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Assessment of the approaches of pulmonologists to sedation in bronchoscopic procedures in Turkey : A survey study

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Abstract:

BACKGROUND: Sedation is recommended during fiberoptic bronchoscopy, which is a common procedure in clinical pulmonary practice. However, there is no consensus or a standard approach globally. The present study aimed to assess the approaches of pulmonologists to sedation before bronchoscopic procedures in Turkey.

MATERIALS AND METHODS: The study is designed as a cross-sectional study, based on survey-generated data. Pulmonologists working in Turkey were sent a 23-item survey via E-mail. The recipients were sent three reminders to complete the survey, and the responses were analyzed. The data analysis was carried out using the Statistical Package for the Social Sciences for Windows 15.0 package program.

RESULTS: A total of 79 pulmonologists participated in the survey, with a mean age of 43.8 ± 7.7 years. Among the respondents, 92.4% stated that they applied sedation before bronchoscopic procedures. Of the total, 92% of the respondents stated that they used midazolam for sedation, while 20% used propofol, 18.7% used fentanyl and 9% used diazepam. All of the respondents reported using local anesthesia before the bronchoscopic procedure, with lidocaine being preferred by all.

CONCLUSIONS: It was determined that most of the pulmonologists applied sedation during bronchoscopy usually in the form of mild-to-moderate sedation, with midazolam being the preferred medication. Of the respondents, 75% believed that the applied sedation was sufficient. Surveys like this could play a role in improving the implementation and application of international guidelines in Turkey.

Keywords:

Bronchoscopy, conscious sedation, Turkey

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Introduction

Sedation during fiberoptic bronchoscopy enhances patient satisfaction and procedural tolerance, according to the ACCP and BTS guidelines. There is a commonly held view that sedation should be recommended to the patient as an option in the absence of contraindication.[1-3] The desired level of sedation is conscious-moderate – which is a state of depressed consciousness at which airway patency and respiratory and cardiac functions are maintained, and at which the patient can respond to verbal commands.[4] The agent selected for sedation should be administered in incremental doses on a needs basis, rather than in fixed doses, although care should be taken to ensure that the depth of sedation does not exceed level 3 on the Ramsey sedation scale [Table 1].

Benzodiazepines, opiates, and propofol are most commonly preferred for such procedures, while other recommended sedatives include fospropofol, Ketamine, and dexmedetomidine, used either as single agents or in combination.

Although sedation is often recommended during fiberoptic bronchoscopy – as a commonly performed procedure in the clinical practice of pulmonology – there is a lack of consensus or a standard approach to this issue, either in our country or globally.

The present survey study assesses the different approaches of pulmonologists to sedation before bronchoscopic procedures in our country. In reflecting their preferred sedation methods, the study thus supports the attainment of consensus in our country on this issue.

Subjects and Methods

This cross-sectional study is based on data obtained from a 23-item survey aimed at garnering information on the different methods of sedation applied during bronchoscopic procedures. Survey questions are presented [Table 2]. The survey was sent via E-mail to pulmonologists working in various cities and at various centers in our country, with reminders to complete the survey sent out three times at 1-week interval. The responses of those who completed the survey were subsequently evaluated and analyzed. The study design was approved by the local scientific committee (15.12.2020/172).

Table 1: Ramsay sedation scale[5]

Point	Clinic
1	Anxious, restless, or both
2	Cooperative, orientated, and tranquil
3	Responding to commands
4	Brisk response to stimulus
5	Sluggish response to stimulus
6	No response to stimulus

Statistical analysis

The Statistical Package for the Social Sciences for Windows 15. 0 package program (IBM, Newyork, USA) was used for the statistical analysis of the data. Data were summarized as mean and standard deviation for normally distributed continuous variables; median and interquartile range 25th–75th percentiles for skewness continuous variables or absolute number and percentage for categorical variables, as appropriate. A value of $P < 0.05$ was considered statistically significant.

Results

A total of 79 pulmonologists completed the E-mailed survey. Of the respondents, 69.6% were female and 30.4% were male, with a mean age of 43.8 ± 7.7 years.

