Conscious Sedation Reduces Patient Discomfort and Improves Satisfaction in Flexible Bronchoscopy

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Background: Conscious sedation for patients undergoing flexible bronchoscopy (FB) is suggested to alleviate discomfort and improve satisfaction despite controversy regarding its benefits. In Taiwan, the general FB practice involves local anesthesia only. This study aimed to assess the benefits and risks of conscious sedation in diagnostic FB.

Methods: This prospective case control study enrolled 44 non-sedated and 44 sedated patients who underwent diagnostic FB. All received the standard upper airway preparation, while sedated patients received clinically judged increments of midazolam and alfentanil for conscious sedation. Patient discomforts and the operator's opinions during FB were assessed using the verbal analogue score (VAS, 0-10 scale). Willingness to return was assessed as five scales to monitor patient satisfaction. Safety profiles throughout the procedures were also assessed.

Results: Compared to non-sedated patients, sedated ones expressed less discomfort, with lower VAS scores regarding scope insertion (3.5 [0-10] vs. 0 [0-5], $p < 0.001$), cough (5 [0-10] vs. 0 [0-5], $p < 0.001$), dyspnea (3 [0-10] vs. 0 [0-8], $p < 0.001$), pain (3 [0-10] vs. 0 [0-5], $p < 0.001$), and global tolerance of the procedures (5 [1-10] vs. 0 [0-9], $p < 0.001$). More sedated patients expressed willingness to return (70.5% vs. 36.4%, $p = 0.001$). The bronchoscopist also rated lower VAS scores on cough and dyspnea in sedated patients. Sedated patients had less hypertension but more hypoxemic episodes during the procedure, which were all transient and not life-threatening.

Conclusions: Conscious sedation with clinically judged midazolam and alfentanil reduces discomforts, improves satisfaction, and carries slight, but manageable, hypoxemia risks in patients undergoing FB.

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Key words: sedation, bronchoscopy, satisfaction, midazolam, alfentanil

Flexible bronchoscopy (FB) has an essential role in the diagnosis and treatment of pulmonary diseases. Aside from safety and diagnostic accuracy, patient satisfaction with health care is an emerging concern.[1,2] Patients undergoing FB frequently experience cough, shortness of breath, sore nose, sore

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throat, or other chest discomfort.[3,4] More than half of the patients express fear of the discomfort they may have when facing this procedure,[5] while 40-60% find the procedure unpleasant and intolerable.[3,6,7] Pre-medication with sedatives and analgesics are considered useful in improving patient satisfaction and reducing procedure-related discomforts.[8,9]

More than 70% of current FBs in North America and the Commonwealth countries are performed under sedation.[10,11] The British Thoracic Society has published guidelines that recommend offering sedation to all patients undergoing FB when there is no contraindication.[12] However, the preparation for FB varies widely in different countries with different facilities. In America, Lechtzin et al. evaluate patients' satisfaction by their willingness to return for a second FB when needed and report that 93% of those who receive sedatives or analgesics express either a definite or a probable willingness to return.[13] However, a study conducted in Spain, where no sedative or analgesic is prescribed, reports that only 41% of patients show tolerance to FB.[7] Here in Taiwan, guidelines of bronchoscopy suggest only upper airway preparation with local anesthesia for FB.[14] Meanwhile, we do not know the discomfort or dissatisfaction our patients may have when they receive non-sedated FB.

Also, there are still controversies in regular conscious sedation during FB.[15-18] Hatton reports that midazolam is no better than a placebo in improving patient comfort or willingness to return.[15] Stolz et al. suggest that certain life-threatening complications of FB are related to sedative drugs.[19] However, these studies have been criticized for inappropriate sedative levels, monitors, or resuscitation equipments. Only few studies have directly examined the pros and cons of sedation compared with local anesthesia in FB.

