Patient Satisfaction During Endobronchial Ultrasound-Guided Transbronchial Needle Aspiration Performed Under Conscious Sedation

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BACKGROUND: Mediastinal and hilar lymph node evaluation with endobronchial ultrasound-guided transbronchial needle aspiration (EBUS-TBNA) is being performed with increasing frequency. Original reports described performance under general anesthesia. Patient satisfaction is an important determinant of whether EBUS-TBNA may be performed under conscious sedation. METHODS: Consecutive patients undergoing EBUS-TBNA under conscious sedation completed a self-administered questionnaire 2–4 hours after the procedure. Satisfaction was determined by patient willingness to return for the procedure in the future. Patients also reported degree of recall of the procedure and any distressing symptoms. Procedural data and complications were also recorded. RESULTS: Forty-one patients underwent EBUS-TBNA, with no serious complications. The mean dose of topical airway anesthesia was 332 ± 51 mg lignocaine. The combinations and doses of intravenous sedative agents varied widely. Patient satisfaction was extremely high, with 40 patients (98%) reporting they would "definitely return" for EBUS-TBNA in the future if required, and one patient (2%) reporting he would "probably" return for such a procedure. To our knowledge, this is the highest reported patient satisfaction associated with a bronchoscopic procedure. CONCLUSIONS: EBUS-TBNA may safely be performed under conscious intravenous sedation and is associated with very high patient satisfaction. *Key words: transbronchial needle aspiration; endobronchial ultrasound; bronchoscopy; propofol; sedation; patient satisfaction.* [Respir Care 2010;55(6): 702–706. © 2010 Daedalus Enterprises]

Introduction

Endobronchial ultrasound-guided transbronchial needle aspiration (EBUS-TBNA) allows minimally invasive evaluation of intrathoracic lymph nodes and other paratracheal structures.[1] Diagnostic accuracy is at least equivalent to mediastinoscopy in the evaluation of mediastinal lymph node metastases in lung cancer.[1] In centers where EBUS-TBNA is available, it has supplanted mediastinoscopy as the procedure of choice for investigating mediastinal or hilar lesions, so EBUS-TBNA is being performed with increasing frequency.

Original reports described introduction of the dedicated convex-probe ultrasound bronchoscope into the airway via an artificial airway (eg, endotracheal tube or laryngeal mask) under general anesthesia.[2] Given the probable cost savings of performing EBUS-TBNA under conscious sedation, as opposed to full anesthesia, many pulmonology units may plan to conduct EBUS-TBNA in an ambulatory setting. The size of the EBUS-TBNA instrument necessitates insertion via the mouth rather than a nostril, but per oral introduction of the bronchoscope has been associated with lower patient satisfaction.[3] In addition, bronchoscopists may underestimate patient discomfort during flexible bronchoscopy.[4] Therefore, we evaluated

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patient satisfaction with EBUS-TBNA under conscious sedation.

Methods

Our institutional review board approved this study, and all patients gave informed consent.

From July to October 2008 we prospectively examined patient satisfaction and tolerance in consecutive patients undergoing EBUS-TBNA for the diagnosis and/or staging of mediastinal or hilar lymphadenopathy. Patients were referred for EBUS-TBNA by a pulmonologist after review in our multidisciplinary lung clinic. Patients were excluded only if the procedure was performed under general anesthesia, or if cognitive impairment precluded completion of the questionnaire.

Performance of EBUS-TBNA

All EBUS-TBNA procedures were performed by the same physician (DPS), with a dedicated linear-array bronchoscope (BF-UC160F-OL8, Olympus, Tokyo, Japan). Co-phenylcaine (lidocaine 50 mg/mL plus phenylephrine 5 mg/mL) was applied to the oropharynx, and the bronchoscope was then introduced per oral, through a bite block. Topical lidocaine 2% was applied routinely via the bronchoscope during introduction of the bronchoscope through the vocal cords and trachea.

Intravenous sedation (midazolam, fentanyl and/or propofol) was given by a dedicated physician. The agents and doses used were at the discretion of the physician administering sedation, with titration to effect throughout the procedure.

Patient Questionnaire

Patient wakefulness was assessed with the modified Aldrete score.[5] Patients completed the self-administered questionnaire 2–4 hours after EBUS-TBNA only if their modified Aldrete score was 19 or 20. Each patient was advised that this was an anonymous survey and that their responses could not be connected to them. Completed questionnaires were placed in a sealed envelope and paired with a physician-completed demographic and procedural questionnaire.

Patients used a 5-point Likert scale to rate their willingness to return for this procedure again in the future, if necessary. This 5-point Likert scale has been previously used to assess tolerance of bronchoscopy.[3,6,7] The Likert scale choices were: definitely not, probably not, unsure, probably would, and definitely would return.

