

# Esophageal fully-covered metal stent as a rescue therapy for a Strasberg type A biliary leak in a huge common bile duct dilation

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**Abstract.** Treatment of biliary leaks is challenging and complex. Even if endoscopic sphincterotomy plus biliary stent is usually resolute in restoring the original bile flow, common bile duct (CBD) diameter and persistence of stones are crucial issues. Additional factors, such as uncommon anatomical reconstructions due to a previous abdominal surgery, could make the endoscopic approach more difficult, therefore increasing the risk of failure. Many articles deal with uncommon techniques adopted to allow an optimal healing of biliary leaks but, thus far, only two reports of biliary stent using an esophageal through-the-scope (TTS), partially-covered, self-expandable metal stent (SEMS) exist in the current literature. This article describes the deployment of an esophageal SEMS into the CBD for a refractory type A Strasberg fistula in a Billroth-II reconstruction. To our knowledge, this is the first report concerning the use of an esophageal stent for CBD drainage in a Billroth-II reconstruction.

**Key words:** Strasberg Type A biliary leak; Huge common bile duct dilation; Forward-viewing endoscope; Billroth II reconstruction; Esophageal fully-covered metal stent; Rescue therapy

## Introduction

Treatment of biliary leaks is challenging and complex (1-4). Even if endoscopic sphincterotomy with biliary stenting is usually resolute in restoring the original bile flow, sometimes, additional factors may lead to a delayed healing (5-9). Treatment mainly depends on the amount of biliary output, ranging from a *wait-and-see* approach to a reoperation. Sometimes, if a mild biliary output keeps going on for several days, an endoscopic retrograde cholangiopancreatography (ERCP) associated to a biliary stent placement is required (9-15). Many articles deal with uncommon technique adopted to allow an optimal healing of biliary leaks but, thus far, only two reports of biliary stent using an esophageal through-the-scope (TTS), partially-covered, self-expandable metal stent (SEMS)

exist in the current literature (15-17). The current article describes the deployment of an esophageal SEMS into the common bile duct (CBD) for a refractory Strasberg type A fistula in a Billroth II reconstruction. Even if technically feasible and sometimes easy to be performed, this choice may be considered as a rescue therapy for severe and refractory biliary leak, whenever other standardized treatment fail. To our knowledge, this is the first report concerning the use of an esophageal stent for CBD drainage in a Billroth II gastrectomy (16-19).

## Case report

A 97-year old woman was admitted to first AID for hematemesis, fever and jaundice. Her past surgical

history was significant only for distal gastrectomy with Billroth II reconstruction for peptic ulcer. Based on physical examination and liver function tests, a cholecystitis seemed to be the more likely hypothesis. The contrast enhancement contrast tomography (CT)-scan showed a severe dilation of gallbladder and CBD, with cholelithiasis and choledocolithiasis. Considering the failure of the initial conservative antibiotic therapy, with a quick worsening of the clinical conditions, patient was referred to an emergency laparotomic cholecystectomy. Surgical approach was made very laborious due to thick adhesions involving the gallbladder; at the end of the operation, a Kehr's T-tube was placed into the CBD in order to allow an optimal biliary drainage, since an intraoperative ERCP was considered too much time consuming (thus increasing consistently the anesthesiological and surgical risk of the patient). A drainage tube was placed in the right sub-diaphragm region, abdomen was irrigated and hemostasis assured.

On 4<sup>th</sup> post-operative day, since a large amount of bile flowed out of the abdominal drain, suspicious for a biliary leak, an ERCP was scheduled.

Procedure was carried out with a forward-viewing endoscope (EG-760 CT therapeutic scope, Fujifilm Medical System, Co. Ltd, Tokyo, Japan) by an experienced endoscopist.

CBD cannulation was difficult to achieve due to the presence of a large diverticulum closed to the duodenal papilla (cannulation time > 30 minutes). Occlusion cholangiogram revealed a huge dilation of the CBD up to 35 mm (with several large biliary stones) and a leak at the level of the cystic duct was visualized (Figure 1).

