

# OXYGEN DESATURATION DURING FIBEROPTIC BRONCHOSCOPY

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Salahuddin Afsar, Ali Nawaz Choudhri, Abu Talib, Tariq Farooqi, Mohammed Javed Pasha ( Department of Medicine, Dow Medical College and Civil Hospital, Karachi. )

## ABSTRACT

A prospective study was performed to detect oxygen saturation (SaO<sub>2</sub>) during and following fiberoptic bronchoscopy (FOB) in 50 patients. Twenty-five patients (group 1) underwent the procedure without and 25 (group 2) with supplemental oxygen. The SaO<sub>2</sub> declined from the baseline value of 96.4% to 92.08% in group 1 and to 94.88% in group 2 after bronchoscopy alone. The decline was also noted when biopsy and broncho-alveolar lavage (BAL) were performed, the lowest values being recorded during BAL. The result showed that the fall in SaO<sub>2</sub> in group 2 was significantly less than that in group 1 (P < 0.05). SaO<sub>2</sub> returned to baseline values after a mean time of 4.9 minutes in group 1 and 2.4 minutes in group 2, demonstrating the benefit of supplemental oxygen (JPMA 42: 263, 1992).

## INTRODUCTION

Since its introduction by Ikeda in 1968<sup>1</sup>, flexible fiberoptic bronchoscopy has been used extensively by respiratory physicians for diagnostic and therapeutic purposes<sup>2,3</sup>. FOB also has its hazards, the most common complications described include adverse reactions to the medications used for sedation or topical anaesthesia, local trauma to airways, haemorrhage, pneumothorax, bronchospasm, laryngospasm, cardiac dysrhythmias and hypoxemia<sup>4-6</sup>. This study was done to determine the degree and duration of hypoxemia during bronchoscopy alone, during bronchial/transbronchial biopsies and bronchoalveolar lavage. The effects of supplemental oxygen during these procedures was also assessed.

## MATERIALS AND METHODS

Fifty patients (45 males, 5 females) with various indications for diagnostic FOB were studied. Their ages ranged from 20-80 years (mean 53.3 years). Premedication was limited to atropine sulfate 0.5 mg intramuscularly given 30 minutes prior to procedure. Posterior pharynx and epiglottis were anaesthetized topically by spraying 2% lignocaine. A fiberoptic bronchoscope was introduced per orally and vocal cords, trachea and airways anaesthetized (2% lignocaine) under direct vision; the patient being kept in supine position. Microspan 3040 pulse oximeter was applied to the index finger of the right hand and baseline SaO<sub>2</sub> was recorded. Half the patients were assigned to receive supplemental oxygen (group 2) through a nasal cannula at a rate of 5L/min. Rest of the patients (group 1) were not given supplemental oxygen. The SaO<sub>2</sub> was continuously monitored during the procedure and lowest readings were recorded during bronchoscopy. Bronchial biopsy was taken from 26 (group 1 = 14, group 2 = 12) and BAL was performed in 19 patients (group 1 = 10, group 2 = 9). After the procedures monitoring of SaO<sub>2</sub> was continued till it returned to baseline levels.

## RESULTS

### Changes in oxygen saturation during fiberoptic bronchoscopy

Baseline arterial haemoglobin saturation (SaO<sub>2</sub>) in all 50 patients studied ranged from 84-98% (mean

96.4%, SD± 3.04). The changes which occurred in SaO<sub>2</sub> during different procedures were as follows:  
**Bronchoscopy alone**  
Mean oxygen saturation in group 1 dropped to 92.08% (SD±3.8) and in group 2 to 94.88% (SD±3.25),  
Pc 0.05 (Figure 1).

