Bilateral balloon expandable biodegradable stent (Y-stent) for postcholecystectomy perihilar biliary stricture

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A 26-year-old woman had a complicated laparoscopic cholecystectomy 12 months earlier that led to biliary stricture (Fig. 1). She required multiple ERCP sessions with balloon dilation and incremental plastic stents over the past year, without resolution of biliary stricture.

At ERCP (using an EVS JF 180; Olympus, Tokyo, Japan), blocked biliary plastic stents were removed using a snare (Video 1, available online at www.giejournal.org). On cholangiogram, Multiple soft stones seen on cholangiogram were cleared with balloon sweep. The perihilar stricture (involving the common hepatic duct and bifurcation of both the right and left hepatic ducts) was persistent, with an overlying surgical clip (Fig. 2).

A novel biliary balloon expandable biodegradable stent (BEBS) (UNITY-B; AMG International, Winsen, Germany) was considered for the persistent perihilar benign biliary stricture. The BEBS is a radiolucent stent tightly crimped over a deflated balloon (Figs. 3 and 4). This stent is

Figure 1. Initial cholangiagram performed 12 months after cholecystectomy showing perihilar stricture.

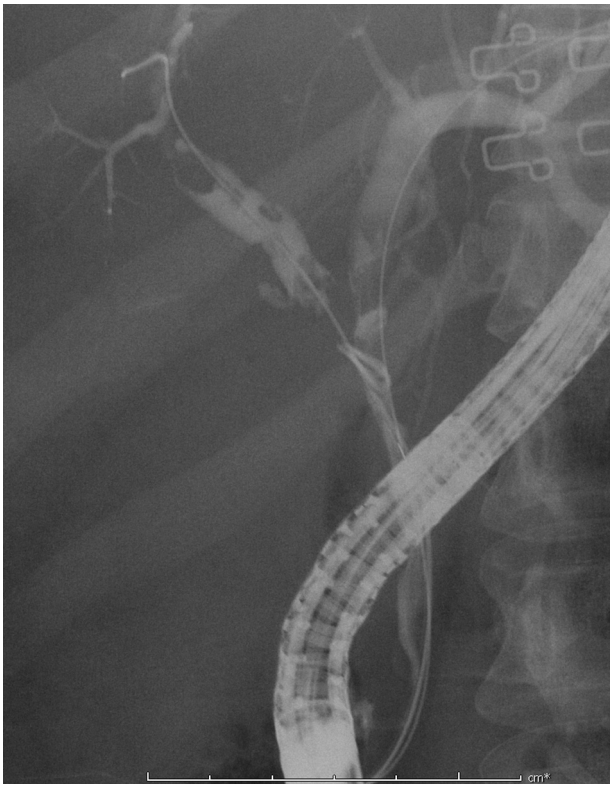

Figure 2. Present cholangiogram showing persistent perihilar stricture involving the common hepatic duct and bifurcation of both right and left hepatic ducts, with overlying surgical clips.

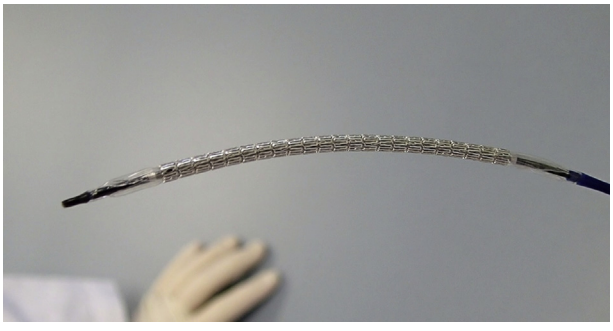

Figure 3. Novel biliary balloon expandable biodegradable stent tightly crimped over a deflated balloon.

