Original Article

Clinical Outcomes and Complications of Endoscopic Retrograde Cholangiopancreatography: A Retrospective Study from a Tertiary Care Center in Bangladesh

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Abstract

Background: Endoscopic retrograde cholangiopancreatography (ERCP) is a crucial interventional procedure for diagnosing and treating pancreatobiliary disorders. This study aimed to evaluate the indications, outcomes, and complications of ERCP in a tertiary care center in Bangladesh.

Materials and Methods: This was an observational, cross-sectional, retrospective study conducted in the Chittagong Medical College, Cottogram, Bangladesh. A total of 86 patients who underwent ERCP between January 2024 to January 2025 were included in this study.

Results: The study included 86 patients who underwent ERCP between January 2024 and January 2025. The median age was 45.5 years, with an equal gender distribution. Most patients were from rural areas (72.1%) and belonged to the lower socioeconomic class (67.4%). The most common indications for ERCP were choledocholithiasis (39.5%) and obstructive jaundice secondary to choledocholithiasis (27.9%). Complications were observed in 26.7% of patients, with post-ERCP pancreatitis being the most frequent (11.6%). Complete stone extraction was achieved in 36.6% of cases, while partial extraction and failure occurred in 31.7% each. The wire-guided technique was the most commonly used cannulation maneuver (66.3%). Cannulation was achieved within 10 minutes in 84.9% of cases. The balloon sweep was the most frequently employed extraction method (61.6%).

Conclusion: The study highlights the importance of ERCP in managing biliary and pancreatic diseases, particularly in resource-limited settings. While the procedure remains effective and safe, efforts to improve complete stone extraction rates and minimize complications are warranted. Further training, better equipment, and enhanced peri-procedural care may improve patient outcomes.

Keywords: Endoscopic Retrograde Cholangiopancreatography (ERCP), Post-ERCP Pancreatitis (PEP), Biliary Obstruction, Choledocholithiasis, Biliary Strictures.

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Introduction:

Endoscopic retrograde cholangiopancreatography (ERCP) is a highly specialized endoscopic procedure that combines endoscopy and fluoroscopy to diagnose and treat conditions affecting the biliary and pancreatic ductal system. The first ERCP was performed in 1968 by McCune et al. in Japan, which marked the beginning of a transformative era in gastrointestinal endoscopy.[1] Initially, ERCP served both diagnostic and therapeutic purposes, providing endoscopists with an unprecedented view of the biliary tree and pancreatic duct. In 1973, a landmark advancement occurred when Dr. Meinhard Classen in Germany and Dr. Keiichi Kawai in Japan independently performed the first endoscopic biliary sphincterotomy.[2] This therapeutic application significantly broadened the scope of ERCP, allowing for the minimally invasive management of previous surgical conditions.

Over the past few decades, the role of ERCP has evolved dramatically owing to the development of advanced noninvasive imaging modalities. Magnetic resonance cholangiopancreatography (MRCP), endoscopic ultrasound (EUS), and high-resolution computed tomography (CT) offer detailed visualization of the biliary and pancreatic ducts without risks associated with invasive procedures. These technological advancements have led to a paradigm shift, relegating ERCP to a predominantly therapeutic role.[3,4] It is now reserved for interventions such as biliary and pancreatic duct stenting, sphincterotomy, stone extraction, dilatation of strictures, and drainage of the obstructed ducts.

Despite its clinical utility, ERCP is associated with several potential complications. These include post-ERCP pancreatitis (PEP), hemorrhage, perforation, cholangitis, and infections. The incidence of post-ERCP pancreatitis alone ranges from 3% to 15%, depending on patient risk factors and procedural complexity.[5] Because of these risks, ERCP is no longer recommended as the first-line diagnostic modality. Safer and more effective diagnostic options, particularly MRCP and EUS, should be utilized before ERCP, ensuring that ERCPs are reserved for therapeutic indications.[6]

ERCP remains the cornerstone in the management of various pancreatobiliary disorders, including choledocholithiasis, malignant biliary obstruction, benign biliary strictures, postoperative bile leaks, and acute cholangitis. In the context of acute cholangitis, early ERCP with biliary decompression has been shown to significantly reduce the

30-day mortality. Delays of more than 48 hours in performing ERCP in such cases are associated with prolonged hospital stays and an increased risk of adverse outcomes, including sepsis and hypotension. Therefore, timely intervention is critical in emergencies.ERCP requires a high level of technical expertise and is generally performed in tertiary care centers by trained endoscopists.[7]