A small-size sphincterotomy with a needle-knife and a subsequent dilation assisted stone extraction using a controlled radial expansion balloon from Boston Scientific® (Natick, MA) with a variable diameter from 12 to 20 mm were performed. Once achieved an optimal sphincteroplasty, most parts of the stones were effectively extracted through attempts with a retrieval balloon catheter. Final cholangiogram detected a persistent stone burden, difficult to retrieve unless a long prolongation of the procedural time, therefore, endoscopist decided to deploy a TTS, partially-covered, biliary SEMS (WallFlex®, Boston Scientific, USA) 10 mm in diameter and 60 mm in length into the CBD,

with the aim of occluding the fistula and diverting bile flow from the leakage-site to the duodenum. Despite the biliary SEMS placement, fistula kept going on during the following days, leading to plan a rescue ERCP. Once again, due to Billroth II reconstruction, procedure was carried out with a forward-viewing endoscope, in order to assess a better stability in front of the papilla; occlusion cholangiogram confirmed the previously detected large dilation of the CBD, with an incomplete occlusion of the leakage-site. As soon as the SEMS was removed through a snare, the scope was inserted into the CBD, allowing a direct visualization both of the fistulous tract and of the residual stones. First of all, an optimal CBD clearance was achieved through several attempts with a retrieval balloon catheter (15 mm in diameter size), thus allowing extraction of the giant stones. In a second step, considering the huge dilation of the CBD and the failure of the biliary SEMS, endoscopist decided to deploy an esophageal TTS (WallFlex®, Boston Scientific, USA), fully-covered, metal stent 20 mm in diameter and 60 mm in length: final occlusion cholangiogram showed a complete occlusion of the fistula, with no sign consistent for leak (Figure 2).

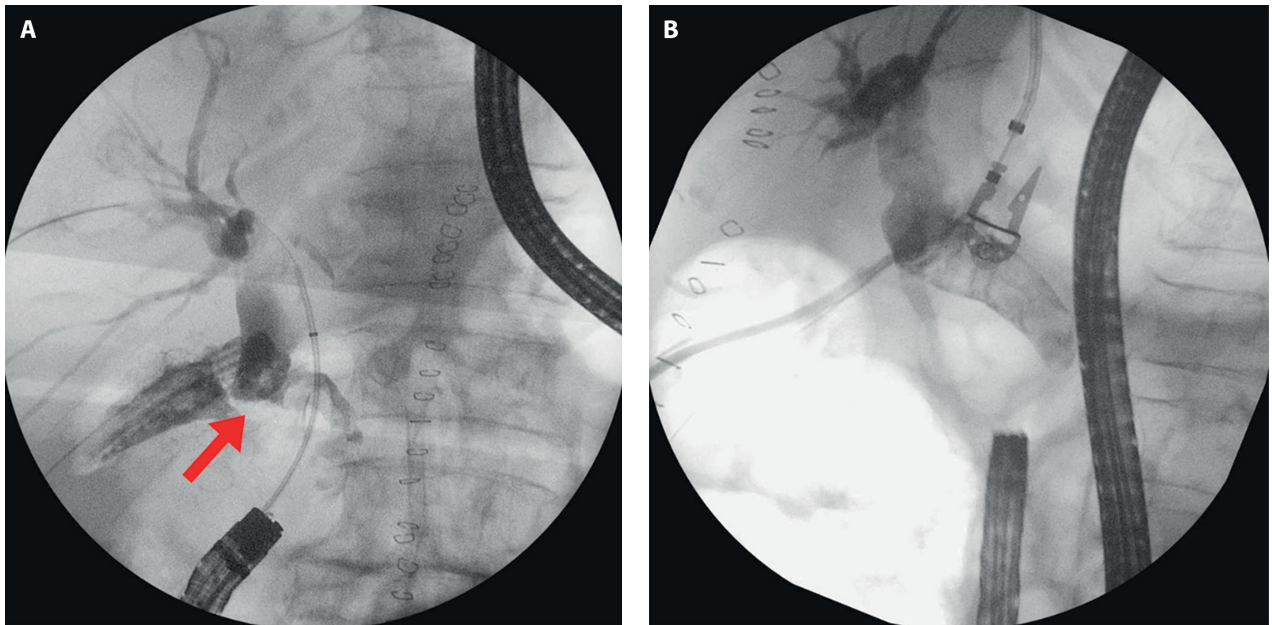
During the following days, no biliary fluid appeared into abdominal tube, thus confirming the efficacy of the esophageal stent placement. Unfortunately, due to the previous biliary peritonitis, patient developed a septic shock, with a progressive worsening of the clinical conditions.

