DOI: https://doi.org/10.54393/pbmj.v9i9.1473

PAKISTAN BIOMEDICAL JOURNAL
https://www.pakistanbmj.com/journal/index.php/pbmj/index
ISSN (E): 2709-2798, (P): 2709-278X
Volume 9, Issue 09 (September 2026)

Original Article

Comparison of Propofol Dexmedetomidine with Propofol Ketamine for Anesthesia during Endoscopic Retrograde Cholangiopancreatography

Muhammad Talha Shamim[1], Maham Khalid[1*], Muhammad Furqan Zahid[1], Adeel Younis[1], Khalid Abaid Ullah[1] and Hafiz Muhammad Danish Farooq[1]

[1]Department of Anesthesia, Fatima Memorial Hospital, Lahore, Pakistan

ARTICLE INFO

Keywords:
Dexmedetomidine, Ketamine, Propofol, Sedation, Anesthesia, Hemodynamic Stability

How to Cite:
Shamim, M. T., Khalid, M., Zahid, M. F., Younis, A., Ullah, K. A., & Farooq, H. M. D. (2026). Comparison of Propofol Dexmedetomidine with Propofol Ketamine for Anesthesia during Endoscopic Retrograde Cholangiopancreatography: Propofol Dexmedetomidine with Propofol Ketamine during ERCP. Pakistan BioMedical Journal, 9(9), 10-16. https://doi.org/10.54393/pbmj.v9i9.1473

***Corresponding Author:**
Maham Khalid
Department of Anesthesia, Fatima Memorial Hospital, Lahore, Pakistan
mahamkhalid30@gmail.com

Received Date: 28th June, 2026
1st Revision Received: 10th August, 2026
2nd Revision Received: 27th August, 2026
3rd Revision Received: 18th September, 2026
Acceptance Date: 24th September, 2026
Published Date: 30th September, 2026

ABSTRACT

Endoscopic Retrograde Cholangiopancreatography (ERCP) is a complex endoscopic procedure. The combination of Propofol with dexmedetomidine or ketamine is commonly used, but the comparative efficacy and safety of these combinations remain a topic of debate. **Objective:** To compare the effects of propofol-dexmedetomidine versus propofol-ketamine for anesthesia in patients undergoing ERCP. **Methods:** This prospective, non-randomized comparative cohort study was conducted at Fatima Memorial Hospital from 20 December 2025 to 20 June 2026. Consecutive sampling was used to select 150 ERCP patients, who were further allocated to two groups: propofol-dexmedetomidine (n=75) and propofol-ketamine (n=75). Baseline characteristics, hemodynamic parameters, total propofol dose, recovery time, adverse events, and satisfaction scores were measured. Data were analyzed using SPSS version 26.0, and the p-value ≤0.05 was regarded as significant. **Results:** Propofol-dexmedetomidine achieved greater reductions in intra-procedural heart rate and BP (all p<0.001), shorter recovery time (p<0.001), and higher endoscopist and patient satisfaction (p=0.006 and p=0.018). A higher incidence of bradycardia (p=0.005) and hypotension (p=0.016) was seen with dexmedetomidine, while more propofol was used with propofol-ketamine (p<0.001) and more excessive secretions (p=0.031) and agitation/emergence reactions (p=0.034). There was no significant difference in crude incidence of ≥1 MAE (p=0.051). **Conclusions:** Propofol-dexmedetomidine allowed for better procedural conditions and satisfaction, and propofol-ketamine allowed for better hemodynamic stability. Each patient should be assessed based on their risk profile and the requirements for their procedure.

INTRODUCTION

Endoscopic Retrograde Cholangiopancreatography (ERCP) is an advanced endoscopic diagnostic and therapeutic technique, which is utilized in the treatment of a broad range of pancreatobiliary diseases [1]. ERCP has been transformed from a diagnostic procedure to a specialized therapeutic procedure that has substantially helped in the management of hepatobiliary diseases and led to a significant decrease in the need for invasive surgical procedures [2]. ERCP is a procedure that is performed on thousands of individuals worldwide each year, including more than 500,000 people in the U.S. each year [3]. The growing incidence of gallstone disease, cholangiocarcinoma, and the aging population with multiple comorbidities have further favored the use of ERCP worldwide [4]. ERCP has unique anesthetic challenges in spite of its therapeutic benefits [5]. This is often performed in the prone or semi-prone position, and airway access may be challenging; hypoventilation, hypoxemia, aspiration, and hemodynamic instability are all possibilities, and the procedure is often long and painful [6]. This requires sufficient sedation or anesthesia to achieve patient immobility, comfort, procedural success,