Midazolam, a short-acting benzodiazepine having anxiolytic, amnestic, and hypnotic effects, is commonly used during FB to achieve conscious sedation. Alfentanil is a fast onset and short-acting opioid which has analgesic and cough suppression properties. Combining these two medications offers synergistic effects and attenuates sympathetic tone during FB.[20] Comparison between different medications during FB has been widely done. However, there has been no study comparing midazolam plus alfentanil to local anesthesia in FB. It is likely that most bronchoscopy performed in the Commonwealth countries are under certain sedatives.[11]

Since most FBs performed in Taiwan are under local anesthesia, there are also no data regarding patient satisfaction, cooperation, willingness to return, and adverse events during and after FB that compare conscious sedation with local anesthesia. This study aimed to compare sedated and non-sedated diagnostic FBs in terms of patient satisfaction and procedure safety in Taiwan. It is hypothesized that, with optimal drug dosages and adequate clinical monitoring, systemic sedation will decrease patient discomforts and increase patients' cooperation and satisfaction with minimal risks.

METHODS

Study subjects

This prospective case-control study was conducted in a tertiary medical center with approval from the institutional review board. All enrolled patients provided written informed consent. Through July 2008 to December 2008, patients who had a will to receive intravenous conscious sedation when undergoing diagnostic FB were evaluated for enrollment. Diagnostic FBs included Lung Imaging Fluorescence Endoscope (LIFE), endobronchial ultrasound (EBUS), bronchial biopsy, trans-bronchial biopsy (TBB), bronchial brushing, bronchial washing, and bronchoalveolar lavage (BAL).[8] Exclusion criteria included patients under 18 years of age, American Society of Anesthesiologists (ASA) physical status classification IV or V, neurologic disorders or other conditions contributing to difficulty in assessing a conscious response, force expiratory vital capacity (FVC) < 15 ml/kg body weight, force expiratory volume in one second (FEV1) < 1000 ml, or FEV1/FVC < 35%. Patients with a known history of allergies to the drugs used in this study or those with glaucoma were also excluded.

During the same period, we evaluated patients who underwent diagnostic FBs with local anesthesia as the control cases, following the same exclusion criteria. Cases with matched diagnostic procedures were selected and enrolled.

Preparations, sedation, and bronchoscopic procedures

All procedures were performed in the bron-

choscopy room. The patients' blood pressures were monitored using an automated blood pressure monitor, while a standard three-lead electrocardiography machine monitored heart rate and rhythm. A pulse oximetry was used to monitor SpO_2 (Oxyhemoglobin saturation by pulse oximetry). A nasal cannula was used to deliver 2 L /min of oxygen during bronchoscopy and adjusted to maintain SpO_2 above 90% whenever necessary. Baseline vital signs were recorded just before the start of the procedures or sedations. All monitors were continuously recorded except for the blood pressure monitor, which was recorded every 3 minutes.

Topical anesthesia with nebulized lidocaine, nasal lidocaine jelly, and a "spray as you go" technique as previously described was applied to all patients.[19] Patients in the control group received only lidocaine for upper airway preparation. In the study, induction was started using alfentanil 4~5 μg/kg bolus followed by 2 mg midazolam bolus. After 2 minutes, if the patient was not sedated sufficiently, midazolam boluses were repeated by increments of 1 mg/min until conscious sedation, defined as a purposeful response to verbal or tactile stimulation, was achieved.[21]

During maintenance, increments of 1 mg/min midazolam boluses were administered according to clinical judgment to achieve conscious sedation or if persistent patient movement interfered with the procedure. In both groups, if the bronchoscopist felt that a persistent cough interfered with the procedure, oral secretions were suctioned and/or 2 ml of 1% lidocaine was instilled via bronchoscope. In the study group, alfentanil 1~2 μg/kg bolus every 15 min was given if cough persisted and if previous management was insufficient. Antidotes, including flumazenil and naloxone, would be administered when necessary. After the procedure, the sedated patients were sent to the recovery room and monitored continuously until full recovery.

Flexible bronchoscopy (BF-P240 or BF-40; Olympus; Tokyo, Japan) was performed via the nasal route. LIFE (BF-F260; Olympus; Tokyo, Japan) would be performed when requested. A 20 m-MHz EBUS mini-probe (UM-BS20-26R, Olympus, Tokyo, Japan) equipped with an endoscopic ultrasound system (EU-M30S, Olympus, Tokyo, Japan) was used for peribronchial lung lesion detection. Diagnostic procedures, including bronchial biopsy, bronchial brushing, bronchial washing, TBB or BAL, were performed according to clinical conditions.

