Factors Effecting Patient Compliance and Tolerability During Bronchoscopy

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Abstract

The aim of our study was to investigate the correlation between patient difficulties or incompability with anxiety and depression during bronchoscopy. Another goal was to evaluate the influence of pulmonary function, sputum and bronchial lavage cytology associated with the bronchoscopy challenge.

A total of 123 patients, 76 male and 47 females with a mean age of 55.6 ± 14.8 years, participated in the study. Each subject filled the BAI and BDI scale before bronchoscopy. The patients were evaluated in according to the demographic, PFT results, ABG levels, cytologic examination of the sputum and BAL samples. Uneasiness or discomfort experienced by the patient during bronchoscopy was classified as mild, intermediate, high discomfort or total intolerance.

Bronchoscopy was performed primarily for the diagnosis of lung cancer, pulmonary infection and interstitial lung diseases. Mean FEV1, FVC and FEV1/FVC values were 1.98 ± 0.84, 2.46 ± 0.98 and 78.3 ± 18.2%, respectively. Hospital Anxiety and Depression scale was used to appraise anxiety or depression in all of the patients. Stress symptoms before bronchoscopy were palpitations, tachypnea, chest tightness, and anxiety. Main patient concern associated with the preliminary diagnosis or bronchoscopy complications were as follows: malignant disease (68%), dyspnea (62%), sense of choking (48%), airway irritation (56%), pain (52%), and hemorrhage (48%). Incidence of anxiety symptoms before bronchoscopy was 19.2% among the patients. BAI score was over eight in 26 patients (p < 0.001) while the BDI was over eight in 10 subjects. Cytologic analysis of the sputum and BAL samples showed normal (52%), inflammatory (38%), reactive (32%), atypical (28%), and malignant (24%) epithelial cells. In nine patients with a severe BAI score, bronchoscopy could not be performed due to the absolute individual intolerance and distress during the intervention.

Anxiety is the hallmark for patient intolerance associated with bronchoscopy while depression does not appear to be a significant factor for procedure adversity. Age, gender, smoking history, comorbid diseases, and poor pulmonary function tests did not reveal a significant statistical correlation with the bronchoscopy compliance of the patients. Cytological findings of the sputum or BAL samples displayed a significant clinical relevance but exhibited a low correlation with the intervention difficulty or adversity experienced by the patients.

Keywords: *Bronchoscopy Compliance; Anxiety; Depression; Beck Anxiety Inventory; Beck Depression Inventory*

Introduction

Bronchoscopy is an invasive intervention that may be a challenge for the clinician due to the adversities experienced by the patients during the procedure. Identifying such patients who display intolerance for bronchoscopy is the main focus for a successful intervention. Almost all difficulties or adversities associated with intolerance that emerge pending bronchoscopy are mostly individual related factors such as a heavy smoking history, reactive airways, previous interstitial or parenchymal lung damage, and comorbid diseases including

mainly heart or pulmonary disorders. Predetermination of these impacts may considerably facilitate the bronchoscopy practice of the clinician which is the hallmark of a successful intervention. Apart from these conventional factors, determination of other criteria that will challenge the clinician and complicate the procedure is the most important link and key for a successful bronchoscopy.

Stress-related anxiety arising from the application of an unknown invasive procedure will emerge as the most important obstacle or drawback relevant to bronchoscopy compliance of the patient and thereby for a properous intervention [1-5]. Since bronchoscopy is done for exploration of the airways, it will lead to a much greater source of psychologic pressure and stress load on the patient than the other endoscopic procedures. Bronchoscopy is frequently carried out for the diagnosis of of a serious lung lung disorder, psychological distress of the preliminary clinical malignant or interstitial lung disease diagnosis, will emerge as another significant and distinctive contributor that enhance the anxiety load of the patient in addition to the stress of the procedure itself. Patient adversity and tolerance during bronchoscopy therefore appears to be the fundamental and hallmark feature of the bronchoscopy challenge for the clinician.

The primary target of our study was to evaluate the effect of anxiety in terms of the intervention adversity for patients undergoing bronchoscopy. Another goal was to assess the influence of the cytomorphological findings in these patients associated with the bronchoscopy compliance. The third aim was to investigate the impact of the previously well-known conventional factors such as pulmonary function tests, arterial blood gases, and the presence of comorbid diseases in regard to the procedure difficulty experienced by the patients during the intervention.