The mean duration of working as a pulmonologist was 13.6 ± 8.1 years. Most of the respondents were working in the provinces of Istanbul and Ankara (53.2%), followed by İzmir. Distribution by the institution of respondents is shown in Table 3. In the institutions, in which the respondents were working, 98.7% had a bronchoscopy unit, 72% had a patient preparation room, 65% had a postoperative recovery room and 34.2% had an interventional bronchology unit.

The mean number of bronchoscopy procedures performed each week in the centers of the respondents was 25 ± 16.

It was stated that a prebronchoscopy anesthesia assessment was requested at a rate of 35.4%.

The pulmonologists recommended various fasting periods before the bronchoscopic procedure, with durations of >8 h recommended by 45%, 6–8 h by 18%, and 4–6 h by 37% of the respondents. Among the respondents, 92.4% stated that they applied sedation as routine before bronchoscopic procedures.

Of the respondents, 92% stated that they used midazolam for sedation, 20% used propofol, 18.7% used fentanyl, and 9% used diazepam [Table 4]. The sedative was administered by a bronchoscopy nurse in 62.8%, a pulmonologist in 20%, an anesthesiologist in 12.5%, and an anesthetic technician in 7.8% of the centers.

For monitoring during the bronchoscopic procedure: saturation monitoring was performed by 100%, heart rate monitoring was performed by 97.5% and blood pressure

Table 2: Survey questions

What is your area of expertise?
How old are you?
What is your gender?
How many years have you been working as a chest diseases specialist?
Which city do you work in?
Which institution do you work from?
What is the number of chest diseases beds in your institution?
Please tick the ones in your institution
Chest polyclinic
Chest clinic
Recovery room
Anesthesia polyclinic
Bronchoscopy room/unit
Interventional pulmonology unit
Patient preparation room
What is the average number of bronchoscopy performed in a week in your institution?
Is anesthesia assessment routinely done in your institution before bronchoscopy?
How long do you recommend fasting before bronchoscopy?
Do you apply sedation before bronchoscopic procedures?
If your answer is yes, please tick the sedation drugs and/or drugs you routinely use
Midazolam
Diazepam
Lorazepam
Fentanyl
Remifentanil
Ketamine
Propofol
Dexmedetomidine
Other
Who gives sedation medications to the patient?
Anesthesiologist
Anesthesia technician
Bronchoscopy nurse
Pulmonologist
Anesthesiologist
Where do you perform bronchoscopic procedures?
Bronchoscopy room/unit
Operating room
Other
Which ones are used for monitoring in bronchoscopy patients?
Blood pressure
Heart rate
Oxygen saturation
End tidal carbon dioxide
Bispectral index
Do you give local anesthetic to the patient before bronchoscopy?
If your answer is yes, which drug do you use?
Do you routinely use antidotes for the medications after the procedure?
Do you use any scoring system for recovery after bronchoscopy procedure?
Where do you follow patients after bronchoscopy?
Do you think the sedation you apply is sufficient for patient satisfaction?
Does the sedation you apply provide you sufficient comfort?

monitoring was performed by 91%. The rate of end-tidal carbon dioxide ($EtCO_2$) measurement was 2.5%.

All pulmonologists administered local anesthesia to the patients before the bronchoscopic procedure, and all (100%) used lidocaine.

Following the procedure, most (91%) of the pulmonologists did not use an antidote, and93.6% did not apply any scoring approach to recovery after the bronchoscopic procedure.

Following the bronchoscopic procedure, the patients were left to recover in the recovery room at a rate of 65%, in the ward at a rate of 26.5%, and in a waiting room at a rate of 16.5%.

In response to the question, "Do you think the applied sedation provide sufficient patient satisfaction?" 75% of the pulmonologists responded yes, and 25% responded no.

Discussion

Fiberoptic bronchoscopy is an invasive procedure that plays an important role in the diagnosis and treatment of pulmonary diseases, and that is in common use in clinical practice. Centers apply different rules to whether or not sedation is applied, to the type of sedation administered and to the agents used.

This survey study was conducted to assess the level of implementation of the international guidelines in our country regarding sedation before bronchoscopic procedures. The findings of the present study indicate that most pulmonologists apply sedation during bronchoscopic procedures and that the most commonly used agent is midazolam. All of the pulmonologists administered local anesthesia in the form of lidocaine before the procedure.

