Surgical management of ERCP-related complications

Afshin Fathi1, Farhad Lahmi2, Rezvaneh Kozegaran2
1 General Surgery Ward, Taleghani Hospital, Shaheed Beheshti University of Medical Sciences, Tehran, Iran
2 Research Institute for Gastroenterology and Liver Disease, Shahid Beheshti University, M.C., Tehran, Iran

ABSTRACT

Aim: The aim of this study was to analyze clinical findings and treatment outcomes of patients with endoscopic retrograde cholangiopancreatography complications.

Background: Endoscopic retrograde cholangiopancreatography has become a very common procedure for the evaluation and treatment of biliary and pancreatic diseases.

Patients and methods: A retrospective review of 2447 endoscopic retrograde cholangiopancreatography procedures and their complications since Apr 2006 till Dec 2010 was conducted to identify their incidence, optimal management, and clinical outcomes.

Results: 2447 endoscopic retrograde cholangiopancreatography procedures were performed. Overall, complications developed in 168 (6.9%) cases: perforation in 10 (0.4%), hemorrhage in 4 (0.16%) and mild to severe pancreatitis in 154 (6.3%). The patients mean age was 66± 6 yrs with females/ males of 1432(58.5%)/ 1015(41.5%). Abdominal pain, nausea, leukocytosis and hyperamylasemia were most common findings in these patients. Surgery was performed for 6 patients (0.24%). The most hospital station was 20 days: surgical group 7±2 days, pancreatitis 11± 4 days and average 6 days for others.

Conclusion: Endoscopic retrograde cholangiopancreatography remains the endoscopic procedure that carries a high risk for morbidity and or mortality. The majority of events are of mild-to-moderate severity and when surgery should be done, it depends upon the clinicopathological condition and we don’t advise pyloric exclusion, gastrojejunostomy and duodenal diversion for these patients.

Keywords: Endoscopic retrograde cholangiopancreatography, Complication, Surgery.

(Please cite as: Fathi A, Lahmi F, Kozegaran R. Surgical management of ERCP-related complications. Gastroenterol Hepatol Bed Bench 2011;4(3):133-137).

Introduction

Since its introduction in 1968, endoscopic retrograde cholangiopancreatography (ERCP) has become a very common procedure for the evaluation and treatment of biliary and pancreatic diseases. Sphincterotomy is used mainly to remove biliary stones, drain the biliary tree, and the placement of stents in the common bile and pancreatic duct (1). However, the rate of complications, such as pancreatitis, bleeding, cholangitis, and perforation has been reported to range from 4% to 30% (2). Duodenal injury was reported to have an incidence of 0.3% to 1.3% (3-5) with a relatively high mortality rate of 16% to 18% (6).
In other studies, the rate of mortality after ERCP was reported between 1.0% to 1.5% (7, 8). The incidence of post-ERCP pancreatitis (PEP) varies from 1% up to 7% (9-13), it may exceed 25% in very high-risk populations (14).

Perforations are usually in the duodenum and retroperitoneal. The majority of cases are due to papillotomy, whereas intraperitoneal perforations are less common and caused by the endoscope itself (5). The management of the latter is not discussed in the report. Until now, some authors classified ERCP-related perforations according to the site and mechanisms of injury and suggested management guidelines accordingly (3, 6, 15). However, despite these guidelines, the classification of perforations remains poorly defined and the management of ERCP-related perforation still remains controversial. The aim of this study was to investigate our findings and treatment outcomes in patients with ERCP-related complications.

**Patients and Methods**

Between April 2006 till July 2010, 2447 ERCP procedures with or without sphincterotomy were performed at the Taleghani Hospital, in Tehran, Iran. A retrospective review of ERCP-related duodenal perforations was conducted to identify their incidence, management, and clinical outcome. Medical records were reviewed for the following data: patient demographics, ERCP indications, clinical presentation after the suspected perforation, diagnostic laboratory and radiologic studies, intraoperative findings, length of hospital stay, clinical course and final outcome. 188 complicated cases were enrolled in the present study.