From an epidemiological perspective, gallstone disease is a major contributor to biliary disorders that require ERCP. The incidence varies regionally. In Bangladesh, the prevalence of gallstone disease is notably higher, resulting in increased demand for ERCP services and regional differences in their utilization. Chattogram, a prominent city in southeastern Bangladesh, reports relatively fewer ERCP procedures. This may be due to a lower regional incidence of gallstone-related complications or the limited availability of specialized medical services.[8,9]

Considering the clinical significance of ERCP and the regional variability in its use, it is crucial to assess its outcomes, challenges, and patient characteristics within specific populations. This study was carried out at a tertiary care and teaching hospital in Bangladesh, with the main objective of analyzing the indications, results, complications, and limitations associated with ERCP procedures in this context. The findings aim to enhance the existing regional data on ERCP and support the development of evidence-based practices and healthcare policies in resource-constrained environments.

Materials and Methods:

We conducted a retrospective analysis of patients who underwent ERCP between January 2024 to January 2025 in the endoscopy suite of the Gastroenterology Department at Chittagong Medical College, Chattogram, Bangladesh. The study included individuals aged over 18 who gave written informed consent before the procedure. All ERCPs were performed either by or under the supervision of five skilled endoscopists, using a side-viewing endoscope (TJF Q180V,150 Olympus, Tokyo, Japan).

Selective cannulation of the common bile duct (CBD) was carried out with a triple lumen sphincterotome (ULTRATOME, Boston Scientific, USA and Clever Cut, Olympus, Tokyo, Japan) and guide wires measuring 0.025 and 0.035 inches (Visi Glide, Olympus, Japan). An ERCP procedure was deemed successful in cases of biliary sepsis if biliary drainage was achieved. If drainage was not possible, the procedure was considered a failure. In other clinical contexts, success or failure was determined based on the indication and outcome of the procedure.

Patient data from these 13 months were gathered using a structured case record form and analyzed with SPSS software (IBM Corp., Armonk, NY). The study included all adult patients who underwent ERCP during the specified time frame. Exclusion criteria were patients under 18 years of age, pregnant women, and individuals with significant cardiac or pulmonary risks.

Results:

A total of 86 patients underwent Endoscopic Retrograde Cholangiopancreatography (ERCP) during the study period. The median age was 45.5 years (interquartile range: 35–58.5 years). The study population had an equal gender distribution, with 43 males (50%) and 43 females (50%). In terms of occupation, the majority were homemakers (45.3%), followed by students (22.1%), service holders (15.1%), businessmen (11.6%), and retired individuals (5.8%). Most patients resided in rural areas (72.1%), while the remaining 27.9% lived in urban settings. Regarding socio-economic status, 67.4% of patients were from the lower class, 30.2% from the middle class, and 2.3% from the upper class (Table 1).

Table 1: Distribution of patients according to demographic profile of patients (n=86).

Variable	Number (Percentage)
Age	45.5 years (Median) (interquartile range: 35-58.5 years).
Gender	
Male	43 (50%)
Female	43 (50%)
Occupation	
Homemaker	39 (45.3%)
Student	19 (22.1%)
Service holder	13 (15.1%)
Business	10 (11.6%)
Retired	5 (5.8%)
Residence	
Rural	62 (72.1%)
Urban	24(27.9%)
Socio-economic Status	
Lower	58 (67.4%)
Middle	26 (30.2%)
Upper	2 (2.3%)

The most common indication for ERCP was choledocholithiasis (39.5%), followed by obstructive jaundice secondary to choledocholithiasis (27.9%), and post-ERCP stent replacement or removal (11.6%). Less frequent indications included benign biliary stricture (7.0%), cholangiocarcinoma (5.8%), biliary ascariasis (4.7%), chronic pancreatitis (4.7%), carcinoma of the head of the pancreas (3.5%), and bile leak (2.3%). These findings highlight that stone-related diseases and biliary obstructions were the predominant reasons for ERCP (Figure 1).

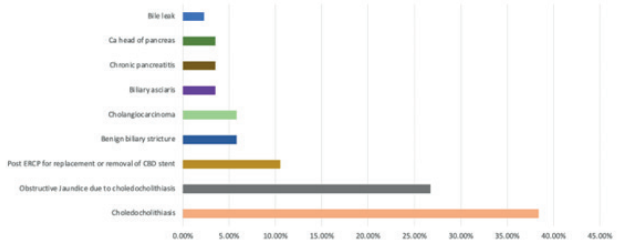

Figure 1: Distribution of patients according to indication of ERCP (n=86).