Assessment of adverse events, patient satisfaction, and bronchoscopist opinion

Induction and total drug doses were recorded. Induction time was defined as the time between the administering of the alfentanil bolus to the insertion of the bronchoscope, while procedure time was defined as the time between bronchoscope insertion to the end of FB and recovery time as the time between the end of FB to the time the patient could walk without assistance. Adverse events during bronchoscopy were defined as follows: hypotension with systolic blood pressure (SBP) < 90 mmHg or mean arterial blood pressure (MAP) < 65 mmHg; baseline hypertension of SBP > 140 mmHg or DBP > 90 mmHg before the procedure; hypertension during the procedure with SBP > 180 mmHg or diastolic BP > 90 mmHg; hypoxemia with oxygen saturation < 90% regardless of duration; and bleeding resulting in the need for diluted epinephrine spray during the procedure.

The cooperation and tolerance of the patient during FB was assessed and any procedural interference caused by irritant movement or severe cough was recorded. "Procedural interference by patients' movement" was defined as when the bronchoscopist had to stop the procedure temporarily in order to hold down the patient. "Procedure interference by cough" was when the bronchoscopist had to stop the procedure temporarily and additional lidocaine spray and/or alfentanil had to be given to stop the cough. After recovery, the investigator recorded the vital signs and any post-procedure symptoms like cough, dyspnea, throat pain, nausea, dizziness, and general weakness.

To evaluate the tolerance of symptoms during FB, a 10-point verbal analogue scale (VAS),[5] ranging from the lowest point (0, no bother) to the highest point (10, worst intolerable level), was scored by patients in terms of the following aspects: nebulized anesthetic inhalation, bronchoscopy insertion, cough, dyspnea, pain and global tolerance of the entire procedure. Willingness to return for a second FB if needed was asked as a five-scale question (i.e., definitely would, probably would, unsure, probably not, and definitely not).[13,22] Non-sedated patients were

asked the same questions right before hospital discharge. The bronchoscopist likewise reported on the severity of cough, dyspnea, and generalized patient cooperation during FB via a 10-point VAS immediately after the procedure.

Statistical analysis

Student's T test and Chi-square with Yates' correction were used for analysis of numeric and categorical parameters, respectively. Age, weight, and procedure time were presented as mean ± standard deviation (SD). VAS was presented as the median (range) and was analyzed by Mann–Whitney U test. Statistical significance was indicated as $p < 0.05$. Data analysis was performed using the Graphpad Prism software version 5.02 (Graphpad software Inc., La Jolla, CA).

RESULTS

Fifty-two patients undergoing diagnostic FB with sedation were evaluated for enrollment. Four did not meet the inclusion criteria and four were unable to understand and answer the questions recorded as VAS after the procedure. Therefore, 44 patients were included in the study as the study group. 44 patients who received matched bronchoscopic procedures under local anesthesia were selected as the control group. Both groups were comparable with age, gender, weight, ASA physical status, and patient source (Table 1). The major indication of FB was lung nodules or tumors, and the other indications were lung infiltrations, hemoptysis, chronic cough or airway evaluation, or endobronchial obstructions. Diagnostic FB-related procedures included LIFE, EBUS, bronchial biopsy, TBB,

