

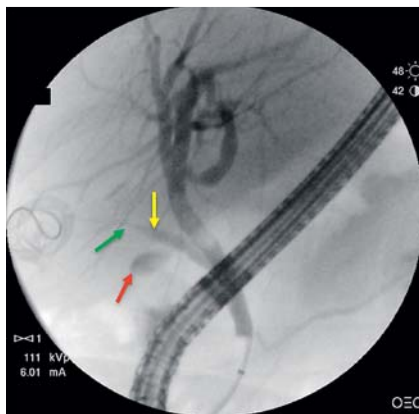
Refractory cystic duct stump leak treated with fibrin glue

A 39-year-old morbidly obese woman with a previous medical history of obstructive sleep apnea presented to an external hospital with right upper quadrant abdominal pain and was diagnosed with choledocholithiasis. She underwent laparoscopic cholecystectomy which was complicated by bile leakage. Endoscopic retrograde cholangiopancreatography (ERCP) showed leakage from the cystic duct stump, which was treated with bili-

ary sphincterotomy and placement of a plastic stent.

Repeat ERCP 8 weeks later showed persistent leakage with the wire exiting the cystic duct stump and coiling within the peritoneum (►Fig. 1). A fully covered self-expandable metal stent (FC-SEMS) was placed. However the patient continued to be symptomatic, with no im-

provement in the biliary leak noted in the surgical drain at 4 weeks. Digital cholangioscopy confirmed a fistula of the cystic duct stump (see fluoroscopy image, ►Fig. 2). Fibrin glue (EVICEL; Ethicon) was injected through the cholangioscope into the cystic duct (►Video 1), followed by placement of another biliary FC-SEMS (►Fig. 3). The



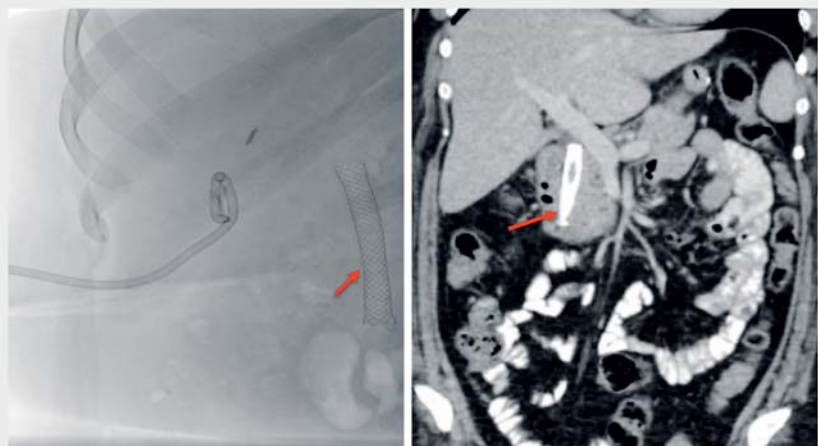
► **Fig. 1** Cystic duct stump leak after laparoscopic cholecystectomy. Endoscopic retrograde cholangiopancreatography (ERCP) shows the guidewire exiting the cystic duct (yellow arrow) and coiling within the peritoneum (green arrow) and also leaked bile (red arrow).



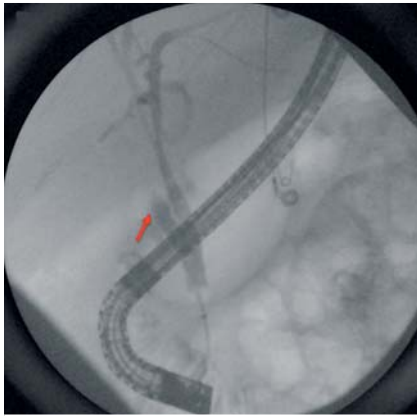
► **Fig. 2** Fluoroscopy image showing the cholangioscope in the bile duct with fistula of the cystic duct stump.



► **Video 1** Cholangioscopy showing a fistula of the cystic duct stump, followed by glue injection and obliteration of the leak.



► **Fig. 3** Placement of fully covered self-expandable metal stent (FC-SEMS; arrows) on fluoroscopy (left image) and computed tomography (CT) scan (right image), after injection of fibrin glue to close a fistula of the cystic duct stump.



► **Fig. 4** Repeat cholangiography showing complete resolution (arrow) of the cystic duct stump leak.

patient had mild post-ERCP pancreatitis and was discharged within 24 hours. The biliary output ceased within 2 weeks and the drain was removed at 4 weeks. Repeat cholangiography 2 months later showed complete resolution of the leak (► **Fig. 4**).

Cystic duct leaks are the most common type of bile duct injury following cholecystectomy, and are usually treated with ERCP and biliary plastic stent placement. ERCP and placement of endovascular coils within the cystic duct stump has shown limited success in refractory leaks [1]. The use of FC-SEMSs for refractory leaks with a success rate of 87% to 100% has been reported, with evidence limited to case reports [2]. Our video shows suc-

cessful treatment of a cystic duct stump leak with the use of fibrin glue in combination with an FC-SEMS, when treatment with FC-SEMS alone had failed. This novel approach could be used to salvage refractory leaks of the cystic duct stump, thus avoiding the need for laparotomy in a high risk surgical patient. Further studies are needed to demonstrate the effectiveness of this technique before it is included in the treatment algorithm.

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Competing interests

None

The authors

Abhilash Perisetti, Saikiran Raghavapuram, Benjamin Tharian

Department of Gastroenterology, University of Arkansas for Medical Sciences, Little Rock, Arkansas, USA

Corresponding author

Abhilash Perisetti, MD

University of Arkansas for Medical Sciences, 4301 W Markham St, Little Rock, AR 72205, USA

Fax: +1-818-319-5817

abhilash.perisetti@gmail.com

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