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A case series



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Intraoperative Endoscopic Retrograde Cholangiopancreatography in patients with complex benign biliary tract pathologies. A case series

INTRODUCTION: *This study presents data about the intraoperative performance of Endoscopic Retrograde Cholangiopancreatography (ERCP) for different types of cases with acute, complex pathologies of the biliary tract.*

MATERIALS AND METHODS: *We retrospectively enrolled cases with intraoperative ERCP performed for different acute complex bile duct pathologies (including injury and cystic stump leak). All patients were analyzed according to demographic findings, etiologies, management and results.*

RESULTS: *Intraoperative ERCP was performed in 4 patients of whom 2 (50%) were female and 2 (50%) were male with different diagnoses. The median age of patients was 46.8 (range of 28-75) years. The diagnosis was bile duct injury in three patients and one had a complicated hydatid cyst with jaundice (T Bil: 18 mg dl⁻¹). All patients were in septic condition. Patients underwent laparotomy and intraoperative ERCP was performed successfully by using the Rendezvous technique. For the last patient, intraoperative ERCP was used for diagnosis and management of bile leak in the cavity.*

CONCLUSION: *Intraoperative endoscopic retrograde cholangiopancreatography is a safe and effective method for treatment of acute complex bile duct pathologies.*

KEY WORDS: Bile Duct Injury, Intraoperative ERCP, Rendezvous Technique

Introduction

Benign biliary duct pathologies consist of duct stones, strictures and iatrogenic bile duct injuries. All the men-

tioned disorders related to the biliary duct can cause severe sepsis resulting in high rates of morbidity and mortality^{1,2}. The gallbladder and bile duct can be visualized using a variety of highly technologic imaging systems. Since its introduction, endoscopic retrograde cholangiopancreatography (ERCP) remains the cornerstone for diagnosis and therapeutic approaches to biliary tract pathologies. Nowadays ERCP enables visualization of the biliary tree, insertion of plastic stent or self-expanding metal stent, and biopsy taking^{3,4}. In recent years, the high success rate of intraoperative

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ERCP was reported for choledocholithiasis by reducing the risk of post-ERCP pancreatitis ^{5,6}. Another benefit of intraoperative ERCP is decreasing the number of interventions from two steps to only one step for common bile duct stones under general anesthesia ⁶. Thus far, there is little data in the literature which investigates the performance of intraoperative ERCP (IOERCP) for complex biliary pathologies except for choledocholithiasis. In this article, we aimed to present our experience and results of intraoperative performance of ERCP for different cases with complex, benign pathologies of the biliary tract.

Materials and Methods

We retrospectively enrolled cases who underwent intraoperative ERCP for different complex bile duct pathologies (including injury, cystic stump leak) at the Department of General Surgery of Canakkale Onsekiz Mart University, Canakkale, Turkey. Patients were excluded if data was missing. Demographic data, etiology, physiological and operative parameters were collected from

medical records and operative notes. A form was created for each patient.

Detailed information about the operation was provided to the participating patients and a written informed consent was obtained from each one. The study was conducted in accordance with the declaration of Helsinki. This study was performed in Canakkale Onsekiz Mart University Research and Application Hospital, Turkey, with the approval of the University's Ethics Committee (No: 2011-KAEK-27/2015-147)..

TECHNIQUE

Patients were referred to our University Hospital with suspicion of bile duct pathology. Patient's notes, radiological findings and all blood tests were reviewed by a multidisciplinary team, including an experienced gastroenterologist, an interventional radiologist and two surgeons. After hemodynamic stability was ensured in the emergency department, patients were taken to an operating room including ERCP device and a near-by angio unit for interventional radiology.

