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Endoscopic Retrograde Cholangiopancreatography Using a Multi-bending Duodenoscope in Patients with a Billroth I Gastrectomy

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Aims : We assessed the success rate at our endoscopic center in patients with a Billroth I gastrectomy and compared it to the rate in patients without a gastrectomy, retrospectively, and assessed the clinical utility of a multi-bending duodenoscope for bile duct cannulation in patients with a Billroth I gastrectomy.

Patients and Methods : Six-hundred and twenty patients who underwent endoscopic retrograde cholangiopancreatography (ERCP) with the use of a conventional single-bending duodenoscope and 26 patients who underwent ERCP with a multi-bending duodenoscope were enrolled. Of the 620 patients, 560 had no history of gastrectomy and the remaining 60 had had a Billroth I gastrectomy. The latter 26 patients included six patients whose bile duct cannulation was unsuccessful by conventional endoscope (three of whom were without gastrectomy and the other three had had a Billroth I gastrectomy).

Results : The success rate of bile duct cannulation in the patients who underwent ERCP with the conventional duodenoscope was higher in those without gastrectomy (89 %) than in those with a Billroth I gastrectomy (85 %), but the difference was not significant. Bile duct cannulation was successful with the multi-bending duodenoscope in all three patients with a Billroth I gastrectomy whose previous cannulation by conventional endoscopy was unsuccessful. In contrast, the cannulation was not successful in all three patients without gastrectomy whose previous cannulation was unsuccessful by conventional endoscopy. The success rate in the 20 naive patients without gastrectomy was 95 % by multi-bending duodenoscope. The incidence of post-ERCP pancreatitis was similar between the patients with the use of the single- (7.6 %) and multi-bending (7.7 %) duodenoscopes.

Conclusion : Our preliminary data suggest that the success rate of bile duct cannulation in the patients who underwent ERCP with the single-bending duodenoscope (TJF-260V) was higher in those without gastrectomy (89 %) than in those with a Billroth I gastrectomy and a multi-bending duodenoscope might be beneficial for bile duct cannulation in patients with a Billroth I gastrectomy. *Shinshu Med J 63 : 385—389, 2015*

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Key words : ERCP, multi-bending duodenoscope, Billroth I gastrectomy

I Introduction

Endoscopic retrograde cholangiopancreatography (ERCP) is a medical procedure that is essential for the diagnosis and treatment of hepatobiliary and pancreatic diseases. One of the key points for the effective performance of ERCP is smooth bile duct

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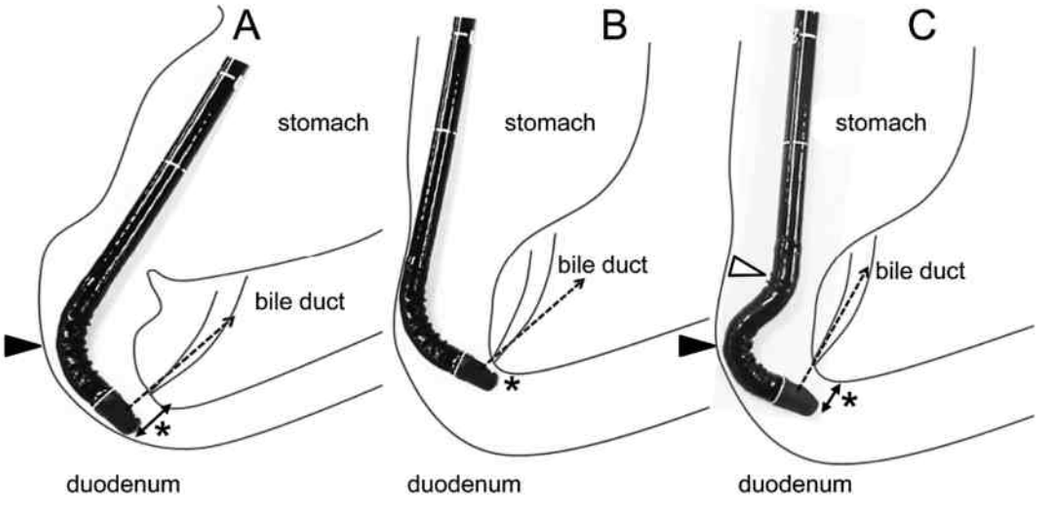

