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RESEARCH ARTICLE

Pre-procedure preparation, monitoring, premedication and sedation practices of bronchoscopists in Türkiye

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ABSTRACT

Pre-procedure preparation, monitoring, premedication and sedation practices of bronchoscopists in Türkiye

Introduction: Sedation is often required during flexible fiberoptic bronchoscopy (FFB) to ensure patient comfort and the success of the procedure. The choice of sedative agents may differ between anesthesiologists and pulmonologists. This pilot study aimed to investigate the current pre-procedure preparation, monitoring, premedication and sedation practices for FFB in Türkiye, focusing on the preferences and practices of pulmonologists.

Materials and Methods: A structured survey consisting of 30 questions was distributed to pulmonologists at various hospitals in Türkiye via Google Forms. A total of 97 responses were received, of which 80 were analyzed. Participants were divided into two groups based on their FFB experience: Group 1 with ≥10 years of experience and Group 2 with <10 years of experience.

Results: The majority of pulmonologists ordered complete blood count, biochemistry, and coagulation tests before the procedure. The most preferred oral ingestion duration was 6-8 hours. Additionally, 98% of the physicians reported using at least one agent for premedication purposes. Routine topical local anesthetic use was high in both groups (88.3% and 85%, respectively). In addition, 40% of the physicians stated that they always applied sedation during FOB, and 48% stated that they applied sedation in certain situations, and that patient request was the most effective factor. Without the assistance of an anesthesiologist, pulmonologists preferred mono midazolam or a combination of midazolam and fentanyl for sedation. In Group 1, two physicians reported using dexmedetomidine for combination sedation. It was also determined that propofol was not used in cases where an anesthesiologist was not available. Additionally, 47% of the physicians reported that they found current sedation practices completely adequate.

Conclusion: Findings highlight the variability in sedation practices for FFB in Türkiye and underscore the need for standardized guidelines to optimize patient care and procedural outcomes. This study can be considered as a fundamental step towards more comprehensive studies by pulmonologists.

Key words: Bronchoscopy; sedation; premedication; Türkiye

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ÖZ

Türkiye’de bronkoskopistlerin işlem öncesi hazırlık, izleme, premedikasyon ve sedasyon uygulamaları

Giriş: Sedasyon, fleksibl fiberoptik bronkoskopi (FFB) sırasında hasta konforunu sağlamak ve prosedürün başarısını arttırmak için sıklıkla gereklidir. Sedatif ajanların seçimi, anestezi uzmanları ile pulmonologlar arasında farklılık gösterebilir. Bu pilot çalışma, Türkiye’de FFB için mevcut ön hazırlık, izleme, premedikasyon ve sedasyon uygulamalarını incelemeyi, özellikle pulmonologların tercih ve uygulamalarına odaklanmayı amaçlamaktadır.

Materyal ve Metod: Türkiye’deki çeşitli hastanelerdeki pulmonologlara yönelik 30 sorudan oluşan yapılandırılmış bir anket, Google Forms aracılığıyla dağıtılmıştır. Toplam 97 yanıt alınmış, bunlardan 80’i analiz edilmiştir. Katılımcılar, FFB deneyimlerine göre iki gruba ayrılmıştır: Grup 1 (≥ 10 yıl deneyim) ve Grup 2 (< 10 yıl deneyim).

Bulgular: Pulmonologların çoğu, prosedür öncesinde tam kan sayımı, biyokimya ve koagülasyon testlerini istemektedir. En çok tercih edilen açıklık süresi 6-8 saat olarak belirlenmiştir. Ayrıca, doktorların %98’i premedikasyon için en az bir ajan kullandığını bildirmiştir. Lokal anesteziklerin rutin kullanımı her iki grupta da yüksektir (%88.3 ve %85). %40’ı her zaman sedasyon uygularken, %48’i belirli durumlarda, hasta talebinin en etkili faktör olduğunu belirtmiştir. Anestezi uzmanı olmadan, pulmonologlar genellikle midazolam ya da midazolam ve fentanil kombinasyonunu tercih etmektedir. Grup 1’de iki doktor, kombinasyon sedasyonu için dexmedetomidin kullandığını belirtmiştir. Anestezi uzmanı yoksa propofol kullanılmadığı tespit edilmiştir. Ayrıca, %47’si mevcut sedasyon uygulamalarını tamamen yeterli bulmaktadır.