## Discussion

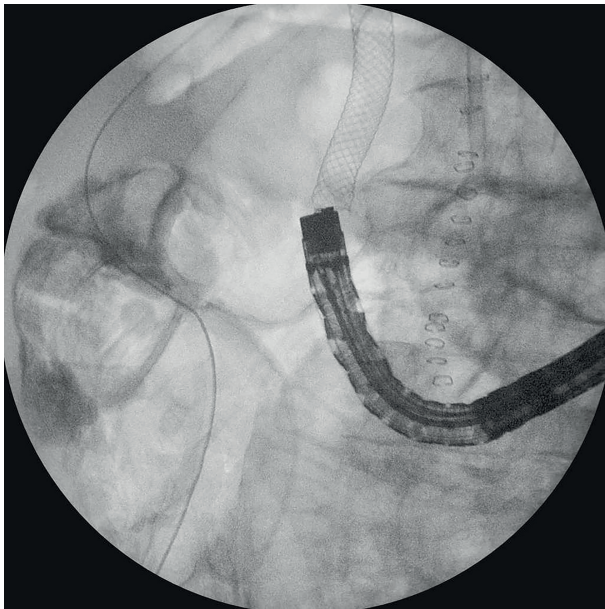
Biliary leak is one of the complications of hepatobiliary surgery, included cholecystectomy (1-5). Therapy depends upon several aspects, including biliary output per day, clinical and biochemical parameters, patient's age and comorbidities, type of surgical operation performed.

According to Strasberg's classification for biliary leakage, the one described in our article may be considered as type A, as it originated from the cystic duct stump (14).

Even if several treatments may be available, current guidelines agree in recognizing endotherapy as



**Figure 1.** 1a) Occlusion cholangiogram revealing the massive dilation of the CBD (about 35 mm in diameter) with the biliary leak at the level of the cystic duct (arrow); 1b) hige dilation of the CBD with several large biliary stones inside.



**Figure 2.** Occlusion cholangiogram once deployed the biliary stent: no fistula was visualized, so that the leak was apparently solved.

treatment of choice: in fact, endoscopy is safer and less time consuming as compared to surgical repair, whilst if compared to percutaneous interventions endoscopy is more effective (1-5, 7-10). Even if universally

considered as the gold standard therapy, there's not as much agreement regarding the specific kind of endoscopic therapy to be selectively performed (1, 2, 10-13). The key element of endoscopic treatment is based on creating a direct connection between the CBD and the duodenal lumen, thus restoring the original bile flow.

As well explained in a recently published article by Chandra S and colleagues, patients' outcome treated with endoscopic sphincterotomy alone is better as compared to endoscopic sphincterotomy with biliary stent; in fact, latter patients experienced longer hospital stay, required longer time for healing of fistula and, moreover, needed a second-look endoscopy to retrieve the stent (3, 5, 7-10). This research article confirms a large retrospective study by Adler DG et al, in which the authors underline how the absence of the stent makes the bile leak to heal faster, as it reduces the grow of bacteria and reduces the inflammation inside the CBD wall (7, 8, 11-13). However, it's important to remember that, sometimes, endoscopist's practice preference is decisive in performing or not-performing the stent (1, 6, 7, 10).

In our specific case, SEMS was mandatory, both due to the large fistula from the cystic duct stump and because of residual biliary stones after the first ERCP.



Once removed the WallFlex<sup>®</sup> SEMS, a huge dilation of the CBD (> 35 mm in diameter) was observed at the occlusion cholangiogram; this severe distension of the CBD and the persistence of stones were considered the main causes of the ineffectiveness of the biliary stent. The dilation was so large as to allow the introduction of the endoscope inside the CBD, thus to visualizing the level of the fistula (Figure 3).