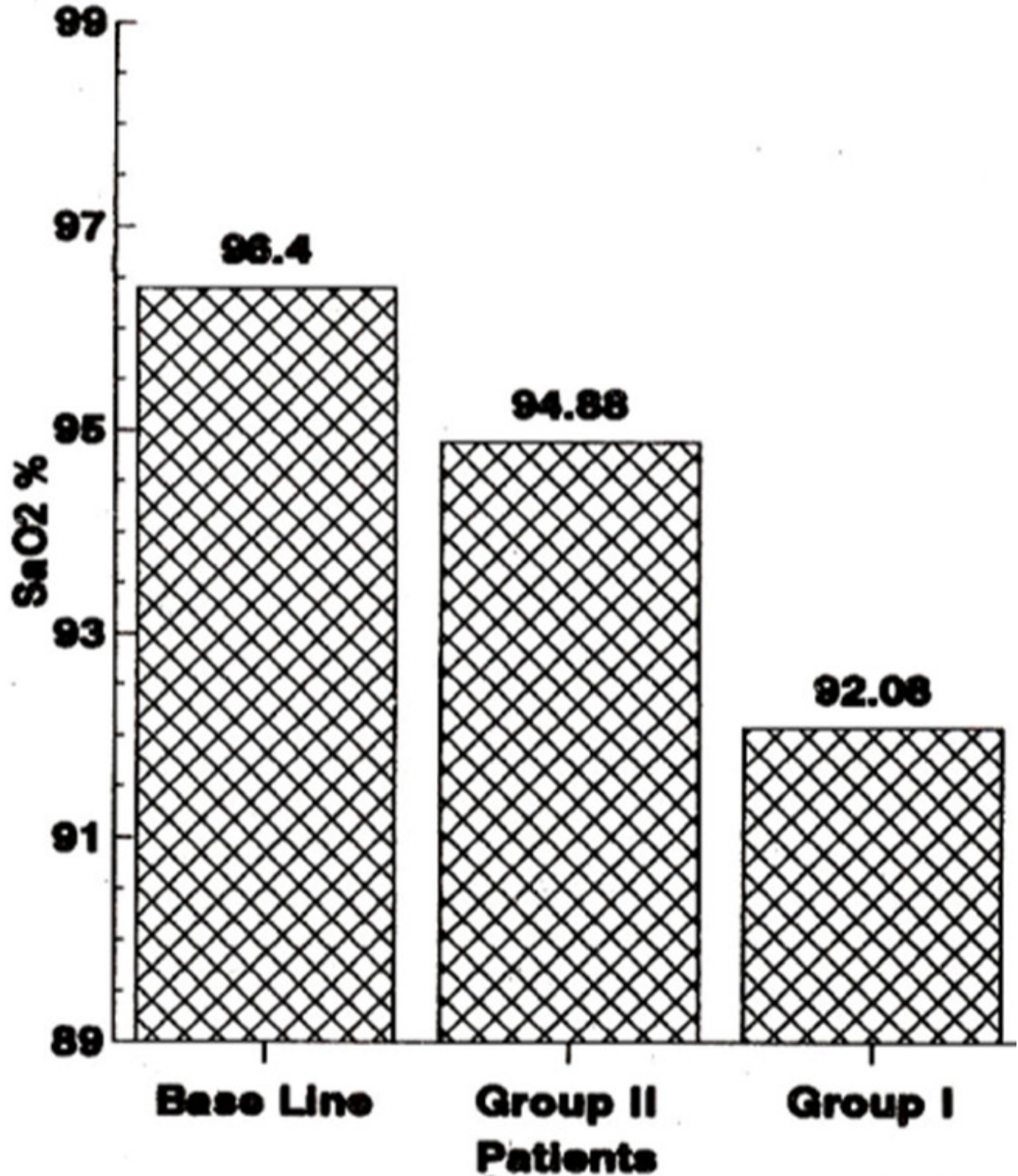


Figure 1. Decline in SaO<sub>2</sub> after bronchoscopy without BAL and biopsy.

**Bronchoscopy and biopsy**

Mean oxygen saturation in group 1 became 90.46% (SD± 5.90), while in group 2 it was 92.88% (SD±6.13), P<0.05 (Figure 2).