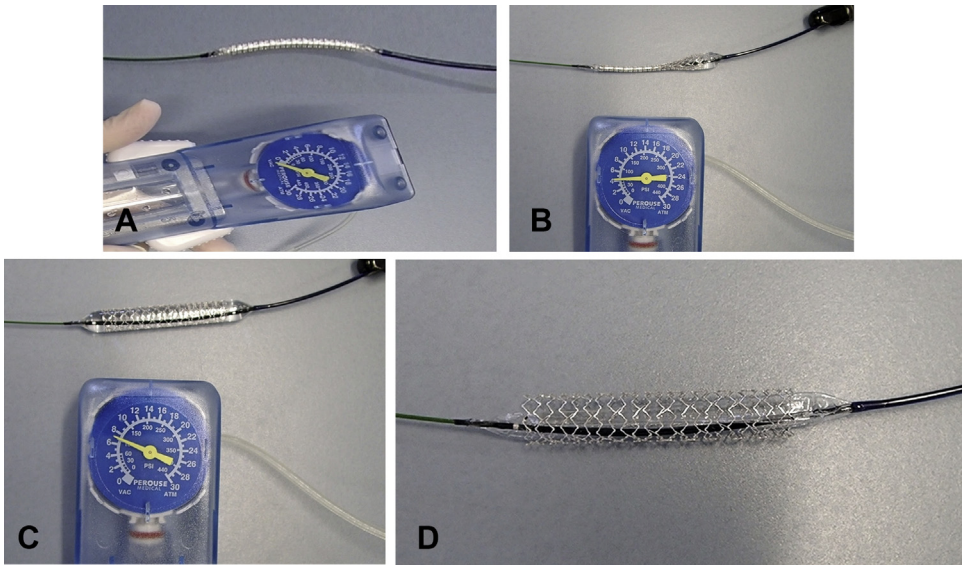

Figure 4. A, Balloon Expandable Biodegradable Stent (BEBS) assembly over the guidewire attached to a pressure gauge measurement device. **B,** Balloon and stent expansion starts from the proximal end of the balloon inflation. **C,** Fully expanded BEBS and balloon at the recommended pressure. **D,** Deflated balloon with BEBS remaining fully expanded.

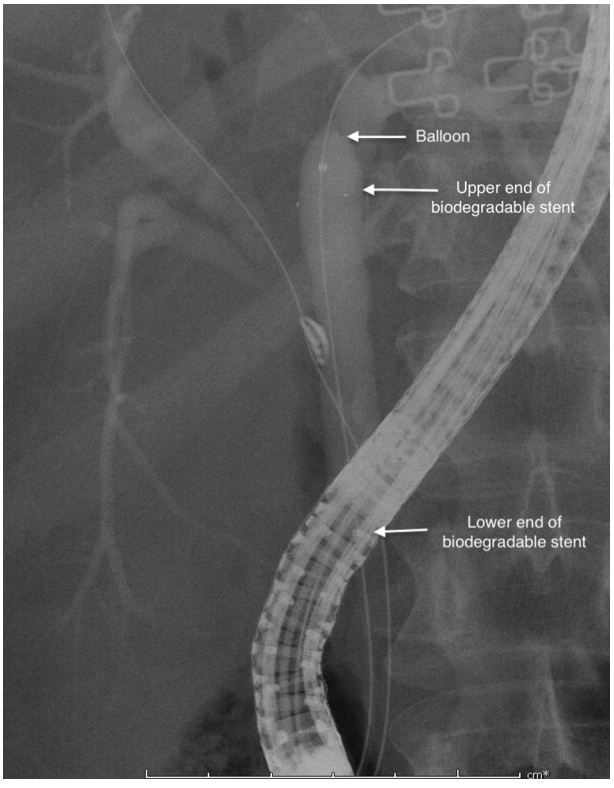

Figure 5. Biliary balloon expandable biodegradable stent placed across the stricture in the left hepatic duct.

Figure 6. Guidewire being negotiated through the mesh of the left biodegradable stent, across the right hepatic duct stricture.

currently not approved by the U.S. Food and Drug Administration.

Two 0.025-inch guidewires (Visiglide, Olympus America, Center Valley, Penn) were passed into the left and right hepatic ducts. After accurate positioning of the stent assembly was confirmed using the radio-opaque markers at both ends, the underlying balloon was inflated with contrast. This was followed by placement of a 10-mm

