ORIGINAL ARTICLE

Managing endoscopic retrograde cholangiopancreatography-related complications in patients referred to the surgical emergency unit

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ABSTRACT

BACKGROUND: The goal of this study was to present our experience in the management of endoscopic retrograde cholangiopancreatography-related complications in patients referred to our surgical emergency unit by various endoscopy centers.

METHODS: A retrospective investigation was conducted on the records of the 54 patients who were referred to our surgical emergency unit between October 2005 and January 2014 due to endoscopic retrograde cholangiopancreatography-related complications.

RESULTS: There were 25 and 29 female and male patients, respectively. Pancreatitis was the most common complication (38.8%). Perforation (27.7%), infection (20.3%), and bleeding (12.9%) were the other complications. In 22.2% of cases, patients were died. The mortality rate was the highest in patients with perforation (40%). The mean age of the patients who were died due to complications was 75.9 years (range, 47–94 years). In total, 41.6% of the patients were died within the first week and 33.3% were died within the second week following ERCP. Nearly half of these patients had a cancerous disease (one had metastatic breast cancer, one had a gallbladder cancer, one had a duodenal cancer, and the other three had periampullary cancers) and 50% of the patients who died also had cardiopulmonary and/or cerebrovascular disorders.

CONCLUSION: Comprehending and managing the main risk factors can minimize complications; however, they would not be eliminated. Moderate and severe complications may increase the mortality rates, particularly in high-risk patients.

Keywords: Complication; endoscopy; ERCP; infection; pancreatitis; perforation.

INTRODUCTION

Endoscopic retrograde cholangiopancreatography (ERCP) is an endoscopic procedure performed for diagnosing and treating pancreatobiliary disorders. Due to potential complications, its role in making a diagnosis has been questioned. It has been advised to prefer alternative diagnostic tools whenever possible.[1] Complication rates of ERCP usually range between 5% and 10%, with a 2.7% mortality rate.[2,3] Acute pancreatitis occurs in 1.3–15.1% of cases when ERCP is performed and is the most common complication.[4] Its occurrence rate may be as high as 30% in high-risk patients undergoing certain high-risk procedures.[5] Bleeding, perforation, infection, and cardiopulmonary complications are other common complications.[3] Early diagnosis and appropriate intervention may decrease morbidity and mortality rates associated with complications.

Previous studies have demonstrated potential risk factors for post-ERCP complications and possible methods for improving the safety of ERCP and reducing the mortality and morbidity rates associated with complications in patients.[1–3] Early surgical consultation is one of these methods. The present study was conducted to evaluate the management of post-ERCP complications in patients referred to our surgical emergency unit by various endoscopy centers.

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MATERIALS AND METHODS

Case Selection Criteria

A retrospective investigation was conducted on the records of patients who were referred to our surgical emergency unit

between October 2005 and January 2014 due to ERCP- related complications. Fifty-four patients were enrolled; they all had at least one of the following four complications: post-ERCP pancreatitis (PEP), perforation, infection, and bleeding. Although hyperamylasemia can commonly develop after ERCP was performed, it does not necessarily suggest pancreatitis. This study did not include hyperamylasemia patients unless it was interpreted as a sign of pancreatitis. Three-fold elevation of amylase and/or lipase levels in the presence of intense abdominal pain (which developed a new or exacerbated) for at least 24 h and the requirement of hospitalization for more than one night and/or radiological findings of pancreatic inflammation were accepted as characteristics of PEP. Patients who had at least two of the above three criteria were included.[6] Patients with bleeding were included if they were hemodynamically unstable and/or had at least 3 g/dl reduction in the hemoglobin level and/or required transfusion.[6] Perforation was diagnosed with abdominal contrast-enhanced computed tomography (CECT), by visualization of contrast extravasation or peritoneal/retroperitoneal free air, and physical examination findings.

Statistical Analysis

The descriptive statistical analysis of data was done using Statistical Package of the Social Sciences (SPSS) 17.0 software (SPSS Inc., Chicago, USA).

Ethics Committee Approval

As this was a retrospective study, we did not apply for ethical committee approval. This study was conducted in accordance with the Helsinki Declaration.

RESULTS

There were 25 and 29 female and male patients, respectively. Their mean age was 57.8 years (range: 20–94 years). Indications for performing ERCP were choledocholithiasis (n=33), periampullary cancer (n=10), biliary stricture (n=5), pancreatic cyst (n=2), gallbladder cancer (n=1), acute cholangitis due to liver metastasis (n=1), acute biliary pancreatitis (n=1), and chronic pancreatitis (n=1). Periampullary cancers comprised a pancreatic head cancer (n=6), cancer of the ampulla of Vater (n=2), duodenal cancer (n=1), and distal bile duct cancer (n=1). The distribution of indications for performing ERCP corresponding to post-ERCP complications are shown in Table 1. All procedures were performed for therapeutic purposes. Sphincterotomy was performed in 39 (72.2%) patients. Of 39 sphincterotomies, 22 (56.4%) were done using the precut technique. Therapeutic applications of ERCP according to complications are shown in Table 2.

