

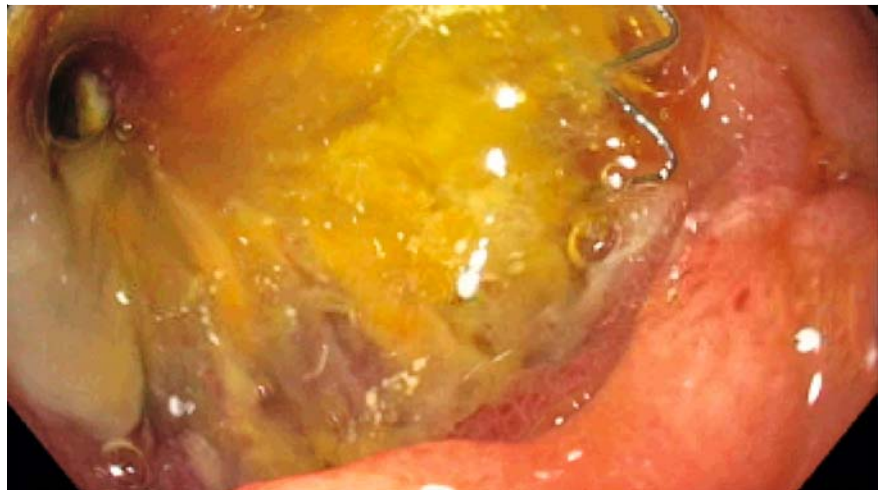
## Double-balloon endoscopic ultrasound-guided gastroenterostomy: simplifying a complex technique towards widespread use

Endoscopic ultrasound-guided gastroenterostomy (EUS-GE) is a novel technique for the management of gastric outlet obstruction (GOO), which has been shown to be safe and effective [1, 2]. To mitigate technical difficulties, a specialized double-balloon catheter was developed in Japan and has been found to be effective when used with an electrocautery-enhanced lumen-apposing metal stent (LAMS) [3]. Outside of Japan, however, this device is unavailable; therefore, in North America and Europe only highly specialized centers are currently performing EUS-GE using techniques that are challenging and with the potential for severe adverse events. Here we describe the performance of double-balloon EUS-GE using a widely available vascular balloon catheter (► **Video 1**).

A 72-year-old man with unresectable pancreatic cancer presented with recurrent GOO following previous enteral stenting and was found to have stent tumor ingrowth (► **Fig. 1**). A multidisciplinary decision was made to attempt EUS-GE facilitated by double-balloon occlusion. A guidewire was endoscopically advanced through the obstructed stent deep into the jejunum. The endoscope was exchanged through an overtube to prevent looping in the stomach. Two vascular balloon catheters with a compliant balloon diameter reaching up to 46 mm when inflated (Coda balloon; Cook Medical, Bloomington, Indiana, USA) were fashioned together with the balloons set 10 cm apart (► **Fig. 2**). The device was advanced distal to the obstruction over the wire using fluoroscopic guidance. The balloons were then inflated to anchor the small bowel and saline with contrast was injected through the proximal catheter, filling the bowel lumen between the balloons. On EUS, the bowel segment was visibly dilated and anchored, thereby facilitating stent insertion (► **Fig. 3**). An electrocautery-enhanced 15-mm LAMS was then inserted to complete the gastroenterostomy (► **Fig. 4**). The patient tolerated a stent diet within 24 hours but required endoscopic revision 6 weeks later owing to blockage of the stent by a potassium chloride pill. No



► **Video 1** Endoscopic ultrasound-guided gastroenterostomy for malignant gastric outlet obstruction facilitated by a double-balloon occlusion device made from a widely available vascular balloon catheter.



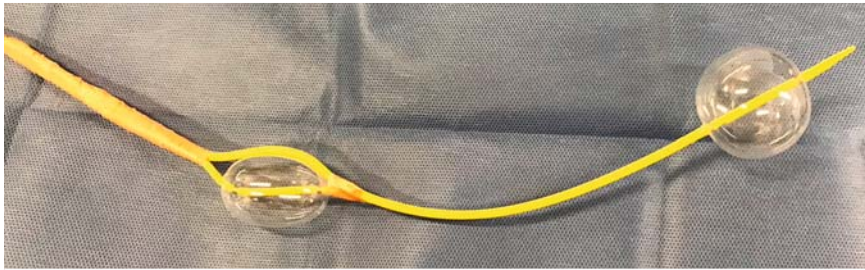
► **Fig. 1** Endoscopic view showing enteral stent obstruction caused by pancreatic cancer tumor ingrowth.

hanced 15-mm LAMS was then inserted to complete the gastroenterostomy (► **Fig. 4**).

The patient tolerated a stent diet within 24 hours but required endoscopic revision 6 weeks later owing to blockage of the stent by a potassium chloride pill. No

further intervention was subsequently required.

The use of EUS-GE as a first-line treatment of GOO is limited by technical challenges. The presently described double-balloon EUS-GE greatly facilitated the procedure using a device that is widely



► **Fig. 2** A double-balloon occlusion device made by connecting two radiologic vascular balloon catheters with the balloons set 10 cm apart.



► **Fig. 3** Endoscopic ultrasound image of the dilated fluid-filled small-bowel segment between the two occluding balloons.



► **Fig. 4** Fluoroscopic image of the lumen-apposing metal stent anastomosing the stomach to the small bowel distal to the enteral stent.

available. This may be a first step towards dissemination of this modality and will likely encourage high quality prospective trials to evaluate its role.

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### Competing interests

Yen-I Chen is a consultant for Boston Scientific. All other authors have disclosed no potential competing interests to disclose.

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