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Assessing the Degree of Satisfaction, Duration, and Level of Cooperativeness among Patients Undergoing Flexible Bronchoscopy

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Abstract

BACKGROUND: Bronchoscopy is an invasive procedure that has been used for a long time for diagnostic and therapeutic purposes.

AIM: The objective of the study was to assess the degree of satisfaction, duration, and level of cooperativeness among patients undergoing flexible fiberoptic bronchoscopy.

METHODS: The quasi-experimental study was carried out on 128 flexible bronchoscopy patients that were equally divided into control and study groups. The program was applied only to the study group, and all procedure steps were discussed with patients by video records. The anxiety level score, patient satisfaction, and duration of the procedure were assessed in both groups.

RESULTS: The highest age range of patients was 61–90 years, with 38 patients from the study group (59.4%) and 44 from the control group (68.8%). Furthermore, in both groups, most patients were illiterate, non-smokers, from non-duty areas, not city center residents, and had more than one associated comorbidities. The hospital anxiety scale was highly significant in the study group ($p = 0.0001$), and the patient's satisfaction rate in the same group was significant ($p = 0.001$). The procedure duration was significantly shorter in the study group (1.381 min) than in the control group.

CONCLUSIONS: Patients with a better knowledge of the bronchoscopy procedure were more comfortable with the process, and the procedure duration was significantly shorter. Moreover, the process results in minimizing the levels of anxiety and improving the tolerability of the patients.

Introduction

There are many challenges associated with placing an endotracheal tube in an awake patient, and the fiberoptic bronchoscope must be able to overcome the airway is difficult [1]. These include limited mouth opening, excess tissue, tumor masses, abundant secretions, compromised neck mobility, or anatomic characteristics that make direct laryngoscopy difficult [2].

Flexible fiberoptic bronchoscopy (FOB) is commonly used for diagnostic and therapeutic indications of respiratory pathologies, especially during emergencies. Any delay because of airway difficulties can lead to hypoxia that may result in catastrophic neurological injury or death. Thus, FOB is performed very frequently in pulmonology and cardiothoracic services where the patients are most critically ill or desperately in need of it [3].

Patient cooperation is fundamental for the FOB procedure's success and for avoiding repetition [4]. The factors that positively affect the success rate and outcome in flexible bronchoscopy are the patient's comfort, better knowledge and preparation for the procedure, and proper upper airway anesthesia before the process [5].

FOB techniques require sedation and airway topicalization strategies but are still not mutually exclusive. However, one of the most common complications of this technique is failure to place the endotracheal tube, often because of difficulty in passing the tube at the level of the vocal cords [6]. It is well known that the endotracheal tube can get hung up on the vocal cords as it is usually pushed blindly over the scope. In addition, FOB has been shown to be associated with oxygen desaturation and multiple attempts due to the secretions and blood in the airway [7].

Classically, FOB-assisted tracheal intubation was the method of choice in the awake patient; however, in several extensive reviews, sharp intubation failure rates are only 1–2% with minimum performance time [8]. Hence, developing a new generation of video laryngoscopes has revolutionized the approach to tracheal intubation in anesthetized patients. Still, the

question of whether video laryngoscopes have a place in the intubation of the difficult airway in the awake patient has not been fully studied [9].

Our study aimed to apply an educational program to increase patients' knowledge of bronchoscopic procedures. It was thought this program could lead to better procedure implementation and reduce periprocedural complications.

Patients and Methods

Sample size

A total of 128 adult patients who required flexible bronchoscopy were consecutively included in the study that attended the Bronchoscopy Unit, Cardiothoracic Department, Shar Teaching Hospital, Sulaimaniyah, Iraq from January 2021 to November 2021.

Study setting

The patients were randomly divided into two groups of 64 patients each (study and control groups). Patients in the study group were given the designed educational program about the bronchoscopy procedure. In contrast, patients in another group did not receive any educational program about the process besides basic consent and a simple explanation.

Inclusion criteria

Adult alert patients aged 18 years and those able to communicate verbally were included in this study regardless of gender.

Exclusion criteria

Children and un-cooperated patients, such as those who suffered from a neuropsychiatric disorder, were excluded from the study.

Patient consent

Signed informed consent was obtained from all the patients who were candidates for flexible bronchoscopy. A well-trained professional nurse, under the supervision of an expert in the field of bronchoscopy, explained the educational program to the enrolled patients. Patients were free to quit at any stage of the process.

Questionnaire

A well-designed was used to collect socio-demographic data, associated comorbidity, previous history of bronchoscopy, and any intervention experience concerning the procedure from the patients.

