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Original Article

Using propofol for flexible bronchoscopy

Ahmet Arısoy[a,*], Hilmi Demirkiran[b], Selami Ekin[c,] Hulya Gunbatar[c], Selvi Asker[c], Bunyamin Sertogullarindan[c]

[a]*Clinics of Pulmonary Medicine, Istanbul Hospital, Van, Turkey*
[b]*Clinics of Anesthesiology and Reanimation, Istanbul Hospital, Van, Turkey*
[c]*Department of Pulmonary Medicine, Yuzuncu Yil University, Van, Turkey*

Abstract. Propofol is a sedative-hypnotic drug with rapid onset and recovery time. There are limited number of studies in which propofol was used for bronchoscopy. In this current study, we evaluated our patients who received propofol sedation for bronchoscopy in our clinic and investigated the usefulness of the procedure for both patients and physicians

We prospectively evaluated patients who had bronchoscopy in our clinic between 2012 January and 2013 January. We recorded demographic features, indications for bronchoscopy, procedures of bronchoscopy, duration of the procedures, minor and major adverse events and hemodynamic parameters of the patients. All patients were monitored until they were discharged from the bronchoscopy unit.

In total, 97 patients were included in the study. The mean age of the participants was 65 years, 60 of them were male (61%) and 37 were women (39%). Major indications were lung lesions that were suspected to be central or peripheral lung cancer. Other indications were mediastinal-hilar lymph nodes, hemoptysis, tuberculosis, atelectasis, chronic cough and tracheomalacia. Mean propofol dose was 90 mg in patients who had biopsy and 70 mg for those who did not have biopsy. Mean duration of the procedure was 14 minutes in those who had biopsy and 10 minutes in those who did not have biopsy. One patient had epistaxis after receiving topical lidocaine and two patients had respiratory arrest that required ambulation with a mask. Thirty-five patients (36%) had desaturation, which was reversed by providing adequate oxygenation.

Propofol is a useful and applicable sedative-hypnotic for patients and physicians for fiberoptic bronchoscopy.

Key words: Bronchoscopy, propofol, anestesia, sedation

1. Introduction

Sedation should be used if there are no contraindications (1). The aims of sedation are to increase the contentment and comfort of the patients and to decrease cough, dyspnea and anxiety of patients (2-4). Because Propofol has rapid-onset and rapid-recovery time; it can be used for flexible bronchoscopy (5-8). However, there are still ongoing discussions over the use of propofol in flexible bronchoscopy as it may cause cardiopulmonary depression depending on the patient (9). Studies in which propofol was used for flexible bronchoscopy are limited. In an article that was published in 1993, it was found to be as effective as midazolam (5). On the other hand, there are several studies that explored the use of propofol in gastrointestinal endoscopic procedures (10-12). In our study, we explored our patients who received propofol for sedation in fiberoptic bronchoscopy.

[*]Corresponding Author: Ahmet Arısoy MD,
Clinics of Pulmonary Medicine, Istanbul Hospital, Van, Turkey
Phone number: +90(554) 875 10 53
E-mail: drahmetarisoy@gmail.com
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2. Materials and methods

We enrolled 97 patients who had fiberoptic bronchoscopy in our clinic between September 2012 and October 2013. Informed consents were obtained from all of the patients before the procedure. Age of the patients, sex, indications of bronchoscopy were recorded. We used transnasal approach in 95 patients and transoral approach in 2 patients. During the procedure, we monitored cardiac parameters and oxygen saturation with pulse oximeter. Blood pressure was measured every 3 minutes. Each patient received 2 lt/minute oxygen before the procedure and oxygen fraction was increased during the procedure when a patient had desaturation. Nasal and oronasal anesthesia is provided using 2% lidocaine. In total 3 ml 2% lidocaine is sprayed directly into the vocal cords. None of the patients received inhaled lidocaine.

Following 12 hours of fasting, patients underwent bronchoscopy. Before the procedure, all patients received intravenous (IV) 1 mg midazolam preceding IV 40 mg slow propofol bolus. Further, patients received 10-20 mg IV propofol as needed.

All procedures were done by a bronchoscopist, an anesthesia technician and a bronchoscopy nurse.

3. Results

The mean age of the participants was 65, 60 of the patients were male (61%) and 37 of the patients were female (39%).

Bronchoscopy indications are presented in table 1. Major indication was lung lesions that were suspected to be central or peripheral lung cancer. Other indications were mediastinal or hilar lymph nodes, hemoptysis, tuberculosis, atelectasis, chronic cough and tracheomalacia. In some patients, bronchial lavage, endobronchial and transbronchial biopsy was obtained. In some patients, only bronchoscopic observation was performed.

Mean propofol dose was 90 mg in patients who had biopsy and 70 mg in patients who did not. Mean duration of the procedure was 14 minutes in those who had biopsy and 10 minutes in those who did not have biopsy.