Copyright© 2026 The Authors. Published by CrossLinks International Publishers LLC, USA
This work is licensed under a Creative Commons Attribution 4.0 International License (CC BY 4.0)

DOI: https://doi.org/10.54393/pbmj.v9i9.1473

endoscopist satisfaction, and decrease peri-procedural complications [7]. The ideal anesthetic plan for ERCP should include rapid onset, predictable level of sedation, cardiovascular stability, analgesic effects, early recovery, and minimal respiratory depression [8]. The rapid onset of action, short duration, and quick recovery of propofol make it one of the most commonly used sedative agents for ERCP [9]. Propofol, however, has no intrinsic analgesic properties, and dose-related side effects include hypotension, bradycardia, and respiratory depression [10]. Therefore, the use of propofol with adjunctive drugs has become a topic of interest to improve analgesia, to decrease propofol requirements, and to increase hemodynamic and respiratory safety [11]. Dexmedetomidine achieves a sedation that resembles natural sleep with little respiratory depression and has anxiolytic and mild analgesic effects [12]. Ketamine provides a powerful analgesic, amnesic, and airway reflex and respiratory drive-sparing effect [13-15].

Propofol-dexmedetomidine and propofol-ketamine have both been studied for use in ERCP for anesthesia, but the results have been inconsistent, due to differences in patient populations, dosing regimens, sedation goals, and endpoints. Most comparisons were performed on a small sample size and were mainly based on hemodynamics, propofol requirements, or recovery. There is limited evidence in Pakistan with studies comparing dexmedetomidine to ketamine in moderate sedation, but few studies comparing the two propofol-based protocols in a wider variety of peri-procedural outcomes. So, there is still a need for locally relevant evidence to compare propofol-dexmedetomidine combinations with propofol-ketamine combinations in Pakistani patients undergoing ERCP. The present study aims to compare their hemodynamic profiles, propofol usage, recovery characteristics, patient and endoscopist satisfaction, and adverse-event distribution in a Pakistani tertiary care center in this setting.

METHODS

This prospective, non-randomized comparative cohort study was carried out from 20 December 2025 to 20 June 2026 in the Department of Anesthesiology, Fatima Memorial Hospital, Lahore, Pakistan. Ethical approval was obtained from the Institutional Review Board (IRB) of Fatima Memorial Hospital before the start of the study. This study received approval under approval number FMH-04/11/2024-IRB-1564 dated 11 March 2025. All participants signed informed consent forms before entering the study, and patient information was kept confidential throughout the research process. The sample size was calculated based on propofol consumption as the primary continuous outcome, using means from Garg and Hasnain [16] (378.9 ± 111.9 mg vs. 454.8 ± 169.9 mg). With a two-sided α of 0.05 and 80% power, a minimum of 116 patients (58 per group) was required. We enrolled 150 patients (75 per group) to improve precision. A non-probability consecutive sampling technique was employed. Eligible patients were consecutively enrolled in accordance with the recommended anesthetic regimen of the attending anesthesiologist, as part of routine clinical practice. No randomization was performed. Patients were recruited until a total of 150 patients were entered into each anesthetic group. This means that groups were not randomly selected for enrollment but rather enrolled to ensure equal group sizes. This was a non-randomized procedure, and this could have caused selection bias. All patients who were eligible for ERCP during the study period, met the predetermined inclusion criteria, and gave informed written consent were enrolled sequentially until a sample size of 150 patients was reached. The propofol-dexmedetomidine group and propofol-ketamine group were assigned based on the anesthetic plan used by the attending anesthesiologist in the routine clinical management of the patient. Patients aged 18-70 years of age of either gender undergoing elective ERCP under sedation/anesthesia and American Society of Anesthesiologists (ASA) physical status I- III were eligible for the study [17]. Patients who were known to be sensitive to propofol, dexmedetomidine, or ketamine; patients with significant cardiac disease, including uncontrolled hypertension, significant arrhythmias, or advanced heart block; patients with severe liver or kidney dysfunction; pregnant or lactating women; patients with psychiatric illness or cognitive impairment that interfered with assessment; chronically sedated patients or opioid-dependent patients; patients requiring endotracheal intubation to enter general anesthesia before the start of the procedure; and patients with a known allergy to any of the other medications used were excluded from the study. A structured proforma was used to record baseline demographic and clinical features such as age, gender, body mass index (BMI), ASA physical status, indication for ERCP, and relevant comorbidities. Two types of anesthesia were used, i.e., propofol-dexmedetomidine and propofol-ketamine, according to the attending anesthesiologist's routine institutional practice [18]. ERCP was performed by experienced endoscopists in the modified semi-prone position. Standard monitoring used was continuous three-lead electrocardiography, non-invasive blood pressure, respiratory rate, and pulse oximetry. The Modified Observer's Assessment of Alertness/Sedation (MOAA/S) scale was used to determine the depth of sedation [19]. The depth of sedation was assessed throughout the procedure using the Modified Observer's Assessment of Alertness/Sedation (MOAA/S) scale. A target MOAA/S