Hospital anxiety scale (HAS)

It was used to assess the degree of procedure-related anxiety, with the score ranging from 0 to 21. Items were ranked on a four-point Likert-type scale that ranged from 0 to 3. Scores from 0 to 7 indicated normal anxiety levels, and then borderline anxiety showed from 8 to 10, while the scores for abnormal anxiety levels ranged from 11 to 21 [10].

Educational program

The educational program of the study was composed of three parts. The design of the first part was a leaflet containing detailed information, with photos, about the procedure in the patient's mother language. The patient's level of education and understanding was considered during the assessment. A description and structure of the respiratory system, and a definition and indication of bronchoscopy, were mentioned clearly and briefly. Further, the patient's preparation before bronchoscopy, and the precautions that should be taken during and after the bronchoscopy, were included in the study.

The second and third parts of the educational program were the recorded audio-visual information with the technique and route of administration of the anesthetics that were given to the patients. All this information was clarified in the first record. Moreover, the technique and practice of the procedure were explained in the second record, which included and highlighted the patient's position, the method of inserting a flexible tube through the mouth or nose, and how it went down to the trachea and different lobar bronchi.

For the study group, instructions were given to the patients a day before the procedure, and an individual face-to-face interview was performed with each patient. The first interview was about 45 min, and all information considering the bronchoscopy was illustrated. The second interview was done on the day of the procedure. At this time, the vital signs, hospital anxiety, scale, and personal characteristics of the studied patients were assessed, which took approximately 20 min. This assessment began 1–2 h before the procedure, in which the patients looked at the video records for 2–4 min.

For the control group, an interview was done on the day of the procedure. Detailed instructions concerning the bronchoscopy were not given to them. Both groups recorded personal characteristics, vital signs, and the HAS at least 60–90 min before the procedure. Pre-procedural nasal oxygen was administered for 10 min in both groups at a rate of 5.0 L/min. Oxygen supplement was given to the control

group during the procedure and afterward for at least 30 min. However, oxygen was only delivered before the process for the case group.

Study protocol

Initially, intra-procedural assessments were done for both groups, including difficulties during bronchoscopy, hemodynamic parameters (heart rate, oxygen saturation, and blood pressure), abnormal movement, complications, and procedure duration. Then, the duration started from the insertion of a flexible tube into the nose until retrieving the scope from the nose was measured. 1 h after the procedure, both groups were re-assessed for vital signs, patient satisfaction with the process, and any discomfort they experienced. A fiberoptic flexible bronchoscope (Olympus® EXERA II BF-P180, Video Bronchoscope, Japan) was used for all patients.

Statistical analysis

The collected data have been organized, categorized, and tabulated. Then, (Statistical Package for the Social Sciences Inc., Chicago, IL, USA) version 25 was used for analysis. The data have been tested for normality using the Anderson-Darling test and for homogeneity variance before further analysis. Number and percentage were used for categorical variables. However, the continuous variable was designated by mean and SD. Categorical variables were compared using the Chi-square test, though the continuous variables were associated using the t-test. A two-tailed $p < 0.05$ was measured statically significant.

Results

Regarding the socio-demographic characteristics, in a total of 64 patients in the study group, 44 (68.8%) were males, and 20 (31.3%) were females, while in the control group of 64 patients, the males were 38 (59.4%) and females were 26 (40.6%). The rate of illiterate patients in both groups was about two-thirds. The highest patient age ranged between 61 and 90 years, with 38 patients in the study group (59.4%) and 44 in the control group (68.8%). About <1/3 of the study group (28.1%) and >1/3 of the control group (37.5%) were smokers. The rate of non-dusty participants in both groups was close; that was 73.4% in the study group and 79.7% in the control group. The small ratio in both groups was free from associated comorbidities, about 17.2% in the study group and 21.9% in the control group (Table 1).

Table 2 illustrates oxygen saturation (SPO_2) and heart rate level in both groups before, during, and after the procedure. The mean SPO_2 levels of the educated group before, during, and after the procedure were 95.42, 94.47, and 95.14, respectively, while they were 93.94, 93.64, and 93.77, respectively, in the control group. In addition, the range of the heart rate level in the informed group before, during, and after the procedure was 69, 79, and 60, with a mean of 92.17, 112.44, and 91.22, respectively, but in the other group; the range was 72, 106, and 65, with mean of 92.41, 121.97, and 98.52, respectively. The mean of SPO_2 before, during, and after the procedure was slightly higher in the control group. Tachycardia was not evident in the study group, but it was very problematic in the control group.

