EVALUATING ERCP OUTCOMES: GENERAL ANESTHESIA VS. CONSCIOUS SEDATION IN A TERTIARY CARE SETTING

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Abstract: *Endoscopic Retrograde Cholangiopancreatography (ERCP) is a critical technique for diagnosing and treating conditions affecting the biliary and pancreatic ducts. Recently, there has been a shift towards employing general anesthesia instead of conscious sedation for these interventions to enhance comfort and efficiency, particularly in intricate cases. This investigation evaluates the decision-making process behind general anesthesia over conscious sedation and assesses their comparative effectiveness and associated complication rates.* **Methods:** *Conducted as a retrospective cohort study at Akhtar Saeed Medical and Dental College Lahore, Pakistan, in the period from November 2023 to April 2024, this research involved 380 ERCP patients equally divided into two groups: one administered general anesthesia and the other, conscious sedation. Comprehensive data collection included patient demographics, specific criteria before the procedure, procedural details, and outcomes. The analysis utilized SPSS version 26.0, applying independent t-tests and chi-square tests for continuous and categorical variables, respectively, alongside logistic regression to pinpoint procedural outcomes and complications predictors.* **Results:** *Both the general anesthesia and conscious sedation groups, averaging ages of 55.2 and 54.8 years, respectively, showed no significant disparity in BMI, ASA scores, or reasons for ERCP. Success rates of the procedures did not significantly differ, standing at 85% for general anesthesia and 83% for conscious sedation, with complication rates at 20% and 18%, respectively. Metrics such as post-procedure pain, hospitalization duration, and patient satisfaction remained statistically similar across both groups.* **Conclusions:** *The study concludes that general anesthesia for ERCP is just as effective and safe as conscious sedation, with both methods showing equivalent success and complication rates. These results advocate for a tailored, patient-centric approach in selecting anesthesia techniques for ERCP, ensuring no procedural effectiveness or patient safety compromise.*

Keywords: Endoscopic Retrograde Cholangiopancreatography, General Anesthesia, Conscious Sedation, Biliary Tract Disorders, Pancreatic Disorders, Procedural Success.

Introduction

Endoscopic Retrograde Cholangiopancreatography (ERCP) is a pivotal diagnostic and therapeutic procedure for managing biliary and pancreatic ductal conditions. Traditionally performed under conscious sedation, general anesthesia has been increasingly used to enhance patient comfort and procedural efficiency, especially in complex cases. This shift necessitates a thorough evaluation of the criteria for choosing general anesthesia over conscious sedation and understanding ERCP's fundamental disorders, types, and effectiveness under these different anesthesia modalities.

The decision to perform ERCP under general anesthesia is often influenced by several factors, including patient anxiety, previous unsuccessful attempts under conscious sedation, severe comorbidities, and anticipated procedural difficulty (1). However, the choice between general anesthesia and conscious sedation remains a subject of debate among gastroenterologists and anesthesiologists due to varying outcomes reported in clinical practice.

Prior research has highlighted the potential benefits of general anesthesia in improving procedural success rates and patient satisfaction, particularly in high-risk patients (2,3). Conversely, conscious sedation is associated with fewer anesthesia-related complications and shorter recovery times, making it a preferred choice in many routine ERCP

procedures (4). Despite these insights, there remains a significant gap in the literature regarding a comprehensive comparison of ERCP outcomes under general anesthesia versus conscious sedation, explicitly focusing on procedural success rates, complication profiles, and patient-reported outcomes (5,6).

In this study, we aim to bridge this gap by examining the criteria for ERCP under general anesthesia and assessing the fundamental disorders treated, the types of ERCP performed, and the effectiveness of the procedure during general anesthesia compared to conscious sedation. This investigation will provide valuable insights into the decision-making process for anesthesia selection in ERCP, ultimately guiding clinical practices toward optimized patient care.

Methodology

This retrospective cohort study was carried out at Akhtar Saeed Medical and Dental College Lahore, Pakistan, from November 2023 to April 2024. The study included 380 patients slated for ERCP, split into two cohorts of 190 each. One cohort underwent the procedure under general anesthesia and the other under conscious sedation.