Complications were observed in 23 patients (26.7%). The most frequent complication was post-ERCP pancreatitis (11.6%), followed by cholangitis (8.1%), bleeding (5.8%), and perforation (1.2%). The remaining 63 patients (73.3%) experienced no complications (Figure 2).

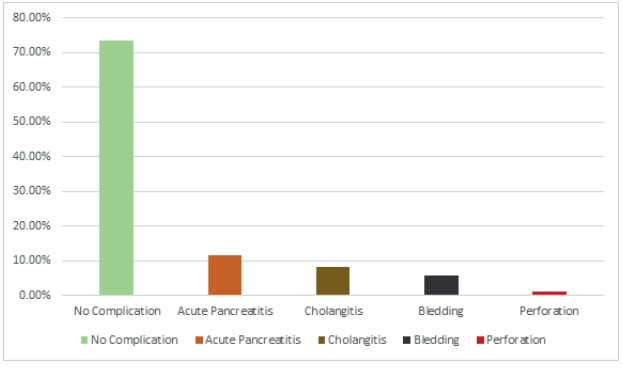

Figure 2: Distribution of patients according to complications of ERCP (n=86).

With regard to stone extraction outcomes, complete extraction was achieved in 23 patients (36.6%), partial extraction in 20 patients (31.7%), and failure occurred in 20 patients (31.7%) (Table 2).

Table 2: Distribution of patients according to success of stone extraction (n=86).

Stone Extraction	Frequency (Percent age)
Complete	23 (36.6)
Partial	20 (31.7)
Failed	20 (31.7)

On endoscopic evaluation, the papilla appeared normal in 73.3% of cases, short in 8.1%, swollen in 7%, long in 5.8%, and showed growth in 5.8%. The endoscope position was short in 95.3% of patients and long in 4.7%. Cannulation was achieved within 5 minutes in 38.4% of cases, between 5 and 10 minutes in 46.5%, and took more than 10 minutes in 15.1%. The wire-guided technique was the most commonly used cannulation maneuver (66.3%), followed by precut (24.4%), double-wire technique (4.7%), over-the-pancreatic stent approach (2.3%), and fistulotomy (2.3%). In terms of stone size, 27.9% measured less than 1 cm, 18.6% were 2 cm, 15.1% were greater than 1.5 cm, and 11.6% exceeded 2 cm. The balloon sweep was the most frequently employed extraction method (61.6%), followed by Dormia basket (14%) and mechanical lithotripsy (2.4%). Cannulation of the pancreatic duct occurred in 31.4% of patients (Table 3).

Table 3: Distribution of patients according to profiles of ERCP (n=86).

Variable	Number (Percentage)
Papilla	
Normal	63 (73.3)
Swollen	6 (7)
Short	7 (8.1)
Long	5 (5.8)
Growth	5 (5.8)
Scope position	
Short	82 (95.3%)
Long	4 (4.7%)
Cannulation time	
<5 minutes	33 (38.4%)
5-10 minutes	40 (46.5%)
>10 minutes	13 (15.1%)
Manuevre	
Wire guided	57 (66.3%)
Precut	21 (24.4%)
Fistulotomy	2 (2.3%)
Over pancreatic stenting	2 (2.3%)
Double wire	4 (4.7%)
Stone size	
<1 cm	24 (27.9%)
>1.5 cm	13 (15.1%)
2 cm	16 (18.6%)
>2 cm	10 (11.6%)
Stone extraction	
Balloon sweep	53 (61.6%)
Dormia basket	12 (14%)
Mechanical lithotripsy	2 (2.4%)
Cannulation of the pancreatic duct	27 (31.4%)

Discussion:

This study highlights a comprehensive analysis of patients undergoing Endoscopic Retrograde Cholangiopancreatography (ERCP), focusing on demographic profiles, indications, procedural outcomes, and associated complications. The median age of 45.5 years indicates that ERCP is commonly performed in middle-aged individuals, while the equal distribution between males and females suggests no gender predominance in the need for these procedures-findings that are consistent with previous studies.[10]

The socio-demographic profile of the study population reveals that a significant majority resided in rural areas (72.1%) and belonged to the lower socio-economic class (67.4%).

This emphasizes the importance of addressing access to specialized healthcare services like ERCP in rural settings, where late presentations and limited diagnostic facilities may contribute to the need for such interventions.