Fig. 1 A : Bile duct cannulation in a patient without gastrectomy, using a single-bending duodenoscope. The direction of the catheter (dashed-line arrow) was adjusted to the bile duct, and the distance between the head of the duodenoscope and the papilla of Vater (*) was appropriate. B : Bile duct cannulation in a patient with a Billroth 1 gastrectomy, using a single-bending duodenoscope. The direction of the catheter was not adjusted to the bile duct, and the distance (*) was too close. C : Bile duct cannulation in a patient with a Billroth 1 gastrectomy, using a multi-bending duodenoscope. The direction of the catheter was adjusted to the bile duct, and the distance (*) was appropriate by bending the second-bending portion of the duodenoscope. Closed arrowheads indicate the conventional bending portion. The open arrowhead indicates the second-bending portion of the multi-bending duodenoscope.

cannulation, which has a success rate of 85-95 % even among well-trained endoscopists[1]. Important factors for successful bile duct cannulation are the direction of the catheter in relation to the targeting of the bile duct and the distance from the duodenoscope to the papilla of Vater. A single-bending duodenoscope, i.e., a conventional duodenoscope, is designed to keep the appropriate direction of the catheter and head position easily at bile duct cannulation in patients without a gastrectomy (**Fig. 1A**). Because the direction of the catheter becomes inappropriate and the distance to the papilla of Vater becomes too close in patients with a Billroth I gastrectomy when using a conventional duodenoscope (**Fig. 1B**), endoscopists find the cannulation rather difficult. So a multi-bending duodenoscope is designed to more easily adjust the direction of the catheter and adjust the distance in patients with a Billroth I gastrectomy with the use of both the original- and second-bending portions (**Fig. 1C**).

Taking these conditions into consideration, we analyzed the success rate at our endoscopic center in patients with a Billroth I gastrectomy and compared it to the rate in patients without a gastrectomy. We also conducted a preliminary test of the performance of a multi-bending duodenoscope in patients whose bile duct cannulation was not successful with a conventional endoscope.

II Patients and Methods

A total of 620 patients who underwent diagnostic or therapeutic ERCP with a conventional single-bended duodenoscope at our endoscopic center between January 2010 and December 2014 were enrolled. Of those, 560 did not have a history of gastrectomy, and the remaining 60 had undergone a Billroth I gastrectomy. All patients had native papilla of Vater of the duodenum. The backgrounds of the patients are compared in **Table 1**.

Three patients without gastrectomy and three patients with a Billroth I gastrectomy whose bile duct cannulation was unsuccessful by conventional endoscopy underwent a retry of the cannulation with the use of a multi-bending duodenoscope.

Table 1 Clinical background and success rate of bile duct cannulation using a single-bending duodenoscope between patients without gastrectomy and those with a Billroth l gastrectomy

	Patients without gastrectomy	Patients with a Billroth I gastrectomy	*p*-value
No. of patients	560	60	
Age (years)[a]	72 (36-98)	76 (68-90)	0.082
Male/female (%)[b]	268/292 (48 %/52 %)	22/38 (37 %/63 %)	0.099
Indications of ERCP :[b]			
Malignant biliary stricture	210 (38 %)	20 (33 %)	0.576
Bile duct stone	265 (47 %)	31 (52 %)	0.587
Others (AIP, papillitis et al.)	85 (15 %)	9 (15 %)	0.971
Success rate of biliary cannulation[b]	496 (89 %)	51 (85 %)	0.665
Post-ERCP pancreatitis[b]	42 (8 %)	5 (8 %)	0.817

[a]Data are median (range). [b]Data are expressed as a positive number (%). AIP : autoimmune pancreatitis.

Table 2 Clinical background and success rate of bile duct cannulation using a multi-bending duodenoscope (TJF-Y0022)

	Naive patients for bile duct cannulation	Patients whose bile duct cannulation was unsuccessful with single-bending duodenoscope	
	Without Gastrectomy	Without Gastrectomy	With Billroth I gastrectomy
No. of patients	20	3	3
Age (year)[a]	76 (52-92)	82 (80-86)	81 (62-90)
Male/female (%)[b]	10/10 (50 %/50 %)	1/2 (33 %/67 %)	1/2 (33 %/67 %)
Indications of ERCP :[b]			
Malignant biliary stricture	6 (30 %)	1 (33 %)	2 (67 %)
Bile duct stone	11 (55 %)	2 (67 %)	1 (33 %)
Others (AIP, papillitis, et al.)	3 (15 %)	0 (0 %)	0 (0 %)
Success rate of biliary cannulation[b]	19 (95 %)	0 (0 %)	3 (100 %)
Post-ERCP pancreatitis[b]	2 (10 %)	0 (0 %)	0 (0 %)

[a]Data are median (range). [b]Data are expressed as a positive number (%). AIP : autoimmune pancreatitis.