Sonuç: Bulgular, Türkiye’de FFB için sedasyon uygulamalarındaki değişkenliği vurgulamakta ve hasta bakımını optimize etmek için standartlaştırılmış kılavuzlara duyulan ihtiyacı ortaya koymaktadır. Bu çalışma, pulmonologlar tarafından daha kapsamlı araştırmalar için temel bir adım olarak değerlendirilebilir.

Anahtar kelimeler: Bronkoskopi; sedasyon; premedikasyon; Türkiye

INTRODUCTION

Flexible fiberoptic bronchoscopy (FFB) is a widely used procedure for diagnosing and treating the tracheobronchial tree (1). The flexible method Dr. Shigeto Ikeda first applied in the 1970s has become more commonly used in correlation with technological developments (2,3). Undoubtedly, intervention in the oropharynx and airway is difficult for patients to tolerate. While local anesthesia was considered sufficient in the past, sedation is now recommended to eliminate the feeling of discomfort and to increase comfort during the procedure (4).

Various studies worldwide have tried to establish guiding protocols for applying sedation in the FOB procedure, although standardization has yet to be achieved (5). Both anesthesiologists and pulmonologists can administer sedoanalgesia. The methods and preferred medications may differ from physician to physician (6). Sedation and monitoring preferences in bronchoscopy have been published in line with the results of national surveys, the largest of which were published in North America (1991) and Germany (2000), with 871 and 681 participants, respectively (7,8).

The importance of evaluation and feedback for change and development is indisputable. The recommendations in the guidelines for FFB are related to the procedure and include follow-up and feedback on the applications at specific intervals (9). This study

aimed to present sedoanalgesia attitudes and behaviors preferred by pulmonologists during the FFB procedure in Türkiye. The study included FFB, the most widely used procedure, but did not include rigid bronchoscopy and endobronchial ultrasonography parameters.

MATERIALS and METHODS

Local ethics committee approval (OMUKAEK:B.30.2. ODM.0.20.08/340) was obtained for the study and clinical trial registration (NCT06000995) was made. The literature was reviewed to determine the questionnaire to be used as a data collection method. After evaluating the most appropriate articles for our study, we contacted Dr. Thomas and Dr. Hautmann (10,11). We first determined 50 questions in line with the literature. Then, we sent them to seven experts via network mail and asked them to evaluate them. The questions were evaluated according to a three-point scale: 1. Appropriate, 2. Needs correction, 3. Not appropriate. In line with the feedback from our experts, the content validity ratio (CVR) was calculated for the inclusion or exclusion of the items in the questionnaire (12). $CVR \leq 0$ meant direct elimination. According to the Lawshe technique, the critical content validity ratio (CVR-critical) was used for each item with a $CVR > 0$ at the $\alpha = 0.05$ significance level. At the $\alpha = 0.05$ significance level, the CVR-critical value for seven experts was 1.0 (13). Accordingly, we excluded items with a CVR-critical < 1.0 from the

questionnaire and corrected questions with a CVR-critical >1 per the experts' recommendations. As a result of the corrections, we decided on 30 questions to be used during data collection. The questions generally fell into three sections: The first section involved eight questions including personal information of the physicians (age, sex, title, institution, etc.). The second section included 13 questions for general evaluation, such as those about sedoanalgesic agents used by physicians before and during the bronchoscopy procedure and satisfaction with the method used. The third section included nine questions to determine the preferred follow-up methods during the procedure (Figure 1). We created a questionnaire form to be used on the network using Google Forms. Finally, the final version of the form was approved in line with the opinions of three experts. As a pilot study group, we sent the questionnaire to 20 physicians working in different institutions, and they were asked to evaluate it. Since there were no additional suggestions regarding the questions, the survey was distributed to pulmonology groups via social media such as WhatsApp, Twitter and Facebook. According to the 2022 data of the Turkish Thoracic Association, there are approximately 2.300 chest diseases specialists and faculty members in our country.

