

Evaluation of Endoscopic Retrograde Cholangiopancreatography Results: Single-Center Real-Life Data

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Abstract

Objective: Endoscopic retrograde cholangiopancreatography is an indispensable method in the diagnosis and treatment of pancreaticobiliary diseases. It may cause complications that may result in mortality. The aim of this study is to evaluate the first endoscopic retrograde cholangiopancreatography experiences of a newly established center.

Methods: Patients who underwent endoscopic retrograde cholangiopancreatography in our clinic between September 2016 and March 2019 were screened retrospectively. Endoscopic retrograde cholangiopancreatography indication was established by imaging methods such as clinical, laboratory, abdominal ultrasonography and magnetic resonance cholangiography. Patients who did not have sufficient data in their files were not included in the study. The procedures were performed with sedoanalgesia under optimal conditions in the operating room accompanied by an anesthesiologist.

Results: Of the 319 patients included in the evaluation, 172 (54%) were female, with a mean age of 54.97 ± 18.09 ; the age range was 14–100 years. Abdominal ultrasonography was requested in 185 (58%) patients, and magnetic resonance cholangiography was requested in 134 (42%) patients for endoscopic retrograde cholangiopancreatography indication. Endoscopic retrograde cholangiopancreatography indications involved the following indicated according to the number of cases: 241 (75.5%) cholelithiasis and choledocholithiasis, 25 (7.5%) cholecystectomy and choledocholithiasis, 26 (8%) hydatid cyst open in biliary tract, 20 (6%) malignancy-stenosis, 20 (6%) previously inserted stent removal, 10 (3%) post-transplant stenosis, 10 (3%) postoperative bile leakage, 5 (1.5%) primary sclerosing cholangitis, and 5 (1.5%) other causes (bilioma, hemobilia, recurrent pancreatitis of unknown cause, etc). Table 1 The procedure could not be performed in approximately 20 (6%) patients owing to various reasons (respiratory depression, inability to cannulate, etc). All patients received intravenous fluid replacement before the procedure. Young female patients were administered rectal indomethacin before the procedure. An anterior incision sphincterotomy was performed in 77 patients (24%). Complications related to endoscopic retrograde cholangiopancreatography occurred in 37 patients (11.5%) in total. Pancreatitis developed in 11 (3.5%) patients after endoscopic retrograde cholangiopancreatography; 3 of them had a severe necrotizing course, and bleeding occurred in 11 (3.5%) patients. Perforation was detected in 5 patients (1.5%), a plastic stent was placed in 2 of them, 1 was followed up with medical treatment without stent, surgery operation was performed in 2 patients, 1 of the operated patients died (mortality owing to endoscopic retrograde cholangiopancreatography: 0.3%). Cholangitis and cholangitis-like infections were detected in 10 patients (3%) and could be controlled with medical treatment. Table 2

Conclusion: Endoscopic retrograde pancreatography is an indispensable procedure for the diagnosis and treatment of cholestatic diseases. Choledocholithiasis is the most common indication for endoscopic retrograde cholangiopancreatography in two-thirds of patients. Complications occurred in approximately 10% of patients after endoscopic retrograde cholangiopancreatography, and one-third of these complications have a serious course, including mortality.

Keywords: Complication, ERCP, indication

INTRODUCTION

Endoscopic retrograde pancreatography (ERCP) is a minimally invasive procedure with a strong therapeutic profile that is frequently used by endoscopists. Endoscopy and imaging are used for a variety of diagnostic and therapeutic procedures. It is used in the treatment of many pancreaticobiliary diseases such as obstructive jaundice, obstruction in the bile ducts, pancreatic and biliary tumors, and traumatic or iatrogenic damage to the bile ducts. Other interventions that can be performed with ERCP are sphincterotomy, dilation of strictures, removal of gallstones, and placement of stents.¹ This procedure is performed under light general anesthesia (GA) or conscious sedation in terms of rapid recovery and greater patient comfort.²

ERCP is a relatively safe and effective method. However, new complications have been noticed with the development of endoscopic techniques, as ERCP is increasingly used for advanced procedures. Pancreatitis, bleeding, perforation, and infection are well-known as post-ERCP complica-

tions. The risks of these complications vary depending on several factors such as patient selection, endoscopist's skills, and the difficulties involved during the procedure.³

The ERCP learning process is a long process that requires experience⁴ and causes complications that may result in mortality.² In this study, it was aimed to evaluate the indications and complications of the first ERCP experiences of a newly established center.