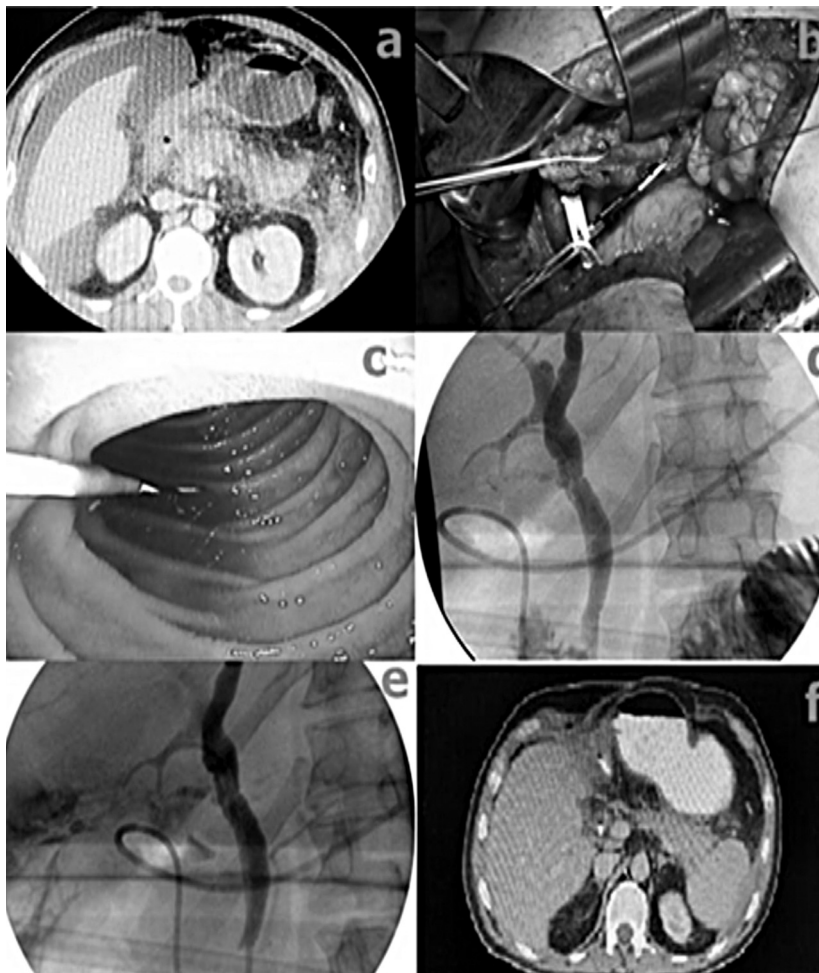


Fig. 1:
a: Early CT scan obtained on admission to the emergency department reveals a homogeneously enlarged pancreas;
b: Coronary (?) [Intraoperative] view;
c: The catheter in the second portion of duodenum;
d: Fluoroscopic image of intraoperative ERCP;
e: Fluoroscopic image of intraoperative ERCP and image of right hepatic duct injury;
f: Follow up CT scan two months later.

If conventional ERCP cannulation techniques failed, a subcostal incision was made. After cleaning of the abdominal space, the cystic duct was dissected. A central venous catheter was inserted into the cystic duct and pushed forward toward papilla through to the second portion of the duodenum. Then a guidewire with soft side was inserted into the catheter and the guide was caught by the gastroenterologist with a snare. Then the guidewire was inserted into channel of the duodenoscope. By using the lateral vision of duodenoscope, an appropriate sphincterotomy was performed. After sphincterotomy, the catheter was pushed forward to the hepatic confluence to inject contrast. A C-arm fluoroscopic unit was employed to obtain real-time images and locate the injured area of the bile duct. After localization of bile duct injury was diagnosed, a stent was inserted covering the damaged part. Finally a drain was placed below the liver through the hepatoduodenale ligament and the subcostal incision was closed anatomically^{7,8}.

Results

Intraoperative ERCP was performed in 4 patients of whom 2 (50%) were female and 2 (50%) were male with different diagnoses. The median age of patients was 46.8 (range of 28-75) years. There was no procedure related complications.

