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Combined endoscopic and radiologic approach for complex bile duct injuries (with video)

Gianfranco Donatelli, MD,¹ Bertrand Marie Vergeau, MD,¹ Serge Derhy, MD,² Jean Loup Dumont, MD,¹ Thierry Tuszynski, MD,¹ Parag Dhumane, MD,³ Bruno Meduri, MD⁴

Paris, France

Bile duct injuries (BDI) during open or laparoscopic hepatobiliary surgery remain a major concern for patients and surgeons. The incidence of BDI ranges from 0.1% to 30%.¹⁻² Mostly, they are caused during laparoscopic cholecystectomy. The mainstay of treatment of complex BDI (complete transection and/or complete occlusion) is surgically re-establishing biliary continuity, such as end-to-end choledochocholedochal anastomosis with or without insertion of a T tube or Roux-en-Y bilioenteric anastomosis. Rarely, hepatectomy or liver transplantation may be needed.³⁻⁴ Endoscopic treatment has been proposed as a less-invasive alternative for management of patients with minor injury

(partial stricture, minor leaks), with results comparable to those of surgery.⁵ Surgery is associated with a high rate of adverse events, with significant morbidity and mortality.^{1,6} Even after the primary reconstructive surgery, multiple endoscopic sessions of balloon dilatation and/or stenting usually are needed for postoperative strictures.

Multiple combined endoscopic and radiologic approaches (CERA) have been reported for complex BDI caused during varied types of surgeries.⁷⁻¹² However, current evidence does not support an endoscopic approach as the primary treatment for iatrogenic complex BDI but supports surgery as a mainstay of treatment. Nevertheless,

Abbreviations: BDI, bile duct injury; CBD, common bile duct; CERA, combined endoscopic and radiologic approach; ERC, endoscopic retrograde cholangiography; PTC, percutaneous transhepatic cholangiography.

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Current affiliations: Service d'Endoscopie Interventionnelle (1); Service de Radiologie Interventionnelle, Hôpital Privé des Peupliers, Générale de Santé, Paris, France (2), Department of General and Laparoscopic Surgery, Lilavati Hospital and Research Center, Bandra(w), Mumbai, India (3).

Reprint requests: Gianfranco Donatelli, Service d'Endoscopie Interventionnelle, Hôpital Privé des Peupliers, Générale de Santé, 8 Place de l'Abbé G. Hénocque 75013 Paris, France.

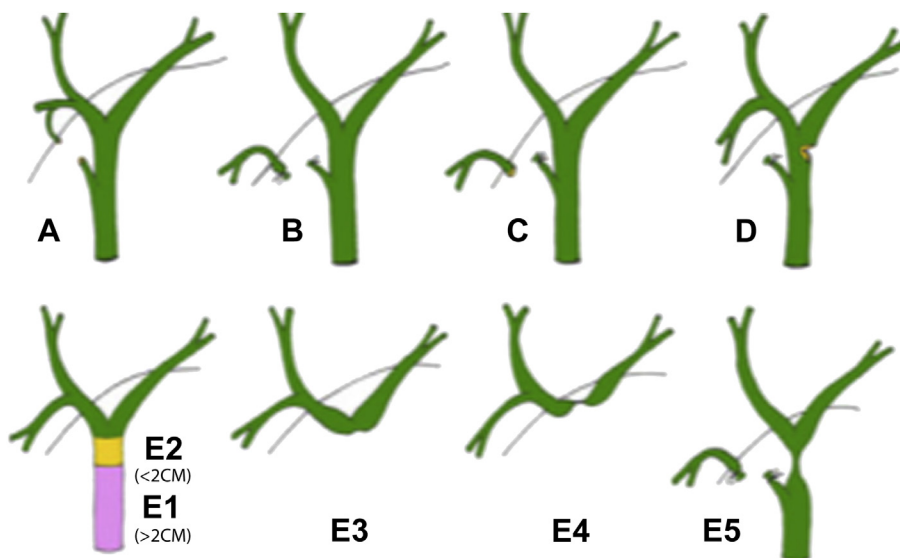


Figure 1. Classification of bile duct injury according to Strasberg et al.¹³ **A**, Cystic duct stump or leak from the gallbladder bed. **B**, Occlusion of a segmental or sectoral bile duct. **C**, Leak from a segmental or sectoral bile duct. **D**, Injury of the common bile duct with an associated leak. **E**, Correspond to the Bismuth classification: **E1**, Disruption of the continuity of the common bile duct (CBD) below the bifurcation (<2 cm); **E2**, Disruption of the continuity of the CBD below the bifurcation (>2 cm); **E3**, Disruption of the continuity at the bifurcation without communication between the left and right main ducts. **E4**, Disruption of the continuity at the bifurcation with communication between the left and right main ducts. **E5**, Lesion of the CBD associated with a concomitant lesion of the right sectoral or segmental duct.

| TABLE 1. Nagano's classification of postoperative bile leakage after hepatic resection ⁴ | |
|---|---|
| Type | Description |
| A | Minor leaks from small bile radicals on the surface of the liver |
| B | Leaks from inadequate closure of the major duct branches on the liver surface |
| C | Injury to the main duct commonly near the hilum |
| D | Leakage because of a transected duct disconnected from the main duct |

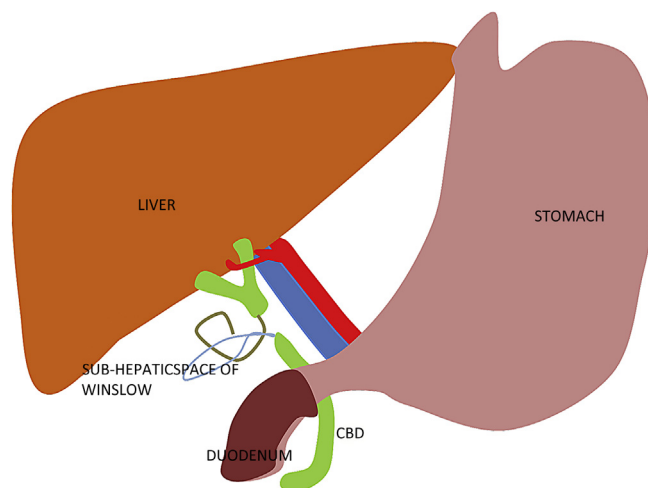


Figure 2. Schematic diagram illustrating the technique of combined endoscopic and radiologic approach and subhepatic space of Winslow. *CBD*, common bile duct.

the success of surgical repair of complex BDI depends on the surgeon's experience, type and location of the injury, and the amount of local inflammation at the time of repair.¹³

We report the technical feasibility and short-term outcomes of CERA for complex BDI after hepatobiliary surgeries.

PATIENTS AND METHODS

Twenty-one consecutive patients (12 female), with an average (\pm standard deviation [SD]) age of 57.47 \pm 13.56 years (range 32-89 years) were treated in our advanced endoscopic unit between January 2008 and May 2013 for complex BDI after hepatobiliary surgery. Data were collected in a prospectively maintained database

and were retrospectively analyzed. All patients were referred to our endoscopy department by the surgical team, who performed surgery on them. Patients consented for the procedure when they were offered this combined approach either as 1 of the treatment modalities available or when surgery was ruled out for biliary reconstruction. Informed consent including details of the need for multiple endoscopic sessions was obtained from all patients. The study was approved by the Institutional Review Board for Human Research.

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