Emergent Endoscopic Retrograde Cholangiopancreatography with Placement of Biliary Double Stents to Salvage Endoscopic Retrograde Cholangiopancreatography-Induced Stapfer’s Type II Perforation

Ping Yue1, Wen-Bo Meng1, Joseph W Leung2, Lei Zhang3, Xiao-Liang Zhu2, Hui Zhang4, Hai-Ping Wang3, Zheng-Feng Wang4, Ke-Xiang Zhu4, Long Miao4, Wen-Ce Zhou5, Xun Li3,5

1Department of Special Minimally Invasive Surgery, The First Hospital of Lanzhou University, Lanzhou, Gansu 730000, China
2Division of Gastroenterology and Hepatology, UC Davis Medical Center, Sacramento, CA 95816, USA
3The Fifth Department of General Surgery, The First Hospital of Lanzhou University, Lanzhou, Gansu 730000, China
4The Second Department of General Surgery, The First Hospital of Lanzhou University, Lanzhou, Gansu 730000, China
5Key Laboratory of Biological Therapy and Regenerative Medicine Transformation Gansu Province, Lanzhou, Gansu 730000, China

To the Editor: Endoscopic retrograde cholangiopancreatography (ERCP) plays a vital role in the management of pancreaticobiliary diseases in recent years and it concomitantly carries a risk of complications including post-ERCP pancreatitis, cholangitis, bleeding, and perforation. The incidence of primary post-ERCP complications ranges from 5.4% to 23.0%, and ERCP-induced perforation can occur in 0.3–1.0% of cases, but the associated mortality is high ranging from 8% to 23%.1 Because of the confluence of the bile duct and pancreatic duct meet at the papilla in proximity to the site of perforation in the duodenum, there is a potential risk of leakage of bile and pancreatic juice into the retroperitoneal space or peritoneum. Patients with Stapfer’s Type II perforation (perivaterian perforation) generally suffered from systemic inflammatory response syndrome, which could progress rapidly to acute lung injury and acute renal insufficiency and even multiple organ failure. All of these contribute to the significantly high mortality. A timely recognition and appropriate treatment are crucial to the management of ERCP-induced perforation to reduce the overall mortality. Conventionally, surgery remains the primary treatment for iatrogenic perforations. With the improvement in endoscopic technique and development of new accessories, nonsurgical management with endoscopic treatment of perforation is increasingly being reported.2,3 We report a retrospective analysis of ERCP-induced Stapfer’s Type II perforations over a 5-year period managed with nonsurgical approach combined with salvage ERCP.

Totally, 5872 patients underwent ERCP for pancreaticobiliary diseases at the endoscopy center of our hospital, and six Type II perforations were analyzed retrospectively between December 2010 and November 2015.

Six patients (4 females and 2 males) with an average age of 52.5 ± 13.9 years were hospitalized with choledocholithiasis and underwent ERCP. After the initial ERCP, the six patients developed severe abdominal pain with fever and signs of peritonitis including muscle guarding and rebound tenderness in the abdomen and pain radiating to the right flank and back. In addition, some patients developed shortness of breath with decrease in blood oxygen saturation and urine output. Computer tomography (CT) scan abdomen revealed retroperitoneal air and fluid collection which is the typical imaging features of Stapfer’s Type II perforation [Figure 1a]. All of the perforations were diagnosed within 24 h (range 13–23 h), and patients underwent salvage ERCP in an attempt to seal the perforation. ERCP procedure included placement of two biliary plastic stents combined with a nasoduodenal tube for decompression. A 5 Fr-5 cm single pigtail stent will be placed simultaneously if the guidewire is cannulated into pancreatic duct unintentionally [Figure 1b]. In addition, a nasoduodenal decompression tube was placed in the descending part of the duodenum and a nasojejunal feeding tube was placed at least 10 cm beyond the ligament of Treitz [Figure 1c]. CT-guided percutaneous drainage of the retroperitoneal fluid collection was performed in five patients [Figure 1d]. Fortunately, all of the six Type II perforations were successfully cured by salvage ERCP. The average post-ERCP hospital stay was 21.33 ± 7.53 days.