Table 1. Patient Characteristics, Indications and Bronchoscopic Procedures

	Non-sedatives (n = 44)	Sedatives (n = 44)	*p* value
Patient characteristics			
Age (mean ± SD), yr	58.2 ± 13.4	60.5 ± 10.4	0.362
ASA ≦ 2, n (%)	29 (65.9%)	32 (72.7%)	0.522
Male, n (%)	26 (59.1%)	19 (43.2%)	0.135
Weight (mean ± SD), kg	61.8 ± 13.8	60.5 ± 10.3	0.622
Outpatient, n (%)	29 (65.9%)	35 (79.5%)	0.151
Indications of FB, n (%)			
Lung tumors / nodules	16 (36.4%)	24 (54.5%)	0.087
Lung infiltrations	12 (27.3%)	6 (13.6%)	0.113
Chronic cough or airway evaluation	6 (13.6%)	4 (9.1%)	0.502
Hemoptysis	6 (13.6%)	8 (18.2%)	0.560
Endobronchial lesions or others	4 (9.1%)	2 (4.5%)	0.676
Procedures during FB, n (%)			
LIFE	7 (15.9%)	9 (20.5%)	0.580
EBUS	24 (54.5%)	31 (70.5%)	0.123
TBB/Bronchial biopsy	19 (43.2%)	21 (47.7%)	0.669
Bronchial washing	21 (47.7%)	27 (61.4%)	0.199
Bronchial brushing	18 (40.9%)	20 (45.5%)	0.667
Bronchoalveolar lavage	11 (25.0%)	8 (18.2%)	0.437

Abbreviations: ASA: American Society of Anesthesia physical status classification; LIFE: lung imaging fluorescence endoscope; EBUS: endobronchial ultrasound; TBB: trans-bronchial biopsy.

bronchial brushing, bronchial washing, and BAL. Both groups showed no difference in the indications and FB-related procedures.

For sedated patients, the average induction doses were 290.3 ± 59.0 μg of alfentanil and 3.7 ± 2.3 mg of midazolam. The total doses of the entire procedure were 333.0 ± 67.3 μg of alfentanil and 5.6 ± 2.6 mg of midazolam. The average induction and recovery times were 5.3 ± 3.5 and 45.9 ± 32.5 minutes, respectively. The total time was 64.2 ± 35 minutes for sedated patients and 13.6 ± 7.4 minutes for non-sedated patients.

The procedure time, events, post-bronchial discomfort, and willingness to return after FB if needed were presented (Table 2). The total procedure time was similar in both groups. During FB, procedure interference by patient movement or cough was similar in both groups, as well as the ratio of hypertension episode (data not shown). However, the non-sedated patients had more hypertension episodes during the procedure. There was also a trend for their blood pressure prior to the procedure to be higher than that of sedated patients. Sedated patients had more hypoxemia but less hypertension episodes, although hypotension events were similar in both groups. All hypoxemia, hypertension, or hypotension events were transient and patients recovered spontaneously or after proper management. No procedure was withdrawn or incomplete, and no intubation or antidote administration was needed. There were no cardiac ischemic events noted by EKG or clinically throughout the procedure.

Patients who received local anesthesia had higher VAS scores than those who received systemic sedation in terms of scope insertion, cough, dyspnea, pain, and global tolerance of the whole procedure, but the discomfort in inhaled nebulized local anesthesia were similar in both groups (Table 3). The

Table 2. Procedure Time, Events, Post-bronchial Discomfort, and Willingness to Return after Bronchoscopy

	Non-sedatives (n = 44)	Sedatives (n = 44)	*p* value
Procedure time (mean ± SD), minutes	13.6 ± 7.4	14.6 ± 5.9	0.484
Procedure interference by patients' movement, n (%)	7 (15.9%)	11 (25.0%)	0.290
Procedure interference by cough, n (%)	15 (34.1%)	15 (34.1%)	1
Adverse events, n (%)			
Baseline hypertension (SBP > 140 or DBP > 90)	26 (59.1%)	17 (38.6%)	0.055
Hypotension (SBP < 90 or MAP < 65)	0	4 (9.1%)	0.116
Hypertension (SBP > 180 or DBP > 90)	21 (47.7%)	9 (20.5%)	0.007
Hypoxemia (O_2 sat < 90%)	2 (4.5%)	14 (31.8%)	0.002
Bleeding	10 (22.7%)	13 (29.5%)	0.467
Post bronchoscopy discomforts, n (%)			
Throat pain	11 (25%)	19 (43.2%)	0.072
Cough	21 (47.7%)	28 (63.6%)	0.133
Dyspnea	16 (36.4%)	4 (9.1%)	0.002
Dizziness	3 (6.8%)	9 (20.5%)	0.118
Malaise	5 (11.4%)	9 (20.5%)	0.244
Willing to return, n (%)			
Definitely would	16 (36.4%)	31 (70.5%)	0.001
Definitely would or probably would	31 (70.5%)	34 (77.3%)	0.467

