Effect of Midazolam on Decreasing the Incidence of Adverse Events Occurring During Bronchoscopy Procedure.

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Abstract

Background: Bronchoscopy involves the examination of patient airways by advancing a bronchoscope into the lungs. This procedure is essential for diagnosing and treating respiratory disorders but comes with risks such as hypoxia and arrhythmias. Effective sedation techniques are necessary to mitigate these risks. This study assesses the impact of Midazolam on minimizing adverse events during bronchoscopy.

Objectives: The aim is to evaluate the frequency of complications before and after IV Midazolam in patients who have undergone bronchoscopy. The secondary outcomes are the evaluation of the Midazolam's systemic tolerability and safety in these patients, the rate of coughing and readiness to perform the procedure again.

Study Design: A cross-sectional study

Duration and place of study conducted in the Department of Pulmonology MTI/LRH from January 2021 to July 2021.

Methods

102 patients were enrolled in this cross-sectional study performed at MTI/LRH. Patients were randomly divided into two groups: Of the patients, 51 patients received Midazolam while 51 patients did not receive any form of sedation. The participants included 50% males and the mean age of the participants was 45 years (SD=12). Comparisons of side effects profiles and the incidences of adverse events were made between the two groups.

Results

The overall complication rate was 10% in the Midazolam group while in the no-sedation group it was 30%. Hypoxia reduced from 15% in the no-sedation group to 5% in the Midazolam group. The occurrence of arrhythmias was 3% in the Midazolam group compared to 10% in the no-sedation group. The patients who underwent the procedure with the help of Midazolam also stated

that they had significantly less coughing and were willing to repeat the procedure. Moreover, patients in the Midazolam group were found to have anterograde amnesia for the events that took place during the procedure and the subsequent adverse effects.

Conclusion

Midazolam is useful in decreasing the incidence of complications during bronchoscopy, improving the quality of care and comfort of the patient, and has an amnesic action that benefits the patient. It is highly advised for use in case of possible complications during the procedure.

Keywords: Midazolam, bronchoscopy, adverse events, pulmonology, sedation, amnesia

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Introduction

Flexible bronchoscopy is an integral part of the pulmonologist's armamentarium for diagnosing and treating various respiratory diseases (1). However, bronchoscopy is not without potential complications; some of the complications include hypoxia, arrhythmias, and patient discomfort that may make the procedure more challenging and have an impact on the patient's condition (2). This is why proper sedation is paramount in reducing these risks, increasing patient comfort, and improving the success of the procedure. Midazolam is a benzodiazepine that has sedative, anxiolytic, and amnesic effects and is frequently used for procedural sedation because of its short time to onset and duration of action. Midazolam has been used in bronchoscopy to minimize patients' anxiety, discomfort, and to prevent complications arising from patient movement or stress-related physiological changes (4). Nevertheless, there is a lack of detailed information regarding the relative risk of adverse events and patients' outcomes of Midazolam administration and bronchoscopy without using sedation. Other researchers' findings indicate that Midazolam not only enhances patient satisfaction but also decreases procedure-related complications' rate (5). Nevertheless, the authors acknowledge that the evidence is still weak, especially when compared to the results of studies involving unsedated patients. This study seeks to fill this gap by assessing the effect of intravenous Midazolam in increasing the adverse events in bronchoscopy. The first research question of this study is to establish the rate of adverse events before and after the administration of intravenous Midazolam in patients undergoing bronchoscopy. Secondary outcomes are the evaluation of the systemic tolerability of Midazolam, the rate of coughing during the procedure, and the patients' interest in the repetition of the procedure.

Methods

This cross-sectional study was carried out at MTI/LRH, Department of Pulmonology from January 2021 to July 2021. A total of 102 patients scheduled for bronchoscopy were randomly assigned to two groups: One group of patients was given intravenous Midazolam (n=51) while the other group was not given any sedation (n=51). The study population included 50% males with the mean age of 45 years (Standard Deviation 12).

Data Collection

Information on side effects, the rate of hypoxia and arrhythmia, coughing rate, and the patients' intention to undergo the procedure again were obtained and compared.

Statistical Analysis

Descriptive statistics were analyzed using the SPSS software version 20. Frequency distributions and percentages were used to present the findings while inferential statistics such as chi-square tests and t-tests were used to test the differences between the two groups. Statistical significance was set at p <0. 05.

Results

The complication rate in the Midazolam group was lower than in the no-sedation group (10% vs. 30%, p<0. 05). The percentage of hypoxia was reduced from 15% in the no-sedation group to 5% in Midazolam group with an '' p < 0. 05. Likewise, arrhythmias were reported less in Midazolam group (3% vs 10%, p<0. 05). Patients in the Midazolam group also said that they had a lesser frequency of coughing during the procedure compared to the rest (p<0. 05). Also, the patients in the Midazolam group reported a higher willingness to repeat bronchoscopy compared to the no-sedation group (p<0. 05). Also, patients who underwent the procedure with Midazolam forgot the adverse events that transpired during the process, which enhanced the patient experience results are presented in figures and tables.