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The management of Stapfer’s Type II perforations after ERCP remains controversial as the clinical outcome can be variable. Conventionally, they are managed by surgical intervention in order to control the inflammation and prevent infection by draining the retroperitoneal fluid collection (white arrows). The patients are supposed to be treated surgically since conservative management did not yield good results. Indications for surgical treatment of periampullary perforations included hemodynamic instability, sepsis, signs of peritonitis, and a large perforation with continuing leakage. In the absence of a surgical indication, crucial nonsurgical management should include duodenal diversion and biliary and/or pancreatic drainage. Other reports have suggested the use of fully covered self-expandable metallic stents (fcSEMSs) which could cover the laceration in ERCP-related perivaterian perforation. However, this procedure was not widely used because of the expensive cost of the stent and it is also prone to migration.

During our practice, we found that Type II perforation cases have a smaller diameter of the biliary tract. Two biliary stents were placed to achieve better drainage than only one stent because the amount of bile drainage per unit time within two stents is more than total parenteral nutrition (TPN) and could avoid intestinal bacterial translocation caused by prolonged fasting and atrophy of the intestinal mucosa. This also reduces the need for TPN and minimizes potential TPN-induced complications and hospital expenses. In view of the fact that most Type II perforation patients can be recovered without laparotomy, interventional surgery should always be considered as a primary minimally invasive method which should be performed after the failure of conservative treatment. Therefore, close monitoring of the patient’s general condition after savage ERCP is crucial, and surgical operations need to carry out in time if deterioration.

In conclusion, ERCP-induced perforation is an uncommon complication, but it is associated with a significantly high overall mortality. The decision for surgical treatment versus conservative endoscopic therapy will depend on the cause of the perforation, the site, and extent of the injury. All of the six Stapfer’s Type II perforation patients in our center were successfully treated with conservative management with no deaths. However, the number of cases in our series is small, and a more extensive study is needed to confirm the effectiveness and success rate of nonsurgical management.

**Declaration of patient consent**

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patients have given their consent for their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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**Figure 1:** (a) CT scan revealed retroperitoneal air and fluid collection (white arrows); (b) two biliary stents (black arrows) and one pancreatic stent (white arrow) were placed during salvage ERCP; (c) nasoduodenal decompression tube (black arrow) and a nasojejunal feeding tube (white arrow); (d) CT-guided percutaneous drainage of the retroperitoneal fluid collection (white arrows). CT: Computer tomography; ERCP: Endoscopic retrograde cholangiopancreatography.
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Conflicts of interest

There are no conflicts of interest.

References

1. Avgerinos DV, Llaguna OH, Lo AY, Voli J, Leitman IM. Management of endoscopic retrograde cholangiopancreatography: Related duodenal perforations. Surg Endosc 2009;23:833-8. doi: 10.1007/s00464-008-0157-9.

2. Canena J, Liberato D, Horta D, Romão C, Coutinho A. Short-term stenting using fully covered self-expandable metal stents for treatment of refractory biliary leaks, post sphincterotomy bleeding, and perforations. Surg Endosc 2013;27:313-24. doi: 10.1007/s00464-012-2368-3.

3. Cho KB. The management of endoscopic retrograde cholangiopancreatography-related duodenal perforation. Clin Endosc 2014;47:341-5. doi: 10.5946/ce.2014.47.4.341.

4. Kumbhari V, Sinha A, Reddy A, Afghani E, Cotsalas D, Patel YA, et al. Algorithm for the management of ERCP-related perforations. Gastrointest Endosc 2016;83:934-43. doi: 10.1016/j.gie.2015.09.039.

5. Zhou WC, Li YM, Zhang H, Li X, Zhang L, Meng WB, et al. Therapeutic effects of endoscopic therapy combined with enteral nutrition on acute severe biliary pancreatitis. Chin Med J 2011;124:2993-6. doi: 10.3760/cma.j.issn.0366-6999.2011.19.007.