Original Article

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Evaluation of oxygen requirement in patients during fiberoptic bronchoscopy

Abstract

Background: *Sometimes oxygen is given to patients during fiberoptic bronchoscopy to prevent arterial hypoxemia, but oxygen usually is given to patients with SPO2 less than 90%. The purpose of this study was to evaluate the patient's oxygen requirement according to SPO2 and its relationship with Pulmonary Function Test (PFT).*

Methods: *From January 2006 to April 2007, 146 patients who needed fiberoptic bronchoscopy were evaluated at Beheshti Hospital in Babol, Iran. Spirometery was performed before bronchoscopy and the patients were divided into three groups: FEV1> 2, between 1-2 and FEV1<1liter, respectively. Oxygen was given to every patient with SPO2 less than 90% which lasted more than 20 seconds during bronchoscopy.*

Results: *Eight (5.5%) out of 146patients needed oxygen, 33.3% had FEV1<1lit ($p<0.06$) and 26.7% had obstructive PFT pattern ($p<0.004$). The mean age of patients who needed oxygen was 66.7±12.5 years old and those without O_2 requirement was 51.9±17.7 years old.*

Conclusion: *According to the results of this study, it is recommended to give oxygen during fiberoptic bronchoscopy for the old patients and patients with FEV1<1lit and obstructive PFT.*

Key words: *Fiberoptic bronchoscopy - Oxygen – Hypoxemia.*

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In order to treat pulmonary diseases, physicians traditionally use clinical, radiological and laboratory findings. As technology had progressed, other methods such as pulmonary function tests (PFT) came to help the diagnosis of the disease, evaluation of lung volumes and therapeutic effects (1-2). Bronchoscopy, an invasive method of diagnosis and treatment, was first used by Gustav Killan. Although both kinds of bronchoscopy - rigid and fiberoptic - are used for diagnosis and treatment in pulmonary disorders (3-5). Even though fiberoptic bronchoscopy is invasive, it can be used in conscious patients with or without sedation (6-8). Most of the side effects of this bronchoscopy are transient with an incidence rate of 2-3% (9-14). Cough and bronchospasm are the most common side effects of fiberoptic bronchoscopy, which can be reduced by administration of β agonist drugs (10). Arterial hypoxemia is another side effect of fiberoptic bronchoscopy during procedure. This can be prevented by O2 administration to all patients as practiced in some centers, whereas in other centers, oxygen saturation control (SPO2<90%) is individually decided to be used (4, 5, 7-10, 13). Because of the different opinions on this matter, this study was designed to evaluate the patient's need for O_2 according to SPO2 and its relation to PFT, age and sex.

Methods

From Janurary 2006 to April 2007, 146 patients who needed fiberoptic bronchoscopy admitted to Beheshti Hospital of Babol Medical University were enrolled in this study.

Patients who contraindicated fiberoptic bronchoscopy such as uncontrolled asthma, hypoxemia, recent Myocardial Infarction (MI) and hypercarbia have been excluded from the study. After obtaining the written informed consent from the patients, PFT was performed to all the patients and they were divided into 3 groups (FEV1 <1, 1-2 and >2 liters). The patients were put in the bronchoscopy position and were monitored with Non- Invasive Blood Pressure Measurement (NIBPM) and pulse oximeter (CLV-U 40) before, during and 5 minutes after fiberoptic bronchoscopy. All fiberoptic bronchoscopies were performed using local anaesthesia (lidocaine) by our team.

Oxygen was given to every patient with SPO2 less than 90% for more than 20 seconds through a nasal catheter. Data were collected and analyzed with SPSS. Student T-test, Fisher exact test were used to compare the differences between these three treated groups.

Result

Among the 146 patients studied, 92(63%) were male and 54(37%) were female with age ranging from 17 to 89 years with mean age of 52.79±17.79 years. FEV1 in 88 patients (60.3%) was more than 2 lits, in 49 patients (33.6%) between 1-2 lits and in 9 patients (6.2%) was less than 1lit. With regard to PFT, 18 patients (12.3%) had restrictive pattern, 15 patients (10.3%) were obstructive, 17 patients (11.6%) had mixed pattern and 96 patients (65.8%) PFT was normal.

The mean SPO2 before bronchoscopy was 96.7±2.6 during bronchoscopy was 93.6±3.1 and immediately after bronchoscopy was 94.6±3.6 ($p> 0.05$). Nasal oxygen was administered only to 8 patients (5.5%). According to table 1, the need to oxygen in patients with a FEV1 less than 1 lit was significant when compared to patients with FEV1 between 1-2 lits ($p<0.042$) and more than 2 lits ($p<0.005$). On the other hand, there was no significant difference in the need of oxygen between patients with FEV1 between 1-2 lits and those with FEV1 more than 2 liters ($p=0.349$).