RESULTS

We shared the survey questions online and received 97 responses in three months between May and July

2022. We excluded 17 people from the evaluation because they had not actively practiced FFB for the last five years. Analyses were made on over 80 responses.

Responses

Of the pulmonologists who participated in the survey, 46 were females and 34 were males. Mean age was 42.86 ± 7.04 years. The institutions where the physicians worked were state hospitals ($n=4$), training and research hospitals ($n=42$), private hospitals ($n=14$), university hospitals ($n=17$), and training and research and university hospitals ($n=3$), respectively. FFB experience was 11.86 ± 7.29 years. Forty-nine participants were specialists, 15 were faculty members, 12 were associate professors, and four were professors. The number of FFBs performed annually was asked for different time intervals: Before the SARS-CoV-2 pandemic and in the last year. In 2022, there was a decrease in the number of FFB procedures ($114.26 \pm 178.34/\text{year}$ and $69.76 \pm 144.95/\text{year}$, respectively) compared to the pre-pandemic period ($p<0.01$).

Pre-bronchoscopy Investigations

Table 1 presents the preparations for the procedure. In the pre-procedural preparation phase, most pulmonologists ordered a complete blood count (CBC), biochemistry, and coagulation tests before the procedure. The most preferred nil-by-mouth time was 6-8 hours.

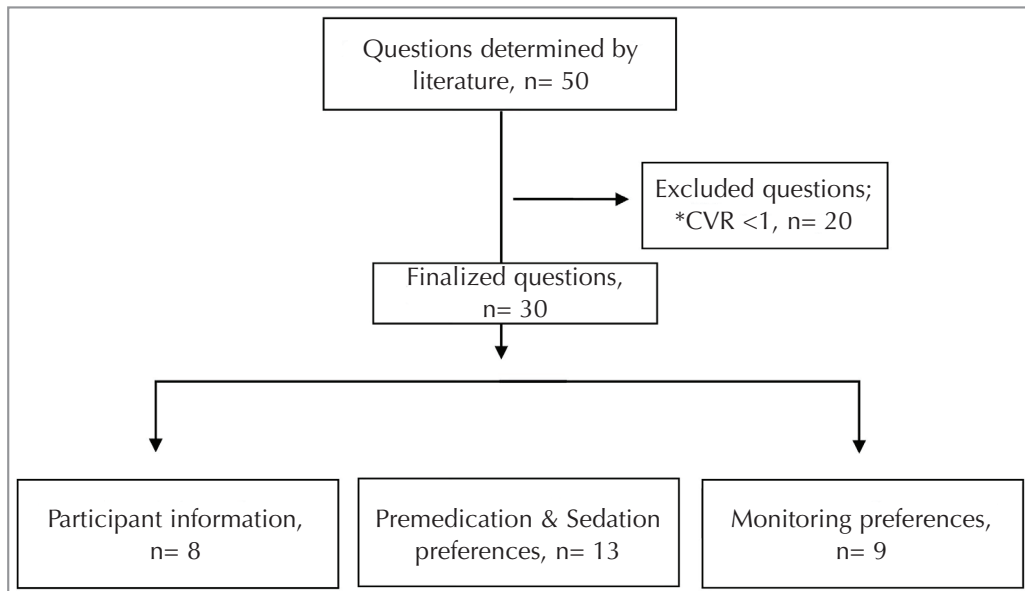


Figure 1. Flowchart of survey questions.

*CVR: Content validity ratio.