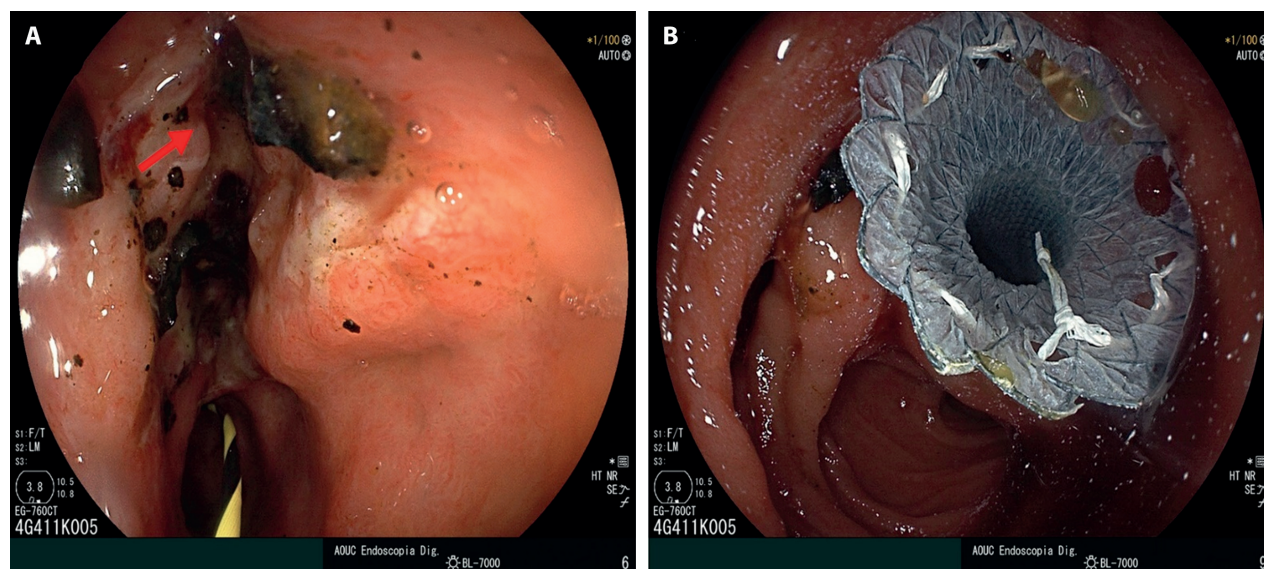
Thus far, literature is poor of reports concerning the use of esophageal stent for the CBD: at our knowledge, this is the third report.

Two similar reports were published in the Vide-oGIE journal in 2015 and 2016, respectively; in both cases, stents were successfully deployed into the CBD, allowing an optimal biliary flow into the duodenal lumen (16, 17).

As well explained by Desai A et al, two are the issues mainly involved in a optimal healing in front of a biliary fistula (16). First, an optimal CBD clearance, restoring the natural flow of bile into the duodenum; second, a large SEMS into the CBD, allowing an occlusion al the level of the fistula. These statements, along the same line of Abbas A and colleagues' paper, find confirmation since biliary leakage stopped as soon as these two issues were solved (8).

In 2016 Mutignani M and colleagues reported their experienced upon digestive multistent placement for difficult to treat bilio-enteric leaks (15). In this well explained article, the authors describes an innovative techniques of inserting a biliary (or pancreatic) stent through the meshes of a previously placed duodenal stent, in order to allow healing of bilio-enteric leaks. Even if an interesting and very complex techniques is reported by the authors, no esophageal stent was inserted by the operators into the CBD (15).

Concerning the use of a forward-viewing endoscope to perform ERCP in Billroth II gastrectomy, along the same line of Park TY et al, there's no difference as compared to side-viewing endoscope, since both instruments are effective and safe in altered gastrointestinal anatomy (18, 19). As well as explained in this relevant review article (including 25 studies with more than 2000 patients), the pooled afferent loop intubation rate was higher with the forward-viewing endoscope, the pooled selective cannulation rate was higher with the side-viewing, whereas the pooled bleeding rate was higher with the forward-viewing endoscope. These data confirm Coşkun O and colleagues' study, published in 2020 upon Surgical Endoscopy journal (20, 21). In our specific case, since the patient



**Figure 3.** 3a) Direct cholangioscopy through the forward-viewing endoscope, allowing a direct visualization of the leakage-site (arrow); 3b) Endoscopic appearance of the the major duodenal papilla once deployed the esophageal metal stent (images acquired through a forward-viewing instrument).

presented a very long afferent loop with several diverticula, the forward-view offered the operator more safety in advancing the scope along the jejunum, thus reducing the risk of perforation; on the other side, once reached the papilla, the endoscopist experience a lack of stability in front of major papilla, making cannulation time-consuming and difficult.

## Conclusions

In conclusion, our report demonstrates the feasibility and efficacy of esophageal stenting for rescue drainage of the CBD, as a feasible alternative to standard biliary SEMS, whenever a huge dilation of the CBD creates a discrepancy between the diameter of the CBD and the stent size. As widely explained in the *discussion*-section, CBD clearance is a key element for an optimal healing of the fistula (16). We hope that, in the next future, further case-series may increase our knowledge about the use of such devices (as off-label approach) for CBD drainage.

**Conflict of Interest:** Each author declares that he or she has no commercial associations (e.g. consultancies, stock ownership, equity interest, patent/licensing arrangement etc.) that might pose a conflict of interest in connection with the submitted article

**Statement of Ethics:** The current study was conducted ethically in accordance with the World Medical Association Declaration of Helsinki.

**Informed Consent:** A preliminary informed consent was obtained before the procedures.

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Received: 11 June 2021

Accepted: 4 October 2021

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