

Table 1. Patient characteristics patients with surgically altered anatomy who underwent ERCP using sDBE for MBO treatment

Age, year, median (range)	67 (59–75)
Sex, male, n (%)	29 (64.4%)
Etiology of MBO, n (%)	
Malignant biliary disease	16 (35.6%)
Malignant pancreatic disease	13 (28.9%)
Gastric cancer	12 (26.7%)
Colon cancer	3 (6.7%)
Hepatocellular carcinoma	1 (2.2%)
Type of MBO, n (%)	
Primary disease	6 (12.8%)
Recurrent disease	39 (86.7%)
Liver metastasis	12 (26.7%)
Lymph node metastasis	7 (15.6%)
Local recurrence	20 (44.4%)
Location of MBO, n (%)	
Hilar or HJ anastomosis	31 (68.9%)
Distal	14 (31.1%)
Digestive reconstruction, n (%)	
Modified Child's method	18 (38.3%)
RY with gastrectomy	13 (28.9%)
RY hepaticojejunostomy	9 (20.0%)
Billroth II with gastrectomy	5 (11.1%)
Presence of a native papilla, n (%)	18 (40.0%)
Presence of peritoneal dissemination, n (%)	13 (28.9%)
Time from surgery to ERCP, days, median (range)	505 (237–1437)
Type of scope	
EI-580BT	12 (26.7%)
EC-450BI5 or EI-530B	33 (73.3%)
T-Bil, mg/dL, median (range)	2.5 (0.7–5.7)
AST, IU/L, median (range)	80 (48–153)
ALT, IU/L, median (range)	72 (40–158)
γGTP, IU/L, median (range)	364 (164–623)
ALP, IU/L, median (range)	1205 (840–1961)

ERCP, endoscopic retrograde cholangiography; sDBE, short-type double-balloon enteroscope; MBO, malignant biliary obstruction; HJ, hepaticojejunostomy; RY, Roux-en-Y; T-Bil, total bilirubin; AST, aspartate aminotransaminase; ALT, alanine aminotransferase; γ GTP, γ -glutamyl transpeptidase; ALP, alkaline phosphatase

Table 2. Clinical outcome of endoscopic treatment

Technical success, n (%)	32/45 (71.1%)
Insertion success	37/45 (82.2%)
Biliary intervention success	32/37 (86.4%)
Procedure time, minutes (range)	
Scope insertion time	17 (10-29)
Total procedure time	66(40-92)
Clinical success, n (%)	31/45 (68.9%)
Treatment after technical failure	
Insertion failure	n=8
PTBD	5
EUS-BD	1
Conservative care	1
Surgery	1
Biliary intervention failure	n=5
PTBD	3
Conservative care	2

ERCP, endoscopic retrograde cholangiopancreatography; PTBD, percutaneous transhepatic biliary drainage; EUS-BD, endoscopic ultrasound-guided biliary drainage

Table 3. Risk factor for clinical failure via endoscopic treatment of MBO in patients with surgically altered anatomy

	Clinical failure n=14	Clinical success n=31	Univariate analysis			Multivariate analysis		
			OR	95% CI	p-value	OR	95% CI	p-value
Age, (>67 years), n (%)	7 (50.0%)	16 (51.6%)	0.9	0.3–3.3	0.92			
Sex, male, n (%)	8 (57.1%)	21 (67.7%)	0.6	0.2–2.3	0.49			
Etiology of MBO, n (%)								
Malignant biliary disease	4(28.6%)	12(38.7%)	0.6	0.2-2.5	0.51			
Malignant pancreatic disease	3(21.4%)	10(32.3%)	0.6	0.1-2.5	0.46			
Gastric cancer	6(42.9%)	6(19.4%)	3.1	0.8-12.5	0.10	0.8	0.1-5.1	0.83
Colon cancer	0(0%)	3(9.7%)	0		0.23			
Hepatocellular carcinoma	1(7.1%)	0(0%)	-		0.13			
Type of MBO, n (%)			0.9	0.1–5.5	0.90			
Primary disease	2(14.3%)	4(12.9%)						
Recurrent disease	12(85.7%)	27(87.1%)						
Liver metastasis	2(14.3%)	10(32.3%)						
Lymph node metastasis	3(21.4%)	4(12.9%)						
Local recurrence	7(50.0%)	13(41.9%)						