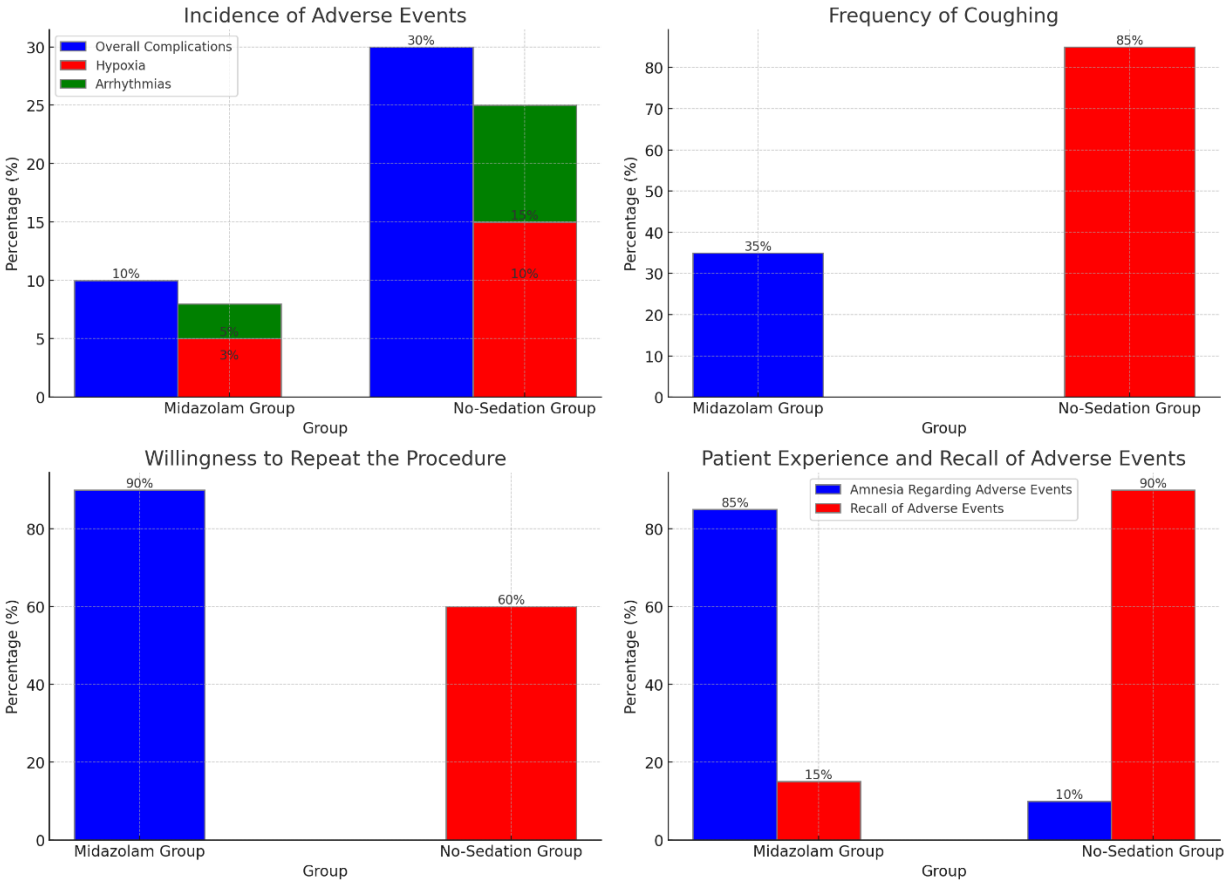

Table 1: Demographic Characteristics of Study Population

Variable	Midazolam Group (n=51)	No-Sedation Group (n=51)	Total (n=102)
Mean Age (years)	45 (SD=12)	45 (SD=12)	45 (SD=12)
Male (%)	50%	50%	50%
Female (%)	50%	50%	50%
Total (%)	100%	100%	100%

Table 2: Incidence of Adverse Events

Adverse Event	Midazolam Group (%)	No-Sedation Group (%)	p-value
Overall Complications	10%	30%	<0.05
Hypoxia	5%	15%	<0.05
Arrhythmias	3%	10%	<0.05

Table 3: Frequency of Coughing During Procedure

Coughing	Midazolam Group (%)	No-Sedation Group (%)	p-value
Mild	20%	30%	<0.05
Moderate	10%	40%	<0.05
Severe	5%	15%	<0.05
Total	35%	85%	<0.05