Copyright© 2026 The Authors. Published by CrossLinks International Publishers LLC, USA
This work is licensed under a Creative Commons Attribution 4.0 International License (CC BY 4.0)

DOI: https://doi.org/10.54393/pbmj.v9i9.1473

score of 2–3 was predefined for both anesthetic groups to achieve a comparable depth of procedural sedation. If the MOAA/S score was 4–5, indicating inadequate sedation, particularly in the presence of purposeful movement or poor procedural tolerance, an additional 10–20 mg intravenous bolus of propofol was administered, and the patient was reassessed. If the MOAA/S score was 2–3, no additional sedative was administered unless clinically indicated. If the MOAA/S score was 0–1, indicating deeper sedation than intended, further sedative administration was withheld, and the patient was closely monitored for respiratory and hemodynamic compromise. Airway maneuvers, supplemental oxygen, or other supportive interventions were provided when clinically indicated. Endotracheal intubation was performed only when adequate oxygenation or ventilation could not be maintained with non-invasive airway support or when airway protection was clinically required. Hypotension was initially managed with intravenous crystalloid fluids. When pharmacological treatment was required, ephedrine 5–10 mg was administered intravenously and repeated as clinically indicated according to the hemodynamic response. Bradycardia was treated with atropine 0.5 mg intravenously, which could be repeated as required. Supplemental oxygen was administered for oxygen desaturation, with airway repositioning and airway adjuncts used when necessary. Persistent hypoxemia or inadequate ventilation despite these measures was managed with escalation of airway support, including endotracheal intubation when clinically indicated. A standardized satisfaction scale was used to measure endoscopist and patient satisfaction, and all data were recorded in a predesigned data collection form completed by the principal investigator. Anesthetic Protocol and Monitoring: After routine monitoring and preoxygenation, sedation was induced with intravenous propofol 1 mg/kg, and increments of 10-20 mg were used as necessary. The propofol-dexmedetomidine group received dexmedetomidine 0.2-0.7 µg/kg/h infusion after a loading dose of 1 µg/kg in 10 minutes. Ketamine hydrochloride was given 0.5 mg/kg intravenously to the propofol-ketamine group, followed by a 10-20 mg intravenous bolus as needed for clinical purposes. Drug administration was carried out with a programmable syringe infusion pump. A multiparameter patient monitor was used to monitor heart rate, non-invasive blood pressure, respiratory rate, and peripheral oxygen saturation. Treatment of hypotension and bradycardia consisted of intravenous fluids and, as clinically indicated, ephedrine and atropine. Airway support and other rescue drugs were administered when necessary, as per facility procedures. The primary outcome was the occurrence of at least one major adverse event (MAE) during ERCP, defined as hypotension, bradycardia, or hypoxemia requiring clinical intervention. Because the sample size was powered for propofol consumption and not for MAE, the primary outcome analysis is underpowered. The crude between-group comparison is reported as the primary analysis. Multivariable logistic regression was performed as a secondary, exploratory analysis to adjust for potential confounders. These adverse events were chosen because of their known association as sedation-related adverse events in ERCP [20].