There was no relationship between oxygen requirement and sex (Fig 1). As shown in tables 1 and 2, the need of oxygen in patients with obstructive pattern in PFT was significantly higher when compared to other patterns ($p<0.004$). Besides, the mean age of patients in need of O_2 was significantly higher than those without oxygen needed such was a 67 year old in comparison to a 52 year old one.

Table1. Number and % of oxygen requirement in regard to *FEV1*

oxygen requirement	Yes	No	Total
FEV1/ lit	N(%)	N(%)	N(%)
>2	2(2.3)	86(97.7)	88(100)
1-2	3(6.1)	46(93.9)	49(100)
<1	3(33.3)	6(66.7)	9(100)
Total	8(5.5)	138(94.5)	146(100)

Table 2. Number and % of oxygen requirement with regard to PFT pattern

Oxygen need	Yes	No	pvalue
Pattern	N(%)	N(%)	
Restrictive	-(-)	18(100)	0.597
Obstructive	4(26.7)	11(73.3)	0.004
Mixed	3(17.6)	14(82.4)	0.053
Normal	1(1)	95(99)	0.002
Total	8(5.5)	138(94.5)	

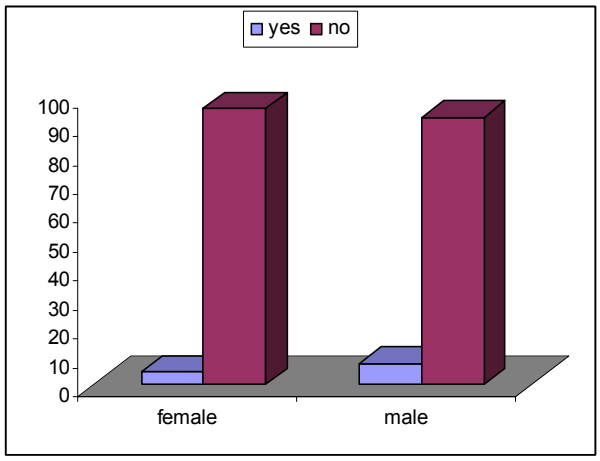

Fig 1: percentage of oxygen requirement in regard to gender

Discussion

Today, fiberoptic bronchoscopy plays an important role in the diagnosis and treatment of patients in some cases, it is the only route of evaluation (5-12). Hypoxemia is a side effect of this method and in order to prevent it, some centers administered oxygen to all patients, whereas in other centers, oxygen is given to patients with SPO2 less than 90% (10). Our study which was performed under SPO2 monitoring, showed that only 8 (5.5%) out of 146 patients had a SPO2

less than 90% for more than 20 seconds and needed oxygen. Among the patients in need of oxygen, 33.3 percent were patients with FEV1 less than 1 lit and 26.7 percent were patients with obstructive PFT pattern. Also, our study showed that the rate of SPO2 during bronchoscopy was reduced when compared before and after the procedure, but this difference was not significant. In the study of Afsar et al. in 1992, the patients were divided into two groups and 50% of them received oxygen during bronchoscopy .The result showed a decline in SPO2 in both groups, but it was less in patients receiving oxygen (15).

Another study by Golpe showed that obstructive pattern of PFT is one of the most important factors for hypoxemia (16). Evans et al. in 1998 showed a decrease in SaO2 and an increase of PaCO2 during bronchoscopy (17). Jones et al. showed that 24% of patients had SPO2 less than 90% during bronchoscopy but 14.4 % of the patients, the decrease of SPO2 lasted for 20-30 seconds for those who received oxygen. According to their report, there is no relationship between FEV1 and fall in SaO2 (18).

Another research in 1998 by Kristensen et al. showed that the amount of FEV1 was one of the most important clinical factors for the prediction of hypoxemia during fiberoptic bronchoscopy (19). Milman et al. indicated that increased age has an effect on the decrease of SPO2 and pulse oximeter is a good monitoring for diagnosis of hypoxemia (20). According to Sharma et al., findings in New Dehli on 21patients with ABG evaluation was reported that all the patients needed oxygen therapy during bronchoscopy (21).

