

Minimally invasive management of bile leak after laparoscopic cholecystectomy

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Background

Bile leakage is an uncommon complication of cholecystectomy. The bile may originate from the gallbladder bed, the cystic duct or rarely from injury to a major bile duct. This study aims to evaluate the efficacy of minimal access endoscopic and percutaneous techniques in treating symptomatic bile leak.

Patients and methods

Twenty-one patients with symptomatic bile leak following laparoscopic cholecystectomy underwent assessment of the extent of the bile leak via ultrasound/CT and ERCP. Following diagnosis, the patients were treated by sphincterotomy and biliary drainage and, if necessary, percutaneous drainage of the bile collection.

Results

Only one patient required primary surgical treatment following diagnosis of a major duct injury. The other 20 were treated by a combination of sphincterotomy (including a stent in most) plus percutaneous drainage in six. In 19 of 20, this minimal access approach stopped the leak.

Discussion

Most patients who present with bile leakage after cholecystectomy can be managed successfully by means of ERCP with percutaneous drainage of any large bile collection.

Keywords

bile leak, laparoscopic cholecystectomy, ERCP.

Introduction

The introduction of laparoscopic cholecystectomy has dramatically changed the approach to gallstone disease over the last decade. However, the laparoscopic approach has been associated with a higher incidence of biliary complications, particularly in the early years of its adoption [1–3]. Bile leak after laparoscopic cholecystectomy is generally due to a minor biliary complication, although it can sometimes herald a major duct injury. Several series have reported bile leakage rates of 1.2–4.0 per cent in laparoscopic cholecystectomy [4–6], which is higher than the incidence with open cholecystectomy [7–9]. In line with other groups, we have applied minimal access techniques to treat patients presenting with symptomatic bile leaks. We report the outcome of this approach in a consecutive series of 21 patients.

Patients and methods

Twenty-one patients were managed for symptomatic bile leak after laparoscopic cholecystectomy in the period

between 1990 and 1998, eight being referred from other hospitals. There were 7 men and 14 women, median age 62 years (29–92 yr). The major presenting symptoms were persistent bile drainage, pain, nausea, pyrexia and abdominal distension. In seven patients, the leak was diagnosed following persistent bile drainage through a drain tube inserted at the time of the initial operation. Among the other 14 patients without a drain, four developed symptoms in the immediate postoperative period, whilst the remainder presented with recurrent symptoms. The overall time for presentation in the 21 patients was a median of 5 days (0–22).

After clinical evaluation all patients were investigated with routine haematological and biochemistry tests, including liver function tests and abdominal US and/or CT scan. When a sizeable localised collection was apparent, percutaneous drainage under US or CT guidance was performed and a catheter was left in place to drain the bile. However, when the collection was large and diffuse, laparoscopy for lavage and drain placement was performed, either before or immediately after ERCP.

ERCP was performed in all cases to delineate the biliary tree anatomy and document the problem and for therapeutic intervention when appropriate. After documentation of the leaking point, an endoscopic sphincterotomy was performed; if bile duct stones were present, they were removed. Early in the series, sphincterotomy alone or nasobiliary tube placement was performed. However, subsequently patients underwent sphincterotomy with stent insertion, usually with a 10F stent 7–12 cm in length. Provided there was no clinical or radiological evidence of further leaking, patients were discharged and a repeat ERCP was performed 4–6 weeks later to document healing of the leaking point and to remove the stent.

Results

Percutaneous drainage of a collection under US/CT guidance was used before ERCP in six patients and laparoscopic lavage in three before ERCP. In another patient, laparoscopic lavage was performed in the immediate post-ERCP period. One patient also required chest drainage of a right-sided emphysema complicating a subhepatic collection.

Common bile duct (CBD) cannulation and cholangiography at ERCP was successful in all cases. In one referred patient, cholangiogram revealed complete division of the right hepatic duct, and this patient subsequently underwent Roux-en-Y hepaticojejunostomy. Cystic stump leak was documented in 16 cases. In four patients choledocholithiasis was present (Figure 1); in three of these, bile duct stones

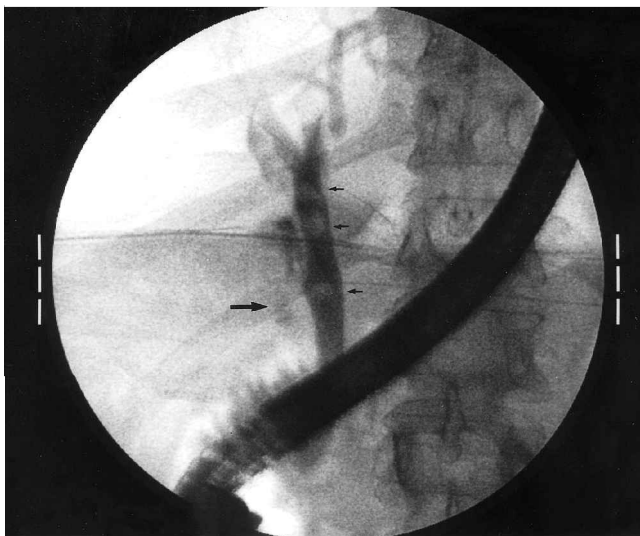


Figure 1. Bile duct leak from the cystic duct stump (thick arrow), choledocholithiasis (thin arrow).