METHODS

Patients who underwent ERCP in our clinic between September 2016 and March 2019 were screened retrospectively. ERCP indication was established by imaging methods including clinical, laboratory, abdominal ultrasonography (USG), and magnetic resonance cholangiography (MRCP). Patients with insufficient data in their files were not included in the study. The procedures were performed with sedoanalgesia under optimal conditions in the operating room accompanied by an anesthesiologist under light GA. During the procedure, an ERCP endoscope with oblique viewing was used, the common bile duct was cannulated, and direct radiographs of the patients were taken under the scope by injecting contrast material through the cannula into the common bile duct. The accessories used in ERCP including ERCP catheter, guide-wire, standard or needle-tipped sphincterotomy, basket or balloon for stone extraction, dilatation balloon, and plastic or metallic biliary stent were used for patients when needed. ERCP procedures were performed by experienced endoscopists who performed an average of 10 ERCP procedures per week. Ethics Committee Approval was received from the Harran University Rectorate Clinical Research Ethics Committee (Decision No: HRU/20.13.01, Decision Date: July 13, 2020).

RESULTS

A total of 319 patients were evaluated (some patients had more than 1 ERCP), including 172 (54%) women and 147 (46%) men; the mean age was 54.97 ± 18.09 , and the age range was 14–100 years.

Abdominal USG was requested from 185 (58%) patients, and MRCP was requested from 134 (42%) patients as the preprocedural imaging method from patients who were thought to have cholestasis clinically and laboratorily. ERCP indication was given to those in whom findings such as dilatation, stones, etc were detected in the biliary tract according to imaging.

ERCP indication was given for patients with findings such as dilatation and stones in the biliary tract during imaging. The ERCP indications classified by the number of patients are as follows: cholelithiasis and choledocholithiasis in 241 patients (75.5%), choledocholithiasis after cholecystectomy in 25 (7.5%) patients, hydatid cyst opening to the bile ducts in 26 (8%) patients, malignancy-stenosis in 20 patients (6%), previously inserted stent removal in 20 patients (6%), post-transplant stenosis in 10 patients (3%), postoperative bile leakage in 10 patients (3%), primary sclerosing cholangitis (PSC) in 5 patients (1.5%), and other causes (bilioma, hemobilia, recurrent pancreatitis of unknown origin, etc) in 5 patients (1.5%).^{Table 1} In 2 of the patients whose stent was removed, the stent was migrated to the common bile duct. Migratory stents could be removed with ERCP. The procedure could not be performed in approximately 20 (6%) patients for various reasons (respiratory depression, inability to cannulate, etc). The technical success of ERCP is 94%. All patients received intravenous fluid replacement before the procedure. Young female patients were administered rectal indomethacin before the procedure. An anterior incision sphincterotomy was performed in 77 patients (24%).

Table 1. Endoscopic retrograde cholangiopancreatography indications

ERCP indications	N	%
Cholelithiasis, choledocholithiasis	241	75.5
Cholecystectomy, choledocholithiasis	25	7.5
Hydatid cyst opening to bile ducts	26	8
Malignancy-stenosis	20	6
Removal of the stent	20	6
Post-transplant stenosis	10	3
Postoperative bile leakage	10	3
Primary sclerosing cholangitis	5	1.5
Other (bilioma, hemobilia, recurrent pancreatitis of unknown origin, etc)	5	1.5

N, number; ERCP, endoscopic retrograde cholangiopancreatography

Table 2. Complications related to ERCP in 319 patients who underwent ERCP

Complications	N	%
Pancreatitis	11	3.5
Severe necrotizing	3	
Light-middle	8	
Bleeding	11	3.5
Perforation	5	1.5
Surgical	2	
Stent	2	
Mortality	1	0.3
Cholangitis	10	3
Total	37	11.5

N, number; ERCP, endoscopic retrograde cholangiopancreatography

Complications related to ERCP occurred in 37 patients (11.5%) in total. Pancreatitis occurred in 11 (3.5%) of the patients after ERCP; 3 of them had a severe necrotizing course, and 1 of these patients underwent surgical debridement. Patients with typical pancreatitis pain and serum amylase/lipase values 3 times the upper limit of normal within 24 h after ERCP were considered as having post-ERCP pancreatitis. Female gender, young age, difficult and repetitive cannulation trials, and pancreatic contrast injection were determined as risk factors in our patients who developed post-ERCP pancreatitis. Bleeding occurred in 11 (3.5%) patients, hemobilia occurred in 2 of these patients, requiring intervention, and sclerotherapy was also performed. Perforation was detected in 5 patients (1.5%). Considering patients with perforation, Stapfer type 1 perforation was found in 2 of them, Stapfer type 2 was found in 2, and Stapfer type 3 was found in 2 of them. With regard to patients who have had a perforation, a plastic stent was placed in 2 of them, 1 was followed up with medical treatment without a stent, surgery was performed in 2 patients, and 1 of the operated patients died (mortality owing to ERCP: 0.3%).(Table 2)

