Endoscopic Treatment of Biliary Leaks After Laparoscopic Cholecystectomy: Cut or Plug?

Patrick G. Brady¹ · Pushpak Taunk¹

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Biliary leaks, a well-recognized and much-feared complication of biliary tract surgery, have increased in frequency in the era of laparoscopic cholecystectomy, with estimates of the frequency of biliary leaks after laparoscopic cholecystectomy estimated at 0.3–0.5% [1]. Leakage post-cholecystectomy most commonly arises from the cystic duct or a duct of Luschka (Amsterdam type A leaks). Although readily amenable to endoscopic intervention, prompt diagnosis and therapy are essential to prevent further complications. Although the diagnosis is readily apparent if bile is leaking from a percutaneous drain placed at the time of cholecystectomy, leaks may also manifest as abdominal pain, jaundice, bilious ascites, or a biloma. Although imaging modalities such as cholescintigraphy (HIDA scan), computed tomography (CT), and magnetic resonance imaging (MRI)/magnetic resonance cholangiopancreatography (MRCP) are useful to confirm the diagnostic suspicion, endoscopic retrograde cholangiopancreatography (ERCP) with demonstration of the site of duct leakage is needed to not only definitively confirm the diagnosis, but also to exclude the presence of retained stones and strictures prior to initiating therapy. Biliary leaks can be characterized as high grade or low grade on the basis of ERCP findings [2]. Low-grade leaks are identified simultaneously or immediately after full opacification of the intrahepatic ducts, whereas contrast extravasation prior to intrahepatic duct filling is the hallmark of high-grade leaks.

The principle underlying endoscopic therapy is elimination of the transpapillary pressure gradient maintained by the sphincter of Oddi between the biliary tract and the duodenum, favoring drainage of bile into the duodenum and away

from the site of leakage, enabling healing and closure of the defect. Careful examination of the biliary tract is imperative as underlying biliary obstruction due to retained stones, present in as many as 20% of patients in some series [3], or biliary strictures will increase intraductal pressure and perpetuate the leak. Endoscopic therapy with sphincterotomy, stent, combined stent and sphincterotomy, and nasobiliary tube have all been used successfully to close biliary leaks with success rates generally > 90%.

Though few prospective studies comparing the available endoscopic therapies are available, a number of retrospective studies are available. In a series of three patients with persistent biliary leaks despite sphincterotomy, Libby et al. [4] reported successful closure in all with placement of a biliary stent. In a study by Kaffes et al. [5], 76 out of 80 (95%) of patients with a biliary leak were successfully treated with ERCP, 18 with sphincterotomy alone, 40 with stent alone, and 32 with sphincterotomy or balloon sphincteroplasty plus stent. All of the six patients treated with sphincterotomy alone failed endoscopic therapy; two were subsequently treated successfully with stent placement, and four were treated surgically without any additional endoscopic therapy. In a study by Sandha et al. [6] of 207 patients with biliary leaks, endoscopic therapy was selected based on the severity of the leaks. Seventy-five patients with low-grade leaks were treated with sphincterotomy alone with a 97% success rate; seven failures required additional therapy. Ninety-seven patients with high-grade leaks were stented with or without sphincterotomy with a 100% successful closure rate. A small prospective study of 27 patients with post-cholecystectomy biliary leaks by Dolay et al. [7] reported a failure rate in 2 out of 13 patients in the sphincterotomy alone group, but a 100% closure rate in the biliary stenting group. The mean time of closure was significantly shorter in the biliary stent group compared to the endoscopic sphincterotomy group among patients with a distal common bile duct diameter ≤ 8 mm. Furthermore, in a canine model of cystic duct leak, biliary stenting significantly reduced the time to resolution

✉ Patrick G. Brady
pbrady@health.usf.edu

¹ Division of Digestive Diseases and Nutrition, Department of Medicine, University of South Florida Morsani College of Medicine, 12901 Bruce B. Downs Blvd, MDC 82, Tampa, FL 33612, USA

of leaks compared to sphincterotomy, supporting the use of biliary stenting as a primary treatment of biliary leaks [8]. In terms of caliber, the Midwest Pancreaticobiliary Group concluded on the basis of a large review that the stent diameter had little importance, as 7F stents were as effective as larger stents with the advantage that the smaller stent does not require sphincterotomy for placement [9].

In this issue of *Digestive Diseases and Sciences*, Ranio et al. [10] report a retrospective analysis of patients referred to Helsinki University Hospital for endoscopic therapy of Amsterdam type A biliary leaks (leak from cystic duct or peripheral radicals). The authors reported no difference in the closure of leaks between those treated with sphincterotomy alone versus those with sphincterotomy plus stent placement. The strengths of this study include a large sample size ($n = 71$), high endoscopic success rate (90%), and inclusion of both high-grade ($n = 24$) and low-grade ($n = 47$) biliary leaks. The advantage of sphincterotomy alone is that a repeat ERCP is not required, thus reducing cost, time, and complications. While sphincterotomy alone appeared sufficient, the sphincterotomies were long, extending to the duodenal wall, posing an increased risk of complications, particularly bleeding, perforation, and pancreatitis. Though the endoscopists in this study are clearly experts given the lack of short- and long-term complications, complete sphincterotomy may pose increased risks among less-experienced endoscopists with lower ERCP volumes. Furthermore, many endoscopists may be uncomfortable performing such large sphincterotomies, which through inexperience may be smaller than intended and incomplete, with the risk of a residual transpapillary pressure gradient with reduced leak resolution. It is also unclear from this retrospective study why certain patients were treated with sphincterotomy alone, and others with sphincterotomy plus stent placement. There were a higher percentage of patients with high-grade leaks in the sphincterotomy plus stent arm indicating possible selection bias in that a stent may have been chosen due to the increased severity of the leak. Despite the higher percentage of high-grade leaks in the dual therapy arm, there was no statistical difference in the proportion of high-grade leaks in both arms. As the authors did not stratify the primary outcome based on the severity of the leak, this factor may have affected the efficacy of each therapy. Finally, there was no direct comparison between endoscopic sphincterotomy and biliary stent placement alone without sphincterotomy. The use of stent placement alone without sphincterotomy, with its inherent risks, is a central question that has been posed several times in the literature for which several studies have confirmed its effectiveness [5–8].

The authors should be commended for performing a large retrospective analysis that indicates that complete

endoscopic sphincterotomy may be as effective as endoscopic sphincterotomy with stent placement for treatment of some bile duct injuries. While sphincterotomy alone may be effective in treating the majority of Amsterdam Type A biliary leaks, there remains an increased risk of complications when performing a complete (long) sphincterotomy extending to the duodenal wall, as was done in this study, particularly in patients with normal-caliber bile ducts. Thus, caution must be exercised when applying this recommendation generally, especially to less-experienced endoscopists with lower procedural volume. Moreover, no definitive data support the assertion that high-grade leaks should be managed with sphincterotomy alone. While the authors of this paper present an interesting concept in the management of biliary leaks with sphincterotomy alone, the authors affirm that the preponderance of evidence supports stent placement for biliary leaks as the preferred management strategy. The definitive answer on the optimal therapy of bile duct leaks awaits prospective randomized trials.

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