Abbreviations: MAP: mean arterial pressure; SBP: systolic blood pressure; DBP: diastolic blood pressure; O_2 sat: oxygen saturation.

operator rated VAS scores on cough (3 [0-8] vs. 2 [0-8], $p = 0.013$) and dyspnea (2 [0-8] vs. 0 [0-3], $p < 0.001$) were higher in the non-sedated group while patient cooperation was not significantly different in the two groups although there was a trend (2 [0-8] vs. 1 [0-6], $p = 0.06$) (Fig. 1). There were no differences in post-bronchoscopy discomforts such as cough, sore throat, dizziness, and general malaise. However, more non-sedated patients experienced dyspnea after bronchoscopy (Table 2).

Compared to sedated patients during FB, fewer non-sedated patients expressed a definite intent to return for repeated bronchoscopy if needed. However, counting probable and definite willingness together, there were no differences in tolerance of the procedure in both groups (Table 2).

DISCUSSION

This is the first study to evaluate patient satisfaction and adverse reactions of conscious sedation in FB in Taiwan. Compared to local anesthesia, conscious sedation during FB, via clinically judged midazolam and alfentanil induction, offers less patient discomfort in scope insertion, cough, dyspnea, and pain as well as less post-bronchoscopy dyspnea. It also generates better global tolerance and higher rates of willingness to return for a second FB if needed. The operators mentioned less cough and dyspnea by applying sedation, although patient cooperation was similar in the two groups. Regarding safety, there was more hypoxemia but less hypertension events in sedated patients. Hypotension and

Table 3. Verbal Analogue Scale (VAS) Scores Made by the Patients on Different Aspects

	VAS scores*, median [range]		*p* value
	Non-sedatives	Sedatives	
Nebulized anesthetic inhalation	2 [0-9]	0 [0-10]	0.231
Bronchoscopy insertion	3.5 [0-10]	0 [0-5]	< 0.001
Cough	5 [0-10]	0 [0-5]	< 0.001
Dyspnea	3 [0-10]	0 [0-8]	< 0.001
Pain	3 [0-10]	0 [0-5]	< 0.001
Global tolerance of the whole procedure	5 [1-10]	0 [0-9]	< 0.001

*: Score 0 represented no bother while 10 represented the worst intolerable level.

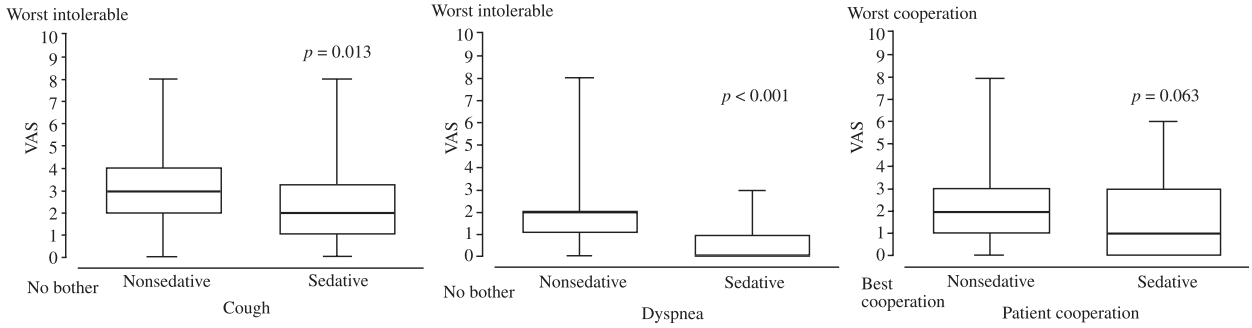

Fig. 1 Verbal analogue scale (VAS) scores made by the bronchoscopist on cough, dyspnea, and patient cooperation. Score 0 represented the least severe degree of symptoms or best cooperation and 10 represented the most severe degree of symptom or worst cooperation. Graphs were presented by Whiskers with minimum to maximum, median, 25% and 75% quartiles. The *p* value was expressed for each category.

bleeding rates were similar and there were no persistent or life threatening complications.