Materials and Methods

A total of 123 patients, 76 (61%) males and 47 (39%) females, participated in this retrospective study performed at the Istanbul Cerrahpasa Medical Faculty pulmonary diseases department. Mean age of the patients was 55,6 ± 14.8 years. Patients with a previous or a current personal history of psychiatric disorder were excluded from the study. Blood count, serum biochemistry, coagulation tests, ECG, PFTs and ABG analysis were performed before bronchoscopy. In all patients, bronchoscopy was done after pulmonary and cardiac consultation determined their suitability by revealing that there exists no contrindications for the intervention. Bronchoscopy was carried out under local anesthesia in all of the patients. Lidocaine was used for local anesthesia and midazolam was given intravenously for sedation if indicated.

The BAI [Beck Anxiety Inventory (BAI)] and BDI [Beck Depression Inventory (BDI)] consists of 21 items with a Likert scale ranging from 0 to 3 and raw scores ranging from 0 to 63. The BAI scores are classified as minimal anxiety (0 to 7), mild anxiety (8 to 15), moderate anxiety (16 to 25), and severe anxiety (30 to 63). BDI standard cut-off scores are as follows: 0 - 9 points indicating minimal, 10 - 18 mild, 19 - 29 moderate, and 30 - 63 severe depression. BAI and BDI provide useful clinical information that may point out to a state of anxiety or depression while they are not specific enough to be used diagnostically [1-5]. BAI and BDI questionnaire forms were completely filled by face-to-face interviews in all patients under the supervision of a physician. All patients were given information about the bronchoscopy process and how to react during the intervention. In order to reduce the stress load on the patients and to provide them with relaxation, a detailed explanation relevant to the prospective probable complications that may occur during the procedure was also conveyed to the patients. Patients were also given the information that the major bronchoscopy complications occurred in less than one percent with a generally reported neglicible mortality rate between 0 and 0.1 percent [6-11].

Patient performance and compability relevant to the bronchoscopy adversity during the procedure was classified in four categories such as mild, moderate, serious difficulty, and absolute intolerance. Mild difficulty was designated as minimal cough, negligible gag reflex, mild larengeal or vocal cord resistance, adequacy of local sedation with a heart rate less than 100 beats/min and total procedure time less than 20 minutes. Moderate difficulty was defined as moderate cough, intermediate gag reflex, larengeal or vocal cord resistance, adequacy of local sedation with a heart rate less than 100 beats/min and a total procedure time less than 20 minutes. Serious difficulty consisted of

significant cough, substantial gag reflex, larengeal or vocal cord resistance, heart rate between 100 and 120 beats/min with a 30 minutes bronchoscopy duration. Unsuccessful and failed bronchoscopy attempt due to patient abearance was described as an absolute intolerance for the intervention. Cytomorphologic assessment of the post-bronchoscopic sputum and BAL samples was done to identify the presence of normal, inflammatory, reactive, atypical, malignant epithelial cells, and hemosiderin-laden macrophages.

Statistical analysis of the study was performed using SPPS version twenty-one. For the normality assessment of the continuous variables, Kolmogorov-Smirnov and Shapiro-Wilk test were performed. Chi square test was utilized for the evaluation of observed frequencies of categorial variables while Fischer's exact test was used for the analysis of contingency between groups. For continuous variables, Mann-Whitney U and Kruskall-Wallis test were applied while post-hoc analysis was done for the significance of the specific data. Spearman correlation analysis was carried out for the assessment of correlation between the variables. A p value less than 0.5 was considered statistically significant. A correlation coefficient between 0.9 and 1.0 was designated as very highly correlated while an r value between 0.7 and 0.9 was considered as highly correlated. Coefficients between 0.5 and 0.7 indicated moderate, between 0.3 and 0.5 revealed a low and a r value less than 0.3 exhibited a weak if any correlation.