Location of MBO, n (%)			2.2	0.6–8.1	0.25			
Hilar or HJ anastomosis	8(57.1%)	23(74.2%)						
Distal	6(42.9%)	8(25.8%)						
Presence of peritoneal dissemination, n (%)	8 (57.1%)	5 (16.1%)	6.9	1.7–28.9	0.005	7.3	1.5–43.5	0.02
Digestive reconstruction, n (%)								
Modified Child’s method	3(21.4%)	15(48.4%)	0.3	0.1-1.3	0.09	3	0.04-1.6	0.16
RY gastorejejunostomy	5(35.7%)	8(25.8%)	1.6	0.4-6.2	0.33			
RY hepaticojejunostomy	4(28.6%)	5(16.1%)	2.1	0.5-9.4	0.33			
Billroth II with gastrectomy	2(14.3%)	3(9.7%)	1.6	0.2-10.5	0.65			
Presence of native papilla, n (%)	7 (50.0%)	11 (35.5%)	1.8	0.5–6.5	0.36			
Time from surgery to ERCP (>505 days), n (%)	5 (35.7%)	18 (58.1%)	0.4	0.1–1.5	0.17			
T-Bil (>2.5 mg/dL), n (%)	9 (64.3%)	13 (41.9%)	2.5	0.7–9.2	0.17			
AST (>80 IU/L), n (%)	8 (57.1%)	14 (45.2%)	1.6	0.5–5.8	0.46			
ALT (>72 IU/L), n (%)	8 (57.1%)	14 (45.2%)	1.6	0.5–5.8	0.46			
γGTP (>364 IU/L), n (%)	8 (57.1%)	13 (41.9%)	1.8	0.5–6.6	0.34			
ALP (>1205 IU/L), n (%)	6 (42.9%)	15 (48.4%)	0.8	0.2–2.9	0.73			
Type of scope, n (%)			1.5	0.3–6.7	0.59			
EI-580BT	3(21.4%)	9(29.0%)						

Other scope

11(78.6%)

22(71.0%)

MBO, malignant biliary obstruction; HJ, hepaticojejunostomy; RY, Roux-en-Y; ERCP, endoscopic retrograde cholangiopancreatography; TB, total bilirubin; AST, aspartate aminotransaminase; ALT, alanine aminotransferase; γ GTP, γ -glutamyl transpeptidase; ALP, alkaline phosphatase; OR, odds ratio; CI, confidence interval

Table 4 Patients characteristics between PS and MS groups

	PS group n=14	MS group n=17	p-value
Etiology of MBO, n (%)			0.21
Malignant biliary disease	8 (57.1%)	4 (23.5%)	
Malignant pancreatic disease	4 (28.6%)	6 (35.3%)	
Gastric cancer	1 (7.1%)	2 (11.8%)	
Colon cancer	1 (7.1%)	5 (29.4%)	
Type of MBO, n (%)			0.20
Primary disease	3 (21.4%)	1 (5.9%)	
Recurrent disease	11 (78.6%)	16 (94.1%)	
Liver metastasis	6 (42.9%)	4 (23.5%)	
Lymph node metastasis	0 (0%)	4 (23.5%)	
Local recurrence	5 (35.7%)	8 (47.1%)	
Location of MBO, n (%)			0.62
Hilar or HJ anastomosis	11(78.6%)	12(70.6%)	
Distal	3(21.4%)	5(29.4%)	
Presence of a native papilla, n (%)	4(28.6%)	7(41.2%)	0.47
Number of stents			0.99
1/2/3	8/5/1	10/6/1	

PS, plastic stent; MS, metallic stent; MBO, malignant biliary obstruction;
HJ, hepaticojejunostomy