

## COMPARISON OF EFFICACY OF LIGNOCAINE ANESTHESIA OF VOCAL CORDS BY "SPRAY AS YOU GO" THROUGH A BRONCHOSCOPE WITH LIGNOCAINE INJECTION THROUGH THE CRICOTHYROID MEMBRANE

Khalid Azam Khan\*, Khalid Mehmood Tariq, Kashif Razzaq

\*Combined Military Hospital Quetta, Combined Military Hospital Rawalpindi

### ABSTRACT

**Objective:** To assess and compare the efficacy of lignocaine anesthesia of vocal cords by "spray as you go" through a bronchoscope with lignocaine injection through the cricothyroid membrane.

**Study Design:** Quasi experimental study.

**Place and Duration of Study:** This study was done in Combined Military Hospital Peshawar from May 2009 to June 2010.

**Material and Methods:** Thirty patients in each group were given local anesthesia to the vocal cords. With lignocaine either via intratracheal instillation through the cricothyroid membrane or through a fiberoptic bronchoscope "spray as you go". A cough score was calculated by recording the number of coughs as the bronchoscope was advanced through the cords into the trachea. A twenty point unpleasantness score was marked by the patient 2 hours after the procedure.

**Result:** Cough score and unpleasantness score was compared among the two groups using SPSS version 19. Median unpleasantness score was 6 [Inter quartile range (IQR) 4-8] whereas median cough score was 2(IQR 0-3). The difference was statistically significant among the two groups for both cough and unpleasant scores ( $p < 0.001$  and  $p < 0.001$  respectively).

**Conclusion:** Intratracheal injection of lignocaine is more comfortable for the patient. It induces much less cough and irritability to the patient than the "spray as you go" technique.

**Keywords:** Anesthesia, Bronchoscopy, Intratracheal lignocaine injection, Lignocaine anesthesia.

### INTRODUCTION

Fiber optic bronchoscopy is the main diagnostic tool available to the pulmonologist. Endobronchial examination was first carried out in the last decade of nineteenth century for the purpose of removing inhaled foreign bodies. In 1904 a rigid bronchoscope with provision one which initially was passed through a rigid bronchoscope, later through a nasopharyngeal airway and finally directly through the nose<sup>3,5</sup>.

Lignocaine is mainly used to anesthetize the nose, nasopharynx, larynx and lower respiratory tract. Lignocaine can be applied to the upper respiratory tract as a viscous paste, as a spray through an atomizer with 2% or 4% lignocaine or even topically by sucking a lignocaine lolly pop<sup>7</sup>.

Prilcoiane can be used as successfully as lignocaine with a lower risk of toxicity<sup>8</sup>. Cocaine anesthesia is also similarly effective<sup>9</sup>. Passing the bronchoscope through the vocal cords is the most unpleasant part of bronchoscopy and effective anesthesia of the vocal cords can make the procedure much less unpleasant. Local anesthesia of the vocal cords should be carried out in a manner that is safe and less unpleasant to the patient and also provide acceptable conditions to the bronchoscopist, as excessive coughing by the patient may render the procedure difficult and the patient may become uncooperative in the later part of the procedure.

The usual technique is to spray lignocaine through a fiberoptic bronchoscope under direct vision the "spray as you go technique". Another technique is to instill lignocaine directly on the vocal cords by a syringe and needle through the cricothyroid membrane. This membrane is marked by a shallow depression in between the

**Correspondence:** Maj Kashif Razzaq, Classified Medical Specialist, MH Rawalpindi.

Email: kashif\_razzaq@hotmail.com

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cricoid and thyroid cartilages. This area is wiped clean by an antiseptic and patient warned that the voice box is going to be numbed. The patient is requested not to swallow to prevent movements of the larynx and is also asked to hold the cough for a few seconds as well. The area is punctured with a 23 g needle attached to a syringe filled with 3 cc of 2% lignocaine. If correctly positioned, the needle will not meet any resistance and suction of the plunger will result in bubbles. The lignocaine is then injected as rapidly as possible but is quickly withdrawn if coughing occurs to avoid damaging the larynx. If less than 3 ml has been injected, the rest can be injected through a second puncture with much less coughing during the second attempt. Various studies have injected up till 100 mg through this procedure<sup>10</sup>. Topical anesthesia of the respiratory tract can also be accomplished by giving lignocaine through an inexpensive jet nebulizer<sup>11</sup>. Usually 500 mg of 2% or 4% lignocaine has been given through this route<sup>12</sup>. The serum concentration of lignocaine is much less when this route is applied with a concomitant reduction in toxicity<sup>13</sup>. Various studies using either visual analog scales or severity scales by patients themselves or by bronchoscopists objective measurements of cough counts and episodes of stridor phonopneumatography<sup>14</sup> have shown patient preference of the nebulised route<sup>15</sup>.

Bronchoscopy is a day to day procedure in the expanding field of pulmonology and its use is increasing these days. This study will help us in better rationalization of a more favorable anesthetizing technique with a sound practical knowledge based on clinical experience. This will benefit the physician as well as the patient.

## **MATERIAL AND METHODS**

This study was carried out in the Combined Military Hospital Peshawar from May 2009 to June 2010.

A total of 60 patients of either gender through non-probability convenient sampling were studied who had lung lesions that required

bronchoscopy. Using non probability convenient sampling. The lesion was either localized by plain X-ray or computerized tomography scan.

Patients (20-60 years of age of either gender) requiring bronchoscopy due to lung pathology or infection were included. Patients with coagulopathies, with pre-existing excessive cough or having co-morbid conditions like cardiac, renal and liver disease were excluded. All of study subjects had blood complete picture with platelets, prothrombin time, activated partial thromboplastin time, urea, creatinine and electrolytes. ECG was also done prior to the procedure.

