Original article

Complications of ERCP (endoscopic retrograde cholangio pancreaticogrphy) in Gastroenterology department of BSMMU

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Abstract

Endoscopic retrograde cholangio pancreaticogrphy (ERCP), though complex and invasive, is one of the commonly performed endoscopic procedures. Its benefits are sometimes compromised by complications which may be life threatening in some instances. Pancreatitis, bleeding, perforation, infections (cholangitis & cholecystitis) and sedation-related complications are common ERCP related complications. This prospective observational study was carried out in the department of Gastroenterology, BSMMU from September 2014 to December 2014 on 56 consecutive patients who underwent ERCP with the intention to assess the occurrence of different ERCP related complications. Nearly half of the patients (51.78%) in this study were suffering from obstructive jaundice due to malignant biliary obstruction. Thirty two percent (32 %) patients had stone in the common bile duct presenting with or without cholangitis. Total 9 patients developed complications and among them 5 patients developed cholangitis in the post ERCP period. Rest of the 2 patients developed pancreatitis. Patient related factors including underlying diagnosis together with variability in endoscopic settings and health care environments may be responsible for occurrence of complications and differences rate of complications across different institutions.

Introduction

After its introduction as a diagnostic and therapeutic modality in hepatobiliary and pancreatic disorders in 1968, endoscopic retrograde cholangio pancreaticogrphy (ERCP) has become one of the commonly performed endoscopic procedures for the management of choledocholithiasis, the diagnosis and management of biliary and pancreatic neoplasms, and the postoperative management of biliary perioperative complications.[1,2] Although the diagnostic importance has been lessened due to introduction of magnetic resonance cholangio pancreaticogrphy (MRCP), newer ERCP based diagnostic and therapeutic procedures i.e. spyglass, laser are in use worldwide.[3,4] As one of the most complex and invasive endoscopic procedures, its benefits are sometimes compromised by complications which may be life threatening in some instances.

ERCP carries a overall risk of adverse events of 7% or less & mortality rate not more than 0.1%.[5] Five major types of complications of ERCP may occur : pancreatitis, bleeding, perforation, infections (cholangitis & cholecystitis) and sedation-related complications.[2]

Among the serious ERCP related complications, pancreatitis is the most common.[2,5,6-8] The incidence of post ERCP pancreatitis (PEP), in a meta-analysis of 21 prospective studies, was approximately 3.5%[9] but ranges widely (1.6%-15.7%) depending on patient selection.[10,11] Balloon dilation of biliary sphincter, history of post-ERCP pancreatitis, normal bilirubin, pancreatic duct injection, pancreatic sphincterotomy, precut sphincterotomy, suspected sphincter of oddi dysfunction, young age all are considered to be the risk factors for developing post ERCP pancreatitis.[2,12]

Hemorrhage is primarily a complication related to sphincterotomy rather than diagnostic ERCP. Hemorrhagic complications may be immediate or delayed, with recognition occurring up to 2 weeks after the procedure.[2] Most ERCP-associated bleeding is intraluminal, although intraductal bleeding can occur and hematomas (hepatic, splenic, and intra-abdominal) have been reported.[13-15] In a meta-analysis of 21 prospective trials, the rate of hemorrhage as a complication of ERCP was 1.3% (95% CI, 1.2%-1.5%) with 70% of the bleeding episodes classified as mild.[9] The risk of severe hemorrhage (i.e. requiring ≥5 units of blood, surgery, or angiography) is estimated to occur in fewer than 1 per 1000 sphincterotomies.[16] Sphincterotomy, coagulopathy, the use of anticoagulants within 72 hours of

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sphincterotomy, the presence of acute cholangitis or papillary stenosis are the risk factors for haemorrhage during or after ERCP.[2,12]

Perforation during ERCP may occur during sphincterotomy or may be induced by guidewire. Alternatively luminal perforation may occur at a site remote from the papilla i.e. in the first part of duodenum.[17] Perforation rates with ERCP range from 0.1% to 0.6%.[6,7,17] Prolonged duration of procedure, biliary stricture dilation, Billroth II anatomy and intramural injection of contrast are considered to be the risk factors for perforation.[18,19]

The rate of post-ERCP cholangitis is 1% or less.[6,7,18] Risk factors identified as significant include the use of combined percutaneous-endoscopic procedures, stent placement in malignant strictures, the presence of jaundice, primary sclerosing cholangitis, low case volume, and incomplete or failed biliary drainage. The risk appears to be correlated with the presence of stones in the gallbladder and possibly filling of the gallbladder with contrast during the examination.[6,7]

Significant cardiopulmonary complications are rare, occurring in 1% of cases with an associated fatality rate of 0.07% based on a meta-analysis of 12,973 patients enrolled in 14 prospective studies.[9] Complications include cardiac arrhythmia, hypoxemia, and aspiration.

