

# Our Anesthesia Experience in Endoscopic Retrograde Cholangiopancreatography Patients

*Endoskopik Retrograd Kolanjiopankreatografi Hastalarında Anestezi Tecrübemiz. Retrospektif Bir Çalışma*

Erdoğan Koca<sup>1</sup>

<sup>1</sup>Anesthesiology and Reanimation, Malatya Training and Research Hospital Anesthesiology and Reanimation Clinic, Malatya, Türkiye

**Cited:** Koca E. (2024). Our Anesthesia Experience in Endoscopic Retrograde Cholangiopancreatography Patients. *Van Sağlık Bilimleri Dergisi*, 17(3), 125-130.

## ABSTRACT

**Objective:** In this study, the non-operating room anesthesia application of 70 patients who underwent endoscopic retrograde cholangiopancreatography (ERCP) was evaluated retrospectively.

**Material and Method:** 70 patients who underwent endoscopic retrograde cholangiopancreatography (ERCP) under sedation at our hospital between 02.02.2017 and 03.12.2019 were examined. The patients were grouped as female, male, and under 65 years of age and over, and were evaluated in terms of duration of the procedure and the amount of medication used. Complications were evaluated additionally.

**Results:** It was determined that midazolam, propofol and fentanyl were preferred in all patients for sedation. There was no statistical difference in terms of processing times. There is no statistically significant difference for propofol and fentanyl in the amount of drugs used according to the age and gender of the patients. There was no difference in the amount of midazolam given between the genders, it was observed that there was a statistically significant difference when the amounts given to the age groups were examined. During the procedure, bradycardia developed in two patients, hypotension in three patients, and hypertension in two patients.

**Conclusion:** Midazolam, propofol, fentanyl can be used safely at titrated doses in endoscopic retrograde cholangiopancreatography (ERCP) applications. Titrated doses of propofol and fentanyl from these drugs have been used safely in similar amounts in the older age group.

**Keywords:** *Non-Operating Room Anesthesia., Endoscopic Retrograde Cholangiopancreatography, Sedoanalgesia*

## ÖZET

**Giriş:** Bu çalışmada endoskopik retrograd kolanjiopankreatografi (ERCP) yapılan 70 hastanın ameliyathane dışı anestezi uygulaması retrospektif olarak değerlendirildi.

**Materyal ve Metot:** 02.02.2017 ile 03.12.2019 tarihleri arasında hastanemizde sedasyon altında Endoskopik Retrograd Kolanjiopankreatografi işlemi yapılan 70 hasta incelendi. Hastalar bayan, erkek ve 65 yaş altı ve üstü olarak gruplandırılarak, işlem süreleri ve kullanılan ilaç miktarları açısından değerlendirildi. Ayrıca oluşan komplikasyonlar değerlendirildi.

**Bulgular:** Sedoanaljezi amacıyla tüm hastalarda midazolam, propofol, fentanil tercih edildiği tespit edildi. İşlem süreleri açısından istatistiksel olarak fark bulunmadı. Hastaların yaş ve cinsiyete göre kullanılan ilaç miktarları incelendiğinde propofol, fentanil için istatistiksel olarak anlamlı bir fark bulunmadı. Midazolamın cinsiyetler arası verilen miktarlarında fark görülmezken, yaş gruplarına verilen miktarlarında istatistiksel olarak anlamlı bir fark olduğu gözlemlenmiştir. İşlem esnasında iki hastada bradikardi, üç hastada hipotansiyon, iki hastada hipertansiyon geliştiği görüldü.

**Sonuç:** Midazolam, propofol, fentanil Endoskopik Retrograd Kolanjiopankreatografi uygulamalarında titre edilen dozlarda güvenle kullanılabilir. Çalışmamızda propofol ve fentanilin titre edilen dozları ileri yaş grubunda da benzer miktarlarda güvenli olarak kullanıldığı tespit edilmiştir.

**Anahtar kelimeler:** *Ameliyathane dışı anestezi, Endoskopik Retrograd Kolanjiopankreatografi, Sedoanaljezi*

\* Corresponding author: Erdoğan Koca. E-mail: [drerdinckoca@hotmail.com](mailto:drerdinckoca@hotmail.com)

ORCID: Erdoğan Koca: 0000-0002-6691-6711

Received: 06.08.2023, Accepted: 21.11.2024 and Published: 30.12.2024



## INTRODUCTION

Outside the operation room applications are increasing in hospitals in parallel with the increase in technological and interventional procedures. During these procedures, it is important for the patient to be immobile, reflexes suppressed, and calm. (Hodgson, 2008).