Results

Fiberoptic bronchoscopy was performed in 123 patients mainly for the identification of primary or metastatic lung malignancy, diagnosis of pulmonary infections, and interstitial lung diseases in 123 patients. BAL [Bronchoalveolar lavage (BAL)] while bronchial lavage was done in the remaining.and post-bronchoscopic sputum were obtained from 80 (65%) and 106 (86.2%) patients, respectively. Spirometry was performed in 85 (69.1%) of the patients before bronchoscopy. PFTs were within normal limits in 43 (50%) while 26 (30%) had obstructive type and 16 (20%) showed restrictive type of pulmonary function abnormalities. ABG values were not included in the statistical analysis because ABG was performed in only 13 (11%) of the patients due to the small sample size which was inadequate for a satisfactory statistical assessment. The anxiety profiles of the patients relevant to the probable bronchoscopic complications and the preliminary clinical diagnosis were as follows: existence of lung cancer (68%), dyspnea (62%), airway irritation (56%), sense of choking (48%), pain (42%), hemorrhage (38%), pulmonary metastasis (36%), and lung laceration (24%). A final diagnostic yield was obtained in 86 (71%) patients by bronchoscopic interventions. As a result of bronchoscopic procedures, 38 (32%) patients were diagnosed with lung cancer, 18 (21%) patients with pneumonia, 13 (15%) patients with interstitial lung disease, 9 (10%) patients with metastatic cancer, 7 (8%) patients with tuberculosis and 4 (5%) patients with hematological malignancy.

Of the patients with a previously diagnosed comorbid diseases 26 (21.1%) had COPD, 14 (11.4%) had hypertension, 8 (6.5%) had type I diabetes mellitus and 6 (4.9%) had various other diseases. Correlation between the presence of comorbid diseases and the difficulty of bronchoscopy was low (Table 1). Cytologic analysis of post-bronchoscopic sputum and bronchoalveolar lavage samples revealed normal (52%), inflammatory (38%), reactive (32%), atypical (28%), and malignant (24%) epithelial cells. Hemosiderin laden macrophages was detected in 3 (% 2.4) of the patients. Histopathologic examination of the bronchoscopic biopsy specimens identified adenocarcinoma 14 (11.3%), in 10 (8.1%) squamous carcinoma and in 8 (6.5%) patients small cell carcinoma. While breast cancer metastasis was detected in three (2.4%) patients, gastric, ovarian, renal, bladder, testis, and thyroid cancer lung metastases were detected in one (0.8%) patient each. Among individuals with a final diagnosis of interstitial lung diseases nine (7.3%) patients had sarcoidosis, two (1.6%) idiopathic pulmonary fibrosis, one (0.8%) bleomycin induced interstitial lung disease, and one (0.8%) pulmonary involvement due to rheumatoid arthritis. Of the patients diagnosed with a hematological malignancy, two (1.6%) had amyloidosis, one (0.8%) had lymphoma, and one (0.8%) had multiple myeloma. One patient (0.8%) was diagnosed with hydatid cyst disease. In two patients, bronchoscopy was performed for the diagnosis and treatment of postintubation stenosis.

Bronchoscopy difficulty level	1	2	3	4	r	p
Gender						
Male	28	24	16	8	0.12	0.28
Female	18	16	9	4	0.16	0.19
Age	55.6 ± 18.4	62.4 ± 16.2	52.8 ± 14.6	64.6 ± 12.8	0.22	0.24
Smoking history						
Non-smoker	23	19	14	3	0.18	0.05
Smoker	26	18	16	2	0.24	0.05
Comorbid disease	24	16	10	2	0.16	0.01
Pulmonary Function Test						
Normal	17	14	11	1	0.28	0.24
Obstructive	10	9	5	2	0.30	0.18
Restrictive	6	4	5	1	0.26	0.32
BAL cytology						
Normal cytology	38	20	18	2	0.22	0.05
Positive cytology	14	6	8	10	0.42	0.05
Sputum cytology						
Normal cytology		24	18	10	0.26	0.05
Positive cytology		6	8	12	0.32	0.05
BI score *						
BAI**	3	8	6	9	0.86	0.01
BDI***	2	6	4	2	0.14	0.05

*Table 1: Correlation of bronchoscopy tolarence with the dermographic features, clinical manifestations and BECK index score of the patients.**BI score > 8 points, **BECK anxiety inventory, ***BECK depression inventory, r: correlation coeefficient, p: p-value.*