The data were entered and analyzed using the Statistical Package for the Social Sciences (SPSS) version 26.0. Continuous variables were normally distributed and presented as mean ± SD. The categorical variables were presented as frequencies and percentages. Normally distributed continuous variables were compared between the two cohorts using an independent-samples t-test. The Chi-square test and Fisher's exact test were used to compare categorical variables. Hemodynamic parameters were analyzed at the three predefined measurement points: baseline, intra-procedural, and post-procedural. Longitudinal hemodynamic parameters were evaluated with linear mixed-effects models, due to the high correlation among repeated observations within the same patient. Individual patients were considered as a random effect, and anesthetic regimen, time, and the interaction of regimen and time were included as fixed effects. To assess whether there was a different pattern of hemodynamic changes, the regimen-by-time interaction was used. Estimated marginal means with 95% confidence intervals were calculated, and two-sided p-values of ≤0.05 were taken as statistically significant. Multivariable logistic regression analyses were performed for the major outcome variables to control for possible confounding factors, and a p-value of ≤ 0.05 was considered to be statistically significant. The participant flow diagram was shown (Figure 1).

RESULTS

A total of 150 patients undergoing ERCP were enrolled in the study, with 75 patients in each cohort. The baseline demographic and clinical variables such as age, gender distribution, BMI, ASA physical status, indications for ERCP, and presence of major comorbidities were similar between the two groups, which had comparable pre-procedural profiles (Table 1).

Table 1: Baseline Demographic and Clinical Characteristics of Study Participants

Variables	Propofol-Dexmedetomidine (n=75), n (%)	Propofol -Ketamine (n=75), n (%)	p-value	SMD
Age (years)	51.8 ± 13.4	53.2 ± 12.8	0.510	0.108
Male Gender	41 (54.7%)	39 (52.0%)	0.740	0.054

Copyright© 2026 The Authors. Published by CrossLinks International Publishers LLC, USA
This work is licensed under a Creative Commons Attribution 4.0 International License (CC BY 4.0)

DOI: https://doi.org/10.54393/pbmj.v9i9.1473

BMI (kg/m^2)	27.1 ± 3.8	27.8 ± 4.2	0.290	0.176
ASA Physical Status				
ASA I	12 (16.0%)	10 (13.3%)	0.860	0.081
ASA II	46 (61.3%)	48 (64.0%)		
ASA III	17 (22.7%)	17 (22.7%)		
Hypertension	29 (38.7%)	31 (41.3%)	0.740	0.053
Diabetes Mellitus	22 (29.3%)	24 (32.0%)	0.720	0.059
Ischemic Heart Disease	9 (12.0%)	8 (10.7%)	0.790	0.041
Chronic Kidney Disease	4 (5.3%)	5 (6.7%)	0.730	0.059
COPD/Asthma	6 (8.0%)	7 (9.3%)	0.770	0.048
Indication for ERCP				
Choledocholithiasis	40 (53.3%)	38 (50.7%)	0.930	0.089
Malignant Biliary Obstruction	18 (24.0%)	20 (26.7%)	–	–
Benign Biliary Stricture	9 (12.0%)	10 (13.3%)	–	–
Chronic Pancreatitis	5 (6.7%)	4 (5.3%)	–	–
Others	3 (4.0%)	3 (4.0%)	–	–

Longitudinal analysis showed clear differences in the pattern of the hemodynamic changes between the anesthetic groups. All four parameters (HR, SBP, DBP, and MAP) were significantly lower in the propofol-dexmedetomidine group than in the propofol-ketamine group during the intra-procedural period (all p<0.001), suggesting that propofol-dexmedetomidine induces greater cardiovascular suppression. The temporal trends of respiratory rate and oxygen saturation were also significantly different between groups (p=0.003 and p=0.006, respectively)(Table 2).