The Diagnostic and Therapeutic Bronchoscopy Consensus Statement (2017) stated that around 80,000 bronchoscopic procedures are implemented every year in around 500 hospitals in our country.[6] Among these, around 25% are carried out in four training and research hospitals, 55% in university and training hospitals, and 20% in various other units.[7] In the present study, 40% of the respondents were employed in university hospitals, 24% in training and research hospitals, 20% in chest disease and thoracic surgery training and research hospitals, 10% in private hospitals, and 6% in state hospitals. Most of the participants worked in the provinces of Istanbul and Ankara (53.2%), followed by İzmir.

Fiberoptic bronchoscopy can be performed safely in the intensive care unit, at the bedside, in the operating

Table 3: Distribution of respondents by institution

Distribution by institution	*n*=79, (%)
University hospital	40
Training and research hospital	24
Chest diseases and thoracic surgery training and research hospital	20
Private hospital	10
State hospital	6

Table 4: Distribution of sedative agents used

Sedative agents	%
Midazolam (%)	92
Propofol (%)	20
Fentanyl (%)	18.7
Diazepam (%)	9

room and in all clinical areas containing the appropriate equipment. The bronchoscopy unit should be structured based on the volume of the center and the experience of the bronchoscopists and should take into account any additional procedures to be performed.

An Ideal Bronchoscopy Unit should have a place to keep all of the equipment required for the bronchoscopy, a preprocedure patient preparation area, an area where the procedure is to be carried out, and an area for the monitoring of the patient after the procedure. In the present study, 98.7% of the institutes in which the respondents were working had a bronchoscopy unit, 72% had a patient preparation room, 65% had a postoperative recovery room and 34.2% had an interventional bronchology unit.

The American Society of Anesthesiologists guidelines recommends a minimum 4–6 h of fasting after light meals, 8 h after normal meals and 2 h after clear liquids before such interventional procedures as bronchoscopy.[8] In the present study, the respondents recommended various fasting periods before bronchoscopic procedures, being predominantly > 8 h in 45% of the responses, whereas 37% recommended 4–6 h and 18% recommended 6–8 h of fasting. A UK survey study by Smyth *et al*. reported that 4–8 h of fasting was preferred to a great extent (77.3%).[9] It was found in the present study that almost half of the pulmonologists asked patients to fast for longer than the recommended periods.

Flexible bronchoscopy is performed mostly under local anesthesia, with or without sedation, and may occasionally be performed under general anesthesia. Sedation enhances patient satisfaction and procedural tolerance, according to the ACCP and BTS guidelines.[1,2,10] The desired level of sedation is conscious-moderate, during which airway patency and respiratory and cardiac functions are maintained, and the patient is able to respond to verbal commands. According to a survey conducted in Switzerland, 95% of the centers reported applying sedation during bronchoscopy.[11] The present study observed that a vast majority (92.4%) of the respondent pulmonologists applied sedation before bronchoscopic procedures, in line with the literature, while this rate was reported to be 88% in a survey study in Germany[12] and relatively lower at 75.3% in a survey conducted in Japan.[13]

An ideal sedative agent should be rapid- and short-acting, and cognitive function should recover quickly.[14] It should have analgesic and amnesic properties, should not impair cardiovascular stability and should not cause respiratory depression. The appropriate sedative agents in this regard include Benzodiazepines (Midazolam, Lorazepam, Diazepam), Opiates (Alfentanyl, Fentanyl, Hydrocodone, and Remifentanyl), Propofol, Fosfopropofol, Ketamine and Dexmedetomidine. Mild or moderate sedation may be provided by a single sedative agent, or by more than one in combination.[15]

The ACCP supports the use of propofol as a safe and efficient sedation method in bronchoscopy, although it is also stated that short-acting benzodiazepines such as midazolam can be used in conjunction with an opioid.[16]

In the present study, the most frequently stated sedative agents were midazolam (92%), propofol (20%), and fentanyl (18.7%), and to a lesser extent, diazepam (9%), and a combination regime was preferred in 40% of cases. A survey study in Japan reported Midazolam to be the most commonly used agent, accounting for 76.9% of the total, which is similar to the findings of the present study.[13] Data from Germany and Switzerland report propofol being used alone or in combination.[12,17] Only 8% of bronchoscopists in Canada reported using propofol for bronchoscopy,[18] while in the present study, this rate was around 20%.

