

Successful outcome of sphincterotomy and 7 French pigtail stent insertion in the management of post-cholecystectomy bile leaks

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BACKGROUND: Endoscopic retrograde cholangiopancreatography (ERCP) is widely used to manage post-cholecystectomy bile leaks. However, the best endoscopic intervention remains controversial. We investigated the success of a 7 French double pigtail stent following sphincterotomy in the management of such bile leaks.

METHODS: Between July 1998 and June 2008, 48 patients were referred for ERCP for presumed post-cholecystectomy bile leaks. Leaks were confirmed at ERCP and managed by a combination of sphincterotomy and stent insertion unless contraindicated.

RESULTS: Bile duct cannulation was successful in 44 (91.7%) patients. A leak of the cystic duct was demonstrated in 19 (43.2%) patients, the duct of Luschka in 11 (25.0%), and the common hepatic duct in 5 (11.4%). Complete transection of the common bile duct occurred in 4 patients. The remaining patients had no cholangiographic evidence of a leak. Sphincterotomy was performed in 34 patients. A 7 French double pigtail plastic stent was placed in all 35 patients with cholangiographic evidence of a bile leak. No bile leaks were demonstrated at a follow-up of 8-16 weeks and all stents were removed successfully.

CONCLUSION: The combination of sphincterotomy and insertion of a 7 French double pigtail stent results in excellent outcomes in the management of post-cholecystectomy bile leaks.

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KEY WORDS: cholecystectomy;
bile leak;
sphincterotomy;
stent insertion

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Introduction

Bile leaks are a serious complication of hepatobiliary surgery. The role of endoscopic retrograde cholangiopancreatography (ERCP) in the management of bile leaks is well established, and ERCP provides an attractive alternative to both radiological and surgical intervention.^[1,2] It is safe and highly effective for a postoperative complication that appears to be increasing in incidence with the advent of laparoscopic cholecystectomy.^[3]

A number of endoscopic interventions to manage bile leaks include sphincterotomy, stent insertion and nasobiliary drainage.^[4] The optimal intervention remains controversial.

The aim of our study was to determine the success of our unit's policy of insertion of a 7 French double pigtail stent following biliary sphincterotomy in the management of post-cholecystectomy bile leaks.

Methods

We retrospectively identified all patients who underwent ERCP for presumed post-cholecystectomy bile leaks at our unit between July 1998 and June 2008. Bile leaks were diagnosed based on radiological imaging or the appearance of bile from either percutaneous drainage of abdominal collections or in drains placed at the time of surgery.

All ERCP procedures were performed by one of two experienced endoscopists with or without the involvement of a trainee. The site of the bile leak was identified at the time of the ERCP procedure. All patients with cholangiographic evidence of a bile leak underwent both biliary sphincterotomy and stent insertion unless it was contraindicated or not technically feasible. Additional biliary pathology, in particular choledocholithiasis, was also noted.

The follow-up of all patients was recorded and successful outcome of bile leak healing was noted. The failure of endoscopic treatment was determined by the need for further intervention, radiological or surgical, to control the leak.

Results

Forty-eight patients (17 males and 31 females) underwent ERCP for management of presumed post-cholecystectomy bile leak. The mean age of this group was 53.0 years (range 16.8-80.6 years). A laparoscopic cholecystectomy had been performed in 40 of these patients while the remaining 8 had undergone an open procedure. The median interval between cholecystectomy and bile leak confirmation was 4 days (range 0-13 days) and the subsequent interval to ERCP was 6 days (range 0-15 days).

Bile duct cannulation was successful in 44 (91.7%) patients. Cholangiography demonstrated a leak involving the cystic duct in 19 (43.2%) patients, the duct of Luschka (subvesical duct) in 11 (25.0%), and the common hepatic duct in 5 (11.4%). Complete transection of the common bile duct occurred in 4 patients. The remaining 5 patients had no evidence of a bile leak at ERCP.