The overall mortality rate after diagnostic ERCP is approximately 0.2%.[10] Death rates after therapeutic ERCP are twice as high (0.4%-0.5% in 2 large prospective studies).[6,18]

Complications are part of endoscopic procedures and more so for ERCP. Numerous studies worldwide have helped determine the expected rates of complications, potential contributing factors for these adverse events and possible methods for improving the safety of ERCP. This study was carried out to evaluate the possible adverse effects of ERCP in a tertiary care hospital with the intention that knowledge of potential ERCP complications & their expected frequency may help to recognize and minimize the incidence and severity of complications.

Methods

This prospective observational study was carried out in the department of Gastroenterology, BSMMU from July 2014 to December 2014. Consecutive 56 patients who underwent ERCP, both diagnostic and therapeutic, for different indications were included in this study. The only exclusion criterion was inability to perform ERCP because of an obstructed duodenum.

Complications of diagnostic and therapeutic ERCP were defined as any adverse events related to the ERCP procedure that required more than one night of hospitalization.[10,18,20]

Unless otherwise specified, the severity of complications was graded according to the length of hospitalization and the degree of intervention required.[21,22] Mild complications required 2 to 3 days of hospitalization; moderate complications required 4 to 10 days of hospitalization. Severe complications required more than 10 days of hospitalization, requiring surgical or invasive radiologic intervention, or leading to death.[21]

Pancreatitis was defined as the presence of abdominal pain at 24 hours after ERCP, together with a 3-fold or greater elevation in serum amylase.[18,20,22,23]

Cholangitis was defined as an elevation in body temperature to greater than 380 C for more than 48 hours.[18,20,23] Cholecystitis was defined as radiographic or clinical evidence of an inflamed gallbladder.[21]

Hemorrhage was defined as mild when there was a decrease in Hb level, moderate when transfusion was required (<4 units), and severe when more than 5 units of blood transfusion were needed or when intervention was required.[21]

Perforation was graded as mild if there was no leakage or limited leakage of contrast and conservative treatment (intravenous fluids, nasogastric suction) was required for 3 or fewer days; as more serious when treatment was required for 4 or more days; and as severe when intervention was necessary.[21]

In the case of more than one complication occurring in the same patient, only the most clinically relevant one was considered for the purposes of the study.

Additional procedure-interrupting events such as hypoxia (decrease in oxygen saturation to below 90% for 2 minutes), hypotension (decrease in systolic blood pressure to below 90 mm Hg for 2 minutes), and bradycardia (decrease in heart rate to less than 50 beats per minute for 2 minutes) were included as ERCP complications.[21]

All ERCPs were performed by a same team lead by a senior gastroenterologist. Prophylactic antibiotic was given to all patients prior to ERCP except to those who

were receiving antibiotics due to cholangitis or other reasons. Propofol was used as anaesthetic agent during ERCP in the presence of anaesthesiologist as per protocol of the department and the hospital.

Data on patient characteristics, ERCP indications and findings and complications were collected during the procedure, during the recovery period and, if necessary, during hospital admission.

Results

Total number of patients was 56. Among them male patients were 30 and female were 23 in number. Mean age was 48.20 and the age range was 20 -81 years. (Table-I)

Table-I: Demographic profile of the patients

Total number of patients	56
Number of male patients	33
Number of female patients	23
Mean age of the patients	48.20 years
Age range	21- 80 years

Among the patients who undergone ERCP for different etiology within this study period, chledocolithiasis was highest in number (18, 32%). Ten among 18 patients of cloedocolithisis presented with cholangitis on admission. Twelve patients (21%), among the study population, were diagnosed as cholangiocarcinima on the basis of USG, CT scan of whole abdomen, MRCP and CA 19-9. Among them, 7 patients had distal cholangiocarcinoma and 5 patients had klatskin tumour. All of them were, on the basis of TNM staging, inoperable and ERCP was contemplated due to presence of intense itching.

Nine patients (16%) undergone ERCP for inoperable ampullary carcinoma and 4 of them presented with cholangitis.

Carcinoma Head of Pancres (5), Chronic Calcific Pancreatitis (5), Carcinoma Gallbladder with infiltration to common bile duct (3), Biliary Ascariasis with cholangitis (2) and Post operative biliary stricture (2) were the other indications for performing ERCP. (Table-II)

Among the 56 patients who undergone ERCP with in this study period, 7 (12.5%) patients developed complications. Five (5,8.9%) patients developed cholangitis in the post ERCP period. Among them 2 patients were suffering from cholangiocarcinoma

Table-II: Underlying Diagnosis/ Indication for ERCP

Underlying Diagnosis/ Indication for ERCP		Number of Patients
Choledocolithiasis	With Cholangitis	10
	Without Cholangitis	8
Cholangio Carcinoma	Distal Cholangio Carcinoma	7
	Klatskin Tumour	5
Ampullary Carcinoma	With Cholangitis	4
	Without Cholangitis	5
Carcinoma Head of Pancres		5
Chronic Calcific Pancreatitis		5
Carcinoma Gallbladder with CBD infiltration		3
Biliary Ascariasis with Cholangitis		2
Post operative Biliary Stricture		2
Total		56