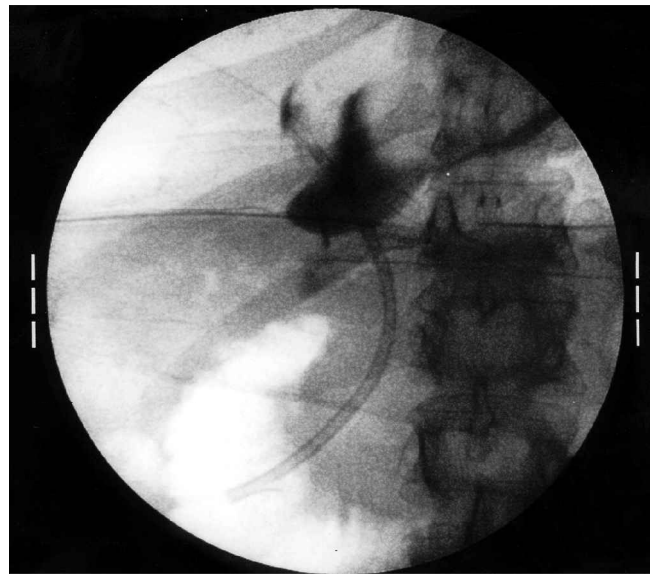


Figure 2. Management of the bile leak via sphincterotomy and stent insertion following endoscopic extraction of the common bile duct calculi.

had been noted at intra-operative cholangiography, and a decision had been made to treat them by postoperative ERCP and sphincterotomy. In these patients, the bile leak was unsuspected and only noted at the time of ERCP. Common hepatic duct (CHD) leak was present in three cases (one with choledocholithiasis), and leakage from the choledochotomy site was demonstrated in the patient who had undergone laparoscopic exploration. Endoscopic treatment was attempted in 20 of the 21 patients (95%); the patient with complete transection of the right hepatic duct (Strasberg [10] type C injury) underwent open reconstruction. Endoscopic sphincterotomy was used alone in five cases, in combination with stent placement in 13 cases (Figure 2), in combination with nasobiliary catheter in one, while in one patient a stent was placed without sphincterotomy. There was only one complication relating to the endoscopic procedure; this patient developed pancreatitis of moderate severity [11], which settled conservatively after a 7-day stay in hospital. Another patient developed deep venous thrombosis during hospitalisation with no further consequences.

In 19 of 20 patients (95%), minimally invasive techniques were successful in treating symptomatic biliary leaks. In one patient who presented with a localised collection drained radiologically, sphincterotomy without stenting failed to seal the leak and laparotomy was necessary for lavage and operative closure of the leaking point.

Discussion

Bile leaks have been reported more commonly after laparoscopic than open cholecystectomy [4–9] and usually occur as a result of injury to a minor duct that remains in continuity with the CBD, a type A injury according to the Strasberg classification [10]. The cystic duct stump and small peripheral right hepatic ducts within the liver bed account for most injuries of this type [12]; those originating from the liver bed often remain asymptomatic [13]. When symptomatic they present with pain, nausea, vomiting, abdominal distension, fever and jaundice or bile leakage in a surgical drain. Cystic stump leaks can occur from faulty clip application, slipping of the clips or necrosis of the cystic duct stump proximal to the clip, probably related to diathermy injury [14]. Retained CBD stones can increase intraluminal pressure and therefore promote bile leakage [12], as seemed to be the case in three of our patients.

The ideal endoscopic approach – whether endoscopic sphincterotomy, long versus short stent placement or nasobiliary tube drainage – has not yet been established. It largely depends on personal experience based on small series, there being no prospective comparative studies. The use of endoscopic sphincterotomy to reduce distal bile duct pressure and facilitate closure of leaking cystic ducts is well described [15,16]. Short stent placement, if possible without sphincterotomy so as to avoid sphincterotomy complications, was thought to achieve the same purpose, as it effectively eliminates sphincter resistance [17]. However, reduction in intraductal pressure is only part of the leak closure process [17–18], as illustrated by our one failure in a patient with sphincterotomy alone without stenting [12,18]. By contrast, stent placement not only satisfies the pressure reduction criterion but also ‘covers’ the leaking point and allows it to heal.

Nasobiliary tube placement has been used variably. It avoids the need for a second ERCP, but at the expense of disadvantages such as the risk of accidental tube removal, patient discomfort and inconvenience. Furthermore, a higher failure rate has been reported [12,19,20], although comparative studies do not exist. In a recent series 18 out of 19 patients with cystic duct leak were treated successfully with nasobiliary tube drainage, saving the patients a repeat ERCP [21].

Most published series focus on the role of ERCP in the diagnosis of bile leak after laparoscopic cholecystectomy, but in many cases endoscopic management can treat the

original cause of the problem, i.e. stop the leak. Supplementary measures may be required to deal with the localised or diffuse bile collections secondary to the leak. In this series, a combination of endoscopic and radiological or laparoscopic procedures was used successfully, avoiding the need for open intervention in all but one patient.

This series is complementary to previous reports that confirm the safety and efficacy of minimally invasive procedures in the management of symptomatic bile leak following minor biliary injuries associated with laparoscopic cholecystectomy. Endoscopic treatment by means of ERCP is the cornerstone of management, supplemented by either interventional radiological or laparoscopic procedures.

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