Table 2: Comparison of Hemodynamic Parameters between Study Groups

Parameters	Time Point	Propofol-Dexmedetomidine (n=75), Mean ± SD	Propofol -Ketamine (n=75), Mean ± SD	Group × Time p-value
Heart Rate (beats/min)	Baseline	82.4 ± 11.2	84.1 ± 10.8	<0.001
	Intra-procedural	66.7 ± 8.9	76.4 ± 9.8	
	Post-procedural	74.8 ± 9.7	79.1 ± 9.4	
Systolic BP (mmHg)	Baseline	132.6 ± 16.8	134.9 ± 15.9	<0.001
	Intra-procedural	109.8 ± 13.7	118.5 ± 14.1	
	Post-procedural	125.4 ± 14.9	130.1 ± 15.2	
Diastolic BP (mmHg)	Baseline	78.2 ± 9.7	79.8 ± 10.2	<0.001
	Intra-procedural	65.9 ± 8.3	71.6 ± 8.9	
	Post-procedural	74.5 ± 8.8	77.2 ± 9.1	
MAP (mmHg)	Baseline	96.3 ± 10.5	98.1 ± 11.3	<0.001
	Intra-procedural	80.5 ± 8.4	87.2 ± 9.3	
	Post-procedural	91.5 ± 9.4	94.8 ± 9.7	
Respiratory Rate (breaths/min)	Baseline	17.2 ± 2.4	17.5 ± 2.7	0.003
	Intra-procedural	13.6 ± 2.1	14.9 ± 2.3	
	Post-procedural	16.1 ± 2.3	16.6 ± 2.5	
Oxygen Saturation (%)	Baseline	98.4 ± 0.9	98.3 ± 1.0	0.006
	Intra-procedural	95.8 ± 2.2	97.1 ± 1.8	
	Post-procedural	97.8 ± 1.2	98.0 ± 1.1	

Effect estimates confirmed clinically meaningful differences between the anesthetic regimens. The propofol-dexmedetomidine group demonstrated lower intra-procedural heart rate, blood pressure, respiratory rate, and oxygen saturation, together with a shorter recovery time, whereas satisfaction scores were higher in this group. The risks of hypotension and bradycardia were greater with dexmedetomidine, while excessive secretions and agitation were less frequent. The confidence intervals for hypoxemia, nausea/vomiting, and airway intervention crossed the null value, indicating imprecision and lack of statistically significant differences for these outcomes (Table 3).

Table 3: Procedural Characteristics and Adverse Events

Outcomes	Propofol-Dexmedetomidine, n (%)	Propofol-Ketamine, n (%)	Effect Estimate	95% CI	p-value
Primary Outcome: ≥1 MAE	22 (29.3%)	12 (16.0%)	RR 1.83	0.98-3.42	0.051
Secondary: Hypotension	18 (24.0%)	7 (9.3%)	RR 2.57	1.14-5.79	0.016
Secondary: Bradycardia	14 (18.7%)	3 (4.0%)	RR 4.67	1.40-15.57	0.005
Secondary: Hypoxemia	8 (10.7%)	3 (4.0%)	RR 2.67	0.74-9.67	0.117
Secondary: Nausea/vomiting	4 (5.3%)	9 (12.0%)	RR 0.44	0.14-1.38	0.245
Secondary: Excessive Secretions	2 (2.7%)	10 (13.3%)	RR 0.20	0.05-0.88	0.031
Secondary: Agitation/Emergence	1 (1.3%)	8 (10.7%)	RR 0.13	0.02-0.97	0.034
Secondary: Airway Intervention	6 (8.0%)	2 (2.7%)	RR 3.00	0.63-14.39	0.276

The satisfaction score for both the endoscopist and patient was significantly higher for the propofol-dexmedetomidine group. Multivariable logistic regression analysis, after adjustment for potential confounding factors, also showed that the use of propofol-dexmedetomidine and ASA III physical status were independent predictors of MAE (Table 4).

Table 4: Comparison of Endoscopist and Patient Satisfaction Scores Between Study Groups

Variables	Propofol-Dexmedetomidine (n=75), Mean ± SD	Propofol-Ketamine (n= 75), Mean ± SD	p-value
Endoscopist Satisfaction Score (1-10)	9.1 ± 0.8	8.7 ± 0.9	0.006
Patient Satisfaction Score (1-10)	8.9 ± 0.9	8.5 ± 1.1	0.018

Copyright© 2026 The Authors. Published by CrossLinks International Publishers LLC, USA
This work is licensed under a Creative Commons Attribution 4.0 International License (CC BY 4.0)

DOI: https://doi.org/10.54393/pbmj.v9i9.1473

Overall, 34 (22.7%) patients experienced a major adverse event, of which 22 (29.3%) were in the propofol-dexmedetomidine group, and 12 (16.0%) were in the propofol-ketamine group (p=0.051). Patients who had more than one component event were counted once, and the composite outcome was defined as those who had at least one incident of hypotension, bradycardia, or hypoxemia. Propofol-dexmedetomidine was independently associated with higher odds of MAEs (p=0.030), and ASA III status was also independently associated with MAEs (p=0.019) in the adjusted multivariable model. Age ≥60 years, male sex, BMI ≥30 kg/m^2, and having at least 1 comorbidity were not independently associated with MAEs (Table 5).