Thirty patients each were allotted at random to each group by using table of random numbers. Group I was labeled as the "spray as you go" group or "spray group". Group II was called the "cricothyroid injection group" or simply the "injection group".

Permission from hospital ethical committee was taken. All patients were explained about the procedure in a pre bronchoscopy session and written consent taken. No sedation was given. The nose was anesthetized by ½ tube lignocaine gel 2% applied through the nostril and the throat was anesthetized by 4% lignocaine spray applied through an atomizer. Thirty patients in the "spray group" were given 3 ml of 2% lignocaine to anesthetise the vocal cords. The beginning of this stage was announced by the bronchoscopist and similarly recorded. The number of coughs was counted till the carina was traversed. This event was again announced by the bronchoscopist and recorded.

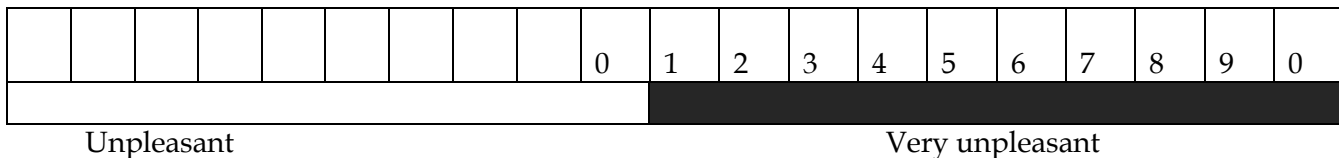
After the procedure, patients were kept in the bronchoscopy department for two hours at the end of which they were asked to document their experience on an unpleasantness scale as either unpleasant or very unpleasant with each of the two categories marked in different color of green and red and graded from 1 to 20 (Figure-1). Data was analyzed using SPSS version 19. Median (IQR) were calculated for unpleasantness and cough scores. Mann-Whitney test was used

to compare the cough and unpleasantness scores among the two groups. *p* value < 0.05 is

intracranial pressure, intracranial bleeding, pain, esophageal penetration, paratracheal abscess and subcutaneous emphysema<sup>21</sup>. No untoward

**Table-1: Comparison of cough and unpleasantness score in two groups**

	Cough score Median (IQR)	Unpleasantness score Median (IQR)
Spray group I	2 (1-3)	7 (5-10)
Injection group II	1 (0-2)	4 (3-6)
<i>p</i> -value	<0.001	0.001



**Figure-1: Unpleasantness score scale.**

considered statistically significant.

**RESULT**

Eighty three percent of the subjects were males while 16.67% were females. Median unpleasant score was 6 (IQR=4-8) where as median cough score was 2 (IQR =0-3). Cough score was significantly higher in group I as compared to group II (*p* < 0.001). Unpleasantness score was significantly higher in group I as compared to group II (*p*= 0.001). (Table-1).

**DISCUSSION**

This study was carried out to compare the usual methods of anaesthetizing the vocal cords by the "spray as you go" technique through the bronchoscope with the less commonly practiced method of injecting lignocaine through the cricothyroid membrane by a small gauge needle.

Cough is the most disturbing part of the bronchoscopy procedure, particularly when the scope traverses the vocal cords. The incidence of cough is significantly less with the intratracheal injection method and the subjective sensation of unpleasantness is also significantly less with this method as compared with the "spray as you go" technique. The amount of lignocaine used was equal in both methods. No untoward reactions were reported in any method. Although potential complications of transtracheal route have been reported including paroxysms of coughing with concomitant rise of heart rate, blood pressure and

reactions were observed in our study.

Injection through the cricothyroid membrane is a painful one as compared to the 'spray as you go' technique because of needle prick through the neck. Injection technique can become a problem especially in pain sensitive patients but we have found that proper prior counseling alleviates patient's anxiety and pain as well. It helped to gain the confidence and injection was not denied by any patient.

Cough score and unpleasantness score was found to be significantly higher in patients in the "spray group" as compared with the "injection group". This shows that anesthetic effect of "injection" is more than the "spray" but needle prick pain is felt by the patients. Because of this initial pain, some anxious patients did not like this technique. However, as far as unpleasantness score and cough score are concerned, it showed a favorable score with the "injection" group.

A review of literature shows that other studies like Webb et al<sup>14</sup> have found that transcricothyroid injection of lignocaine produces less cough than that with "spray as you go" technique. Graham et al<sup>19</sup> using phonopneumography have also found that transcricothyroid injection method produced less cough and stridor during bronchoscopy than the "spray as you go" technique.

Although no survey has been done in Pakistan so far but the general perception is that

bronchoscopists prefer the spray as you go technique. Reviews<sup>8</sup> and a survey of fiberoptic bronchoscopy in the Hong Kong<sup>14</sup> show that majority of bronchoscopists spray the vocal cords through the bronchoscope "as you go".

An Indian study was carried out which compared anesthesia by transtracheal injection, versus bronchoscope using "spray as you go" technique. It showed that "spray as you go" technique was safe, provided effective local anesthesia and was preferred by both patients and endoscopist.

Safety and efficacy of 2% and 4% lidocaine was also compared in a Chinese study using "spray as you go" technique. Both concentrations can provide chemically acceptable intubating conditions for awake fiberoptic intubation. However 2% lidocaine requires a smaller dosage and results in lower plasma concentrations.

## CONCLUSION

With the use of intratracheal lignocaine injection, the induced coughing as the bronchoscope is passed through the vocal cords and the patient's sense of unpleasantness for the procedure can be significantly reduced, as compared with the "spray as you go" technique of lignocaine anaesthesia of the vocal cords. Therefore we recommend the lignocaine injection through the cricothyroid membrane as the preferred technique to anesthetize the vocal cords.

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