Table 1. Prebronchoscopy Investigations

Assay/Test	Nil-by-mouth policy				
	Routinely	Occasionally		with Sedation	without Sedation
CBC* (%)	85	14	6-8 h prior (%)	83	63
Biochemistry (%)	74	24	3-5 h prior (%)	11	27
Coagulation (%)	81	16	0-2 h prior (%)	4	8
Spirometry (%)	14	63	No policy (%)	2	2
Hepatitis test panel (%)	53	30			
SARS-CoV-2 (%)	41	49			
Premedication Choice					
	Routinely	Occasionally		Routinely	Occasionally
iv/im anticholinergic (%)	7	29	Diazepam (%)	5	10
inh β mimetic (%)	1	97	Midazolam (%)	65	29
inh local anesthetic (%)	64	13	Meperidine (%)	-	20
inh corticosteroid (%)	5	56	iv. corticosteroid (%)	5	68
Topical anesthetic (%)	87	6	inh cold steam (%)	3	13
inh epinephrine (%)	3	15			

CBC: Complete blood count, h: Hours, SARS-CoV-2: Severe acute respiratory syndrome coronavirus-2.

Table 2. Monitorization

Monitorisation	Oxygen Insufflation				
	Routinely	Occasionally		Routinely	Occasionally
ECG* (%)	83	11	with Sedation (%)	90	6
NIBP** (%)	78	10	without Sedation (%)	89	7
Pulse oximetry (%)	100	-			
Capnography (%)	1	11			
Transcutaneous capnography (%)	1	6			

*ECG: 3-channel electrocardiography, **NIBP: non-Invasive blood pressure.

Of the physicians, 98% stated that they used at least one agent for premedication. Topical local anesthetic use had the highest rate, with 87%. Short-acting benzodiazepines, inhaled local anesthetics, and inhaled beta mimetics were the other agents used at high rates. The use of IV/IM anticholinergics for premedication continued routinely or occasionally (36%). About 88% used sedation during FFB either as a routine or occasionally. There was no use of inhaled magnesium.

Monitorization and Safety

Table 2 and 3 summarizes the results regarding monitoring and safety. The number of attendants accompanying the physician during the procedure was minimum 1, maximum 4, and mode 2. All patients were monitored with transcutaneous pulse

oximetry during FFB. Oxygen insufflation was administered during the procedure in 96% of patients and was not associated with sedation ($p = 0.98$).

Epinephrine, endotracheal tube, laryngoscope, and oxygen mask were highly available in the procedure room. Most of the clinics that performed procedures had emergency trolleys. As for antidotes, 11.76% of the physicians stated that they did not have flumazenil even though they were using midazolam. All of the physicians who used fentanyl had access to naloxone.

All doctors worked with non-sterile gloves as personal protective measures. However, the use of other protective materials did not reach 100%.

The rate of physicians who stated that they would refrain from performing FFB procedures if no anesthesiologists were available in the hospital was 8.8%.

Table 3. Safety

Emergency Supplies			Personal Protective Equipment		
	Routinely	Occasionally		Routinely	Occasionally
Oxygen mask (%)	96	3	Surgical mask - 1 piece (%)	80	14
Balloon mask valve (%)	79	6	Surgical mask - 2 pieces (%)	14	51
Laryngoscope (%)	91	3	N95 mask (%)	36	51
Endotracheal tube (%)	94	4	Glasses (%)	36	41
Defibrillator (%)	78	20	Visor (%)	16	43
Adrenaline (%)	93	5	Bone (%)	55	29
Atropine (%)	89	5	non-Sterile gloves (%)	93	8
Anexate (%)	63	20	Sterile gloves (%)	9	44
Naloxone (%)	55	15	Apron (%)	81	9
Emergency response trolley (%)	91	8	Coveralls (%)	6	33

The rate of concern for the team's health while performing FFB during the pandemic was 80%.

Sedation

Of the physicians who responded to the questionnaire, 40% stated that they always sedate their patients during FFB and 48% in certain situations, with patient requests being the most influential factor (Table 4).

One of the questions asked was, "Does knowing that the patient will sleep during the procedure have a positive effect on decision-making for the procedure?" the responses were 57% "always" and 42% "sometimes". The rate of physicians who stated that it had no positive effect was 1%.