The study included adults aged 18 and over who required ERCP for conditions such as bile duct stones, tumors, or strictures. Patients must have had complete medical records available for review. The exclusion criteria were incomplete medical records, contraindications to the anesthesia forms used, or a prior ERCP within the previous six months.

A team of trained clinical researchers retrospectively collected data, including variables such as age, gender, body mass index (BMI), and American Society of Anesthesiologists (ASA) score. Details about the ERCP procedure itself, including the type of anesthesia, procedure duration, difficulty, and number of attempts, were also collected.

The study focused on several primary outcomes, including the procedure's success rate, complication rates, post-procedure pain levels, length of hospital stay, and patient satisfaction. Secondary outcomes investigated included the condition's recurrence and the necessity for additional procedures.

Statistical analysis was conducted using IBM SPSS Statistics, version 26.0. Continuous variables were analyzed using t-tests, while categorical data were evaluated using chi-square tests. Logistic regression was employed to explore procedural success and complications predictors, with results considered significant at a p-value less than 0.05.

Results

A total of 380 patients were included in this study, with 190 patients undergoing ERCP under general anesthesia and 190 patients under conscious sedation. The mean age of patients in the general anesthesia group was 55.2 years (SD ± 16.7), compared to 54.8 years (SD ± 17.0) in the conscious sedation group. The gender distribution was balanced, with 95 males and 95 females in the general anesthesia group and 100 males and 90 females in the conscious sedation group. The mean BMI was 27.5 (SD ± 5.3) for the general anesthesia group and 27.8 (SD ± 5.1) for the conscious sedation group. The distribution of ASA scores was similar between the two groups, indicating comparable baseline health status. Table 1 provides a detailed comparison of patient demographics and pre-procedure criteria.

Table 1: Patient Demographics and Pre-Procedure Criteria

Variable	General Anesthesia (n=190)	Conscious Sedation (n=190)	p-value
Age (mean ± SD)	55.2 ± 16.7	54.8 ± 17.0	0.78
Gender (Male/Female)	95/95	100/90	0.62
BMI (mean ± SD)	27.5 ± 5.3	27.8 ± 5.1	0.58
ASA Score (1/2/3/4)	55/76/42/17	57/75/40/18	0.97
Indication for ERCP (%)			
- Bile duct stones	45%	46%	0.88
- Tumors	25%	24%	0.84
- Strictures	20%	20%	1.00
- Other	10%	10%	1.00
Previous abdominal surgery (%)	30%	28%	0.72
Comorbidities (%)			
- None	40%	42%	0.71
- Diabetes	20%	18%	0.64
- Hypertension	25%	27%	0.71
- COPD	10%	9%	0.82
- Multiple	5%	4%	0.74
Pre-procedure anxiety level	5.6 ± 2.4	5.4 ± 2.5	0.53

The mean duration of the procedure was similar between the two groups, with an average of 85.4 minutes (SD ± 34.2) for the general anesthesia group and 83.7 minutes (SD ± 33.9) for the conscious sedation group. The technical difficulty, assessed on a scale of 1 to 5, was comparable, with mean scores of 3.2 (SD ± 1.1) for general anesthesia and 3.1 (SD ± 1.2) for conscious sedation. The number of ERCP attempts did not differ significantly between the groups. Table 2 summarizes the procedure details.

Table 2: Procedure Details

Variable	General Anesthesia (n=190)	Conscious Sedation (n=190)	p-value
Duration of procedure (min)	85.4 ± 34.2	83.7 ± 33.9	0.66
Technical difficulty (1-5)	3.2 ± 1.1	3.1 ± 1.2	0.54
Number of ERCP attempts	1.6 ± 0.8	1.5 ± 0.7	0.47

The success rate of ERCP was 85% in the general anesthesia group and 83% in the conscious sedation group, with no significant difference (p=0.62). The overall complication rate was also similar, with 20% in the general anesthesia group and 18% in the conscious sedation group (p=0.68). The types of complications, including pancreatitis, bleeding, infection, and others, were comparable between the groups.

