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Sedation-free upper gastrointestinal endoscopy and its cost-effectiveness

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Abstract

This study aimed to determine the success rate of sedation-free upper gastrointestinal (GI) endoscopy and evaluate the cost-effectiveness of this drug-free approach. The study included patients who underwent gastroscopy between February 2020 and December 2022. Demographic information such as age and gender, along with clinical data including whether the procedure was performed with sedation and the patients' tolerance status, were recorded. Statistical analysis revealed no significant difference between the sedation and sedation-free groups in terms of procedural success. Interestingly, a notable cost difference of 43% was observed between the two groups, with the sedation-free group demonstrating higher cost-effectiveness. Despite the nearly 50% higher cost associated with administering sedation, there was no significant disparity in the successful completion of the procedure between the two groups. The findings of this study indicate that sedation-free upper GI endoscopy can achieve comparable success rates to the sedation-assisted approach. Moreover, the cost-effectiveness analysis highlights the economic advantage of the drug-free alternative, given the substantial cost reduction observed in the sedation-free group. This study underscores the feasibility of implementing sedation-free procedures as a cost-effective and successful option for upper GI endoscopy.

Key words: Endoscopy, cost-effectiveness, sedation

Introduction

Endoscopy is a commonly performed procedure performed today, both for diagnosis and treatment. As well as the skill and experience of the endoscopist performing the procedure, the patient's anxiety, discomfort, and lack of tolerance also affect the result and the quality of the procedure. Benzodiazepines and propofol are commonly used drugs administered intravenously before the procedure providing comfort to the patient and thus provide a comfortable procedure. However, being comfortable for the patients, sedation comes with extra costs. Extra staff for short-stay units, medication costs, and bed occupancy rate adds extra burden to the hospital. While moderate sedation (benzodiazepine) can be performed by nurses and endoscopists performing the procedure worldwide, deep sedation with propofol makes an anesthesiologist present during the procedure [1]. Cardiac arrhythmia and decreased oxygen saturation are more common in sedation than without sedation [2,3]. In this study, we aimed to investigate the clinical and economic results of performing upper gastrointestinal (GI) endoscopy without sedation.

Material and Methods

717 patients were included in the study. Age, gender, whether they received sedation anesthesia, and their tolerance to the procedure were recorded. The study is done in a secondary care hospital, between January 2021 and December 2022. The study includes 717 upper GI endoscopy procedures performed in the hospital by a single endoscopist and diagnostic data is recorded.

In our clinic, the routine gastroscopy procedure was done 2-3 minutes after xylocaine application to the pharynx, and by informing the patient about the procedure risks and benefits of not using sedation. Sedation is performed at the request of

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patients. Intravenous access, 2 mg/ml dormicum (midazolam) was administered 2 minutes before the beginning of the procedure. Patients who were not sedated after the procedure were discharged immediately, while those who received sedation were discharged after an observation period of approximately 30-45 minutes and short-stay unit occupation. The endoscopy procedure was performed with olympus gif-xq200 (9.2mm). Procedure is considered to be successful with duodenal insufflation (imaging) regardless of the indication.

Ethical approval

This study was carried out in accordance with the Declaration of Helsinki. All participants have been informed. Consent of all participants was obtained. This prospective study was approved by the local Ethical Board of Bezmialem Universisty (approval number: 71306657-050.01.04-18785).

Statistical analysis

Descriptive statistics for continuous variables in our study; expressed as mean, standard deviation, minimum, and maximum values; Expressed as Number (N) and Percentage (%) for categorical variables. Kolmogorov Smirnov test was used for Normal distribution variables. The Mann-Whitney U test was used to compare continuous independent variables that did not show normal distribution. Chi-square test was used to determine the relationship between categorical variables. The statistical significance level was taken as 5% in the calculations and the SPSS (IBM SPSS for Windows, Ver.24) statistical package program was used for the calculations.