**Results**

2447 ERCP procedures were performed in our hospital, of which 65% were therapeutic and 35% were diagnostic. Complications developed in 168 (7%) cases: pancreatitis in 154 (6%), hemorrhage in 4 (0.16%) and duodenal perforation in 10 (0.4%). The patients mean age was 66 ± 6 years with females/males: 1432(58%)/ 1015(42%). Abdominal pain, nausea, leukocytosis and hyperamylasemia were most common findings in

| Table 1. Clinical and paraclinical findings in patients after ERCP according to complications |
|----------------------------------------|-----------------|-----------------|-----------------|
| Perforation                            | Pancreatitis    | Bleeding        |
| Laparotomy                             | Observation     |                 |
| PR> 100/min                            | 6               | 88              |
| RR>28/min                              | 6               | 12              |
| RR : 18-28/min                         | 0               | 43              |
| OT> 38.3°c                            | 0               | 32              |
| Nausea/ Vomiting                       | 3               | 139             |
| Abdominal tenderness                   | 6               | 127             |
| Abdominal rebound tenderness           | 6               | 0               |
| Abd. Distention                        | 6               | 0               |
| WBC> 11000/mm³                        | 5               | 78              |
| Amylase> 200 Iu/lit                    | 6               | 45              |
| Amylase: 100-200 Iu/lit                | 0               | 100             |
| Lipase> 60 IU/lit                      | 6               | 110             |
| Free air(upright CXR)                  | 6               | 0               |
| Air in retroperitoneal(AXR)            | 2               | 0               |
| Abdominal Ultrasound Free fluid        | 6               | 0               |
| CT scan                                | 0               | 14/5            |

PR: pulse rate, RR: respiratory rate, OT: oral temperature, Abd. Tend: abdominal tenderness, CXR: chest x-ray, AXR: abdominal x-ray
these patients (table 1). ERCP indications are showed in table 2.

**Table 2.** ERCP indications and patient’s data in each group

| Stone | Cholangiocarcinoma | Periampullary Carcinoma | SOD* |
|-------|---------------------|--------------------------|------|
| Number (%) | 1492(61) | 117(4.8) | 407(16.6) | 431(17.6) |
| Age | 61.4±5 | 68.3±4 | 69.8±7.9 | 52.3±6.1 |
| Sex (F/M) | 59/41 | 43/57 | 46/54 | 36/64 |

*Mean±Standard deviation; †F/m: Female/Male; ‡SOD: Sphincter of oddi dysfunction

154 cases (6.29%) suffered from mild to severe pancreatitis. On examination, most patients with PEP had abdominal tenderness, usually localized to the epigastric and periumbilical regions, without rebound tenderness or abdominal distention. Laboratory investigations revealed leukocytosis, hyperamylasemia and hyperlipidemia (table 1).

**Table 3.** Descriptive statistics of patient’s data (n=2447)

| Management | Perforation | Mild/Severe pancreatitis | Bleeding |
|------------|-------------|--------------------------|----------|
| Number (%) | 10(0.4) | 154(6.3) | 4(0.2) |
| Management | n=6/10; PR+d | GI rest± | GI rest+ AB/±ED | OB |
| ICU station (day) | 3.3±0.8 | 3.7±1 | 0 |
| Hospital station (day) | 6.7±2.4 | 11 ± 3.7 | 6±1.4 |

*PR: primary repair, d: drainage, GI: gastrointestinal, AB: antibiotic, ED: external drainage, OB: observation

In the surgically treated group there was bile collection at laparotomy in two cases and 1-2cm perforations were found in lateral wall of duodenum after Kocher’s maneuver. Surgical procedures included duodenal primary repair and drainage, common bile duct exploration and choledocho-duodenostomy (n=1). Patients were admitted to intensive care unit for 3 ± 1days and then discharged on the 7±2 postoperative days.

**Discussion**

Generally, ERCP is regarded as a safe procedure in the hands of experienced gastroenterologists. However, the rate of major complications approaches 10%, with bleeding, pancreatitis, cholangitis, and perforation among the most commonly reported serious complications. The overall mortality rate of the procedure is
approximately 1% to 1.5% (7, 8), but in our study there was no any mortality. Careful patient selection combined with skilled cannulation minimizes complications and higher-risk procedures should be performed in specialist centers.

154 cases (6.29%) suffered from mild to severe pancreatitis. Our reported rates of PEP are within the range of other cohort studies and randomized, clinical trials (16-21).