Fifty-four patients suffered complications, and their distribution was as follows: pancreatitis (n=21), perforation (n=15), infection (n=11) and hemorrhage (n=7). There were signs and symptoms of acute abdomen in all patients, except in those with bleeding. Abdominal CECT scans were obtained from 36 patients. Twelve of the 54 (22.2%) patients were died.

Abdominal pain and vomiting were the most common symptoms in patients with pancreatitis. Eighteen of them presented in the first day after ERCP was performed. Seventeen patients underwent abdominal CECT. One patient (4.76%) had a necrotizing disease. Conservative management was the first choice in all patients with pancreatitis. As all patients with biliary obstruction were successfully drained at the time of performing ERCP, routine antibiotic prophylaxis was not used, excluding the patient with a necrotizing disease. Antibiotics (usually Imipenem) were used only in patients with clinically and/or microbiologically verified infections. Laparoscopic cholecystectomy was performed in two patients prior to discharge. Two of twenty-one (9.5%) patients died from sepsis and acute respiratory distress syndrome. One of these two had a necrotizing disease and a Ranson's score of 2. She was 90 year old and had a cancer of the ampulla of Vater. The other patient was an 87-year-old man with a Ranson's score of 3.

All patients with perforation had abdominal pain. Ten patients were admitted in the first day after ERCP was performed, four were admitted two days after ERCP was performed, and one was admitted 24 days after ERCP was performed. Two of these patients were immediately taken to the operating room due to severe sepsis, while the other 13 patients underwent abdominal CECT. Nonsurgical management was preferred in six patients with periampullary duodenal microperforations. Cholecystectomy and T-tube drainage after common bile duct exploration were performed in three patients with common bile duct injury. We performed primary closure of the duodenal perforation (second part of the duodenum in its posteromedial wall) combined with duodenal drainage in one patient. The walled-off abscess secondary to the duodenal perforation was surgically drained in one patient. Cystogastrostomy and cholecystectomy were performed in one patient with gastric perforation. Primary closure reinforced with an omental patch was preferred for afferent loop perforation in two patients by Billroth II gastrectomy. The thoracic esophageal perforation in one patient was treated with primary repair and tube thoracostomy. All patients received antibiotic therapy. Four patients who underwent surgical interventions and two patients who were conservatively managed succumbed due to overwhelming sepsis. One of the two patients who died under conservative management had a pancreatic head cancer (she was 79 years old), and the other had chronic obstructive pulmonary disease (she was 88 years old). The first patient died 20 days after ERCP was performed; she did not have any progression of disease as observed in repeat CT scans. The second patient died two days after ERCP was performed, without having a repeat CT scan. One of the four patients who died despite surgical treatment was a 77-year-old man with duodenal perforation. The others were a 97-year-old woman with esophageal perforation,

Table 1. Indications for ERCP according to post-ERCP complications

	Pancreatitis	Infection	Perforation	Bleeding
Choledocholithiasis	14	4	11	4
Periampullary tumor	4	3	1	2
Biliary stricture	3	2		
Pancreatic cyst			2	
Gallbladder tumor		1		
Acute cholangitis due to liver metastasis			1	
Acute biliary pancreatitis				1
Chronic pancreatitis		1		

ERCP: Endoscopic retrograde cholangiopancreatography.

Table 2. Procedures of endoscopic retrograde cholangiopancreatography according to complications

	Pancreatitis	Infection	Perforation	Bleeding
Sphincterotomy	16	2	4	3
Choledochal duct stenting	1	5		
Sphincterotomy + Choledochal duct stenting		2	4	3
Sphincterotomy + Choledochal stenting + Biopsy	1			1
Sphincterotomy + Wirsung's duct stenting	1			
Sphincterotomy + Balloon dilation	1		1	
Sphincterotomy + Stone removal			1	
Stone removal		1		
Cystogastrostomy			2	
Failed procedure	1	1	3	

a 68-year-old man with duodenal perforation (he had coronary heart disease), and a 47-year-old woman with duodenal perforation (she had metastatic breast cancer). None of the operated patients had surgical complications.