ERCP using a multi-bending duodenoscope was also performed in 20 patients without gastrectomy. The clinical backgrounds of these patients are compared in **Table 2**. All 26 of the patients who were examined by multi-bending duodenoscope had native papilla.

All duodenoscopes used in the present study are manufactured by Olympus Medical Systems (Tokyo). As shown in Figure 1, the multi-bending duodenoscope (TJF-Y0022), which has a second bending portion near the ordinary bending portion, was modified from a commercially available single-bending duodenoscope (TJF-260V).

All procedures were performed by one highly experienced endoscopist (N.A.) who had previously performed over 1,000 ERCP procedures. The ERCP procedure in patients with either of the following conditions were considered failures in the present study : (1) the procedure required more than 15 min of examination time, or (2) wire-guided cannulation, pancreatic guide-wire placement, or precutting of the papilla of Vater was required for the cannulation.

Ⅲ Results

The success rate of bile duct cannulation in the patients who underwent ERCP with the single-bend-

ing duodenoscope was higher in those without gastrectomy (89 %) than in those with a Billroth I gastrectomy (85 %) by 4 %, but the difference was not significant. There were no significant differences in the clinical backgrounds or in the incidence of post-ERCP pancreatitis between the two groups.

Bile duct cannulation was successful with the multi-bending duodenoscope in all three of the patients with a Billroth I gastrectomy whose cannulation was unsuccessful by conventional endoscopy. In contrast, the cannulation was not successful in all three of the patients without gastrectomy whose cannulation was similarly unsuccessful. The success rate in the 20 patients without gastrectomy who were examined using the multi-bending duodenoscope was 95 %, and this rate did not differ significantly from that in the 560 patients without gastrectomy who were examined with the single-bending duodenoscope (89 %). The incidence of post-ERCP pancreatitis was similar between the patients for whom the single- (7.6 %, 47/620) and multi-bending (7.7 %, 2/26) duodenoscopes were used.

Ⅳ Discussion

In this patient series, the success rate of bile duct cannulation in the patients who were examined by a single-bending duodenoscope was somewhat higher (by 4 %) in those without a gastrectomy than in those with a Billroth I gastrectomy. We suspect that the difference in success rates was minimized because all of the procedures were performed by a well-trained endoscopist.

Here, the benefit of the multi-bending duodenoscope was suggested for bile duct cannulation in patients with a Billroth I gastrectomy because the cannulation was successful in all three patients whose cannulation was unsuccessful with the use of a single-bending duodenoscope. Imazu et al. reported two similar cases in which a multi-bending duodenoscope was used (a different type from ours), further indicating the benefit[2]. Even if it exists, the beneficial effect of a multi-bending duodenoscope for bile duct cannulation in patients without a gastrectomy seems minimal, because the success rate of bile duct cannulation was similar between the present examinations using single- and multi-bending duodenoscopes, and because the cannulation was unsuccessful in the three patients without gastrectomy in whom it was unsuccessful by single-bending duodenoscopy. The safety of the multi-bending duodenoscope was similar to that of the single-bending duodenoscope in terms of the incidence of post-ERCP pancreatitis. This is the second benefit of multi-bending duodenoscope, because other techniques that are known to help successful cannulation, i.e. wire-guided cannulation, pancreatic guide-wire placement, and precutting of the papilla of Vater, are also known as risk factors for post-ERCP pancreatitis[3)–5)].

Our preliminary data suggest that a multi-bending duodenoscope might be beneficial for bile duct cannulation in patients with a Billroth I gastrectomy. However, further studies are required to verify our findings, as the number of patients analyzed using a multi-bending duodenoscope was small.

Conflict of Interest

The authors were provided with the prototype multi-bending duodenoscope by Olympus Medical Systems Corp. (Tokyo) free of charge. The company had no role in the design, practice or analysis of this study.

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