In western countries, most FB practices are performed under conscious sedation with various medications or combinations.[10,11] Midazolam, diazepam, lorazepam, propofol, fentanil, alfentanil, morphine, and meperidine are some medications used.[11] However, the benefits, the regimens, and the dosages remain controversial. Some authors report better patient tolerance by using intravenous diazepam (5-15 mg), oral lorazepam (2 mg), or incremental intravenous midazolam (mean 0.16 ± 0.095 mg/kg).[6,8,9] In contrast, several authors argue that using sedative drugs during FB is neither justified nor cost-effective.[15,16,23] No difference in patient satisfaction has been reported when 0.07 mg/kg midazolam[15] or 4.5 mg midazolam plus alfentanil (0.5 mg/kg)[24] were administered for conscious sedation in FB. Colt and Morris state that compared to local anesthesia, premedication with sedatives before FB does not decrease complication rates but increases costs and observation needs.[16]

In the present study, a low dose alfentanil (5 μg/kg) bolus was given as pre-medication following midazolam administration in induction and maintenance. During maintenance, patients' consciousness levels were assessed every minute and extra midazolam bolus was given as needed, based on clinical judgment, to maintain conscious sedation. The total sedative doses, which were 5.6 ± 2.6 mg (0.10 ± 0.05 mg/kg) of midazolam and 333.0 ± 67.3 μg of alfentanil, were just between sub-optimal and over-sedation. This resulted in less discomfort and better tolerance in both patients' and operators' views. Though desaturation episodes were higher in sedated patients, those episodes were not sustained and caused no procedure incompletion or life threatening conditions. The hypotension episodes did not differ in the two groups and improved after proper management. This study enrolled only patients with better health status (ASA ≦ 3) and pulmonary function. The results showed that conscious sedation during FB in this given population could be done safely and successfully.

Patient tolerance of invasive procedures is emphasized more nowadays.[1,2] Up to 80% of patients choose sedation when asked if they would like to have conscious sedation during FBs.[5] Some studies use willingness to return for repeated FBs when needed as a predictor of patient satisfaction.[13,22] Lechtzin et al. report in their survey, conducted in North America, that > 90% of patients received intravenous sedatives or analgesics, and 71% and 22.2% would definitely and probably return respectively if repeated bronchoscopy was needed.[13] However, a study conducted in Spain shows only 41% of patients chose "definitely would" after receiving FB with topical anesthesia.[7] Hirose et al. report that 12.4% of patients in Japan chose "definitely would" and 53.4% chose "probably would" while they were under pentazocin sedation and had an oral route of scope insertion.[25]

Though the willingness to return, including definitely will and probably will, are similar in both groups in this study, the ratio of definitely will is significantly lower in the non-sedated group. Although many other factors, such as age, gender, disease districts, diagnostic procedures, bronchoscope sizes, procedure durations, health status, and physician qualities are all reportedly associated with patient tolerance and satisfaction,[3,7,13] the difference in patient satisfaction is mainly related to sedation.

Some studies state the degree of tolerance as excellent when no sedation is prescribed.[17,26,27] However, the impression is obtained more subjectively, not systemically, and solely from the operator. The verbal analogue scale (VAS) has been utilized in assessing FB related discomforts.[28] In this study, VAS scores in discomfort, such as scope insertion, cough, dyspnea, pain, and global discomfort related to the entire procedure, all decreased after sedation. Operators also express less cough and dyspnea among patients. However, patient cooperation is not significantly different in either the sedated or non-sedated groups when assessed by the operator's perception. This may be related to the sedation effects on patients, which makes them unable to control some involuntary movements. Therefore, procedure interruptions by cough or irritant movements are similar in the two groups.

