malacia or effects of voluntary cough. Therefore, a risk–benefit approach comparing the same procedure performed under sedation and under local anaesthesia alone is indicated.[3] There are several techniques for anaesthetising the vocal cords and tracheobronchial

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tree, each with its own potential advantages and disadvantages. The fibreoptic bronchoscopies in our institute are performed under local anaesthesia alone without sedation. Topical lignocaine applied by the "spray as you go" technique with direct instillation of 4% solutions is used by a few bronchoscopists, while the others use transcricoid route for local anaesthesia of the vocal cords and tracheobronchial mucosa. We have compared a transcricoid injection of local anaesthesia with the "spray as you go" technique without sedation in patients posted for elective fibreoptic bronchoscopies requiring only bronchoalveolar aspirate for diagnosis and not biopsies of any kind.

The practice of flexible bronchoscopy is not standardised. Current guidelines are concerned primarily with safety aspects of the procedure. It is a very safe technique which can be performed with or without conscious sedation.[4]

METHODS

After obtaining institutional ethical committee approval, 60 patients in the age group 20–70 years of either sex, undergoing elective fibreoptic bronchoscopies for diagnostic bronchoalveolar aspirate, were included in this study. The patients of the specified age group coming to the bronchoscopy suit, requiring only diagnostic bronchoalveolar lavage over a period of 6 months, were selected and alternatively divided into two groups of 30 each. Group I patients were given a single transcricoid injection of lignocaine, while in group II patients lignocaine was used as spray as the bronchoscopist entered inside, after the lignocaine sensitivity test was done in all the patients.

We studied patients presenting for routine diagnostic fibreoptic bronchoscopy requiring bronchoalveolar lavage. If any contraindication for transcricoid injection was present, like any local pathology, then these patients were included in the other group. After taking an informed written consent and lignocaine sensitivity test was done, the patients were alternatively assigned to different groups. All the patients were given injection atropine 0.6 mg intramuscularly, 20 min prior to the procedure. Venous patency was secured in all the patients. Nebulisation with 3 ml of 4% lignocaine was done in all the patients for 15 min before starting the procedure. The blood pressure, pulse and oxygen saturation (SpO_2) were recorded before the procedure in both the groups. The patency of the nostril was checked, and in the more patent nostril, 2 ml of 2% lignocaine gel was applied in all the patients. Group I patients received transcricoid injection of 3 ml of 4% lignocaine solution given as a bolus through a 21-G hypodermic needle in the sitting position after confirming its position by aspirating air under aseptic conditions. In group II patients, 2 ml of 4% lignocaine was instilled on to the vocal cords under direct vision after insertion of the bronchoscope. A further 1 ml of 2% lignocaine solution was instilled into each main bronchus. Further boluses of lignocaine were instilled through the bronchoscope if local anaesthesia was thought to be inadequate in both the groups. The assistant as well as the bronchoscopist could not be blinded to the local anaesthetic techniques. A single endobronchial procedure was selected and the bronchoscopist was also not changed to allow a fair comparison of the two techniques studied. The bronchoscope used was model BF-TE2(E), 5.8 mm of Olympus. The pulse rate and systolic blood pressure were recorded before the procedure and 5 min after the bronchoscopy. The time from the nasal insertion of bronchoscope to reach the carina was recorded in both the groups. The cough episodes during the procedure were recorded by an assistant. A bout of coughing was considered as a single episode of cough. The total dose of lignocaine used in both the groups was also noted. Record of any complication like bleeding from the transcricoid site was made, as well as any other complication if detected was observed and noted. Thirty min after the procedure, an assistant who was unaware of the patients' group was asked to assess any discomfort to the patients, using a 10-cm Visual analogue scale (VAS). The VAS score of 0 was considered as no discomfort, 1 as mild, 2 as moderate discomfort and 3 or more as severe discomfort. The data were analysed using Chi-square test and the *P* values were calculated. $P<0.05$ was considered significant.

RESULTS

Sixty patients were studied as two groups of 30 each. Group I was transcricoid group and group II patients received "spray as you go" technique.