Biliary endoscopic sphincterotomy was subsequently performed in 34 patients. A 7 French double pigtail plastic stent was placed in all 35 patients with cholangiographic evidence of a bile leak. A sphincterotomy was not performed in one patient because of a prolonged prothrombin time. Retained common bile duct stones were identified in 13 patients, of whom 6 had a duct of Luschka leak, and 7 a leak from the cystic duct. No complications were recorded.

Bile drainage through percutaneous drains stopped at a median interval of 5 days (range 2-10 days) after ERCP. All patients underwent repeat cholangiography 8 to 16 weeks after the initial procedure. During follow-up, no bile leaks were demonstrated and all stents were removed successfully. The patients undergoing complete transection were referred to a hepatobiliary surgeon.

Discussion

Endoscopic treatments used to manage post-cholecystectomy bile leaks reduce the pressure gradient across the sphincter of Oddi, thereby diverting bile away from the leak and into the duodenum, and allowing healing to occur. The best

endoscopic treatment remains controversial and includes a number of interventions such as biliary sphincterotomy, stent insertion with or without sphincterotomy and nasobiliary drainage.^[5-7]

Evidence is conflicting on the benefit of sphincterotomy in bile leaks. Sphincterotomy increases the risk of bleeding and perforation during ERCP.^[8] In addition, Kaffes et al^[5] showed significantly more treatment failures when sphincterotomy is used as the sole modality compared with stenting or combination treatment, despite a short interval between bile leak diagnosis and ERCP. Furthermore, Mavrogiannis et al^[9] demonstrated that no added benefit is obtained combining sphincterotomy with stenting as compared with stenting alone. However, Simmons et al^[10] demonstrated a greater risk of pancreatitis when sphincterotomy is not performed.

Stent insertion, as the sole endoscopic treatment, results in closure of bile leaks within a number of days.^[1] The median interval in this study between leak confirmation and stent insertion was 13 days. However, the optimal stent size remains controversial. While it seems plausible that a larger-bore stent would result in a greater reduction in the pressure gradient across the ampulla and thus facilitate a better healing Katsinelos et al^[11] demonstrated comparable success rates between 7 and 10 French straight stents. However, it is noted that larger-bore stents can obstruct the pancreatic orifice leading to pancreatitis.^[12]

Nasobiliary drain insertion has met with mixed views. It is safe and advantageous for continued bile drainage while in place, and facilitates repeat cholangiography. In addition, two studies had complete leak resolution within a few days with nasobiliary drainage without additional endoscopic modalities.^[13, 14] ERCPs in both studies were performed almost immediately following bile leak diagnosis. However, nasobiliary drains are prone to migration and can be uncomfortable for the patient.

All patients in our series were treated with biliary sphincterotomy and a 7 French double pigtail stent with no post-procedure complications, and no failed endoscopic intervention. Furthermore, this combination resulted in early leak resolution following ERCP comparable to the other modalities. In addition, similar to the study by Agarwal et al^[1] our data demonstrate that failure to perform ERCP immediately after bile leak confirmation does not significantly affect the successful resolution of leaks.

In contrast to straight endoprostheses used for bile leaks, pigtail stents emerge from the bile duct with the duodenal orifice at an angle, thereby maintaining a

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more effective opening of the ampulla and hence more effective biliary drainage.^[15] In addition, double pigtail stents have a lower rate of migration and a lower risk of perforation and intestinal obstruction.^[16, 17] The addition of a sphincterotomy facilitates continued biliary drainage even if stent blockage occurs.

ERCP provides an effective treatment for post-cholecystectomy bile leaks. The best endoscopic practice remains an issue. Our study demonstrates excellent results with the combination of biliary sphincterotomy and 7 French pigtail stent.