Table 5: Multivariable Logistic Regression Analysis of factors associated with Major Adverse Events

Variables	Adjusted Odds Ratio (AOR)	95% CI	p-value
Propofol-Dexmedetomidine Regimen	2.508	1.091-5.765	0.030
Age ≥60 Years	1.803	0.718-4.526	0.210
Male Gender	1.302	0.565-2.999	0.535
BMI ≥30 kg/m^2	0.809	0.261-2.506	0.713
ASA III Status	2.910	1.193-7.090	0.019
Presence of ≥1 Comorbidity	2.087	0.897-4.856	0.087

Values are presented as mean measurements at baseline, intra-procedural, and post-procedural periods. The propofol-dexmedetomidine group demonstrated greater reductions in heart rate, systolic blood pressure, and mean arterial pressure during the intra-procedural period compared with the propofol-ketamine group (Figure 1).

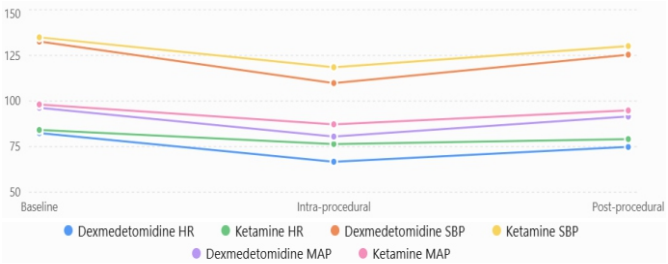


Figure 1: Serial Changes in Key Hemodynamic Parameters During ERCP According to Anesthetic Regimen

DISCUSSION

In this current prospective cohort study, propofol-dexmedetomidine was compared to propofol-ketamine as anesthesia during ERCP. There was no significant difference in baseline characteristics, suggesting little selection bias, consistent with the results of some recent studies that have obtained demographic similarity between the sedative groups to evaluate their results fairly. Comparability of baseline data across study arms was also supported within ERCP sedation trials, as Garg and Hasnain, and Taha et al. also showed no significant baseline differences between study arms in ERCP sedation trials, supporting internal validity across comparative designs in this setting [13, 16]. Hemodynamically, the results of the current study showed that the combination of propofol with dexmedetomidine resulted in significantly lower heart rate and blood pressure values than the combination of propofol with ketamine, suggesting greater cardiovascular depression. This is consistent with the findings of Zhang *et al.* in ERCP sedation using dexmedetomidine, who noted greater bradycardia and hypotension [9]. Similarly, the hemodynamic suppression during dexmedetomidine infusion during ERCP was greater than under propofol-only or ketamine-based sedation, suggesting its central sympatholytic effect in a study by Srivastava *et al.* [21]. In contrast, ketamine-containing regimens tend to preserve cardiovascular stability due to sympathomimetic activity, which explains the relatively stable hemodynamics observed in the propofol-ketamine group in the current study. In the present study, hypotension and bradycardia occurred more frequently in the propofol-dexmedetomidine group, and agitation and excessive secretions occurred more frequently in the propofol-ketamine group.

Although this study is a promising prospective cohort study, some limitations should be noted. First, the non-randomized design allowed for the possibility of selection bias because the anesthetist's choice of anesthetic regimen was a clinical judgment and not random. Second, the study was performed at a single tertiary care center, and the results may not be representative of other populations or health-care systems using different sedation protocols or patient populations. Also this sample size was not calculated for the primary safety outcome (≥1 MAE). Therefore, the study is underpowered to detect a statistically significant difference in MAE incidence, and the primary outcome should be considered exploratory. Several important confounders were not collected or reported, including procedure duration, endoscopist experience, use of adjunctive sedatives or analgesics (e.g., midazolam, fentanyl), and capnography monitoring (only SpO_2 was available). These factors are known to influence propofol requirements, recovery time, and adverse events, and their absence may have introduced residual confounding. Future studies should also use objective sedation depth monitoring devices like Bispectral Index and patient-centered outcomes like satisfaction with the procedure and cognitive recovery and/or quality of recovery scores.