Moreover, the blood pressure measurement (systolic and diastolic) and respiratory rate (RR) of both groups with the duration of the procedure are highlighted

Table 1: Socio-demographic characteristics of patients in both groups

Socio-demographic characteristic	Group			
	Study		Control	
	No.	%	No.	%
Age				
<30 years	6	9.4	2	3.1
31–60 years	20	31.3	18	28.1
61–90 years	38	59.4	44	68.8
Total	64	100	64	100
Mean ± SD	59.1 ± 16.4		62.0 ± 14.1	
Gender				
Male	44	68.8	38	59.4
Female	20	31.3	26	40.6
Total	64	100	64	100
Education				
Illiterate	40	62.5	41	64.1
Secondary	17	26.6	14	21.9
High school	5	7.8	5	7.8
University graduated	1	1.6	3	4.7
Other	1	1.6	1	1.6
Total	64	100	64	100
Residence				
City center	21	32.8	26	40.6
Others	43	67.2	38	59.4
Total	64	100	64	100
Occupation				
Dusty	17	26.6	13	20.3
Non dusty	47	73.4	51	79.7
Total	64	100.0	64	100.0
Smoking habits				
Current smoker	18	28.1	24	37.5
Cesate smoking	19	29.7	12	18.8
Passive smoker	2	3.1	3	4.7
Non-smoker	25	39.1	25	39.1
Total	64	100	64	100
Associated comorbidity				
None	11	17.2	14	21.9
COPD	2	3.1	1	1.6
Chronic bronchitis	11	17.2	6	9.4
Renal problem	2	1.6	2	3.1
Diabetes mellitus	11	17.2	16	25.0
Cardiovascular disease	9	14.1	6	9.4
More than one	1	1.6	1	1.6
Others	18	28.1	18	28.1
Total	64	100	64	100

Table 2: Explains the level of heart rate with SPO_2 saturation in patients of both groups before, during, and after the procedure

PR/SPO_2	Heart rate before	Heart rate during	Heart rate after	SPO_2 before	SPO_2 during	SPO_2 after
Study group						
Maximum	129	147	120	99	99	99
Minimum	60	68	60	90	84	85
Range	69	79	60			
Mean	92.17	112.44	91.22	95.42	94.47	95.14
Control group						
Maximum	132	164	135	99	99	99
Minimum	60	58	70	60	82	70
Range	72	106	65			
Mean	92.41	121.97	98.52	93.94	93.64	93.77

PR: Pulse rate, SPO_2: Oxygen saturation.

in Table 3. The mean of both hemodynamic parameters before and after the procedure of the educated group was 123.72 and 120.63 systolic blood pressure (SBP), 79.52 and 76.41 diastolic blood pressure (DBP), with RR of 17.73 and 18.39. At the same time, the uneducated group was 131.09 and 125.91 SBP, 78.06 and 74.48 DBP, with RR of 20.75 and 20.05 before and after the procedure. The mean duration of the procedure in the study group was 4.45 min which was shorter than the control group (6.5 min).

Table 3: Illustrates the BP, PR, and duration of the procedure in patients of both groups before, during, and after the procedure

BP/RR duration	SBP before	SBP after	DBP before	DBP after	RR before	RR after	Duration/ minute
Study							
Maximum	179	195	105	106	24	24	9
Group							
Minimum	90	80	60	60	15	15	2
Range	89	115	45	46	9	9	7
Mean	123.72	120.63	79.52	76.41	17.73	18.39	4.45
Control group							
Maximum	195	173	100	100	27	25	12
Minimum	90	90	55	55	15	15	3
Range	105	83	45	45	12	10	9
Mean	131.09	125.91	78.06	74.48	20.75	20.05	6.50

SBP: Systolic blood pressure, DBP: Diastolic blood pressure, RR: Respiration rate.

Table 4 presents the overall HAS level of both groups, which was highly significant (p = 0.0001) for the normal condition in both groups. Regarding the borderline/abnormal conditions, there was no record in a study group, with 64.1% and 9.4% for the control group, respectively.

Table 4: Presents the anxiety scale level among patients of both groups

Overall anxiety	Control group		Study group		p-value (Independent t-test)
	Frequency	%	Frequency	%	
Normal	17	26.6	64	100	0.0001*
Borderline	41	64.1	0	0	
Abnormal	6	9.4	0	0	

*Highly significant.

Table 5 clarifies the patient's satisfaction with the procedure and willingness to return among both groups. The most significant number of the educated group (54 out of 64) defiantly agreed to repeat the procedure; however, 57 patients in the other group were probably not ready to repeat the procedure if they needed it (p = 0.001). In addition, slightly all informed participants were satisfied with pre-procedure information, but less than half of the uneducated group were not satisfied with the pre-information procedure (p = 0.001).

