

SUPPLEMENTARY METHODS

PTCS-assisted recanalization

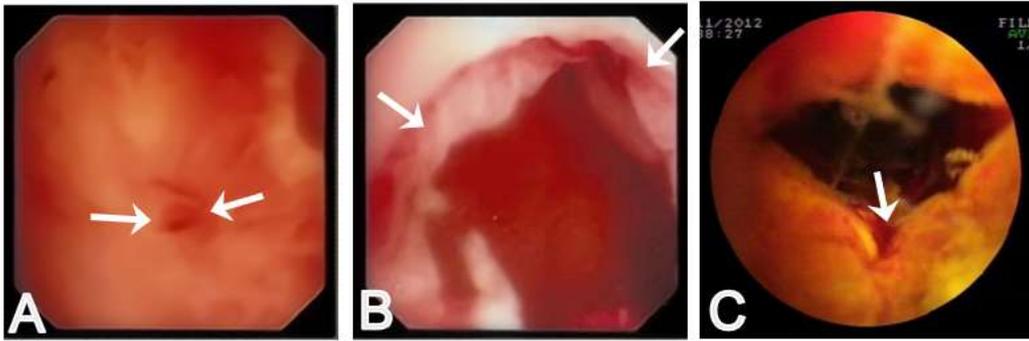
PTCS-assisted recanalization was performed for severe strictures for which the guidewire could not pass through the anastomosis prior to stricture dilation. It was performed with a 0.035-inch guidewire, a microcatheter (5 Fr) and microguidewire (0.018 or 0.025-inch) system, a 25-gauge injection needle, or a needle knife, depending on the features of the stricture.

Recanalization with a guidewire was performed as follows: With PTCS assistance, the ERCP cannula-assisted flexible tip of the 0.035-inch guidewire repetitively tapped the suspected anastomotic area. When the guidewire went through the anastomosis into the jejunum as confirmed by radiography, a fine bougie or balloon dilator was used over the guidewire to dilate the anastomosis.

Recanalization with a microcatheter system was performed as follows: If the 0.035-inch guidewire or the 6-Fr bougie could not pass the stenotic anastomosis due to sharp angulation and/or looping, a stiff 0.025-inch guidewire (VisiGlide 2™, Olympus, Japan) was used to pass through the anastomosis with guidance under PTCS. Then, a microcatheter that was made from a 5-Fr nasal biliary drainage tube (PBD-V803W, Olympus) with ≤ 3 Fr at the tip and 75 cm in length was used to pass over the guidewire through the anastomosis, followed by placement of an indwelling PTCS catheter. Finally, the microcatheter was left within the indwelling PTCS catheter, and the stricture was dilated with a bougie, or in combination with a balloon over a stiff 0.035-inch guidewire (Dreamwire™, Boston Scientific Inc. USA) after 1–2 weeks.

Recanalization with a needle knife was performed as follows: For a complete anastomotic membranous occlusion, a 25-gauge injection needle (NM-201 L, Olympus, Japan) was first punctured at the center of the

converging mucosal membrane in the anastomotic scar, and the contrast medium was injected. If the intestinal circular fold image was visualized, the injection needle was exchanged for a needle-knife papillotome (KD-10Q-1, Olympus, Japan) in the same position, and fistulotomy was made using a needle knife with the help of an electrocautery device (PSD-30, Olympus) to allow the passage of the guidewire to complete the anastomotic dilation.



Supplementary Figure 1 Images. A: Showing successful PTCS-assisted anastomotic recanalization in one patient with severe BBAS in whom a pinhole-sized anastomosis (arrows) is observed; B: And the anastomosis is enlarged (arrows) after balloon dilation for one week; C: In another patient PTCS shows a mild anastomotic tear (arrow) with hemobilia after balloon dilation.

Supplementary Table 1 Characteristics of patients with a benign biliary anastomotic stricture and concurrent biliary stones (n=36)

Characteristics	Value
Size of stones (mm)	
<10	18 (50.0)
10-20	10 (27.8)
>20	8 (22.2)
Number of stones	
Single	4 (11.1)
Multiple	32 (88.9)
Location of stones	
Extrahepatic duct stones in CHD and CBD	9 (25.0)
Intrahepatic duct stones	27 (75.0)
Right	4 (11.1)
Left	7 (19.4)
Bilateral	16 (44.4)
Stone composition	
Bilirubin	30 (83.3)
Black	6 (16.7)
Cholesterol	0 (0.0)

Data are expressed as a number (percentage). CHD, common hepatic duct; CBD, common bile duct.