Perforation of the duodenum is a major complication that may lead to great mortality if left untreated. As a serious complication after ERCP, perforations have been reported in some series to occur in 0.35% to 2.1% of patients (3, 4, 8) and it was 0.28% in our study.

ERCP-related perforations are diagnosed more frequently by experienced endoscopists, because of either contrast extravasations or appearance of retro-/intraperitoneal air during the procedure.

There are some reports that scope-related perforations presented in gastric, esophageal, and lateral wall of duodenum and jejunum tend to be large and remote from the ampulla and require immediate surgery (3, 6).

In our series, early surgery, with primary repair, was the preferred operation. The surgical procedure selected is based upon the mechanism and degree of injury and patient’s condition.

Some authors performed pyloric exclusion and gastrojejunostomy in patients with duodenal perforation and failed conservative management (6). Options include cholecotom y with stone extraction and T-tube drainage, repair of the perforation, drainage of abscess or phlegmon, cholecodojejunostomy, or pancreateoduodenectomy (22, 23). Whereas, duodenal diversion has been reported frequently in patients with peri-Vaterian perforations and those operated on late (6). In our study none of the patients were treated with pyloric exclusion, gastrojejunostomy and duodenal diversion. The decision to treat patients with primary repair appears justified given the favorable outcomes that we reported.

If the physical examination after ERCP is indicative of perforation, then a decision regarding operative or nonoperative treatment must be made. Clinical decisions can be supported, but not guided by investigations such as an erect chest X-ray, supine and upright abdominal radiographs and an abdominal CT scan in patients with severe pancreatitis if their symptoms and clinical parameters worsen.

The extent of the operation was proportional to the degree of injury and the intra-abdominal contamination. The two basic principles of our surgical procedures were: a) primary repair of the perforation site and b) extensive drainage and/or debridement. Our patients hospital stay were significantly less than another studies (less than 11 days versus 31 days in Ji Hun Kim study (24) and 21 days in Dimitrios V. Avgerinos’s study (25) and mean ICU station was 3.66 days Vs. 9 days of their studies (24, 25).

In conclusion, patients should be kept fasting while receiving hydration, nasogastric suction and/or intravenous antibiotics. Percutaneous drainage may be an alternative to surgical drainage in patients who develop retroperitoneal collections. Surgery should be recommended for patients with toxic condition, peritonitis signs, abdominal distention and free air in chest x-ray. The type of surgical intervention depends upon the clinicopathological condition. Our study supports primary repair.

References

1. Barthet M, Lesavre N, Desjeux A, Gasmi M, Berthezene P, Berdah S, et al. Complications of endoscopic sphincterotomy: results from a single tertiary referral center. Endoscopy 2002; 34:991–97.

2. Freeman ML. Adverse outcomes of ERCP. Gastrointest Endosc 2002; 56: S273–82.

3. Enns R, Eloubeidi MA, Mergener K, Jowell PS, Branch MS, Pappas TM, et al. ERCP-related perforations: risk factors and management. Endoscopy 2000; 34: 293–98.
4. Freeman ML, Nelson DB, Sherman S, Haber GB, Herman ME, Dorsher PJ, et al. Complications of endoscopic biliary sphincterotomy. N Engl J Med 1999; 335: 909–18.

5. Martin DF, Tweedle DE. Retroperitoneal perforation during ERCP and endoscopic sphincterotomy: causes, clinical course, and management. Endoscopy 1990; 22: 174–75.

6. Stapfer M, Selby RR, Stain SC, Katkhouda N, Parekh D, Jabbour N, et al. Management of duodenal perforation after endoscopic retrograde cholangiopancreatography and sphincterotomy. Ann Surg 2000; 232: 191–98

7. Dunham F, Bourgeois N, Gelin M, Jeanmart J, Toussaint J, Cremer M. Retroperitoneal perforations following endoscopic sphincterotomy: clinical course and management. Endoscopy 1982; 14: 92–96.

8. Cotton PB, Lehman G, Vennes J, Geenen JE, Russell RC, Meyers WC, et al. Endoscopic sphincterotomy complications and their management: An attempt at consensus. Gastrointest Endosc 1991; 37: 383–93.