FB alone can trigger hemodynamic and/or respiratory responses, including increased heart rate, elevated blood pressure, or oxygen desaturation.[29] Increased sympathetic tone may also cause arrhythmia or myocardial ischemia during the procedure.[30,31] A recent study shows that adequate midazolam-alfentanil sedation diminishes the excessive sympathetic drive.[20] In this study, the hypertension

episodes that reached the definition of hypertensive urgency are significantly higher in the non-sedated patients. Adequate sedation can ease this phenomenon without increasing the risk of hypotension.

This study has several limitations. First, this was not a randomized but a case control study. Second, although FB was performed in the same bronchoscopic room following the same procedures, it was not done by the same bronchoscopist. However, most of the procedures were done by two experienced operators and there was no obvious inter-operator variance. Third, the VAS scores by patients are quite subjective. Other factors or patient characteristics, such as personality or racial characteristics that may affect the result, need to be studied further. Last, we did not assess the cost of conscious sedation compared to non-sedation, including medication, space and monitors during the entire procedure and recovery phase. The cost-effectiveness of conscious sedation in FB might need further evaluation.

In conclusion, for FB in Taiwan, conscious sedation with clinically judged midazolam and alfentanil can reduce patient discomfort and improve patient satisfaction, with only some manageable hypoxemia as risks. Sedation for FB can be conducted safely under adequate monitoring and management. Patients should therefore be given the choice of conscious sedation in FB in medical practice in Taiwan.

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意識鎮靜術有助於改善接受支氣管鏡檢查病患的滿意度

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背 景： 多數歐美國家建議於病患接受支氣管鏡檢查 (flexible bronchoscopy, FB) 時，同時實施意識鎮靜術，以減緩病人不適感、增加病患滿意度。然而使用藥物及劑量目前仍有爭議，台灣地區多數也只採取局部上呼吸道麻醉作爲術前準備。本研究主要評估接受意識鎮靜術的病患，是否對於 FB 有較低的不適感及較高的滿意度。

方 法： 本病例對照研究收錄接受診斷性 FB 的病患。其中 44 位接受意識鎮靜術 (鎮靜組)，而另 44 位病患不接受 (非鎮靜組)。所有病患均被施予標準上呼吸道局部麻醉，而鎮靜組則合併施予靜脈注射導眠靜 (midazolam) 以及阿華吩坦尼 (alfentanil)，並達到意識鎮靜效果。檢查結束後，病患及操做者接受問卷調查，以 verbal analogue scale (VAS) 評估術中不適感以及整體滿意度，以 0 至 10 分來表現完全無不適感至最不舒適。並且以需要時願意接受第二次支氣管鏡檢查的意願來評估病患滿意度，總共分爲五個程度 (一定會，可能會，不確定，可能不會，一定不會)。

結 果： 相較於非鎮靜組，鎮靜組病患對於檢查中的不適感，如支氣管鏡置入 (3.5 [0-10] vs. 0 [0-5], $p < 0.001$)，咳嗽 (5 [0-10] vs. 0 [0-5], $p < 0.001$)，呼吸喘 (3 [0-10] vs. 0 [0-8], $p < 0.001$)，疼痛 (3 [0-10] vs. 0 [0-5], $p < 0.001$)，以及整體滿意度 (5 [1-10] vs. 0 [0-9], $p < 0.001$) 有較低的 VAS 分數，在被問及接受第二次檢查的意願時，鎮靜組病患有較高的比例選擇“一定會”(70.5% vs. 36.4%, $p = 0.001$)。操作者也認爲鎮靜組病患有較少的咳嗽及呼吸喘。在操作安全方面，鎮靜組病患有較高的低血氧發生率，但有較低的高血壓發作比率。所有的副作用在處理後皆改善，並沒有持續性的副作用產生。

結 論： 藉由靜脈注射 midazolam 及 alfentanil 對於接受支氣管鏡檢查的病患施予意識鎮靜，可以有效的降低病人不適感以及提高病患滿意度，並且不會產生嚴重之副作用。
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關鍵詞： 意識鎮靜，支氣管鏡，滿意度，導眠靜，阿華吩坦尼

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