Three patients were treated due to bile duct injury. The first case was a male with a history of open cholecystectomy seven days previous, referred to our hospital with bile sepsis. After hemodynamic stability was ensured, the patient was taken to the operating room. After a subcostal incision and cleaning of the abdominal cavity, ERCP was performed with the Rendezvous cannulation procedure. Right hepatic duct injury was diagnosed. A 7 f stent was inserted through the injured part. After abdominal cleaning, a drain was placed into the subhepatic area. The patient was discharged seven days postoperatively. Two months later, a control ERCP was performed and the stent was removed successfully (Fig. 1).

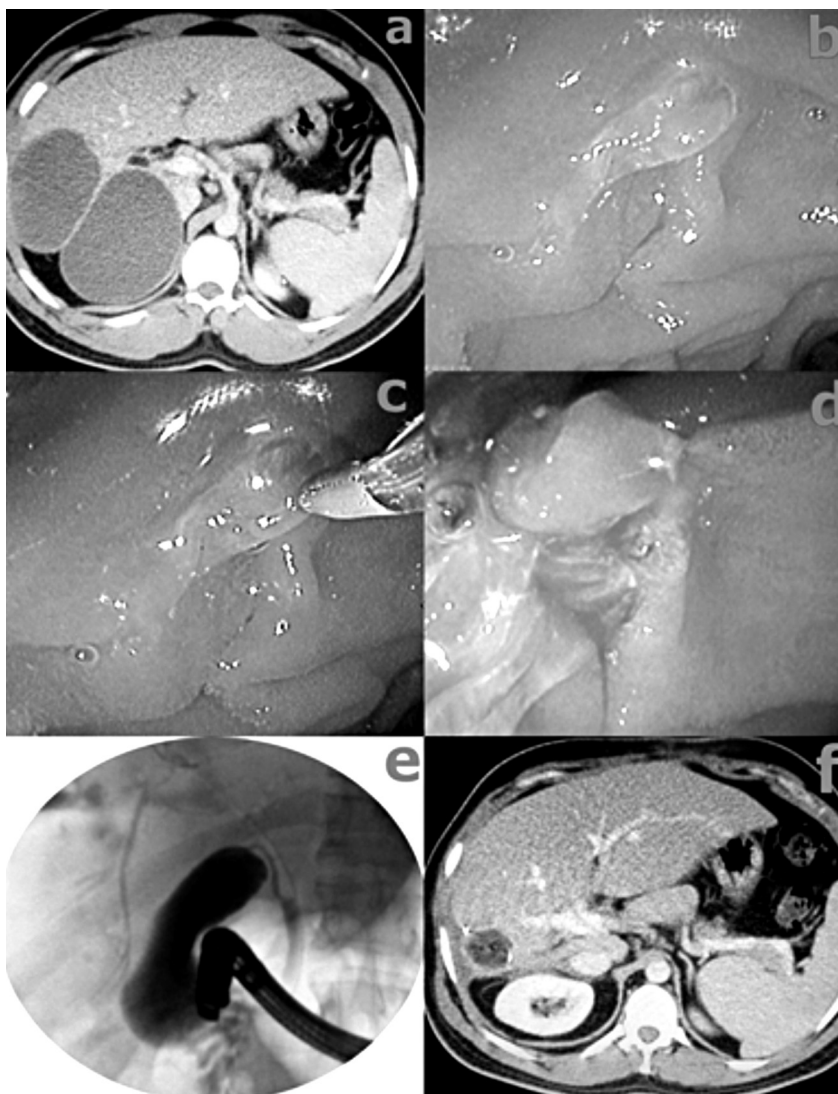


Fig. 2:

- a: Abdominal CT revealed a multilocular hepatic hydatid cyst, localized in the right lobe measuring 10 x 6 cm. A second hydatid cyst was found in segment IV with a size of 8 x 6 cm;
- b: Endoscopic image of the duodenum;
- c: After sphincterotomy, emptying of hydatid membranes with occlusion balloon;
- d: Extraction of small daughter cysts and hydatid materials;
- e: Fluoroscopic image;
- f: Postoperative follow CT scan.