Choledocholithiasis accounted for the majority of ERCP indications (39.5%), followed by obstructive jaundice due to choledocholithiasis (27.9%), totaling 67.4% overall. Most of the other studies support the findings.[11,12] Especially in developing countries, these findings align with previous literature that cites biliary stone disease as the leading cause of ERCP.[13-16] Other notable indications in our study included post-ERCP stent management, benign biliary strictures, and malignancies such as cholangiocarcinoma and carcinoma of the pancreas. These results underscore the broad utility of ERCP in both diagnostic and therapeutic contexts. Ascaris lumbricoides is a widespread parasitic worm, with a higher prevalence in developing nations. It can migrate into the bile duct, leading to obstruction and presenting clinically as cholangitis or obstructive jaundice.[17] The standard treatment involves ERCP with removal of the worm(s) from the bile duct.[18] In our study, biliary ascariasis was also observed in 4.7% of patients, and we successfully managed the case using sphincterotomy followed by worm extraction with a basket.

Research has indicated that ERCP carries a higher risk of complications, which may reach as high as 15.7%, with a mortality rate of 0.7% in the general population.[19] The overall complication rate in this study was 26.7%. A meta-analysis study conducted by Kochar et al.[20] On 108 randomized controlled trials (RCT) involving 13296 patients reported an overall incidence of 9.7% for PEP (95% CI = 8.6–10.7%), with an increased incidence of 14.7% (95% CI = 11.8–17.7%) in the high-risk patients. In our study post-ERCP pancreatitis was the most frequent (11.6%), which is consistent with findings reported in most other studies,[21] followed by cholangitis, bleeding, and perforation. While this rate is slightly higher than some global averages, it may reflect the complexity of cases or the learning curve in resource-limited settings. The slightly elevated incidence of pancreatitis in our study may be explained by the fact that ERCP procedures were conducted in a teaching center involving trainees. Nonetheless, the majority (73.3%) of patients experienced no complications, indicating that ERCP remains a relatively safe procedure when performed under appropriate conditions. Although many risk factors related to the patient, endoscopist, and procedure have been identified concerning adverse events, there remains significant potential to discover additional ones.[22] Early recognition and prompt, timely management are crucial to improve outcomes and decrease the morbidity of ERCP complications.[5]

Hossain et al. studied at Dhaka Medical College and showed that stone extraction was successful during the initial ERCP in 65.06%.[8] In our study, complete stone extraction was achieved only in 36.6% of cases, while partial or failed extractions accounted for a combined 63.4%. This relatively modest complete success rate suggests potential areas for improvement in technique, equipment availability, or patient selection.

A study in Sri Lanka focusing on CBD stone extraction using ERCP reported an 82.7% success rate in CBD stone removal, with the majority of patients undergoing balloon extraction (98.1%),[15] Similar to that study, balloon sweep was the most commonly used extraction method, followed by Dormia basket and mechanical lithotripsy, reflecting standard practice for managing biliary stones.

Cannulation techniques varied, with wire-guided cannulation being the predominant method (66.3%). Precut techniques like others[23] and other advanced methods were employed in more challenging cases. Cannulation was successfully achieved within 10 minutes in 84.9% of cases, suggesting generally efficient endoscopic access.

The endoscopic appearance of the papilla and endoscope positioning was mostly unremarkable, though a small proportion showed abnormal or variant anatomy, which may have contributed to the complexity of the procedure. Interestingly, pancreatic duct cannulation occurred in about a third of patients, which may be an unintended consequence during biliary cannulation and could be associated with the incidence of post-ERCP pancreatitis. Although we did not use temporary pancreatic stenting to prevent ERCP-related pancreatitis.

In summary, the findings of this study reinforce the role of ERCP as a vital intervention for managing biliary and pancreatic diseases. While the procedure remains largely effective and safe, efforts to improve complete stone extraction rates and minimize complications are warranted. Further training, better equipment, and enhanced peri-procedural care, particularly in resource-limited and rural settings, may improve patient outcomes.

Conclusion:

Despite the limitation of being a single-center, retrospective study where a prospective design would have provided stronger evidence, our findings indicate that ERCP can be performed successfully with a high technical success rate. The overall complication rates were in line with those reported in existing literature. Therefore, ERCP appears to be an effective and viable procedure in our setting, demonstrating both satisfactory success rates and a manageable complication profile.

Conflicts of Interest: There is no conflict of interest.
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