Ensuring basic standards in outside the operation room practices is important for patient safety. (TARD, 2015). Before the procedure, the patient should be evaluated and anesthesia type and preparations should be decided according to the procedure to be applied. During the procedure, adequate monitoring should be performed as prescribed by the guidelines, and the necessary equipment should be kept ready (Sargin et al., 2015; TARD, 2015). The ERCP procedure is mainly carried out to determine and treat diseases of the biliary tract, pancreatic duct and periampullary region. Sedation during the procedure increases the success of the procedure by increasing the comfort of both the patient and the endoscopist. Since this procedure can cause many complications, close follow-up of the patient should prevent potentially fatal complications such as hypotension, hypertension, bradycardia, oxygen desaturation, respiratory arrest (TARD, 2015).

In our study, we divided 70 patients who underwent ERCP into two groups as under 65 years old and over and we separated the sample as male and female. We examined the duration of the procedure, the drugs used and their amounts. We retrospectively investigated the amount of fluid administered and complications. Our aim was to compare the amount of drug used between the groups under 65 years old in terms of the duration of the procedure and complications in patients who underwent ERCP.

## MATERIAL and METHOD

Ethical approval was obtained from the Malatya Clinical Research Ethics Committee (Ethical approval number: 2021/45). Underwent ERCP under sedation between 02.02.2017 and 03.12.2019 were examined. Our study was retrospective. Data were scanned through anesthesia follow-up records and hospital information system. Patients who could not obtain sufficient information in the patient records were excluded from the study. ERCP was performed under sedation and general anesthesia was not given to all of our patients. All patients are evaluated by an anesthesiologist before the procedure. Necessary examinations

and consultations were made regarding the current diseases. Necessary preparations and equipment control are made. Electrocardiography (ECG), pulse oximetry, monitoring are performed as standard for patients who will undergo ERCP. Before our patients are placed in the left lateral position, vascular access is opened and fluid replacement is started. Our patients are treated in the ERCP unit and taken to the recovery unit in the same unit. Hemodynamic follow-up, medications and complications are recorded throughout the entire procedure. The patient is followed in this unit until the transfer to the service becomes appropriate.

## Statistical Analysis

Data analysis was performed using the IBM SPSS version 26.0 statistical program (Chicago, IL, USA). A p value of <0.05 was considered statistically significant. Skewness and Kurtosis values were used to test the normality of the distribution of the data. In order to see the effects of independent variables (Gender, Age, Drug) on the dependent variable (Duration), Multiple Regression analysis was performed after providing the assumptions. For the analysis of significant differences between categorical variables (Age, Gender) and continuous variables (Drugs, Duration), the Independent Sample T test was used for groups with normal distribution and the Mann-Whitney U test for groups without normal distribution. Chi-square test was performed to examine whether there was a difference in groups within categorical variables. Descriptive statistics data were shared as mean, median, standard deviation and quartiles for continuous variables, and as numbers and percentages (%) for categorical variables.

In the regression analysis performed with 70 patients included in the study, the effect size was calculated as  $f^2 = 184834$ . In the power analysis performed with the G\*Power 3.1.9.7 (Dusseldorf, Germany) program, when  $f^2=184834$  and alpha error probability = 0.05, the power of the study was calculated as 0.80 in this sample of 70 people.

## RESULTS

36 (51.4%) of our ERCP patients who underwent outside the operating room application were female and 34 (48.6%) were male. There were 35 (50%) patients under the age of 65 and 35 (50%) patients over the age of 65 (Table 1).

**Table 1.** Patient demographic data

| Demographic |        |       | Age   |        | Total |
|-------------|--------|-------|-------|--------|-------|
|             |        |       | ≤65   | 65>    |       |
| Gender      | Male   | n     | 16    | 18     | 34    |
|             |        | %     | 22.9% | 25.7%  | 48,6% |
|             | Female | n     | 19    | 17     | 36    |
|             |        | %     | 27.1% | 24.3%  | 51,4% |
| Total       | n      | 35    | 35    | 70     |       |
|             | %      | 50.0% | 50.0% | 100.0% |       |

The average duration of the procedure was 47.9 minutes, parallel with similar studies. Since ERCP is a procedure that requires long-term deep anesthesia, drugs were used in combination. Thus, both effective sedation was provided and the side effects of the drugs were reduced. It was observed that midazolam, fentanyl and propofol were preferred in all

patients in the drug combinations. There was no significant difference between the male and female groups in terms of drug doses. When the midazolam, fentanyl and propofol levels given were examined, no statistically significant difference was found in terms of gender (p=0.433) (p=0.510) (p=0.951) (Table 2)