Results

The study includes 717 patients. 54 of the patients were given 2mg/ml dormicum before the procedure due to their anxiety and at their request. Of these 54 patients, only 1 of them was not able to finish the procedure. Of the patients who underwent endoscopy under sedation, 25 (46%) were male and 29 (54%) were female. There was no significant difference between the groups in terms of gender distribution (p=0.750). The mean age of the patients who received sedation was 49.96-12.92, and there was no significant difference between the mean age of the patients who did not receive sedation (51.75-15.16) (p=0.325). Among the 663 patients who underwent the procedure without sedation, the number of cases who were not able to finish the procedure was 21. Of these 663 patients, 267 were male (40%) and 396 were female (60%). Of the 21 patients who could not tolerate the procedure, 14 (66%) were female and 7 (33%) were male. Statistically, there was no difference between the sedation group and non-sedation group in terms of tolerating the procedure (p=0.601).

During the study, several reasons are observed causing the procedure to terminate. Gag reflex is commonly observed caused by the scope, slowing down the procedure. Patients also experience, the feeling of not being able to breathe and the constant urge to swallow due to physiologic oral secretions [4]. The patients were pulling their heads back, trying to get up from the Table 1, and trying to hold the device with their hands. With mild sedation, these findings are not observed, the patient's level of consciousness decreases and the procedure is easier by creating a feeling of sedation [5].

Table 1. Charactheristics and clinical findings of patients

		With sedationn (%)	Without sedation n (%)	
Age	Mean±SD	45.2	40.1	0.325a
Gender	Male	25	267	0.750b
	Female	29	396	
Toleration	Yes (+)	53 (98.15)	642 (96.83)	0.601b
	No (-)	1 (1.85)	21 (3.17)	

a: Mann-Whitney U Test, b: Pearson Chi-Square Test

Discussion

In our study, only 3.17% of the patients were not able to tolerate sedation-free endoscopy procedures. 1.85% of the sedated patients were not able to finish the procedure. Having recorded these data, we postulate that administering light sedation could be useful in the non-tolerant patient group. Although the success rate of the procedure increases with light sedation, the length of stay after the procedure, the medication cost for sedation, monitoring, intravenous catheter application, and the amount of time consumed by sedation should be taken into account.

According to the state hospitals' financial administration in 2023, the billed amount of the upper GI endoscopy procedure is 124 TL. Intravenous access catheter application is billed 8.5 TL, and the monitoring is billed 19 TL [6].

The current price of 5mg/5ml–flacons of midazolam, which is among the drugs in the benzodiazepine group, is 55 TL. Average (initial dose) of 2 ampoules is made for each patient [7].

Although it cannot certainly be individually priced, there is a 43.8% price difference between the procedure with mild sedation and with xylocaine spray only.

Repeat procedures of patients who could not tolerate the procedure were not included in this rate. Our study does not include deep sedation and its cost-effectiveness. Since deep sedation necessitates more equipment and personnel; we postulate it is more costly and time-consuming and it should further be studied.

Although there is no consensus in terms of performing upper GI endoscopy with or without sedation mild sedation is recommended in most centers for patient comfort [1,8,9]. In the pediatric population, sedation is a priority [10]. Diameter of the endoscope also has an effect on the procedure tolerance, reducing the need for sedation. [11] Communication with patients and giving information about the procedure increases the chance of success of gastroscopy without sedation [12]. In a study with 419 cases in Canada, one group was given midazolam and the other group was given normal saline. In this study, while no difference

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was found in technical competence -patient satisfaction, there was a difference of approximately 50% in the patient's recovery time and 30% in terms of the price difference. In our practice, we perform upper GI endoscopy without sedation, if it is not tolerated, we administer light sedation upon the patient's request.

Conclusion

From a cost-effectiveness perspective, we suggest that it is more suitable to perform upper gi endoscpoy without sedation. Since there is %40 cost difference between these procedures with or without sedation we think it is more appropriate to administer sedation if the patient does not tolerate the procedure without it.

Conflict of Interests
The authors declare that there is no conflict of interest in the study.

Financial Disclosure
The authors declare that they have received no financial support for the study.

Ethical Approval
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