The patients used a 5-point Likert scale to report their degree of recall of the procedure. The patients used a 3-point Likert scale (none, a small amount, or a significant amount) to report their degree of discomfort from anesthetic throat spray, bronchoscope insertion, shortness of breath, cough, throat pain, and chest pain.

Procedural and Demographic Data

Data relating to performance of the EBUS-TBNA procedure were recorded, including clinical indication for the procedure, number of prior bronchoscopic procedures, dose of anesthetic agents administered during EBUS-TBNA, procedure duration, number of TBNAs performed, complications, and final diagnosis resulting from the procedure.

Statistical Analysis

Categorical data were analyzed with the chi-square test for trend, and means were compared with an unpaired *t* test. Analyses were performed with statistics software (InStat 3 for Macintosh, GraphPad Software, La Jolla, California).

Results

Forty-one consecutive patients undergoing EBUS-TBNA completed the patient-satisfaction questionnaire, and all the questionnaires were completed within 4 hours of the EBUS-TBNA procedure. None of the patients had previously undergone EBUS-TBNA. Two patients were excluded from the study. Cognitive impairment precluded informed consent in one patient, and one EBUS-TBNA (on a 14-year-old pediatric patient) was performed under general anesthesia. None of the patients were denied EBUS-TBNA on medical or anesthetic grounds. Table 1 shows the demographic data and lymph node stations sampled. EBUS-TBNA yielded a positive diagnosis in 37 patients (90%).[8] One EBUS-TBNA yielded normal lymphoid tissue. Three EBUS-TBNA procedures yielded non-diagnostic specimens. There were no major EBUS-TBNA complications. There was transient hypoxia and transient hypotension in one patient.

The mean dose of topical lidocaine (excluding oropharyngeal Co-Phenylcaine) was 332 ± 51 mg. The combinations and doses of intravenous sedatives ranged widely (Table 2).

Forty patients (98%) reported they would "definitely return" for EBUS-TBNA in the future if required, and one (2%) patient reported they would "probably" return for such a procedure.

Table 3 shows the frequency and severity of reported symptoms. The most commonly reported symptom was cough (71%), which was most prominent on introduction of the bronchoscope through the vocal cords. Cough did not interfere with EBUS-TBNA in any of the patients. Ten

Table 1. Subject Demographics

Male (*n*, %)	24 (59)
Female (*n*, %)	17 (41)
Age (mean ± SD y)	66 ± 12
Number of Previous Bronchoscopic Procedures (no. patients)	
0	29
1	11
2	1
Indication for EBUS-TBNA	
Mediastinal lung cancer staging	28
Evaluation of suspected sarcoidosis	5
Isolated mediastinal lymphadenopathy	8
Lymph-Node Stations Evaluated (no. patients)*	
2 right/left	4
4 right/left	24
7	16
10 right/left	7
11 right/left	3
Number of punctures (mean and range)	3.6 (1–6)
EBUS-TBNA duration (mean ± SD and range min)	31 ± 8 (18–45)

* Multiple lymph node stations were sampled in 10 patients. Lymph node stations were classified according to the system described by Mountain and Dresler.[8]
EBUS-TBNA = endobronchial ultrasound-guided transbronchial needle aspiration

Table 2. Doses and Combinations of Sedatives During EBUS-TBNA Under Conscious Intravenous Sedation

Medications Combination	Patients (*n*)	Dose (mean ± SD)
Midazolam/fentanyl	13	3.8 ± 1.4 mg/75 ± 28 μg
Midazolam/propofol	4	2.0 ± 1.3 mg/220 ± 205 mg
Fentanyl/propofol	2	62 ± 18 μg/240 ± 57 mg
Midazolam/fentanyl/propofol	22	3.0 ± 1.3 mg/75 ± 24 μg/130 ± 75 mg

EBUS-TBNA = endobronchial ultrasound-guided transbronchial needle aspiration

patients (24%) reported no symptoms from EBUS-TBNA. Twenty-four patients (59%) recalled nothing of the procedure; the patients who received propofol were significantly more likely to report no recollection of the procedure than those who received midazolam and fentanyl but no propofol ($P = .001$). The degree of recall among the remaining patients was: no details, 4 patients (10%); some details, 6 patients (15%); most details, 4 patients (10%); and all details of the procedure, 3 patients (7%). Recall was not significantly related to reporting of symptoms.

Discussion

Routine bronchoscopy under conscious intravenous sedation was previously associated with a high willingness to return for the procedure, which suggested good tolerance of the procedure.[3] Our results confirm that EBUS-TBNA under conscious sedation can be associated with extremely high patient satisfaction and provide strong reassurance that conscious-sedation EBUS-TBNA is safe and well tolerated. Ninety-eight percent of our patients reported they "definitely would" return for conscious-sedation EBUS-TBNA if required, which, to our knowledge, is the highest reported patient satisfaction for any form of bronchoscopy.