**Table 2.** Drug doses by gender

| Drug              |                    | Female<br>(n=36)      | Male<br>(n=34)        | P value |
|-------------------|--------------------|-----------------------|-----------------------|---------|
| Midazolam<br>(mg) | Median(Range)(IQR) | 2.0(4.0)(2.000-2.000) | 2.0(2.0)(1.875-2.000) | 0.433   |
|                   | Mean±Std.Deviation | 2.083±0.7700          | 1.926±0.6047          |         |
| Fentanyl (mcg)    | Median(Range)(IQR) | 50(50)(50-50)         | 50(85)(50-50)         | 0.510   |
|                   | Mean±Std.Deviation | 55.56±13.511          | 54.12±17.428          |         |
| Propofol (mg)     | Median(Range)(IQR) | 200(420)(100-225)     | 195(400)(150-250)     | 0.951   |
|                   | Mean±Std.Deviation | 196.67±100.768        | 195.29±85.643         |         |

When the midazolam levels given to the age groups were examined, it was observed that there was a statistically significant difference (p=0.008). On the otherhand the fentanyl and

propofol levels given to the age groups were examined, no statistically significant difference was found (p=0.775) (p=0.090) (Table 3).

**Table 3.** Drug doses according to age

| Drug              |                    | Under 65 years of age<br>(n=35) | Over 65 years of age<br>(n=35) | P value |
|-------------------|--------------------|---------------------------------|--------------------------------|---------|
| Midazolam<br>(mg) | Median(Range)(IQR) | 2.0(2.0)(2.000-3.000)           | 2.0(4.0)(1.000-2.000)          | 0.008   |
|                   | Mean±Std.Deviation | 2.171±0.5681                    | 1.843±0.7743                   |         |
| Fentanyl<br>(mcg) | Median(Range)(IQR) | 50(50)(50-50)                   | 50(85)(50-50)                  | 0.775   |
|                   | Mean±Std.Deviation | 55.71±14.958                    | 54.00±16.079                   |         |
| Propofol (mg)     | Median(Range)(IQR) | 200(400)(150-250)               | 170(420)(100-200)              | 0.090   |
|                   | Mean±Std.Deviation | 214.86±96.752                   | 177.14±86.486                  |         |

When the processing times of the age groups were examined, no statistically significant difference was found (p=0.866) (Table 4).

When the processing times of the gender groups were examined, no statistically significant difference was found (p=0.535) (Table 5).

**Table 4.** ERCP procedure time by age

| AGE (year)                       | Under 65 years of age (n=35) | Over 65 years of age (n=35) | P value |
|----------------------------------|------------------------------|-----------------------------|---------|
| TIME(minutes) Median(range)(IQR) | 45(30)(30-60)                | 45(90)(30-60)               | 0.866   |
|                                  | 46.43 ± 11.979               | 49.51 ± 20.523              |         |

**Table 5.** ERCP procedure time by gender

| Gender (Female/Male)             | Female (n=36)    | Male (n=34)   | P value |
|----------------------------------|------------------|---------------|---------|
| TIME(minutes) Median(range)(IQR) | 50(90)(31.25-60) | 45(60)(30-60) | 0.535   |
| Mean ± Std. Deviation            | 49.67±18.936     | 46.18±14.145  |         |

During the procedure, bradycardia developed in two patients, hypotension in three patients, and hypertension in two patients. An average of 770.6 cc fluid replacement was performed throughout the procedure. Intravenous lidocaine (20-200 mg) was administered to 20 of the patients. Considering the ASA (American Society of Anesthesiologists) scoring of our patients, it was seen that there were ASA 1:10, ASA 2:35, ASA 3:24, ASA 4:1 patients.

## DISCUSSION

Technological developments have enabled patients to perform invasive and non-invasive interventions for diagnosis and treatment in environments outside the operating room. These practices reduce hospital costs. Mainly gastroenterology, radiology, audiology, cardiology, interventional neuroradiology, urology, haematology, oncology and dentistry are the units where these procedures are performed. With the increase of these procedures, anesthesia services have made it necessary to form anesthesia teams in the area outside the operating room. (Türk et al., 2013). In our hospital, the current team for outside the operating room applications consists of an anesthesiologist and two anesthesia technicians and practices in the adult endoscopy, paediatric endoscopy, coronary angiography, and interventional neuroradiology units.