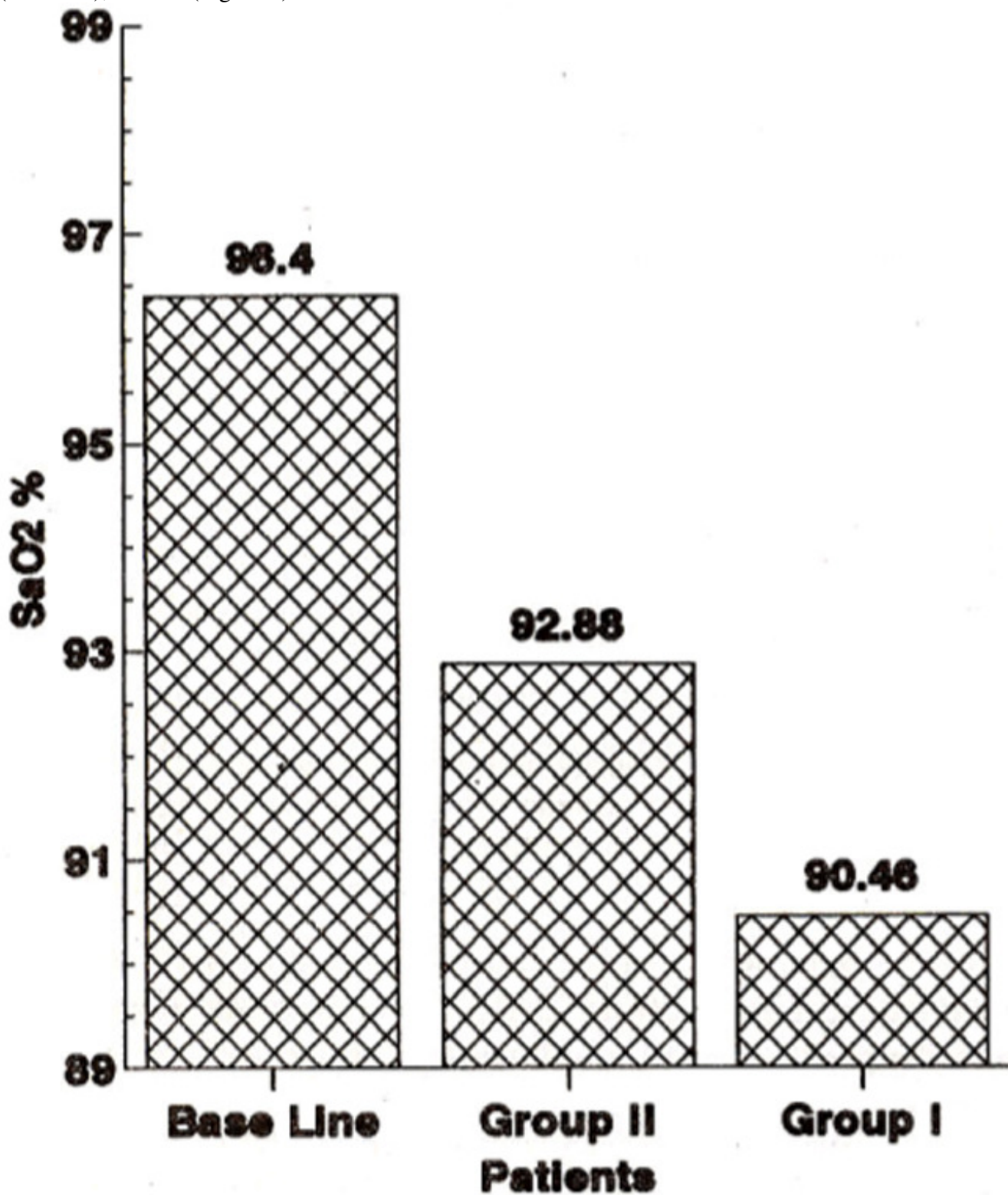


Figure 2. Decline in SaO2 after bronchoscopy and biopsy.

**Bronchoscopy with bronchoalveolar lavage**

Mean oxygen saturation in group 1 fell to 90.2% (SD±6.62), while in group 2 it was 91.66% (SD± 5.12), PcO.05 (Figure 3).