Previous authors have suggested that EBUS-TBNA is best performed under general anesthesia via an artificial airway.[2] The dedicated linear-array bronchoscope required for EBUS-TBNA is larger than a routine bronchoscope (6.9 mm diameter) and has a fixed, non-flexible tip, which necessitates oral insertion. Lechtzin et al previously reported lower satisfaction among patients undergoing routine bronchoscopy with oral insertion,[3] but all those patients had failed attempts at nasal insertion, which suggests that failed nasal insertion reduces patient satisfaction, rather than per-oral insertion per se. Our findings indicate that oral insertion under conscious sedation can be well tolerated.

Reported patient satisfaction with bronchoscopy has ranged from 52% to 98%.[7,9] It is possible that EBUS-TBNA is less stimulating than bronchoalveolar lavage or transbronchial lung biopsy, which may explain our extremely high patient satisfaction. However, in administering sedation, our aim was for moderately deep anesthesia, and we feel this is responsible for the high satisfaction among our patients. Importantly, we have also shown that a moderate dose of sedatives is associated with an excellent safety and satisfaction profile.

Flexible bronchoscopy can be performed safely without sedation; one randomized study suggested that patient tolerance is not affected by sedatives.[10] However, as few as 27% of patients who received placebo sedation in that study reported a willingness to return for the procedure, and the generalizability of that study's findings is difficult to determine, due to very low sedative doses in the treatment arm.[10] Hirose et al reported that just 12% of patients would "definitely return" following bronchoscopy performed under sedation with intramuscular pentazocine, with a weight-based dose equivalent to morphine 5 mg.[6] That low dose may be sub-sedative and therefore likely to be associated with lower patient tolerance.

In contrast, multiple studies have suggested that routine use of sedation improves patient tolerance of flexible bronchoscopy.[4,7,11-15] Most recently, Silvestri et al found that a significantly higher proportion of patients expressed a willingness to be treated again following sedation for bronchoscopy with higher doses of a novel sedative drug, fospropofol,[14] which indicates that sedation is associated with better patient tolerance of bronchoscopy. Not surprisingly, a survey of pulmonologists in the United Kingdom found that just 0.1% of those who regularly perform bronchos-

Table 3. Frequency and Severity of Reported Symptoms During EBUS-TBNA

Symptom	Likert Scale of Symptom Severity (*n* and % who reported this symptom severity)		
	None	Small Amount	Substantial Amount
Anesthetic throat spray	30 (73)	9 (22)	2 (5)
Discomfort during scope insertion	32 (78)	8 (20)	1 (2)
Dyspnea	33 (80)	7 (17)	1 (2)
Cough	12 (29)	21 (51)	8 (20)
Throat pain	30 (73)	11 (27)	0 (0)
Chest pain	37 (90)	4 (10)	0 (0)

EBUS-TBNA = endobronchial ultrasound-guided transbronchial needle aspiration

copy do so without sedation.[16] Indeed, the British Thoracic Society recommends that all patients undergoing flexible bronchoscopy be offered sedation unless clear contraindications exist.[17]

Limitations

We had no control group, and the sedation regimens were not uniform, so we cannot definitively comment on patient tolerance with respect to routine bronchoscopy, or with the use of specific sedation regimens. We also recognize that having a physician focused on sedation may provide a more satisfactory procedure, but that having a physician focused on sedation is not possible in all centers that perform EBUS-TBNA. However, our intent was to describe patient satisfaction with conscious-sedation EBUS-TBNA, rather than to identify optimal sedation practice. Our results provide reassuring evidence that EBUS-TBNA under conscious sedation can be associated with high patient satisfaction, regardless of the sedation regimen.

We recorded patient satisfaction at only one time point. However, Maguire et al found no difference in patient satisfaction reported immediately following bronchoscopy and one month after the procedure.[7] Therefore, we feel that assessment at 2–4 hours after EBUS-TBNA is reliable. Furthermore, we have not determined if patient satisfaction differs according to whether the physician providing sedation is an anesthetist or non-anesthetist. While non-anesthetist sedation for flexible bronchoscopy is safe,[18] we are not aware of any studies that have examined patient tolerance of non-anesthetist-administered sedation for bronchoscopy, and we feel this warrants further study.

Finally, all the EBUS-TBNA procedures were performed by the same physician. Patient satisfaction is expected to differ between individual proceduralists and institutions. While the satisfaction reported by our patients may not be experienced by all persons undergoing EBUS-TBNA, our results do afford confidence that EBUS-TBNA under conscious sedation can be safe and with patient satisfaction at least as high as that previously recorded for routine bronchoscopy.

Conclusions

EBUS-TBNA can safely be performed under conscious intravenous sedation, which is associated with very high patient satisfaction, and patient satisfaction appears to be independent of the sedation regimen. Prospective trials are required to determine the optimal combination of sedative agents in patients undergoing bronchoscopy, and to confirm that sedation for bronchoscopy may safely be administered by non-anesthetist physicians.

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