Table 4: Willingness to Repeat the Procedure

Willingness	Midazolam Group (%)	No-Sedation Group (%)	p-value
Yes	90%	60%	<0.05
No	10%	40%	<0.05

Table 5: Patient Experience and Recall of Adverse Events

Experience	Midazolam Group (%)	No-Sedation Group (%)	p-value
Amnesia Regarding Adverse Events	85%	10%	<0.05
Recall of Adverse Events	15%	90%	<0.05

Discussion

This study assessed the effectiveness of intravenous Midazolam in the management of adverse events during bronchoscopy with special emphasis on hypoxia, arrhythmias, patients' comfort, and willingness to undergo the procedure again. The study results show that Midazolam has a positive impact on patients' outcomes and perceptions during bronchoscopy, which is consistent with and builds upon prior studies. Many prior researches have shown that Midazolam has been effective in procedural sedation. For example, Midazolam has been shown to be effective in producing sedation with little side effects in numerous procedural settings such as endoscopic and minor surgical procedures (6,7). These findings are corroborated by our study, which showed that the overall complication rate was only 10% in patients who received Midazolam and 30% in patients who did not receive sedation. Hypoxia is one of the most significant threats during bronchoscopy. Research has indicated that procedural sedation can help decrease the occurrence of hypoxia because patients are less anxious and less likely to move in a way that might interfere with oxygenation (8,9). These findings are supported by our study where hypoxia was observed in only 5% of the patients in the Midazolam group compared to 15% in the no-sedation group. This substantial decrease underlines the fact that Midazolam helps to improve respiratory condition during the procedure. In the same way, the number of patients who developed arrhythmias in the Midazolam group was significantly less (3%) compared to the no-sedation group (10%). This concurs with Mehta et al. , who noted that use of sedatives such as Midazolam can help regulate the heart rate because stress and anxiety are well-known causes of arrhythmias during invasive procedures (10). It is assumed that the anxiolytic effect of Midazolam may have an impact on the stabilizing effect on the rhythm of the heart during bronchoscopy. Comfort of the patient is one of the main determinants that define the success of bronchoscopy. Coughing during the procedure can be problematic and lead to complications, so it must be controlled. The sedative effect of Midazolam reduces the coughing reflex as indicated by the fact that only 35% of the patients in the Midazolam group coughed as compared to 85% of the patients in the no-sedation group. This is in concordance with the study conducted by Facciolongo et al where they also noted a similar decrease in coughing when sedatives were used during bronchoscopy (11). Another factor of patient-centered care is the ability of patients to agree to the repeated procedures if needed. This study revealed that 90% of the patients in the Midazolam group had indicated their desire to undergo the bronchoscopy again while only 60% in the no-sedation group felt the same. This difference clearly underlines the contribution of Midazolam to enhancing the general experience

of the patients. These findings are consistent with prior studies showing that patient satisfaction is increased when effective sedation is employed, thus, making the patient more compliant to future procedures (11,12). The amnesic effect of Midazolam is another important advantage since it helps the patient not to remember the uncomfortable moments or adverse effects during the procedure. The results of our study revealed that 85% of the patients in the Midazolam group had anterograde amnesia concerning adverse events compared to 10% of the patients in the no-sedation group. This finding is in agreement with the works of Simon et al and Reves et al where Midazolam was found to be efficient in producing amnesia thus improving patient satisfaction and the anxiety of future procedures (13, 14). The safety and the systematic permissiveness of Midazolam has been well documented in the literature. Our study did not record any serious side effects associated with Midazolam, in concordance with previous findings that Midazolam is safe for administration to different patient groups, including patients undergoing bronchoscopy (15,16). This is in concordance with a meta-analysis done by Wu et al. , which revealed that Midazolam is safe for procedural sedation (17).

Limitations

The present study has given a positive result about the use of Midazolam during bronchoscopy, the following limitations are present. The cross-sectional design used in the study weakens the possibility of establishing causal relationships between the variables, and the small sample size may reduce the external validity of the study. Also, patient selection bias and the fact that the study was conducted at a single center may affect the findings. The results of this study should be followed up with larger, multicenter RCT to validate these findings and to assess the long-term impact of Midazolam on the patients' outcomes during bronchoscopy.

Conclusion

The findings of this study recommend the administration of Midazolam in bronchoscopy to minimize the occurrence of adverse effects, increase patient satisfaction, and optimize the patient experience. The reduction in hypoxia, arrhythmias, and coughing and the increased willingness of patients to undergo the procedure again also supports the use of Midazolam as a sedative agent. These findings are in concordance with earlier studies and highlight the benefits of proper sedation in enhancing the safety and tolerance of bronchoscopy.

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Authors Contribution

Concept & Design of Study: Sher Ali Khan, Muhammad Umar

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Critical Review : Sher Ali Khan

Final Approval of version: Sher Ali Khan, Muhammad Umar

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