While 41% of the physicians always performed the sedation procedure in the presence of an anesthesiologist, 13% never had an anesthesiologist accompany them. Anesthesiologist accompaniment was preferred in procedures requiring deep sedation (68%). It was most common in training and research hospitals (18%).

Pulmonologists preferred mono midazolam or midazolam combined with fentanyl for sedation. No anesthesiologist indicated any propofol use. The agents preferred by the anesthesiologist were propofol and midazolam, either mono or in combination. The third most preferred agent was fentanyl. Other agents used less frequently were long-acting benzodiazepine, meperidine, dexmethothymine, ketamine, barbiturate, and remifentanyl (Table 4).

Table 4. Sedative choice

	Routinely	Occasionally	
Patient request (%)	36	55	
Long processing time (%)	28	63	
Presence of comorbidity (%)	13	71	
Absence of comorbidities (%)	10	58	
Sedative Choice			
	Mono Agent		
	Midazolam	Fentanyl	Propofol
Pulmonologist (%)	100	-	-
Anesthesiologist (%)	45	11	25
	Combine Agent		
	Midazolam	Fentanyl	Propofol
Pulmonologist (%)	40	40	-
Anesthesiologist (%)	28	13	33



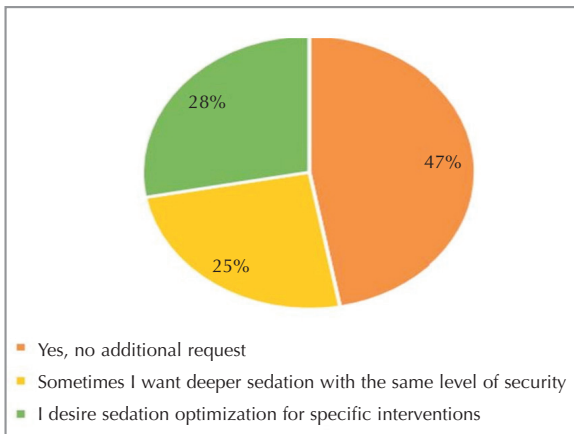


Figure 2. Satisfaction of chest diseases specialist with the sedation protocols they applied during FFB.

During FFB, 58% of the participants did not perform endotracheal intubation, while 19% stated that endotracheal intubation may be required in more complex interventions and 15% in critically ill patients.

The time for the patient to leave the hospital was 120 (120) minutes. This time was obtained from the responses of physicians who administered sedation. Physicians who did not administer sedation did not answer this question.

While 92% of the physicians stated that they learned their sedation practices from the anesthesiologist, 47% found the practice they were using entirely sufficient. The proportion of pulmonologists who requested sedation optimization in specific procedures was 28% (Figure 2).

DISCUSSION

This study represents a pilot investigation into the FFB practices of pulmonologists in Türkiye. While the study provides valuable insights into current practices, the sample size of 80 participants is a notable limitation and restricts the generalizability of the results. The primary goal of this pilot study was to explore preliminary trends and identify areas requiring further investigation rather than to achieve nationwide representativeness. Data results can be divided into main headings as follows: Pre-procedural preparation, intra-procedural monitoring, and sedation preferences. The most striking findings were that the use of atropine in premedication continued, albeit to a lesser extent. The procedure was mostly performed under sedation, but propofol was not preferred if an

anesthesiologist was not available and full compliance with pulse oximetry monitoring was achieved.

The evaluation before FFB, a specific invasive procedure, requires detailed anamnesis and examination like surgical evaluation. Thoracic and anesthesia guidelines emphasize that preoperative laboratory evaluations should be patient-specific (9,14-16). In this context, we observed that especially CBC and coagulation tests are evaluated at a high rate before the procedure in our country. Although fasting time is recommended as two hours for clear liquids and four hours for light foods, the most common fasting duration in Türkiye is 6-8 hours before the procedure following a study on bronchoscopy practice in Australia and New Zealand (15,6).