The second case was referred to our department with a suspicion of bile duct injury while performing percutaneous transhepatic cholangiography and drainage catheter insertion for obstructive jaundice due to Mirizzi syndrome. After stabilization of the patient, they were taken to the operating room, and exploratory laparotomy was performed. After free bile fluid cleaning, a cholecystectomy was performed. The Rendezvous technique was used for cannulation. After sphincterotomy, right hepatic duct injury was diagnosed and a stent was inserted into the right hepatic duct. The patient was discharged three days later. After a month, the stent was removed after control ERCP.

The third case was admitted to our emergency department with right quadrant pain with a history of laparoscopic cholecystectomy two weeks previous. An inflamed appendix and free fluid was revealed on CT scan. The patient underwent laparotomy with McBurney incision. After free bile was seen, a midline laparotomy was performed. There were dense adhesions and free bile in the subhepatic area. A peroperative ERCP was performed. After contrast injection, a cystic duct leak and injury of the choledoch was diagnosed. A stent was inserted through the choledoch. Appendectomy was performed after the cystic duct was closed with a suture. The patient was discharged four days postoperatively and the stent was removed one month later.

The fourth case was a male who was referred to our department with biliary sepsis due to obstructive jaundice. Total bilirubin and direct bilirubin were 18 mg dl-1 and 15 mg dl-1 respectively. Abdominal CT revealed a multilocular hepatic hydatid cyst, localized in the right lobe measuring 10 x 6 cm. A second hydatid cyst was found in segment IV with a size of 8 x 6 cm. After hemodynamic stability, ERCP was performed. After sphincterotomy, hydatid materials were seen and cleaned out with biliary occlusion balloon and basket. Twelve hours later, the patient was taken to the operating room and underwent a laparotomy with left subcostal incision. Peroperative findings were two large sized cysts with a thickened wall. Hypertonic saline solution (hps) soaked gauzes were inserted to protect against spreading. After injection of hps into the cysts, pericystectomy was completed by excision of anterior cyst wall and removal of daughter cysts and the infected contents.

Then the gastroenterologist was invited to the operating room. After placement of C-armed fluoroscopy, contrast was injected by using the nasobiliary catheter. A small leak was diagnosed in the cavity and closed by sutures. All cavities were cleaned up by injection of hps. The patient had a wound infection which was controlled by negative pressure wound therapy and was discharged postoperatively nine days later. The nasobiliary catheter was removed six weeks after control cholangiogram (Fig. 2).

Discussion

In this study we demonstrated that ante-grade guide-wire assisted rendezvous technique was effective and safety for the treatment of bile duct injuries. To the best of our knowledge, combined endoscopic and surgical approaches has not been previously used for the treatment of bile duct injuries.

Iatrogenic bile duct injury is a challenging condition with medico-legal aspects for a surgeon, due to peritonitis and sepsis in the short term and cirrhosis which can occur in the later period with high mortality and morbidity rate ⁹. Iatrogenic bile duct injuries commonly require several interventions including surgical, endoscopic and radiological interventions. The first step for the management of septic condition is emplacement of percutaneous catheter for drainage of bile and insertion of stent with ERCP. An exploratory laparotomy is needed for severe biliary peritonitis ¹⁰.

The scan of literature reveals few studies regarding the efficacy and safety of using combined PTC and ERCP for the management of biliary injuries. Salama et al. argued that a multidisciplinary approach must be followed for biliary injury. They presented a case series including 18 patients successfully treated with the Rendezvous technique using percutaneous transhepatic cholangiography guidance ¹¹. Then a case was presented with the Rendezvous approach with PTC for complete transection of common bile duct injury during right hepatectomy by Shin et al ¹². Other published reports include bile leaks and segmental injuries following segmental hepatectomy. These authors used the Rendezvous procedure in combination with endoscopic and percutaneous techniques for three patients. This technique was successful in restoring biliary continuity and avoiding hepaticojejunostomy in 2 of the 3 patients ⁸.