Patients with infection presented with abdominal pain, jaundice, and fever. Ten of them had cholangitis, and one had hepatic abscess. The patients with cholangitis were admitted to the ward in the first week after ERCP was performed, and the patient with hepatic abscess was admitted in the second week after ERCP was performed. As seven patients were referred by different endoscopy centers, it was not known if they had any infection prior to performing ERCP. However, it can be suggested that all had predisposing factors to infection (three patients had periampullary cancers and four had choledocholithiasis). All 11 patients received conservative management, including antibiotic treatment. Percutaneous drainage was performed in the patient with hepatic abscess. Two patients died from sepsis. One of the patients who died had a pancreatic head cancer, and the other had a gallbladder cancer.

All cases of bleeding occurred after sphincterotomy was performed. Additionally, biliary stents were inserted in four patients, and a biopsy sample was taken from one patient. Patients complicated with bleeding presented with melena and generalized weakness. Six of them were hospitalized on the first day after ERCP was performed. One patient was admitted 12 days after ERCP was performed. Two of them had a history of anticoagulant and antiplatelet therapies and elevated international normalized ratios (INRs) (1.48 and 1.68). Six patients were conservatively managed, and one patient underwent laparotomy with hematoma evacuation. Laparotomy was performed in a patient with an INR of 1.68. Repeat endoscopy was performed in four patients (two had received an epinephrine injection and one had undergone additional sclerotherapy). Blood products were used in six patients. Two of seven patients (28.5%) died. A 70-year-old woman who underwent surgery died from myocardial infarction, and a 76-year-old man who received conservative treatment died from febrile neutropenia. Febrile neutropenia was seen in a patient with a duodenal cancer.

The mean age of the patients who died was 75.9 years (range: 47–94 years). For the cause of death, 50% were among those

with perforation, 16.6% were among those with pancreatitis, 16.6% were among those with infection, and 16.6% were among those with bleeding. Although pancreatitis was the most common complication (38.8%), its mortality rate (9.5%) was lower than that of other complications. The highest mortality rate was due to perforation (40%). Fifty percent of the patients who died had cancers (one had metastatic breast cancer, one had a gallbladder cancer, one had a duodenal cancer, and the other three had periampullary cancers). Further, 50% of those who died had cardiopulmonary and/or cerebrovascular disorders. For the time of death, 41.6% occurred within the first week and 33.3% occurred within the second week after ERCP was performed. The mean lengths of hospital stay were 7.58 (range: 2–18) and 15.9 (range: 4–86) days for fatal and nonfatal cases, respectively.

DISCUSSION

ERCP is an endoscopic procedure performed for diagnosing and treating pancreatobiliary disorders. Complication rates of ERCP usually range between 5% and 10%, with a 2.7% mortality rate.[2,3] Several studies have reported that therapeutic procedures lead to more complications than diagnostic procedures. Halme et al. and Farrell et al. found complication rates of 9.1 vs. 1.8% and 4.6 vs. 2.1%, respectively.[7,8] The present study included a highly selected group of patients who were referred to a tertiary center surgical unit and who required rigorous management. It is therefore not surprising that all procedures were performed for therapeutic purposes, leading to more serious complications.

Acute pancreatitis (38.8%) was the most common complication after ERCP was performed. The mortality rate was the highest among patients with perforation, whereas it was the lowest among those with pancreatitis. These findings were consistent with those in the literature; however, the mortality rates were higher in the present study.[4,9] In a study on post-ERCP complications that prospectively investigated the survey data of 16,855 patients, the rate of ERCP-related complications (pancreatitis, bleeding, perforation, and infection) was 6.85%. Pancreatitis was the most common complication (50.6%), followed by infection (20.9%), bleeding (19.5%), and perforation (8.75%). Among the complicated cases, 24.4% were severe. The percentage of patients who were lost due to complications was 4.76%. Mortality rates in patients with pancreatitis, infection, bleeding, and perforation were as follows: 3.08%, 7.85%, 3.54%, and 9.9%, respectively.[9] In a review of post-ERCP-associated pancreatitis that pooled randomized controlled trial data from 13,296 patients, the incidence of PEP was 9.7% and the mortality rate was 0.7%. The mortality rate of patients who were complicated with pancreatitis was 7.2%.[10] Some of the higher death rates in our study may be attributed to differences in the study design and inclusion criteria. The previous studies enrolled all patients who have undergone ERCP and included mild complications as well. There was heterogeneity in the descriptions of complications. This study included patients referred to our surgical unit and in whom complications were either moderate or severe.

ERCP with sphincterotomy or ampullectomy is relatively contraindicated in patients with coagulopathy (INR >1.5 or platelet count <50,000/μL).[2,11] Our two patients with bleeding had a history of anticoagulant and antiplatelet therapy with elevated INRs. One of them underwent surgical intervention.