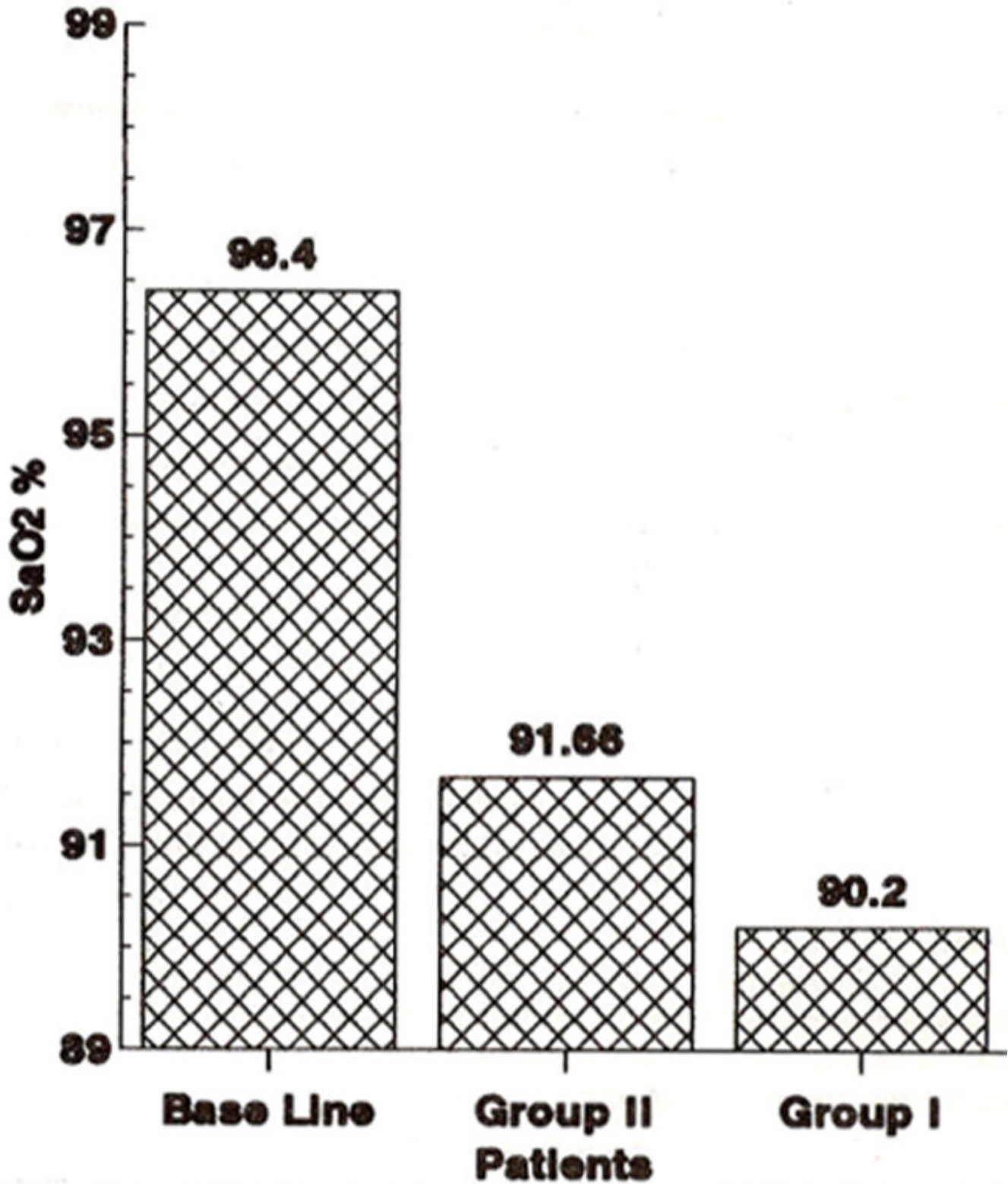


Figure 3. Decline in SaO2 after bronchoscopy and BAL.

### **Time taken for SaO<sub>2</sub> to return to baseline values**

After the FOB oxygen saturation in all patients returned to baseline values. Time taken in group 1 ranged from 1-32 minutes (mean 4.9 min) and in group 2, 0-14 minutes (mean 2.4 min).

### **DISCUSSION**

This study shows that a decline in SaO<sub>2</sub> is frequently noted during FOB and this decline can be of a substantial degree and duration. However, the drop in SaO<sub>2</sub> was reduced by the administration of supplemental oxygen. The drop in SaO<sub>2</sub> reported by others<sup>7</sup> has also been maximal in this study when bronchoscopy was associated with bronchial veolarlavage. In contrast Breuer et al<sup>8</sup> did not find any significant change in oxygen saturation during different diagnostic procedures. In both studies supplemental oxygen was given. In this study the SaO<sub>2</sub> returned to baseline within 32 minutes after completion of the procedure. This was to 30 minutes reported by others<sup>9,10</sup>. The decline in arterial P<sub>O</sub><sub>2</sub> after FOB may be immediate<sup>11</sup> or may range from one to more than four hours. The cause of hypoxemia during FOB is not clear. It could be reflex in nature. The subepithelial receptors in the trachea may be affected by mechanical stimulation of the instrument resulting in bronchoconstriction with a consequent mismatch of ventilation and perfusion<sup>11</sup>. The procedure may induce modest intrapulmonary shunt and zones of low ventilation:perfusion ratio due to loss of lavage fluid and bronchospasm by tracheal stimulation during the procedure<sup>1</sup>. Other causes include prolonged suction<sup>9</sup> and haemorrhage from the biopsy site<sup>12</sup>. Hypoxemia can also be worsened if the patients are oversedated especially by opiates<sup>5,13,14</sup>. Hypoxia occurring due to any cause leads to its complications, cardiovascular rhythm disturbances being a major risk. Many studies have documented a correlation between hypoxemia and dysrhythmias<sup>15,16</sup>. The measurement of SaO<sub>2</sub> rather than of PaO<sub>2</sub> was obtained in this study. The rapid response time (2-3 sec) and self calibration make the pulse oximeter an efficient and accurate non-invasive monitoring device<sup>9</sup>. Fanconi et al<sup>17</sup> reported pulse oximetry as a reliable technique for monitoring oxygenation. On the basis of the results of this study when performing FOB, pulse oximetry should be a routine, supplemental oxygen should be given to all patients and facilities for cardio-respiratory resuscitation should be at hand.

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