The guide for non-operating room anesthesia practices published by the Turkish Society of Anesthesiology and Reanimation regarding outside the operating room practices and the guide of the American Society of Anesthesiology have been decisive in this regard. The equipment, drugs and environmental conditions to be kept in the units where outside the operating room

applications will be made are determined in the guidelines. In the units where outside the operating room will be applied; oxygen supply, aspirator, defibrillator, monitor (suitable for heart rate, blood pressure, arterial and oxygen saturation monitoring), laryngoscope set, equipment suitable for emergency resuscitation, adequate electrical connection, adequate lighting and a suitable unit for recovery (TARD, 2015).

In the unit where ERCP procedure is performed in our hospital, anesthesia device, aspirator, defibrillator, emergency medicine car, oxygen connections and spare oxygen tube, patient monitor (ECG, blood pressure arterial, peripheral oxygen saturation), laryngoscope set, equipment suitable for emergency resuscitation, adequate electrical connection and lighting and a suitable unit for recovery exist.

An anesthesiologist and two anesthesia technicians are present during the procedure. In the guidelines, the importance of the experience of the team in emergency situations is mentioned in outside the operating room applications. Ease of access to the appropriate environment and equipment is important for the team to work.

During the ERCP procedure, the patient's reflexes such as coughing and gagging should be suppressed under deep sedation. Medications to be administered during this procedure, which continues for a long time while preserving protective airway reflexes, should be evaluated by considering the clinical condition, age and diseases of the patient.

The amount of drug administered varies according to the patient's condition. In outside the operating room applications, children

under the age of 1 and premature, ASA III - IV patients, airway abnormalities and respiratory system diseases, sleep apnoea disorder, morbid obesity, neurological, developmental and psychiatric diseases, liver and kidney diseases (metabolism and excretion of the agents used vary), Those with a history of complications related to anesthesia under anesthesia in the past are in the risk group. In our patient group ASA classification was as follows; ASA 3; 24 and ASA 4; 1 patient.

Appropriate monitoring is the most important part of anesthesia care, especially in high-risk patients such as advanced age, Chronic Obstructive Pulmonary Disease (COPD), smoking history, heart failure, and obstructive sleep apnea syndrome (Saunders et al., 2016).

Of our patients, 6 had COPD, 1 had OSAS (Obstructive Sleep Apnea Syndrome), 18 had a history of smoking, and 6 had a history of heart failure. Capnography is particularly recommended in this high-risk group of patients as it reduces respiratory complications. Capnography is also recommended in endoscopic procedures (Saunders et al., 2016).

We used capnography in all our patients who underwent ERCP. Many different anesthetic agents can be used in outside the operating room applications. The primary reason for preference among these anesthetic drugs is the onset of action. According to the property, dexmedetomidine, propofol, midazolam, pentobarbital should be the first choice. Propofol is particularly advantageous in maintenance due to its ease of titration, low incidence of nausea and vomiting, and rapid recovery (Starkey and Sammons, 2011).

Benzodiazepines, hypnotics and opioids are commonly used agents in outside the operating room applications. These drugs require careful use because of their side effects. (Campo et al., 2004). The most commonly used opioid is fentanyl. Midazolam is the most preferred sedative agent due to its amnesic effect. Propofol is preferred due to its pharmacodynamic and pharmacokinetic advantages as well as its antiemetic properties. Many studies show that anesthesia with propofol has good tolerability and allows rapid recovery. In studies, it was observed that propofol anesthesia had a fast response time and well tolerated. (Wang et al., 2013).

Türk et al. used propofol in 3244 patients in their study with 3583 patients (Türk et al., 2013). In our study, we found that midazolam, propofol and fentanyl were used in all patients. ERCP is a long and painful procedure and requires the patient to be completely immobile,

we administered deep sedation to all our patients to maintain this situation. In ERCP applications, different doses and protocols of propofol, midazolam and fentanyl are generally applied (Koshy et al., 2000).

When the amounts of propofol and fentanyl administered in our patients were evaluated between age and gender, no difference was observed. These doses, which are administered by titration, are very important for both patient safety and the success of the procedure. All the patients we take under elective conditions are examined in detail by the anesthesiologist before the procedure. A detailed preoperative evaluation reduces possible complications and facilitates the management of complications (Karamnov et al., 2017):

Respiratory and circulatory depression, nausea-vomiting, hypotension, hypoxia, hypothermia, aspiration of gastric contents, allergy, anaphylaxis, cardiac complications, pneumothorax are among the complications that can be seen during outside the operating room applications (Türk et al., 2013).