Cholangitis and cholangitis-like infection were detected in 10 patients (3%) and could be controlled with medical treatment.

Serious morbidity and mortality developed in 7 (2%) of 37 patients, in whom complications as follows were also observed: 3 severe pancreatitis, 2 severe bleeding, 2 perforation leading to surgery, and 1 resulting in mortality.

DISCUSSION

ERCP is a well-known procedure with both diagnostic and therapeutic benefits in the treatment of pancreaticobiliary diseases. In a study in which 5226 patients were evaluated with ERCP, endoscopic sphincter-

otomy (EST) was performed in 2137 patients (1458 female, 679 male, mean age 57 years) to remove bile duct stones.³ In our series, there was an average age similar to that in this series in which ERCP was performed for choledocholithiasis. However, whereas the female/male ratio was similar in our series, there was female dominance in this series. Considering postoperative recovery in elderly patients, ERCP is as effective and safe as it is in younger patients.⁵ Although we did not evaluate our patients according to age group in detail, our age distribution was between 14 and 100 years. ERCP was performed on advanced age patients.

In a study evaluating 852 patients who presented with clinical and biochemical obstructive jaundice without cholangitis and underwent ERCP, dilatation of the biliary tree was detected by USG and/or MRCP in all the patients. In our series, abdominal USG was requested in 185 (58%) patients, and MRCP was requested in 134 (42%) patients who were thought to have cholestasis clinically and laboratorily. ERCP was indicated according to these imaging methods.⁶

Cholestasis because of bile duct stones is one of the most common ERCP indications. In a series in which 1023 (501 [48.97%] men and 522 [51.03%] women) ERCP patients were evaluated, the mean age was 47.2 ± 6.7 years, and the most common ERCP indication was choledocholithiasis (76.15%).² In our patient series, the age and gender distribution was similar to this study, and in our case, the most common ERCP indications were as follows: 241 (75.5%) patients had cholelithiasis and choledocholithiasis and 25 (7.5%) patients had choledocholithiasis after cholecystectomy.

A hydatid cyst is an endemic zoonosis of many countries around the world. 60%–75% of the cases are located in the liver, and broad-spectrum complications are seen in approximately one-third of the patients. Some of these complications are potentially life-threatening and require prompt diagnosis and treatment. Rupture, bacterial superinfection, and mass compression are some of the complications.⁷ A hydatid cyst is endemic to our region. Rupture to the biliary tract is one of the important complications of hydatid cysts, and it was the second-most-common indication for ERCP in our ERCP intervention series. ERCP was performed in 26 (8%) patients because of the opening of the hydatid cyst into the biliary tract.

A pancreaticobiliary stent was placed in 1229 (21.56%) patients in a study involving 5700 procedures in 3800 patients. A stent was placed in 745 (60.61%) patients owing to benign conditions and in 484 (39.38%) patients owing to malignant conditions. Stent migration was detected in 51 (4.14%) patients, including 30 (58.8%) men and 21 (41.2%) women. In terms of clinical presentation, right upper quadrant pain was the most common symptom. 100% technical success was achieved in all patients, 45 (88.2%) of them in the first procedure. No complications or mortality were detected. In conclusion, ERCP has been shown to be a safe and effective modality for stent removal in a patient with stent migration.^{8,9} Although we did not evaluate the total stent-implanted patients in our study, the indications for malignancy-stenosis in 20 (6%) patients and removal of the previously inserted stent in 20 (6%) patients were among our frequent ERCP indications. In our series, stent migration was detected in 2 patients, and they were successfully removed technically.

ERCP is a safe and useful method for the management of complications after liver transplantation. Some patients require repeat procedures to achieve a good clinical response.¹⁰ Increasing severity of cirrhosis pre-

dicts increased side effects. It has been reported that MELD-Na scoring may be more useful than Child-Pugh scoring in predicting side effects.¹¹ Although we did not evaluate the cirrhotic patients separately, ERCP was performed in 10 (3%) patients who were transplanted owing to cirrhosis because of post-transplant stenosis.