In 2002, a research by Yildi showed that, there was no difference between the amount of oxygen saturation in ABG and Pulse Oximeter. One of the most important factors in the decrease of SPO2 is the duration of bronchoscopy. They recommended pulse oximeter monitoring for all the patients and in cases were prolonged bronchoscopy oxygen therapy was needed (22). According to the results of this study, it is recommended to give oxygen during fiberoptic bronchoscopy for old patients, patients with FEV1<1lit and obstructive PFT.

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References

1. Gregg L. Ruppel MED RRT RPFT FAARC From. Mannual of pulmonary function testing. 8th edition. Philadelphia, Lippincott; 2003; PP: 1-10.
2. Guyton C, Hall JE. Text Book of Medical physiology; 9th edition. Philadelphia sanders Co; 1996; PP: 480-97.
3. Kitmural S. History of bronchoscope. In: Kitamura S, editor. Color Atlas of clinical application of fiberoptic bronchoscopy. St. Louis: mosby 1990; PP: 7-8.
4. Lukanich JM, Sabiston DJ. The text book of surgery: the bidogical basis of modern surgical practice. I7th edition Philadelphia: Sunders Co. 2004; PP: 1784-6.
5. Feinsilver SH, Fein AM. The text Book of bronchoscopy. 2nd Edition. Baltimore, MD: Williams & Wilkins 1996; PP: 1-40.
6. Ernst A, Silvestri GA, Johnstone D; American college of chest physicians. Interventional pulmonary procedures: Guidelines from the American College of Chest Physicians. Chest 2003; 123: 1693-717.
7. Sway MS, Jayakyishnan B, Behbehani N, et al. Flexible fiberoptic bronchoscopy. Diagnostic yield Saudi Med J 2004; 25: 1459-63.
8. Schellhase DE, Fewcett DD, Schutse GE, Lensing SY, Tryka AF. Clinical utility of flexible bronchoscopy and bronchoalveolar lavage in young children with recurrent wheezing. J pediatr 1998; 132: 312-8.
9. Thompson A Rennard S. Diagnostic procedures not involving pleura, In: Baum G: Grapoj GB, Karlinsky S. Pulmonary diseases, 6th edition Philadelphia, Lippincott 1998; PP: 240-4.
10. Jeffrey M, Drazen, steven E. Weinberger Harrison's principles of internal medicine. 5th Edition. New York: MC Graw-Hill 2002; PP: 1450-5.
11. Arroliga AC, Matthay RA. The role of Bronchoscopy in Lung cancer clin chest Med 1993; 14: 87-98.
12. Torres A, Serra-Batlles J, Ferrer A, et al. Severe community - acquired pneumonia- Epidemilogy and prognostic factors. Am Rev Resp Dis 1991; 144: 312-8.
13. Sinha S, Guleria R, Panda JN, Pandey KM. Bronchoscopy in adults at a tertiary care centre: indications and complications. J Indian med Assoc 2004; 102: 52-4, 156.
14. Barbato A, Magarotto M, Crivellaro M, et al. Use of the paediatric bronchoscope, flexible and rigid, in 51 European centres. Eur Respir J 1997; 10: 1761-6.

15. Afsar s, choudhri AN, Talib A, Farooqi T, Pasha MJ. Oxygen desaturation during fiber optic bronchoscopy. J pak Med Assoc 1992; 42: 263-5.
16. Golpe R, Mateos A. Supplemental oxygen during flexible bronchoscopy Chest 2002; 121: 663-4.
17. Evans EN, Ganeshalingam K, Ebden P. Changes in oxygen saturation and transcutaneous carbon dioxid and oxygen levels in patients undergoing fibreoptic bronchoscopy. Respir med 1998; 92: 739-42.
18. Jones AM, O' Driscoll R. Do all patients require supplemental oxygen during flexible bronchoscopy? Chest 2000; 119: 1906-9.
19. Kristensen MS, Milman N, Jarnvig IL. Pulse oximetry at fibre-optic bronchoscopy in local anaesthesia: indication for postbronchoscopy oxygen supplementation? Respir Med 1998; 92: 432-7.
20. Milman N, faurschou P, Grode G, Jorgensen A. Pulse oximetry during fibreoptic bronchoscopy in local anaesthesia: frequency of hypoxaemia and effect of oxygen supplematation. Respiration 1994; 61: 342-7.
21. Sharma SK, Pande JN, sakar R. Effect of routine fiberoptic bronchoscopy and bronchoalveolar lavage on arterial blood gases. Indian J chest Dis Allied Sci 1993; 35: 3-8.
22. Yildi P, Ozgul A, Yilmaz V. Changes in oxygen saturation in patients undergoing fiberoptic bronchoscopy. Chet 2002; 121: 1007-8.