Modified single-balloon endoscopy for ERCP in a patient with Billroth II gastrectomy



Fig. 1 Magnetic resonance cholangiopancreatography (MRCP) in an 84-year-old man with a history of hepatocellular carcinoma showing a tumor invading the bifurcation of common bile duct.



Fig. 2 Photograph of the overtube with an aperture at a point 75 cm from its tip on the side opposite to the pressure line with a conventional forwardviewing upper gastrointestinal endoscope inserted through it via the aperture.



Fig.3 Image during the modified single-balloon enteroscopy-assisted endoscopic retrograde cholangiopancreatography (ERCP) procedure showing a plastic stent that has been successfully placed after location of the papilla via the afferent loop.

An 84-year-old man with a history of hepatocellular carcinoma treated by transcatheter arterial chemoembolization and percutaneous ethanol injection therapy 2 years previously was admitted with jaundice. Magnetic resonance cholangiopancreatography (MRCP) showed a tumor invading the bifurcation of the common bile duct with bilateral intrahepatic duct dilatation (> Fig. 1). Endoscopic retrograde cholangiopancreatography (ERCP) was considered but as the patient had undergone a previous Billroth II gastrectomy and was concerned about possible complications, we held back from performing this procedure.

A modified single-balloon enteroscopyassisted ERCP was planned instead, using a sliding tube with a balloon (XST-SB1; Olympus) and a balloon controller (XMAJ-1725; Olympus). The sliding tube has a working length of 132 cm, with outer and inner diameters of 13.2 mm and 11 mm respectively, and has a silicone balloon at its tip [1]. An adequate aperture was made in the overtube at a point 75 cm from its tip on the side opposite to the pressure line. A conventional forward-viewing upper gastrointestinal endoscope with this modified single balloon was used to perform ERCP by the standard single-balloon method (> Fig. 2). The papilla was found via the afferent loop and a plastic stent was successfully placed with no complications (**Fig. 3** and **Fig. 4**).

It is usually difficult to perform ERCP in postoperative patients because of their altered anatomy. Balloon-assisted enteroscopy, with either a double or single balloon, can be used for these patients [1,2]. Although single-balloon enteroscopy-assisted ERCP is an accepted method, some endoscopists believe that "short-type" double-balloon enteroscopy is more effective in such patients [3]. In one multicenter experience of overtube-assisted enteroscopic ERCP in patients with surgically altered pancreaticobiliary anatomy, the overall success rates were 60% and 63% in single-balloon and double-balloon procedures respectively. There was no significant difference between ERCPs performed by single-balloon or double-balloon enteroscopy [4].

There are many published case reports using double-balloon enteroscopy for ERCP in patients with altered anatomy, but reports of single-balloon enteroscopyassisted ERCPs are rare [1,5,6]. One reason for this is that double-balloon enteroscopy was developed before single-balloon enteroscopy. The other reason is that "short" double-balloon enteroscopy is easy to use for ERCP in patients with altered anatomy. Single-balloon enteroscopy has a 200-cm working length and the accessories are very limited [7].

Itoi et al. developed one possible method for single-balloon enteroscopy-assisted ERCP [1]. They performed traditional single-balloon enteroscopy first; they then made an aperture in the overtube at a point 100 cm from its tip. A conventional forward-viewing upper gastrointestinal endoscope was then substituted for the



enteroscope before the ERCP. Their overall success rate for therapeutic ERCP was 76.9%; however, this is a complicated method.

Here, we report an easier method that we have developed for ERCP in patients with altered anatomy. We make an aperture in the overtube at a point 75 cm from its tip, which enables us to complete the balloon-assisted ERCP with a conventional forward-viewing upper gastrointestinal endoscope – the enteroscopy is unnecessary in our method. The one limitation to our method is that it is not suitable for patients with a Roux-en-Y anastomosis because the loop from the anastomosis to the papilla is longer in this situation than after other types of surgery.

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Chen-Wang Chang^{1,3,4}, Chien-Yuan Hung^{1,2,3}, Tai-Cherng Liou^{1,3,4}, Ching-Wei Chang^{1,3}, Horng-Yuan Wang^{1,2,3,4}, Wen-Hsiung Chang^{1,3}, Cheng-Hsin Chu^{1,3}, Ching-Chung Lin^{1,3,4}, Chih-Jen Chen^{1,3}, Shou-Chuan Shih^{1,2,3,4}

- ¹ Division of Gastroenterology, Department of Internal Medicine, Mackay Memorial Hospital, Taipei, Taiwan
- ² Mackay Junior College of Medicine, Nursing and Management, Taipei, Taiwan
- ³ Health Evaluation Center, Mackay Memorial Hospital, Taipei, Taiwan,
- ⁴ Mackay Medical College, New Taipei, Taiwan,

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Corresponding author

Horng-Yuan Wang, MD Division of Gastroenterology Department of Internal Medicine Mackay Memorial Hospital No. 92, Sec. 2, Chung-Shan N. Road Taipei Taiwan Fax: +886-2-25433642 mmhgiman@gmail.com