Physicians largely used anticholinergics for premedication until the 2000s (17,18). A study of 1000 cases conducted in 2009 reported that glycopyrrolate (not atropine) was associated with decreased airway secretions reported by the bronchoscopist but not with cough and patient discomfort. Anticholinergics are not routinely recommended for FFB premedication, especially because of hemodynamic fluctuations (19). Although pulmonologists in Türkiye have largely abandoned the use of atropine in premedication, 7% continue to use it routinely. Since there is no data on previous preferences in our country, we could not make any comparisons. Corresponding with the guidelines, topical local anesthetics are routine in physicians' practice. Although several studies show that nebulized magnesium sulfate, known to have a bronchodilator effect, may have positive effects on respiratory parameters and postoperative sore throat, it has not yet found a place in physicians' practice (20,21).

Pulmonologists in Türkiye fully comply with continuous pulse oximetry monitoring recommended by the British Thoracic Society (9). Another recommendation, oxygen supplementation during the procedure, has high rates of 94% and 95.2% in other countries such as Germany and is practiced at similar rates in Türkiye (6,11). It was found that oxygen administration was independent of sedation administration to the patient.

Gown, gloves, mask, and eye gear are recommended as personal protective equipment in standard practices during FFB, and additional precautions are recommended for airborne pathogens (22,23). It was determined that pulmonologists performing FFB in

Türkiye used personal protective equipment to a large extent, if not completely. Since this study was conducted at the end of the pandemic, the rate of protective equipment such as N95, overalls, goggles, and aprons may be high, but we do not have data to compare.

The rate of physicians applying sedation during FFB is increasing day by day. In line with guideline recommendations, each patient should be sedated to a sufficient depth for the procedure unless contraindicated (4,9). As stated in the American College of Chest Physicians Consensus, propofol can be used to induce amnesia and sedation as an alternative to benzodiazepine and opioid combination. There is now talk and even a term for non-anesthesiologists' ability to administer propofol: Non-anesthesiologist-administered Propofol. Some clinics most commonly prefer the combination of propofol and midazolam, and studies support its use (11,24,25). According to the study results, propofol sedation is the most preferred agent by anesthesiologists during FFB, either mono or combined, but not by pulmonologists. What is encouraging is that the rate of non-sedation was 12%. Pulmonologists stated that they prefer anesthesiologist accompaniment when deep sedation is required. In patients requiring close hemodynamic monitoring or specialized procedures such as deep sedation, it is natural for pulmonologists to want to focus only on the procedure and demand teamwork.

CONCLUSION

We believe that this pilot study, which aimed to determine the FFB routine in Türkiye, may be the first step of more comprehensive studies to be carried out by pulmonology specialists.

Limitations

This study has several limitations. First, although a power analysis was conducted with the aim of collecting responses from 350 participants, the target sample size was not achieved within the designated cohort. As a result, the findings are presented as preliminary data from a pilot study. The rapidly evolving nature of medicine, with the introduction of new alternatives, agents, and combinations, may lead to shifts in participants' preferences over time. Publishing this study as a pilot allows for consideration of such variability. Another limitation is the unbalanced distribution of participants across different institution types. For instance, only four participants were from public hospitals, while 42 participants were from

teaching and research hospitals. This imbalance may have reduced the statistical power for comparisons between institutions and introduced potential systemic bias. Nonetheless, as the primary aim of this study was to provide pilot data, the results should be interpreted with these limitations in mind. Future studies with larger sample sizes and more balanced institutional representation will be essential to overcome these challenges. Additionally, the study was limited to questions directed solely to physicians, and the exclusion of patient perspectives is another noteworthy limitation.

Ethical Committee Approval: This study was approved by Ondokuz Mayıs University Faculty of Medicine Clinical Research Committee (Decision no: 2022/255 Date: 18.05.2022).

CONFLICT of INTEREST

The authors declare that they have no conflict of interest.

AUTHORSHIP CONTRIBUTIONS

Concept/Design: DA

Analys/Interpretation: DA, ŞCA

Data acquisition: ŞCA, HBA, GÜÖ

Writing: ST

Clinical Revision: NGA

Final Approval: MS

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