Bile duct injuries can be seen as a complication of abdominal trauma, postoperative cholecystectomy, liver resection, liver transplantation, and ERCP. The clinical presentation of canal injuries is highly variable and primarily depends on the underlying cause.¹² ERCP is useful in the treatment of bile duct injuries that cannot be diagnosed intraoperatively. This procedure facilitates the localization of the injured area of the bile duct, therapeutic maneuvers, and success in postoperative complications.¹³ In an article evaluating 90 patients with biliary fistula (37 men and 53 women) who underwent ERCP, cannulation was successful in 87 patients. The proximal biliary tract could not be visualized in 5 patients, and a complex cut of the common bile duct was considered. Contrast extravasation was detected in the cystic duct in 44 patients; in the common bile duct in 8 patients, in the liver bed in 4 patients, in the hepatic duct bifurcation in 2 patients, in the right hepatic duct in 7 patients, and in the left hepatic duct in 2 patients. In the end of this article, it is reported that ERCP is an effective method in the diagnosis and treatment of biliary diseases. ERCP has been found to reduce cost, morbidity, and mortality in the diagnosis and treatment of postoperative biliary fistulas.¹⁴ In our series, ERCP was performed in 10 (3%) patients because of postoperative bile leakage.

PSC is a progressive disease characterized by chronic inflammation causing liver fibrosis and cirrhosis. The most important step in diagnosis is cholangiography obtained by ERCP, MRCP (gold standard), or percutaneous transhepatic cholangiography (PTC). The beaded appearance of multifocal short biliary strictures is typical. Cholangiocarcinoma and colorectal adenocarcinoma are the most feared complications of PSC.¹⁵ If a clinically and radiologically significant stricture or cholangiocarcinoma is suspected in PSC patients, ERCP is recommended for the diagnosis and dilation of stenosis (with or without stent) and for brushing biopsy sampling.¹⁶ In our series, ERCP was performed for dilatation in 5 patients (1.5%) with a previous diagnosis of PSC.

ERCP has become an indispensable tool of the gastroenterologist for the treatment of pancreatobiliary diseases. Given the increasing number of therapeutic ERCP procedures today, the need for rapid and accurate diagnosis of ERCP complications is crucial.¹⁷ In a study where complications were also evaluated, they occurred in 171 (8%) patients who underwent ERCP; pancreatitis occurred in 87 patients (4.1%), bleeding in 48 patients (2.2%), other complications in 36 patients (1.8%), and mortality in 0.6% (3). Complications related to ERCP occurred in 37 patients (11.5%) in this series, which is similar to ours. Our complications were similar, and pancreatitis occurred in 11 patients (3.5%) after ERCP, bleeding in 11 patients (3.5%), perforation in 5 patients (1.5%), cholangitis in 10 patients (3%), and mortality in 1 patient (0.3%).

In another series, the most common complication was hemodynamic instability (37.01%) followed by desaturation (11.65%), both of which were anesthesia-related complications. Complications related to the gastrointestinal system (GIS) were detected at a rate of 13.39%. The most common GIS complications were pancreatitis (7.92%) and bleeding (3.32%). The total mortality rate was 0.88%. At the end of this article, it was reported that complications associated with ERCP are inevitable but can be controlled with early diagnosis and clinical experience. It has been reported that serious complications and high-risk patients

may increase mortality and morbidity and that anesthesia-related complications may be seen more frequently than GIS complications.² We did not evaluate the complications related to anesthesia in our study; the procedure could not be performed in 20 (6%) patients for various reasons. Among these reasons, anesthesia-related reasons such as respiratory depression had an important place. Again, we saw GIS complications at a similar rate to this series. In our case, the most common complications were as follows: we found post-ERCP pancreatitis and bleeding in 11 patients (3.5%) and bleeding in 11 (3.5%) patients after ERCP. Our mortality rate was slightly lower (0.3%) than this series.