The age of patients in group I (51.66±14.08 years) was comparable with that in group II patients (48.26±13.32, *P*=NS). The sex ratio in the two groups was also comparable. As shown in Table 1, mean basal values of systolic blood pressure in both the groups were comparable before starting the procedure. In group II, the systolic blood pressure increased significantly

from the baseline when measured 5 min after the procedure ($P<0.02$). Similarly, as shown in Table 2, the pulse rate was comparable in both the groups before starting the procedure (P=NS), but it increased significantly in group II when measured 5 min after the procedure. The total dose of lignocaine used in group II (372.66±24.90 mg) was significantly higher than that used in group I (314±9.32 mg, $P<0.001$) as shown in Figure 1. The number of coughs in group I (4±0.98) was significantly lesser than in group II (4.9±1.24, $P<0.05$), as shown in Figure 2. The mean time to reach the carina was significantly shorter in group I (57.33±12.98 sec) compared to group II (79.33±22.35 sec, $P<0.02$).

As shown in Table 3, the values of VAS score were comparable after 30 min of the procedure in both the groups. There were no cases of haematoma or subcutaneous emphysema when the neck was examined after the procedure in the transcricoid group.

DISCUSSION

Lignocaine is the most commonly used local anaesthetic agent for fibreoptic bronchoscopy and has a wide margin of safety. It has been suggested that the total dose should be limited to 300–400 mg[5] as absorption of lignocaine from the respiratory mucosa is known to be rapid.[6] Lignocaine toxicity is directly correlated with its concentration in the blood. The risk of more serious side effects increases when blood concentrations exceed 5 mg/l, with seizures and hallucinations occurring at concentrations of 8–12 mg/l and cardiorespiratory arrest at 20–25 mg/l.[7] The peak blood concentration of lignocaine is generally reached 20–40 min after application. The peak concentration is influenced by dose per unit weight administered and not by the factors considered likely to influence mucosal absorption from the bronchial tree, such as sputum production, airflow obstruction or cigarette smoking. A major proportion of the total dose of lignocaine is required to anaesthetise the nose, pharynx and larynx, with only a small proportion needed for the bronchial tree.[8] Although most clinical studies have reported non-toxic blood lignocaine concentration associated with bronchoscopy,[9] several have reported concentration in the toxic range (>5 mg/l).[8,10]

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.[11] Activation of the cough centre 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.[12] Various local anaesthetic techniques can be used to anaesthetise the respiratory mucosa for fibreoptic bronchoscopy. The better local anaesthetic technique would require a lower dose of local anaesthetic. It would be safe and not unpleasant for the patient and would at the same time provide acceptable conditions for the bronchoscopist.[13] In our institute, we get a large number of patients of suspected tuberculosis and

Table 1: Systolic blood pressure before and 5 min after the procedure

Systolic BP (mmHg)	Group I	Group II	*P* value
Before the procedure	119.46±5.89	120.26±7.82	NS
5 min after the procedure	121±7.44	125.73±10.63	<0.02

Table 2: Pulse rate before and 5 min after the procedure

Pulse rate	Group I	Group II	*P* value
Before the procedure	87.23±10.22	87.06±10.20	NS
5 min after the procedure	90.46±9.30	97.36±9.03	<0.001

Table 3: VAS score 30 min after the procedure

Visual analogue scale	Group I	Group II	*P* value
30 min after the procedure	0.70±0.70	0.73±0.53	NS