(Klatskin tumour) and other 2 patients were having choledocolithiasis. One patient of choledocolithiasis, in addition to cholangitis, developed multiple hepatic abscesses as found on CT scan of abdomen 5 days after ERCP. Three (5.35%) patients developed acute pancreatitis. One of them was suffering from post operative biliary stricture and had already developed secondary biliary cirrhosis. Another patient had stone in common bile duct. (Table - III)

Numbers of patients who were suffering from cholangitis prior to ERCP and continued to have cholangitis post-ERCP were not considered among complications.

Table-III: Complications of ERCP

Complications	Number of Patients (%)
Cholangitis	4 (7.14%)
Cholangitis with Liver Abscess	1 (1.78%)
Pancreatitis	2 (3.57%)

Discussion

ERCP practice may vary between different types of institutions. Variability in endoscopic settings and health care environments, together with differences in physician's expertise and skill level may affect outcome. It is generally believed that specialized centers may not have fewer complications than smaller centers, because of the reduced number of "routine" cases. Indeed, in the prospective multicenter study by Freeman et al,[6] sphincterotomy complications were more frequent at university-affiliated centers. However, the same study showed that low case volume was associated with a higher overall rate of complications and, in addition, with a higher rate of severe complications.[6]

In this study, nearly half of the patients (51.78%) were suffering from obstructive jaundice due to malignant biliary obstruction i.e. proximal or distal Cholangiocarcinima, Carcinoma Gallbladder with infiltration to common bile duct, Carcinoma Head of Pancres and Ampullary Carcinoma. They were, on the basis of TNM staging, inoperable in most of the cases and undergone ERCP either due to intense itching or presence of cholangitis. There were 41% patients with malignant biliary obstruction in the study by Alam & Khan.[24] On the the other hand, choledocolithiasis was the highest in number(38%) followed by malignant biliary obstruction (Cholangiocarcinima and Periampulary carcinoma,28%) in the study carried out by Masud et al.[25]

Overall complication rate was 12.5 % in this study. ERCP carries an overall risk of adverse events of around 7%.[5] Over all complication rate was 4.9% in the study by Masci E et al[7] and 11.2% in the study by Vandervoort J et al.[26] Thirteen patients developed severe complications with mortality in 12 patients in a series of 689 patients carried out by Alam & Khan although total number of patients developing complications (mild, moderate and severe) were not clearly mentioned.[24]

The incidence of post ERCP pancreatitis, in a meta-analysis of 21 prospective studies, was approximately 3.5%[9] but ranged widely (1.6%-15.7%) depending on patient selection.[10,11] Incidence of 7.2% % of acute pancreatitis was observed associated with therapeutic ERCP by Vandervoort J et al.[26] In the study by Christensen M et al 3.8% of patients had clinical and biochemical evidence of post-ERCP pancreatitis.[27] Occurrence of acute pancreatitis was 3.57% in the current study. This correlates with the occurrence of acute pancreatitis in Masud et al study (3.7%).[25]

The rate of post-ERCP cholangitis is 1% or less.[6,7,18] But it was around 7.14 % in the current study. It also coreleates with the 8.8% Cholangitis in Masud et al study.[25]

Duodenal perforation, an uncommon but severe complication of ERCP, occurred in less than 1% of cases in both the Freeman et al & Christensen M et al.[6,27] No such complication was observed among our study population. In a meta-analysis of 21 prospective trials, the rate of hemorrhage as a complication of ERCP was 1.3% (95% CI, 1.2%-1.5%) with 70% of the bleeding episodes classified as mild.[9] There was no important bleeding (mild, moderate or severe), either clinically or on Hb estimation, in this study. Perforation rates during ERCP range from 0.1 % to 0.6 %.[6,7,17] There was no case of perforation in this series. Several studies have found that about 50% of the deaths related to ERCP are caused by cardiopulmonary complications.[27,28] Patients suffering from major cardio-pulmonary disorders and those who were not fit for anaesthesia were excluded from the current study. Propofol was used as anaesthetic agent during ERCP in the presence of anaesthesiologist. There was no cardio-pulmonary or anaesthetic complication among the study subjects.

Other than cholangitis, overall complication rate and rate of individual complications in this study were comparable to other studies home & abroad. Increased rate of cholangitis might be due to small case volume; patient related factors e.g. age, underlying diagnosis; and procedure related factors e.g. precut sphincturotomy and lack of adequate per and post procedure control of infection.

Further large scale studies are required with large case volume and with special emphasis to risk factors related to overall and individual complications of ERCP.

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