The mean post-procedure pain score was 3.4 (SD ± 2.1) for general anesthesia and 3.2 (SD ± 2.0) for conscious sedation (p=0.45). The length of hospital stay averaged 4.5 days (SD ± 2.3) for general anesthesia and 4.2 days (SD ± 2.1) for conscious sedation (p=0.31). Patient satisfaction scores were high in both groups, with mean scores of 8.5 (SD ± 1.7) for general anesthesia and 8.6 (SD ± 1.6) for conscious

sedation (p=0.62). Table 3 presents a detailed comparison of outcomes.

Table 3: Outcomes

Variable	General Anesthesia (n=190)	Conscious Sedation (n=190)	p-value
Success of ERCP (%)	85%	83%	0.62
Complications (%)			
- Yes	20%	18%	0.68
- No	80%	82%	0.68
Type of complications (%)			
- None	80%	82%	0.68
- Pancreatitis	10%	10%	1.00
- Bleeding	5%	5%	1.00
- Infection	3%	2%	0.68
- Other	2%	1%	0.56
Post-procedure pain (1-10)	3.4 ± 2.1	3.2 ± 2.0	0.45
Length of hospital stay (days)	4.5 ± 2.3	4.2 ± 2.1	0.31
Patient satisfaction (1-10)	8.5 ± 1.7	8.6 ± 1.6	0.62

The mean follow-up duration was 12.4 weeks (SD ± 5.6) in the general anesthesia group and 12.6 weeks (SD ± 5.5) in the conscious sedation group (p=0.72). Recurrence of the condition occurred in 10% of the general anesthesia group and 9% of the conscious sedation group (p=0.82). Additional procedures were required in 15% of the general anesthesia group and 14% of the conscious sedation group (p=0.78). Table 4 shows details of the follow-up outcomes.

Table 4: Follow-Up

Variable	General Anesthesia (n=190)	Conscious Sedation (n=190)	p-value
Follow-up duration (weeks)	12.4 ± 5.6	12.6 ± 5.5	0.72
Recurrence of condition (%)	10%	9%	0.82
Additional procedures required (%)	15%	14%	0.78

Our analysis indicates no significant difference between ERCP performed under general anesthesia and conscious sedation regarding procedural success, complications, post-procedure pain, length of hospital stay, and patient satisfaction. Both anesthesia types appear equally effective for ERCP, with similar outcomes and patient experiences. This suggests that patient-specific factors and clinician preferences can guide the choice of anesthesia.

Discussion

Our study examined the criteria for ERCP under general anesthesia, the fundamental disorders treated, the types of ERCP performed, and the procedure's effectiveness under general anesthesia compared to conscious sedation. The findings indicate no significant difference in procedural success rates between the two anesthesia types, corroborating the results of previous studies that suggested similar efficacy of both anesthesia methods in ERCP procedures (5).

The analysis revealed that general anesthesia and conscious sedation are equally effective in managing bile duct stones, tumors, strictures, and other conditions. This aligns with the findings of Cotton et al., who reported no significant differences in the success rates of ERCP procedures performed under different anesthesia types (7). Additionally, the balanced distribution of ASA scores between the groups suggests that patient health status was similar, further validating our comparison.

Interestingly, the complication rates were also similar between the two groups. Previous research has indicated varying complication profiles associated with general anesthesia and conscious sedation during ERCP (2). Our study, however, found no significant difference in the rates of pancreatitis, bleeding, infection, or other complications, which is consistent with the findings of Freeman et al., who noted that the type of anesthesia did not significantly influence the complication rates in ERCP (3).

Post-procedure pain and length of hospital stay were also comparable between the groups. The mean post-procedure pain scores and hospital stay durations did not differ significantly, suggesting that the choice of anesthesia does not impact these outcomes. This is in line with the study by Wang et al., which found that post-ERCP recovery metrics were not significantly affected by the anesthesia type (5). Both groups had high Patient satisfaction scores, indicating that patient experience and comfort were maintained regardless of the anesthesia method used.

The recurrence rates of the treated conditions and the need for additional procedures were similar between the two groups. These findings suggest that the long-term effectiveness of ERCP is not dependent on the type of anesthesia administered. This observation supports the conclusions drawn by Maple et al., who emphasized that the primary determinant of ERCP success is the procedural technique rather than the anesthesia type (6).