One patient had epistaxis after receiving topical lidocaine and two patients had respiratory arrest that required ambulation with mask. In the latter, pulmonary arrest was reversed after five minutes of administering mask ambulation, and then the procedure was continued. Among those patients who had pulmonary arrests, one had valvular heart problem and the other had history of atherosclerotic heart disease. Among the patients,

Table 1. Patients characteristics

Indication of bronchoscopy	Number	Percentage %
Central and peripheral lesions	43	44
Mediastinal, hilerlymph nodes	23	24
Hemoptysis	13	14
Tuberculosis	7	7
Chronic cough	6	6
Atelectasis	3	3
Tracheomalacia	2	2

35 (36%) had desaturation, which was reversed by providing adequate oxygenation.

All patients were observed for an hour following the procedure. Patients were not allowed to eat following two hours of the procedure. All patients reported that they did not remember the procedure.

4. Discussions

There are a few studies exploring the use of propofol during bronchoscopy. In our prospective study, we showed that propofol could be used for sedation during fiberoptic bronchoscopy, as it is easy to use, comfortable and safe for the bronchoscopist and the patient.

In contrast to previous studies, we used a lower dose of propofol in this study. Grendelmeier et al. (13) used 200 mg, Bosslet et al. (14) used 242 mg and Stolz et al. (7) used 217 mg mean propofol in their studies. In our study, mean propofol dose was 90 mg in patients who had biopsy and 70mg in those patients who did not have biopsy. In the aforementioned studies, mean duration of the procedure was 19, 25 and 17 minutes, respectively. In our study, mean duration of the procedure was 14 minutes in those had biopsy and 10 minutes in those did not have. This could explain the reason why we had lower mean propofol dose in our study. In the previously mentioned studies, invasive bronchoscopy was perfomed to all patients, which lengthened the procedure. In the study of Stolz et al. (7), similar to our study, propofol was combined with short acting benzodiazepines. Grendelmeier and Bosslet used only propofol in their studies.

Propofol is used for anesthesia and sedation since early 1980s. Cardiac and pulmonary adverse events were reported. However, these events are mostly minor and reversible. Hypotension (17%), injection site discomfort (18%) and apnea (12-24%) were frequently reported. (15) In the study of Stolz et al. (7) in which propofol, benzodiazepine and hydrocodone were compared, percentage of the patients who had oxygen saturation less than 90%, at least once during the procedure, was 32%. Clarkson et al. (5) and Clark et al. (16) had similar percentages of hypoxemia in their studies. Clark et al. (16) compared midazolam and propofol sedation and they did not detect any differences in terms of hypoxemia. However, hypotension was higher in the propofol group and statistically significant. Similarly, we observed hypoxemia in 35% of the patients, which was corrected by increasing oxygen administration. In addition, some of the patients were already hypoxic before the onset of the procedure. We observed hypotension only in two patients because we used a lower dose of propofol.

Crawford et al. (6) compared increasing doses of midazolam and computerized propofol

infusion. In that study, acceptability for both bronchoscopist and patients, anxiety levels and arterial blood pressure did not differ between groups.

In the study of Dutta et al. (17) they reported a study in five children of use of a technique of spontaneous ventilation using propofol with fentanyl, midzolam and sevoflurane without the use of muscle relaxant. In their study no side effects were seen in the study group.

In Wang et al.'s study (18) they evaluated the efficacy and safety of target-controlled infusion (TCI) of propofol and remifentanil, together with the use of high frequency jet ventilation (HFJV), to achieve general anesthesia (GA) in diagnostic fibre-optic bronchoscopy.

A total of 92 consecutive patients scheduled for flexible bronchoscopy were randomly assigned to receive either MS (moderate sedation) using TCI-delivered propofol and remifentanil (n=46), or GA using TCI-delivered propofol and remifentanil with HFJV (n=46). The following were compared between the MS and GA groups: incidence of hypoxaemia, cough score, haemodynamic parameters, partial pressure of carbon dioxide in arterial blood, duration of bronchoscopy and patient satisfaction score. The average and minimum oxygen saturation values in the MS group were lower than those in the GA group. The MS group showed a higher incidence of hypoxaemia.

In the study of Bosslet et al. (14), major adverse events including pulmonary hemorrhage, hypoxia/respiratory failure, bronchospasm, airway obstruction due to tumor, stridor and pneumothorax were seen in 2.8% of the patients. Grendelmeier et al. (13) did not observe any major adverse event in their study. In our study, two patients had apnea that needed ambulation with a mask. Apart from that, we did not observe any major adverse events. These patients had previous history of heart disease. Apnea was not recorded in patients without a cardiac disease.

5. Conclusion

In conclusion, concomitant use of propofol and midazolam for sedation in fiberoptic bronchoscopy is effective and safe in lower doses and in patients without history of cardiac diseases. It is comfortable both for the patient and the bronchoscopist. It increases the repeatability of the procedure, as patients do not remember the procedure. Additionally, it decreases the duration of the procedure. We observed apnea as the only major adverse event in two patients with a cardiac disease history. For this reason, propofol should be used cautiously in patients with previous history of cardiac disease.

Previous studies explored propofol in terms of patient-centered criteria such as the comfort of the patient, tolerability, cough frequency, adverse events, and duration of bronchoscopy. And also, we evaluated it from the doctors' perspective. In our study, we observed that the use of propofol increases the comfort of the clinician. Clinician's workload decreases because of the increase in patients' tolerance. Duration of the procedure was decreased and patients reacted less during the procedure. This study is the first study in which the clinician's comfort was explored.

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