Previous studies showed that the rendezvous technique is a useful method for laparoendoscopic and open approach surgery with successful results for bile duct stones with surgery. This technique improves success rate for ERCP and reduces complications especially ERCP-related pancreatitis. In addition to reducing the hospital stay, this approach has a high success rate for bile duct cannulation ^{6,7,12-14}. Moreover a recent meta-analysis showed that in terms of morbidity, hospital stay and hospitalization charges, the rendezvous technique is an effective and safety method rather than sequential ERCP of patients with bile duct stones ¹⁴. To date, this technique has not been completely evaluated for complex biliary pathologies especially bile duct injury and obstructive jaundice.

In this study, we described the rendezvous technique for patients with complex and challenging bile duct pathologies. We performed this technique successfully in three patients who had iatrogenic bile duct injury and one with biliary sepsis due to a large complicated hydatid cyst. All patients needed surgical intervention because of

biliary sepsis and severe peritonitis. For these patients, surgery was mandatory as a treatment option with a multidisciplinary team. Our first step was surgical intervention due to biliary sepsis. Intrabdominal bile leak was cleaned and the surgeon inserted the guidewire into the cystic duct then ERCP was performed by the gastroenterologist. In these cases, endoscopy showed severe edema in the periampullar region and a silent major papilla due to biliary sepsis obstructing bile drainage into duodenum. Therefore, we did not initially perform sequential ERCP. We think that the Rendezvous technique was a successful option for these patients. Bile duct cannulation was performed successfully and stents were inserted into the bile duct with sphincterotomy using the Rendezvous technique in three patients. The other advantage of this technique is the reduction of the risk of ERCP-related complications such as pancreatitis and duodenal or periampullary perforation in septic patients. There was no mortality and morbidity related to this treatment approach. The last patient was in septic condition with jaundice. He had a complicated hydatid cyst. One of the serious complications of hepatic hydatid cyst disease is rupture of the cyst into intrahepatic bile ducts leading to obstructive jaundice. After hemodynamic stability, drainage was performed by ERCP. In the second step, the patient was operated. During the peroperative period, a nasobiliary catheter was used to locate the rupture. The bile leak was fixed successfully with the assistance of intraoperative ERCP. Preoperative ERCP is a well known method for management of complicated hydatid cysts¹⁵ and we think intraoperative ERCP is a useful method to locate the rupture and drain it using sphincterotomy in acute conditions.

In conclusion, this is the first study evaluating intraoperative ERCP for patients with iatrogenic biliary injury and hydatid cysts. Furthermore, our data demonstrated that these patients require a multidisciplinary approach. Intraoperative ERCP is a safe and practical method for complex biliary pathologies such as injury and hydatid cyst.

Riassunto

Viene presentata un'esperienza relativa all'esecuzione intraoperatoria della CPRE (colangiopancreatografia retrograde endoscopica) in una piccola serie di casi con patologia acuta e complessa delle vie biliari.

Si tratta di uno studio retrospettivo di casi scelti in cui è stata effettuata la CPRE per differenti condizioni di patologia acuta della via biliari (compresi danni e deiscenze del dotto cistico). Per tutti i pazienti l'analisi è stata comprensiva dei dati demografici, all'etiologia, al trattamento ed ai risultati.

La CPRE intraoperatoria è stata adottata in 4 pazien-

ti, 2 donne e 2 uomini, con differenti diagnosi. L'età media era di 46,8 anni (da 28 a 75). In tre pazienti si è trattato di danni alla via biliare, e in un caso di un cisti idatidea complicata con ittero (bilirubinemia totale 18 mg%). tutti i pazienti si presentavano in stato settico. Nel corso della laparotomia è stata eseguita con successo una CPRE con la tecnica del rendezvous. Per l'ultimo paziente la CPRE intraoperatoria è stata impiegata per la diagnosi ed il trattamento della perdita biliare nella cavità

In conclusione la CPRE si è dimostrata una metodica sicura ed efficace per il trattamento di patologia biliari acute e complesse.

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