The correlation of patient bronchoscopy tolerance between age, smoking status, gender, pulmonary function, BAI, BDI scores, sputum and BAL cytology findings of the patients are depicted in Table 1. Of the 30 patients with a high BAI score nine exhibited an absolute bronchoscopy intolerance while six showed severe abearance. Among 18 patients with a high BDI score, four displayed a severe difficulty and two had an absolute intolerance for the intervention. Since arterial blood gas samples were taken from only 12 patients before bronchoscopy, statistical analysis of ABG values were not included considering that such a small number of samples would not provide a reliable statistical data. The correlation of age, gender, smoking history (pack/year), and existence of comorbid diseases did not reveal a significant correlation with the adversity of bronchoscopy. There was no significant gender difference between male and female patients in terms of procedure difficulty. The pulmonary function test results exhibited a weak correlation with the bronchoscopy compliance. BAL cytological analysis revealed indicated a low correlation (r = 0.38, p < 0.05) with patient intolerance during bronchoscopy. Presence of inflammatory and atypical cells in the BAL was significantly higher in patients who experienced severe difficulty or with an absolute intolerance for bronchoscopy (p < 0.05). Cytologic analysis of sputum also indicated a weak correlation (r = 0.24, p < 0.05) with the patient bronchoscopy acquiescence. BECK anxiety scale score analysis displayed a high correlation (r = 0.84, p < 0.05) while BECK depression scale score revealed a low correlation (r = 0.34, p < 0.05) with the degree of difficulty experienced by the patients during the procedure.

BAI score was above normal in all of the patients with an absolute intolerance for bronchoscopy which turned out to be a significant clinical factor in the achievement of the procedure. On the other hand, the BDI score did not reach a significant correlation that could be attributed to the bronchoscopy difficulty experienced by the patient.

Discussion

Anxiety emerges as an important clinician challenge for endoscopic interventions in many studies. Psychological state and reactions of patients become more prominent especially in interventions involving the airway such as bronchoscopy [1-3,5]. Although many evaluation scales including varying diagnosis rates have been used until today to determine the anxiety and depression status of the patients, the most successful results have been obtained with the BECK anxiety and depression index scale [12-17]. We evaluated the factors that may affect the patient drawback undergoing fiberoptic bronchoscopy along with the difficulty and adversity profile of the patients that may lead to a per engrossing feature of this research is the absence of any correlation between the distress of bronchoscopy and pulmonary function tests [21,22]. Although cytologic analysis did not reveal a statistically significant conclusion, it displayed a crucial sequence that may be considered as an outstanding clinical outcome. There are many current prospective analytic studies that reveal the safety, efficiency, and factors associated with bronchoscopy [23-28]. These surveys have not shed light on the clinical circumstances relevant to the individual patient profile. Future studies may reveal more specific, apparent, and clear-cut consequences relevant with the effectiveness of such factors other than anxiety. The hallmark of our study is the existence of a high correlation between the BECK anxiety score and the bronchoscopy adversity that may lead to a great challenge for the clinician. On the other hand, the association of BECK depression score with a successful bronchoscopic intervention among our patients is unclear. Despite all its restrictions, our study is a pioneer in revealing the fundamental determinant of the bronchoscopy pitfall faced by the patients during the procedure appears to be anxiety related drawback.

Conclusions

Patient anxiety appears to be the most significant determinant for bronchoscopy tolerance of the individual. Anxiety caused by the psychological stress associated with the procedure emerges as the greatest clinician challenge for a successful intervention. Factors associated with anxiety occur due to the psychological burden created by the stress due to the probable complications of an airway related intervention and the preliminary diagnosis of malignancy in most of the patient's undergoing bronchoscopy. Apart from the existence of anxiety that arises as the hallmark for a prosperous bronchoscopic intervention, another crucial finding of our study is the unclear and indistinct conclusion for the entity of unfavorable or adverse factors like old age, pulmonary function level, lavage or sputum cytology, and comorbid diseases for a successful bronchoscopic intervention. A significant correlation between age, smoking, pulmonary function level, and existence of comorbid diseases relevant with an adverse bronchoscopy intervention could not be demonstrated in our study. Statistical significance of the cytologic analysis for the presence of specific cellular types in bronchoalveolar or sputum samples in regard to a successful procedure requires to be verified by further studies since the existence of normal, inflammatory, reactive, atypical or malignant epithelial cells may emerge as a crucial determining factor for an accomplished bronchoscopy due its established clinical but a low statistical significance in our study.

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