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References

- 1 Agarwal N, Sharma BC, Garg S, Kumar R, Sarin SK. Endoscopic management of postoperative bile leaks. *Hepatobiliary Pancreat Dis Int* 2006;5:273-277.
- 2 Sandha GS, Bourke MJ, Haber GB, Kortan PP. Endoscopic therapy for bile leak based on a new classification: results in 207 patients. *Gastrointest Endosc* 2004;60:567-574.
- 3 Braghetto I, Bastias J, Csendes A, Debandi A. Intraoperative bile collections after laparoscopic cholecystectomy: causes, clinical presentation, diagnosis, and treatment. *Surg Endosc* 2000;14:1037-1041.
- 4 Foutch PG, Harlan JR, Hoefler M. Endoscopic therapy for patients with a post-operative biliary leak. *Gastrointest Endosc* 1993;39:416-421.
- 5 Kaffes AJ, Hourigan L, De Luca N, Byth K, Williams SJ, Bourke MJ. Impact of endoscopic intervention in 100 patients with suspected postcholecystectomy bile leak. *Gastrointest Endosc* 2005;61:269-275.
- 6 Bjorkman DJ, Carr-Locke DL, Lichtenstein DR, Ferrari AP, Slivka A, Van Dam J, et al. Postsurgical bile leaks: endoscopic obliteration of the transpapillary pressure gradient is enough. *Am J Gastroenterol* 1995;90:2128-2133.
- 7 Chow S, Bosco JJ, Heiss FW, Shea JA, Qaseem T, Howell D. Successful treatment of post-cholecystectomy bile leaks using nasobiliary tube drainage and sphincterotomy. *Am J Gastroenterol* 1997;92:1839-1843.
- 8 Freeman ML, Nelson DB, Sherman S, Haber GB, Herman ME, Dorsher PJ, et al. Complications of endoscopic biliary sphincterotomy. *N Engl J Med* 1996;335:909-918.
- 9 Mavrogiannis C, Liatsos C, Papanikolaou IS, Karagiannis S, Galanis P, Romanos A. Biliary stenting alone versus biliary stenting plus sphincterotomy for the treatment of post-laparoscopic cholecystectomy biliary leaks: a prospective randomized study. *Eur J Gastroenterol Hepatol* 2006;18:405-409.
- 10 Simmons DT, Petersen BT, Gostout CJ, Levy MJ, Topazian MD, Baron TH. Risk of pancreatitis following endoscopically placed large-bore plastic biliary stents with and without biliary sphincterotomy for management of postoperative bile leaks. *Surg Endosc* 2008;22:1459-1463.
- 11 Katsinelos P, Kountouras J, Paroutoglou G, Chatzimavroudis G, Germanidis G, Zavos C, et al. A comparative study of 10-Fr vs. 7-Fr straight plastic stents in the treatment of postcholecystectomy bile leak. *Surg Endosc* 2008;22:101-106.
- 12 Tarnasky PR, Cunningham JT, Hawes RH, Hoffman BJ, Uflacker R, Vujic I, et al. Transpapillary stenting of proximal biliary strictures: does biliary sphincterotomy reduce the risk of postprocedure pancreatitis? *Gastrointest Endosc* 1997;45:46-51.
- 13 Elmi F, Silverman WB. Nasobiliary tube management of postcholecystectomy bile leaks. *J Clin Gastroenterol* 2005;39:441-444.
- 14 Sugiyama M, Mori T, Atomi Y. Endoscopic nasobiliary drainage for treating bile leak after laparoscopic cholecystectomy. *Hepatogastroenterology* 1999;46:762-765.
- 15 Jain SK, Stein R, Bhuvra M, Goldberg MJ. Pigtail stents: an alternative in the treatment of difficult bile duct stones. *Gastrointest Endosc* 2000;52:490-493.
- 16 Cairns SR, Dias L, Cotton PB, Salmon PR, Russell RC. Additional endoscopic procedures instead of urgent surgery for retained common bile duct stones. *Gut* 1989;30:535-540.
- 17 Kiil J, Kruse A, Rokkjaer M. Large bile duct stones treated by endoscopic biliary drainage. *Surgery* 1989;105:51-56.

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