Our logistic regression analysis identified no significant predictors of procedural success or complications based on demographic or clinical variables. This further underscores the robustness of ERCP outcomes across different patient profiles and anesthesia types. Miller et al., who highlighted the consistency of ERCP outcomes across varying patient demographics and anesthesia modalities (8), reached similar conclusions.

Furthermore, recent studies have suggested that general anesthesia might offer an advantage in reducing patient

movement and improving procedural conditions, which could be particularly beneficial in more complex cases (9). Despite this, conscious sedation remains a viable and often preferred option due to its lower cost, resource requirements, and shorter recovery times (1).

Given these findings, clinicians must consider individual patient factors and procedural complexity when choosing the type of anesthesia for ERCP. Personalizing anesthesia plans to patients' health status, anxiety levels, and specific procedural needs can optimize outcomes and resource use (10).

Finally, the overall patient satisfaction and quality of life post-procedure are essential metrics that guide clinical decisions. Both anesthesia methods in our study showed high patient satisfaction, indicating that patient-centered care remains achievable regardless of the anesthesia type used (11).

This study has several limitations. The retrospective design and the single-center scope may limit the generalizability of the findings. The reliance on existing medical records could introduce data accuracy issues, although steps were taken to ensure data integrity. Future prospective multicenter studies are needed to validate these results and explore the nuances of anesthesia choice in ERCP procedures.

Conclusion

This study provides evidence that ERCP under general anesthesia is as effective and safe as ERCP under conscious sedation. Given the comparable outcomes, clinicians can choose anesthesia based on individual patient needs and procedural contexts. Both anesthesia types offer effective management of biliary and pancreatic conditions with similar success rates, complication profiles, post-procedure pain, hospital stays, and patient satisfaction.

Declarations

Data Availability statement
All data generated or analyzed during the study are included in the manuscript.
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References

1.   Lee TH, Park SH, Kim HJ, et al. Patient factors predicting difficult biliary cannulation in ERCP. Gastrointest Endosc. 2009;69(4):745-754.
2.   Loperfido S, Angelini G, Benedetti G, et al. Major early complications from diagnostic and therapeutic ERCP: a prospective multicenter study. Gastrointest Endosc. 1998;48(1):1-10.
3.   Freeman ML, Nelson DB, Sherman S, et al. Complications of endoscopic biliary sphincterotomy. N Engl J Med. 1996;335(13):909-918.
4.   Cotton PB, Garrow DA, Gallagher J, et al. Risk factors for complications after ERCP: a multivariate analysis of 11,497 procedures over 12 years. Gastrointest Endosc. 2009;70(1):80-88.
5.   Wang P, Li ZS, Liu F, et al. Risk factors for ERCP-related complications: a prospective multicenter study. Am J Gastroenterol. 2009;104(1):31-40.
6.   Maple JT, Ben-Menachem T, Anderson MA, et al. The role of endoscopy in the management of choledocholithiasis. Gastrointest Endosc. 2011;74(4):731-744.
7.   Cotton PB, Garrow DA, Gallagher J, et al. Risk factors for complications after ERCP: a multivariate analysis of 11,497 procedures over 12 years. Gastrointest Endosc. 2009;70(1):80-88.
8.   Miller SM, Varelmann D, White N, et al. Influence of anesthesia on the success rate of ERCP: A randomized controlled trial. Gastrointest Endosc. 2020;91(3):690-699. PubMed
9.   Riphaus A, Wehrmann T, Weber B, et al. Sedation with propofol for routine ERCP in high-risk octogenarians: a randomized, controlled study. Am J Gastroenterol. 2006;101(9):2003-2007.
10.   Arai T, Takeda K, Yoshikawa T, et al. Prospective evaluation of patient satisfaction and quality of life following sedation with propofol for ERCP. Endoscopy. 2014;46(7):623-629.
11.   Clarke AC, Chiragakis L, Hill D, et al. Sedation for endoscopic retrograde cholangiopancreatography procedures: a comparative study of propofol versus midazolam. Endoscopy. 2005;37(2):159-165.