Table 5: Clarifies the patient's satisfaction of the pre-procedure information and willing to return

Variable	Valid	No. study group	No. control group	Chi-square test	df	p-value
Willing to return	Definitely yes	54	0	124.364	3	0.001*
	Probably yes	10	1			
	Not sure	0	6			
	Probably no	0	57			
	Total	64	64			
Satisfaction with pre-bronchoscopy information	Definitely yes	63		126.0	4	0.001*
	Probably yes	1	1			
	Not sure	0	11			
	Probably no	0	22			
	Definitely no	0	30			
	Total	64	64			

*Significant difference.

Finally, Table 6 shows patients' cough levels during flexible bronchoscopy. The majority of patients, 51 (79.7%) in the studied group, rarely had a cough. In comparison, the intermittent cough was found in 40 (62.5%) patients in the control group during the process, with a highly significant difference between both groups (p < 0.001).

Table 6: The patient's breathing status in each group during the flexible bronchoscopy

Cough during flexible bronchoscopy	Validity	Case group (%)	Control group (%)	Chi-square	df	p-value
	Very severe	0.0	14 (21.9)	98.655	3	<0.001*
	Intermittent	9 (14.1)	40 (62.5)			
	Not much	4 (6.3)	9 (14.1)			
	Rarely	51 (79.7)	1 (1.6)			
	I don't know	0.0	0.0			
	Total	64	64			

*Highly significant difference.

Discussion

FOB is one of the most stressful procedures in medical practice, as it creates a sensation of asphyxia and periprocedural complications among patients [11]. In this study, approximately one-fifth of the control group participants and a quarter of the study group were workers in the construction domains. This is a risk factor for many pulmonary diseases, such as pneumoconiosis, lung cancer, and chronic obstructive pulmonary disease [12]. Some of them also worked outside as farmers, which prescribes as dusty work. More studies approved the idea and agreed with this finding [13], [14].

In our study group, all the patients were comfortable and reluctant to repeat the procedure if required, and about 55% were willing to return. These outcomes are consistent with Madkour *et al*., 2015 on Egyptian patients [15]. Lechtzin *et al*. 2022 also stated that some patients were comfortable and felt safe to the point where they were ready to re-do the examination whenever necessary [16]. In addition, the study argues that well-explained instructions to patients were associated with a definite willingness to return.

We also discovered that satisfaction among the study group patients was significant (p = 0.001), similar to the outcomes of a prospective single-center randomized controlled trial on 59 patients at German University Hospital [17]. Other authors have stated that patient cooperation depends on the comfort level after an initial bronchoscopy [5].

Another point that affects patients' discomfort is the duration of the procedure; some papers have argued that longer examination time is associated with patient discomfort [18], [19], however; our study revealed that the duration of the procedure was significantly shorter in the study group than the control group.

Moreover, we realized that the anxiety scale in the study group was significantly low, which agreed with Choi *et al*., 2016, who stated that talking with

the patients before the procedure greatly minimizes anxiety levels among them [20]. Furthermore, Hasan *et al*., 2018 mentioned that using an educational program for patients raises tolerability and easiness and minimizes procedure-related complications [7]. Many other researchers have also highlighted that a significant factor that affects tolerability is patients' comfort during the procedure [5].

Moreover, one piece of current research describes how the assessment of anxiety levels before the procedure can help the examiner anticipate patients' anxiety levels. Further research mentioned that anxiety is the predominant factor for patient tolerance [21], [22]. Anxiety also reduced the mean heart rate and systolic and diastolic blood pressure, which are significantly lower in our study group compared to the un-interventional group. These findings are relevant to the outcomes of another study that used music during bronchoscopy to reduce the level of anxiety in patients [23]. Coughing is distressing to the patient and bronchoscopist equally. However, this disturbing symptom was lower in our study group than in the control group, as a positive correlation was found between coughing and patient discomfort. Similar results were found by Hadzri *et al*. 2010 [24] and Madkour *et al*., 2013 [15].

Conclusions

Our study shows that when patients were fully informed about the FOB, their tolerability and comfort were improved during the procedure. In addition, the shorter duration of the procedure is another significant point that affects the patient's comfort. Therefore, further study of patient assessments for the bronchoscopy procedure is recommended.

Author Contribution

RSK: Conceptualization, data collection, data analysis, and writing the original manuscript, ABM: Supervision, resources, validation, edition, proof-reading, and corrections.

Ethical Considerations

The Ethical Committee of the College of Medicine, University of Sulaimani, approved the study protocol with the number 60/7/03/2021.

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