CONCLUSIONS

The peri-procedural profiles for propofol-dexmedetomidine and propofol-ketamine were different during ERCP. Propofol-dexmedetomidine was found to be associated with more pronounced reductions in HR and BP, more frequent hypotension and bradycardia, quicker recovery, and higher levels of patient and endoscopist satisfaction. Propofol-ketamine, by contrast, was linked to

Copyright© 2026 The Authors. Published by CrossLinks International Publishers LLC, USA
This work is licensed under a Creative Commons Attribution 4.0 International License (CC BY 4.0)

DOI: https://doi.org/10.54393/pbmj.v9i9.1473

more hemodynamic stability, but led to an increased total dose of propofol and excessive secretions and agitation/emergence reactions.

Authors' Contribution

Conceptualization: MTS
Methodology: MK, MFZ, AY, HMDF
Formal analysis: MTS
Writing and Drafting: MTS, MFZ, AY, KAU, HMDF
Review and Editing: MTS, MK, MFZ, AY, KAU, HMDF

All authors approved the final manuscript and take responsibility for the integrity of the work

Conflict of Interest

All the authors declare no conflict of interest.

Source of Funding

The authors received no financial support for the research, authorship and/or publication of this article.

REFERENCES

[1] Sun R, Xu X, Zheng Q, Zhan J. Therapeutic Endoscopic Retrograde Cholangiopancreatography for Pediatric Hepato-Pancreato-Biliary Diseases: A Systematic Review and Meta-Analysis. Frontiers in Pediatrics. 2022 Jun; 10: 915085. doi: 10.3389/fped.2022.915085.

[2] Dell'Anna G, Bruni A, Fanizza J, Biamonte P, Bencardino S, Mandarino FV *et al.* Current Status and Further Directions of Endoscopic Ultrasound-Directed Transgastric ERCP and Endoscopic Ultrasound-Directed Transenteric ERCP in the Management of Pancreaticobiliary Diseases in Surgically Altered Anatomy: A Comprehensive Review. Therapeutic Advances in Gastroenterology. 2025 Aug; 18: 17562848251359006. doi: 10.1177/17562848251359006.

[3] Yang HY, Wang D, Lin X, Han C, Lv YW, Huang RQ *et al.* Global Trends of ERCP Research in the Last 25 Years: A Bibliometrics Study. Medicine. 2022 Aug; 101(31): e29454. doi: 10.1097/MD.0000000000029454.

[4] Alexander S and Menon S. Current Oncological Management Options for Hepato-Pancreato-Biliary Cancers. Gastrointestinal Nursing. 2025 Dec; 23(10): 370-9. doi: 10.12968/gasn.2024.0116R1.

[5] Dietrich CF, Bekkali NL, Burmeister S, Dong Y, Everett SM, Hocke M et al. Controversies in ERCP: Indications and Preparation. Endoscopic Ultrasound. 2021 Oct; 11(3): 186. doi: 10.4103/EUS-D-21-00106.

[6] Maiellare F, Sbaraglia F, Del Vicario M, Fattore R, Ferrone G, Lucente M *et al.* New Trends in Airway Management During Endoscopic Retrograde Cholangiopancreatography: A Narrative Review. Journal of Clinical Medicine. 2025 Aug; 14(16): 5905. doi: 10.3390/jcm14165905.

[7] Neelam-Naganathan DG and Sidhu R. Sedation for Gastrointestinal Endoscopy—A Case-Based Review. British Journal of Hospital Medicine. 2026 Feb; 87(2). doi: 10.31083/BJHM50846.

[8] Melita G, Tripodi VF, Pallio S, Shahini E, Vitello A, Sinagra E *et al.* Moderate Sedation or Deep Sedation for ERCP: What are the Preferences in the Literature? Life. 2024 Oct; 14(10): 1306. doi: 10.3390/life14101306.

[9] Zhang N and Li G. Comparing Sedation Protocols for Endoscopic Retrograde Cholangiopancreatography (ERCP): A Retrospective Study. Heliyon. 2024 Mar; 10(5). doi: 10.1016/j.heliyon.2024.e27447.

[10] Inam K, Qazi MS, Ahmed M, Hassan A, Yaseen I, Khan M *et al.* Efficacy and Safety of Ketamine or Esketamine versus Fentanyl-Class Opioids as Adjuncts to Propofol for Gastrointestinal Endoscopy: A Systematic Review and Meta-Analysis. A and A Practice. 2026 Apr; 20(4): e02177. doi: 10.1213/XAA.0000000000002177.