Sedation is primarily the field of anesthesiologists but is now performed also by emergency and intensive care physicians and nurses as routine.[14] In the present study, sedative agents were reported to be administered by a bronchoscopy nurse in 65.8%, by a pulmonologist in 33%, by an anesthesiologist in 21.5% and by an anesthetic technician in 8.8% of the centers. Although this is a subject that relates directly to the anesthesiology field, there is a lack of standardization in who administers sedative agents in invasive procedures like bronchoscopy. The use of sedatives with a narrow confidence interval, like propofol, in the absence of an anesthesiologist is controversial in certain countries due to concerns over safety.[1] Although anesthetic management is recommended, a study by Gaisl *et al*. in Switzerland reported propofol being used in most cases (84%) in the absence of an anesthesiologist, and the rate of

complications to be very low. The authors concluded that propofol would come to be used more over time.[11] Recommendations that propofol should be used only in the presence of anesthesiologists,[19] given its narrow therapeutic window and the possibility of producing general anesthesia and respiratory depression, has undergone changes, with suggestions that it may also be used without anesthesiologists.

In a previous retrospective study in Germany evaluating approximately 1600 bronchoscopic procedures and comparing various combinations of moderate sedation, the application of moderate sedation with triple sedative combinations (propofol, midazolam, and fentanyl) was recommended since the total dose of each agent administered could be reduced without increasing the incidence of complications.[20] When propofol combined with an opioid was compared with propofol alone, it was found to be associated with lower oxygen saturation, although close monitoring was recommended.[21] The present study also found a combination regime to be preferred, with midazolam and propofol in combination being the most popular, at a rate of 40%.

In bronchoscopy, flumazenil (Anexate) is used as antidote for midazolam.[22] The rate of antagonists used in selected patients was reported to be 38.2% in the literature,[13] while in the present study, most (91%) pulmonologists refrained from using antidotes.

Lidocaine is preferred for the topical anesthesia of the upper airways due to its short half-life and wide confidence interval, and its ability to prevent coughing and stridor while reducing the need for sedation. A previous randomized controlled study found that nebulized lidocaine provided no benefits.[23] All pulmonologists administered local anesthesia to the patients before the bronchoscopic procedure, and all used lidocaine. It has been ascertained from the literature that lidocaine is the most preferred option for local anesthesia.[9,13]

It is very important to monitor patients during sedation, with blood pressure, pulse and respiratory rate measured regularly, while continuous monitoring is recommended for oxygen saturation, $EtCO_2$ level, and cardiac rhythm.[24] All of the bronchoscopists participating in the present study monitored the patient during the procedure, and the vast majority monitored also heart rate (97.5%) and blood pressure (91%), while the rate of $EtCO_2$ measurement was 2.5%. The study by Horinouchi *et al*. reported continuous monitoring of saturation in all patients, while intermittent blood pressure was measured in 96.3%and electrocardiography monitoring was applied in 82.1% of all cases.[13] The monitoring of blood pressure, pulse, and saturation is standard practice in Switzerland,[11] although, in the study by Smyth *et al*., 82% of the respondents reported not monitoring blood pressure during bronchoscopy.[9]

Limitations

The limited number of participation in the survey is decreased the power and representation of the study. Therefore, it is not possible to generalize the results. The self-reported design may be considered a limitation of the present study, as is the case with all survey studies.

Conclusions

- It was found that most pulmonologists apply sedation during bronchoscopy– usually at a mild-to-moderate level– through the use of midazolam. Almost half of the pulmonologists use a combination of sedative agents. All of the pulmonologists administer topical anesthesia in the form of lidocaine
- Midazolam is usually administered by a bronchoscopy nurse
- Of the pulmonologists, 75% believe the applied sedation to be sufficient.

The variations in bronchoscopic applications in our country and worldwide are attributable to individual habits, learned practices, and available opportunities. The presence of a national training and application standard for bronchoscopic procedures is required to limit this variability and to improve the quality and consistency of health-care service provision.

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Conflicts of interest

There are no conflicts of interest.

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