9. Cotton PB, Garrow DA, Gallagher J, Romagnuolo J. Risk factors for complications after ERCP: a multivariate analysis of 11,497 procedures over 12 years. Gastrointest Endosc 2009; 70: 80–88.

10. Loperfido S, Angelini G, Benedetti G, Chilovi F, Costan F, De Berardinis F, et al. Major early complications from diagnostic and therapeutic ERCP: a prospective multicenter study. Gastrointest Endosc 1998; 48: 1–10.

11. Masci E, Toti G, Mariani A, Curioni S, Lomazzi A, Dinelli M, et al. Complications of diagnostic and therapeutic ERCP: a prospective multicenter study. Am J Gastroenterol 2001; 96: 417–23.

12. Mehta SN, Pavone E, Barkun JS, Bouchard S, Barkun AN. Predictors of post-ERCP complications in patients with suspected choledocholithiasis. Endoscopy 1998; 30: 457–63

13. Vandervoot J, Soetikno RM, Tham TC, Wong RC, Ferrari AP Jr, Montes H, et al. Risk factors for complications after performance of ERCP. Gastrointest Endosc 2002; 56: 652–56.

14. Fogel EL, Eversman D, Jamidar P, Sherman S, Lehman GA. Sphincter of Oddi dysfunction: pancreaticobiliary sphincterotomy with pancreatic stent placement has a lower rate of pancreatitis than biliary sphincterotomy alone. Endoscopy 2002; 34: 280–285

15. Howard TJ, Tan T, Lehman GA, Sherman S, Madura JA, Fogel E, et al. Classification and management of perforations complicating endoscopic sphincterotomy. Surgery 1999; 126: 658–63.

16. Kaassis M, Boyer J, Dumas R, Ponchon T, Coumaros D, Delcenserie R, et al. Plastic or metal stents for malignant stricture of the common bile duct? Results of a randomized prospective study. Gastrointest Endosc 2003; 57: 178–82.

17. Schmassmann A, von Gunten E, Knuchel J, Scheurer U, Fehr HF, Halter F. Wallstents versus plastic stents in malignant biliary obstruction: effects of stent patency of the first and second stent on patient compliance and survival. Am J Gastroenterol 1996; 91: 654–59.

18. Nakai Y, Isayama H, Komatsu Y, Tsujino T, Toda N, Sasahira N, et al. Efficacy and safety of the covered Wallstent in patients with distal malignant biliary obstruction. Gastrointest Endosc 2005; 62: 742–48.

19. Yang KY, Ryu JK, Seo JK, Woo SM, Park JK, Kim YT, et al. A comparison of the Niti-D biliary uncovered stent and the uncovered Wallstent in malignant biliary obstruction. Gastrointest Endosc 2009; 70: 45–51.

20. Decker C, Christein JD, Phadnis MA, Mel Wilcox C, Varadarajulu S. Biliary metal stents are superior to plastic stents for preoperative biliary decompression in pancreatic cancer. Surg Endosc 2011; Mar 4.

21. Mohammad Alizadeh AH, Afzali ES, Mousavi M, Moaddab Y, Zali MR. Endoscopic retrograde cholangiopancreatography outcome from a single referral center in Iran. Hepatobiliary Pancreat Dis Int 2010; 9: 428–32.

22. Isozaki H, Okajima K, Mizutani H, Takeda Y. The successful surgical management of perforation after endoscopic sphincterotomy: report of two cases. Surg Today 1993; 23: 1018.

23. Doglietto GB, Pacelli F, Caprino P, Alfieri S, Tortorelli AP, Mutignani M. Posterior laparostomy through the bed of the 12th rib to drain retroperitoneal infection after endoscopic sphincterotomy. Br J Surg 2004; 91: 730–33.

24. Kim JH, Yoo BM, Kim JH, Kim MW, Kim WH. Management of ERCP-related perforations: outcomes of single institution in Korea. J Gastrointest Surg 2009; 13: 728–34.

25. Avgeronos DV, Llaguna OH, Lo AY, Voli J, Leitman IM. Management of endoscopic retrograde cholangiopancreatography: related duodenal perforations. Surg Endosc 2009; 23: 833–88.