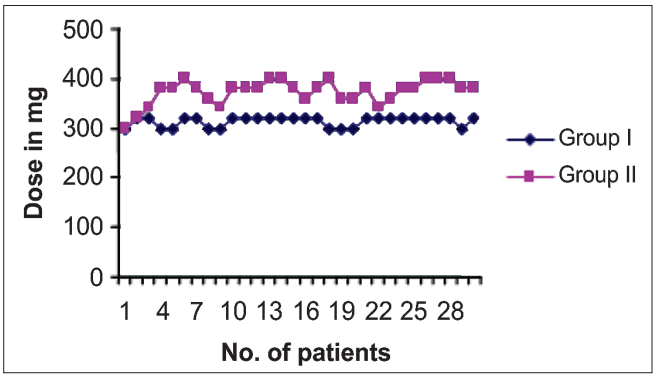

Figure 1: Dose of lignocaine used plotted against the no. of patients

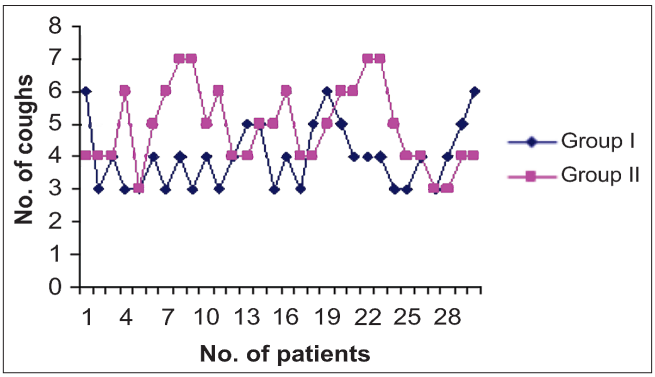

Figure 2: Cough episodes plotted against the no. of patients

malignancy. These patients are malnourished and have deranged liver function tests as well as the pulmonary function tests, hence doing fibreoptic bronchoscopy under local anaesthesia only without sedation is a routine. The present study was designed to compare the techniques of applying topical anaesthesia to the respiratory mucosa for elective diagnostic fibreoptic bronchoscopy. The bronchoscopist was not changed, to allow a fair comparison of the two techniques studied.

Although the current British Thoracic Society guidelines provide a consensus statement on the current evidence base without specific guidance on drugs or techniques and without defining methods of sedation, the guidelines recommend offering sedation to all, except where there are contraindications. However, the issues of sedation are controversial. If a centre has experience of performing unsedated diagnostic flexible bronchoscopy, it is reported that patient co-operation is not improved with sedation.[14] Maltias *et al.* performed a double-blinded, placebo-controlled trial in 100 patients in a centre that normally performs unsedated bronchoscopy, and could not demonstrate improved patient tolerance, comfort and co-operation with lorazepam.[15] Poi *et al.* tried to identify the common fears of patients undergoing fibreoptic bronchoscopy and also determine whether any factors might contribute to reducing these fears. It was found that doctors were more likely to explain the indication for bronchoscopy than how it would be performed. They concluded that provision of detailed information about sensations that are likely to be experienced in bronchoscopy could be used to allay some of the common fears.[16] Improved preparation of patients with lower education, inferior health status and asthma may lead to decreased pain during fibreoptic bronchoscopy.[17] Although sedation is associated with major complications, sedative drugs are often given immediately before fibreoptic bronchoscopy in the belief that patient's comfort is improved. Uncontrolled studies have shown that fibreoptic bronchoscopy is well tolerated without sedation. Opiates and benzodiazepines are frequently used for sedation during fibreoptic bronchoscopy. Hatton *et al.* compared two such regimens with placebo and concluded that routine sedation has little part to play in patients undergoing a single diagnostic procedure. Sedation is more suited for intubation than for diagnostic procedures.[18]

The present study compared two techniques of anaesthetising the respiratory mucosa for diagnostic bronchoscopy without sedation. The transcricoid method was more effective than the "spray as you go technique". A similar result was obtained by Webb *et al.*,[19] in their study where alfentanil was used for sedation. No complication was associated with transcricoid injection and minor bleeding associated with the technique did not interfere with the bronchoscopy. They recommended transcricoid technique as a safe method of inducing effective local anaesthesia that is well tolerated by the patient. In our study, we nebulised all the patients with 3 ml of 4% lignocaine for 15 min before the procedure. The systolic blood pressure and pulse rate were compared between the two groups before the procedure and 5 min after the procedure. The systolic blood pressure and the pulse rate were comparable in both the groups before the procedure, but the systolic blood pressure increased significantly in group II after the procedure ($P<0.02$). Similarly, the pulse rate also increased significantly after the procedure in group II ($P<0.001$). The VAS score was similar in both the groups, 30 min after the procedure (P=NS). The incidence of side effects was negligible in both the groups. The dose of lignocaine used in group II (372.66±24.90 mg) was significantly higher than that used in group I (314±9.32 mg, $P<0.001$). The number of coughs in group I (4±0.98) was also significantly lower than in group II (4.9±1.24, $P<0.05$). The time to reach the carina was also significantly lesser in group I (57.33±12.98 sec) compared to group II (79.33±22.35 sec, $P<0.02$) as the transcricoid injection given probably brought about excellent relaxation of the vocal cords, making the introduction of the bronchoscope smooth.

CONCLUSION

Diagnostic fibreoptic bronchoscopy without sedation with transcricoid injection of lignocaine can be recommended as a safe method of anaesthetising the respiratory mucosa, which is well tolerated by the patients with negligible side effects and provides acceptable conditions for the bronchoscopist as compared to the "spray as you go" technique.

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