Optimizing the indication for ERCP in acute biliary pancreatitis is critical, because suboptimal ERCP applications without definitive stone detection are associated with worse clinical outcomes.¹⁸ Despite many studies, the role and timing of ERCP in acute biliary pancreatitis is controversial. The indication for ERCP is clear in the first 72 h in choledochal obstruction in acute biliary pancreatitis and in the first 24 h in cholangitis.¹⁹ Asymptomatic choledochal stones are associated more with post-ERCP pancreatitis than symptomatic choledochal stones.²⁰ Rectal nonsteroidal anti-inflammatory drug (NSAID) administration before ERCP may reduce the severity of pancreatitis. In addition, rectal NSAID administration may result in less asymptomatic hyperamylasemia. It has been suggested that pre-ERCP diclofenac administration has a satisfactory efficacy to prevent post-ERCP pancreatitis and is the optimal prevention method.^{21,22} Although acute biliary pancreatitis was not evaluated separately in our series, some of our patients with choledocholithiasis presented with acute biliary pancreatitis. In these patients, ERCP was performed within 72 h if stones were found in the common bile duct and/or cholangitis was accompanied. Post-ERCP pancreatitis was the most common complication we found. Intravenous fluid replacement was administered to all our patients before the procedure, and rectal NSAIDs were administered to young female patients. A prophylactic pancreatic stent was used in case of recurrent pancreatic duct cannulation. Post-ERCP pancreatitis occurred in 11 of our patients (3.5%), and 3 of them had a severe necrotizing course; surgical debridement was performed in 1 of these patients. Table 2

Bleeding is the second-most-common complication after pancreatitis in the series.² It is our most common complication with post-ERCP pancreatitis in our series. It occurred in 11 (3.5%) patients, and hemobilia occurred in 2 of these patients, requiring intervention. Sclerotherapy was also performed. Table 2

In a study evaluating 852 patients who underwent ERCP, perforation was found in 6 (0.7%) patients. Two patients with perforation were initially treated surgically; 1 died of multiorgan failure. The other 4 patients were initially treated conservatively, 2 of whom were unsuccessful and 1 died of sepsis. The other 3 patients recovered without complications. The overall mortality rate was 33.3%. Multiple cannulation and sphincterotomy with anterior incision may increase the possibility of duodenal perforation. In the presence of clinical suspicion of perforation, early radiological imaging is useful for early intervention. Improving clinical outcomes depends on early diagnosis and intervention. Therefore, a high index of suspicion is required. In difficult ERCP procedures, fluoroscopy control with postprocedure contrast injection has been recommended.⁶ ERCP-related perforation causes high morbidity and mortality. The Stapfer classification is made according to different perforation localizations and recommends management accordingly. This classification may not be used if perforation is not detected during endoscopy. In a study, 52 patients were evaluated according to computed tomography findings, and it was reported that tomography findings

may be useful in predicting the risk of mortality.²³ Perforation was the most mortal complication in our series.

With respect to our patients with perforation, Stapfer type 1 perforation was detected in 2, Stapfer type 2 in 2, and Stapfer type 3 was detected in 1 of them. In our series, out of 5 (1.5%) patients with perforation, a plastic stent was placed in 2 of them; 1 was followed up with medical treatment without stent. Surgery was performed in 2 patients; 1 of the operated patients died (mortality owing to ERCP: 0.3%). In our series, perforation was detected in 5 patients (1.5%); a plastic stent was placed in 2 of them, 1 was followed up with medical treatment without stent, surgical operation was performed in 2 patients, and 1 of the operated patients died (mortality owing to ERCP: 0.3%).

In a study comparing the effectiveness of performing ERCP before and after 72 h in 95 patients with cholangitis, 70% of patients had an early treatment procedure, and 30% of the patients had a late treatment procedure. As a result, it was suggested that delayed ERCP could be performed in selected patients as similar complication rates were observed, but it was found that the hospital stay was longer in this group.²⁴ Among the infections, cholangitis among others is an especially important indication and complication of ERCP. In our series, we did not document the presence of cholangitis before the procedure in patients who underwent ERCP, but cholangitis and cholangitis-like infections were detected in 10 patients (3%) after the procedure and could be controlled with medical treatment.

In conclusion, except for the high rate of ERCP because of hydatid cysts, our indications and complications are similar to the literature, and ERCP is an indispensable procedure in the diagnosis and treatment of cholestatic diseases. In two-thirds of patients, choledocholithiasis is the most common indication for ERCP. Complications occurred in approximately 10% of patients after ERCP, and pancreatitis and bleeding are the most common complications; perforation is the most risky complication. One-third of patients in whom complications were observed have a serious course, including mortality.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of Harran University (Date: July 13, 2020, Decision No: HRU/20.13.01).

Informed Consent: Written informed consent was obtained from patients who participated in this study.

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