Post-ERCP-associated perforation was classified in descending order of severity into four types: type I, lateral or medial wall duodenal perforation; type II, perivaterian injuries; type III, distal bile duct injuries; and type IV, retroperitoneal air alone. Type IV injuries are not accepted to be indicative of true perforation and are thought to be related to compressed air used to maintain the patency of the duodenal lumen, which resulted in air passing within the duodenal wall. Therefore, these types of perforations do not require surgical intervention. We preferred nonsurgical management in six patients with periampullary duodenal microperforation. If nonsurgical intervention will be preferred in the management of perforation related with ERCP, repeated CECT scan should be planned.

The routine use of prophylactic antibiotics while performing elective ERCP is controversial. Current guidelines recommend prophylactic antibiotic therapy in all patients with cholangitis or biliary obstruction that is unlikely to be drained at the time when ERCP is being performed.[12] It was also recommended in immunocompromised patients and patients with communicating pancreatic cysts or pseudocysts before transpapillary or transmural drainage of pseudocysts.[13] Because patients enrolled in the present study were referred by different endoscopy centers, it was not known if they received prophylactic antibiotics prior to undergoing ERCP, and, besides, it was not known if patients with infection had any infections prior to undergoing ERCP. Because all cases of biliary obstruction were successfully drained at the time of performing ERCP, routine antibiotic prophylaxis was not used in patients with pancreatitis, except in the patient with a necrotizing disease. Antibiotics were used in patients with clinically and/or microbiologically verified infections. The immune system was compromised in six patients with a cancer, leading to death due to sepsis. Overwhelming sepsis was a major problem leading to death in the present study. We believe that bacterial overgrowth due to biliary stasis, even if it was successfully drained at the time of performing ERCP, increase the risk of infections, particularly in older patients with a tumor interfering with normal biliary drainage. Prophylactic antibiotics and, perhaps, even hospitalization can minimize potential complications.

In the current study, there was insufficient evidence to attribute mortality to the complications because of the high incidence of comorbidities. Fifty percent of patients who died

had a cancer that significantly decreased the chance of survival. Further, 50% of patients who died had cardiopulmonary and/or cerebrovascular disorders.

Because this was a retrospective study, it was limited by the records of patients. This study also was limited by the small number of patients.

Conclusion

Understanding and managing the main risk factors can minimize complications; however, they would not be eliminated. Moderate and severe complications may increase the mortality rate, particularly in high-risk patients. Potential benefits favor the use of therapeutic ERCP. Timely and effective intervention can reduce mortality and morbidity rates.

Conflict of interest: None declared.

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ORİJİNAL ÇALIŞMA - *ÖZET*

Bir acil cerrahi kliniğinin endoskopik retrograd kolanjiyopankreatografi komplikasyonları ile ilgili deneyimi

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AMAÇ: Bu çalışmanın amacı farklı endoskopi merkezleri tarafından kliniğimize yönlendirilen endoskopik retrograd kolanjiyopankreatografi (ERCP) komplikasyonları ile ilgili deneyimimizi aktarmaktır.

GEREÇ VE YÖNTEM: ERCP komplikasyonu nedeniyle Ekim 2005–Ocak 2014 tarihleri arasında acil cerrahi kliniğimize yönlendirilen 54 hastanın kayıtları geriye dönük incelendi.

BULGULAR: Çalışmada 25 kadın, 29 erkek hasta yer aldı. Pankreatit en sık görülen komplikasyon (%38.8) idi. Perforasyon (%27.7), enfeksiyon (%20.3) ve kanama (%12.9) diğer sık görülen komplikasyonlardı. En yüksek oran perforasyonlu hastalarda (%40) olmak üzere olguların %22.2'si ölüm ile sonuçlandı. Ölen olguların ortalama yaşı 75.9 idi (dağılım, 47–94). Ölümlerin %41.6'sı ERCP sonrası ilk hafta, %33.3'ü ikinci hafta içerisinde gerçekleşti. Ölen hastaların %50'sinde malign bir hastalık mevcuttu (birisinde metastatik meme kanseri, birisinde safra kesesi tümörü, birisinde duedonum tümörü, üçünde periampuller tümör). Ölen hastaların %50'sinde kardiyopulmoner ve/veya serebrovasküler hastalıklar da mevcuttu.

TARTIŞMA: Risk faktörlerini bilerek uygun yönetimin sağlanması komplikasyon oranını en aza indirse de tamamen ortadan kaldıramaz. Orta ve ciddi dereceli komplikasyonlar özellikle yüksek riskli hastalarda mortaliteyi artırabilir.

Anahtar sözcükler: Endoskopi; enfeksiyon; ERCP; komplikasyon; pankreatit; perforasyon.

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