[11] Zhang W, Wang L, Zhu N, Wu W, Liu H. A Prospective, Randomized, Single-Blinded Study Comparing the Efficacy and Safety of Dexmedetomidine and Propofol for Sedation During Endoscopic Retrograde Cholangiopancreatography. BioMed Central Anesthesiology. 2024 May; 24(1): 191. doi: 10.1186/s12871-024-02572-z.

[12] Koruk S, Koruk I, Arslan AM, Bilgi M, Gul R, Bozgeyik S. Dexmedetomidine or Midazolam in Combination with Propofol for Sedation in Endoscopic Retrograde Cholangiopancreatography: A Randomized Double Blind Prospective Study. Videosurgery and Other Minimally Invasive Techniques. 2020 May; 15(3): 526. doi: 10.5114/wiitm.2020.95066.

[13] Taha SS, Zaki MS, Salama MA, Morkos FA. Propofol-Dexmedetomidine versus Propofol-Ketamine for Anesthesia of Endoscopic Retrograde Cholangiopancreatography (ERCP)(Comparative Study). The Egyptian Journal of Hospital Medicine. 2023 Apr; 91(1): 5142-50. doi: 10.21608/ejhm.2023.303646.

[14] Eberl S, Koers L, van Hooft J, de Jong E, Hermanides J, Hollmann MW *et al.* The Effectiveness of A Low-Dose Esketamine versus an Alfentanil Adjunct to Propofol Sedation During Endoscopic Retrograde Cholangiopancreatography: A Randomized Controlled Multicentre Trial. European Journal of Anaesthesiology. 2020 May; 37(5): 394-401. doi: 10.1097/EJA.0000000000001134.

[15] Zaki HA, Shallik N, Shaban E, Bashir K, Iftikhar H, Khair YM *et al.* An Analytical Comparison Between

Copyright© 2026 The Authors. Published by CrossLinks International Publishers LLC, USA
This work is licensed under a Creative Commons Attribution 4.0 International License (CC BY 4.0)

DOI: https://doi.org/10.54393/pbmj.v9i9.1473

Ketamine Alone and A Combination of Ketamine and Propofol (Ketofol) for Procedural Sedation and Analgesia from an Emergency Perspective: A Systematic Review and Meta-Analysis. Cureus. 2022 Jul; 14(7). doi: 10.7759/cureus.27318.

[16] Garg I and Hasnain S. A Comparative Study of Propofol-Dexmedetomidine versus Propofol-Ketamine for the Anesthetic Management of Patients During Endoscopic Retrograde Cholangiopancreatography. Cureus. 2024 Nov; 16(11). doi: 10.7759/cureus.74472.

[17] Hendrix JM and Garmon EH. American Society of Anesthesiologists Physical Status Classification System. InStatPearls [Internet] StatPearls Publishing. 2025 Feb.

[18] Azimaraghi O, Bilal M, Amornyotin S, Arain M, Behrends M, Berzin TM *et al.* Consensus Guidelines for the Perioperative Management of Patients Undergoing Endoscopic Retrograde Cholangiopancreatography. British Journal of Anaesthesia. 2023 Jun; 130(6): 763-72. doi: 10.1016/j.bja.2023.03.012.

[19] Ekka N, Chauhan AS, Kumar B, Shrivastava S. Propofol-Dexmedetomidine versus Propofol-Ketamine for Endoscopic Retrograde Cholangiopancreatography Sedation. Bioinformation. 2026 Feb; 22(2): 665. doi: 10.6026/97320630022066 5.

[20] Chainaki IG, Manolaraki MM, Paspatis GA. Deep Sedation for Endoscopic Retrograde Cholangiopacreatography. World Journal of Gastrointestinal Endoscopy. 2011 Feb; 3(2): 34.

[21] Srivastava N, Harjai M, Kumar S, Rai S, Malviya D, Tripathi M. A Comparative Study of Dexmedetomidine and Propofol Infusion During Monitored Anesthesia Care (MAC) in Endoscopic Retrograde Cholangiopancreatography (ERCP): A Randomized Controlled Trial. Ain-Shams Journal of Anesthesiology. 2021 Jul 23; 13(1): 48. doi: 10.1186/s42077-021-00168-0.

Copyright© 2026 The Authors. Published by CrossLinks International Publishers LLC, USA
This work is licensed under a Creative Commons Attribution 4.0 International License (CC BY 4.0)