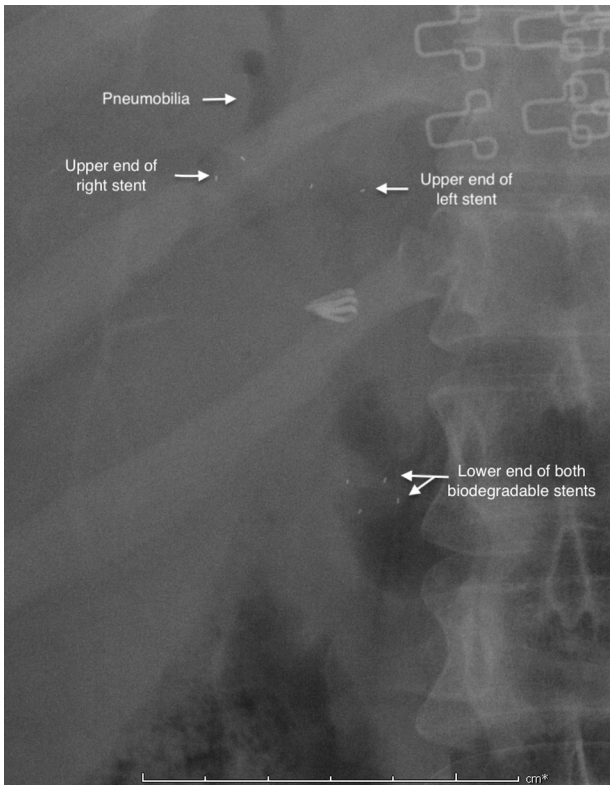

Figure 7. Fluoroscopic image showing upper and lower end of the radiopaque markers of the balloon expandable biodegradable stent, confirming placement of both stents across the stricture.

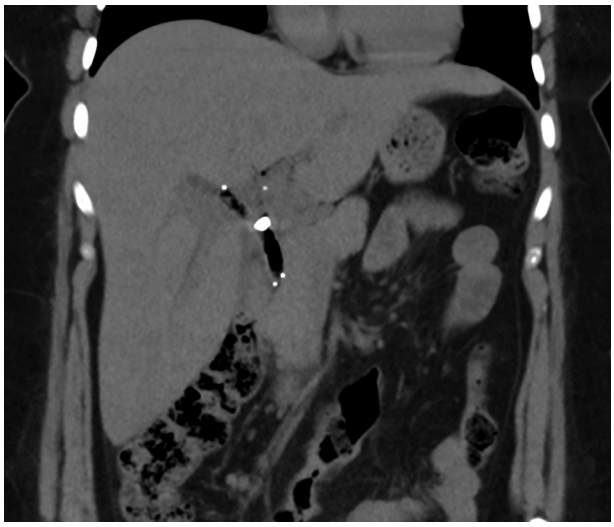

Figure 8. CT reconstructed image 24 hours after the procedure.

caliber (57-mm-long) BEBS across the approved left hepatic duct stricture after dilation of the balloon. The BEBS is radiolucent except for 2 radio-opaque markers each at both ends (Fig. 5). Another guidewire was negotiated through the mesh of the biodegradable stent using the prior right hepatic duct (RHD) wire for proper direction (Fig. 6). The latter was removed after successful passage of through-the-stent wire. The RHD stricture was dilated with a standard balloon (8 mm, Titan, Cook Medical LLC, Bloomington, Ind, USA). This was followed by similar placement of an 8-mm caliber BEBS (57 mm length) through the mesh of the biodegradable stent placed in the left hepatic duct (in a stent-in-stent "Y shaped" configuration). Accurate positioning of both BEBSs was confirmed on fluoroscopy showing the end markers and aerobilia (Fig. 7). Mild periprocedural pain was managed with analgesics on an outpatient basis. A CT scan performed 24 hours later confirmed that the bilateral stents were open (Fig. 8). The patient was comfortable at 8 weeks after the procedure and has normal biochemistry (Video 1, available online at www.giejournal.org).

Biodegradable stents with different stent designs have been used for various indications (after liver transplant, after Whipple with biliary anastomoses for chronic pancreatitis) to prevent bile leaks or in patients with equivocal common biliary duct clearance.[1,2] Such biliary stents have efficacy for benign biliary strictures.[3]

Benign common biliary duct strictures can be managed efficiently endoscopically by serial placement of multiple plastic stents or a single fully covered self-expandable metal stent (FCSEMS). However, complex benign hilar biliary strictures pose a greater challenge, with options including bilateral multiple plastic stents placed over several ERCP procedures, a combination of plastic on one side and an FCSEMS on the contralateral side, and, rarely, a bilateral FCSEMS.[4] The advantage of the BEBS is continuous dilation of the stricture with remodeling of the bile duct around the expanded stent without the need for additional procedure(s) to remove or replace the stent. This case report presents the use of the novel biliary BEBS for postcholecystectomy perihilar benign biliary stricture. An additional interesting aspect is that a BEBS can be placed stent-in-stent (Y-shaped-configuration), which may be useful for biliary drainage in complex benign or indeterminate biliary strictures.

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Abbreviations: BEBS, balloon expandable biodegradable stent; RHD, right hepatic duct; FCSEMS, fully covered self-expandable metal stent.

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