Beach et al. In a series of 139142 cases, they reported that only 10 patients developed aspiration and 75 patients developed major complications, and none of them died during the procedure. (Beach et al., 2016). During the procedure, bradycardia developed in two patients, hypotension in three patients, and hypertension in two patients.

Cooper et al. examined 165527 patients who underwent colonoscopy and reported that the most common complication was aspiration of gastric contents. (Cooper et al., 2013).

In units where the outside room practices carried out, there should be recovery units that allows the follow-up of patients after the procedure. After the application, patients are at risk for many complications. In our unit, we have a unit where our patients with sufficient equipment will be rehabilitated before discharge to the service.

The ERCP procedure is special because it takes a long time and requires deep sedation. We analyzed the anesthetic drug doses by grouping the patients who underwent ERCP according to gender and age. In our study, we found that drug amounts at titrated doses were administered safely. In addition, we did not observe a difference between the sexes in terms of drug doses.

### Conclusion

The outside operating room applications, pre-anesthesia evaluation, determination of the anesthesia method, adequate equipment preparation, team experience, taking

precautions to protect the patient against complications, each of the follow-up steps in the recovery unit are very important. The long duration of ERCP, the constant presence of an endoscope in the airway, the difficulty in swallowing and the requirement of continuous deep sedation increase the difficulty of the procedure. The results of our study show that the amount of drugs administered did not change according to the gender and age.

We observed that midazolam, propofol and fentanyl, which are prominent in the studies for sedoanalgesia, were used safely in our patient group. There was no difference between the groups in terms of drug amounts and processing times, except for the amount of midazolam use over the age of 65. The small number of participants in our study was the limitation of our study.

**Ethics Committee Approval:** Ethical Issue: Ethical approval was obtained from the Malatya Clinical Research Ethics Committee (Ethical approval number: 2021/45).

**Conflict of Interest:** The authors declare that they have no conflict of interests regarding content of this article.

**Financial Support:** No financial support was received for this study. This study was supported by author

#### REFERENCES

- Beach ML, Cohen DM, Gallagher SM, Cravero JP. (2016). Major adverse events and relationship to nil per os status in pediatric sedation/anesthesia outside the operating room. *Anesthesiology*, 124, 80-88.
- Campo R, Brullet E, Junquera F, Puig-Diví V, Vergara M. (2004). Sedation in digestive endoscopy. Results of a hospital survey in Catalonia (Spain). *Gastroenterology and Hepatology*, 27, 503-507.
- Cooper GS, Kou TD, Rex DK. (2013). Complications following colonoscopy with anesthesia assistance: A population-based analysis. *JAMA Internal Medicine*, 173, 551-556.
- Hodgson E. (2008). Airway management outside the operating theatre. *Saudi Journal of Anaesthesia*, 2, 35-39.
- Karamnov S, Sarkisian N, Grammer R, Gross WL, Urman RD (2017). Analysis of adverse events associated with adult moderate procedural sedation outside the operating room. *Journal of Patient Safety*, 13, 111-121.
- Koshy G, Nair S, Norkus EP, Herten HI, Pitchumoni CS (2000). Propofol versus midazolam and meperidine for conscious sedation in GI endoscopy. *American Journal of Gastroenterology*, 95, 1476-9.
- Sargın M, Sarıtaş TB, Borazan H, Otelcioğlu Ş. (2015). ERCP uygulanacak pediatrik hastada anestezi. *Selçuk Tıp Dergisi*, 31, 29-30.
- Saunders R, Erslon M, Vargo J. (2016). Modeling the costs and benefits of capnography monitoring during procedural sedation for gastrointestinal endoscopy. *Endoscopy International Open*, 4, 340-451.
- Starkey E, Sammons HM. (2011). Sedation for radiological imaging. *Archives of Disease in Childhood: Education & Practice*, 96, 101-106.
- Türk Anesteziyoloji ve Reanimasyon Derneği (TARD) Anestezi Uygulama Kılavuzları. Ameliyathane Dışı Anestezi Uygulamaları 2015. Aralık. <https://www.tard.org.tr/assets/kilavuz/1.pdf>. (Erişim Tarihi 20.06.2022)
- Türk HŞ, Aybey F, Ünsal O, Açık M.E, Ediz N (2013). Ameliyathane dışı anestezi deneyimlerimiz. *Şişli Etfal Hastanesi Tıp Bülteni*, 47, 5-9.
- Wang D, Chen C, Chen J, Xu Y, Wang L. (2013). The use of propofol as a sedative agent in gastrointestinal endoscopy: a meta-analysis. *PLoS One*, 8, 53311.