Endoscopic closure, involving the muscle layer, of a duodenal post-resection mucosal defect using double-layer suturing assisted by reopenable clips

Endoscopic double-layered suturing is one of the methods for endoscopic closure. To approximate a mucosal defect, endoscopic clips are applied to the submucosal layer at the center of the long axis of the ulcer [1]. We report a case in which complete closure of the muscle layer of the duodenum was achieved by double-layer suturing assisted by reopenable clips (▶ Video 1).

A 15-mm flat elevated lesion with slight elevation was located in the transverse part of the duodenum (▶ Fig. 1) and was treated by underwater endoscopic mucosal resection. En bloc resection was achieved, and a resected specimen of size 16 mm × 13 mm was obtained. After resection, endoscopic double-layered suturing was performed as follows: (i) the central muscle layer of the ulcer was gently grasped with a reopenable clip (SureClip; MicroTech, Nanjing, China), thus folding the muscle layer in the direction of the long axis (▶ Fig. 2a, b); (ii) the ulcer was closed by adding a second reopenable clip over the folded muscle layer (▶ Fig. 2c); (iii) the closure was reinforced with conventional endoscopic clips (EZ Clip, HX-610-090S; Olympus Medical Systems, Tokyo, Japan) (▶ Fig. 2d). The pathological diagnosis was tubular adenoma, and R0 resection was achieved. There were no delayed adverse events.

The duodenum has a thin wall and a severe environment because of being exposed to bile and pancreatic juices. Closing the mucosal defect using endoclips is reported to significantly reduce delayed adverse events; however, the wound may sometimes dehisce after closure when clipping is limited in suturing the together the edges of the mucosal defect, leaving a dead space below the mucosa [2–4]. Using reopenable clips to gently grasp the duodenal muscle layer and intentionally fold it could allow for more complete closure of the mucosal defect in the duodenum.

Competing interests
The authors declare that they have no conflict of interest.

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**Fig. 2** Double-layer suturing assisted by reopenable clips for closing the duodenal post-resection mucosal defect. 

- **a** Duodenal mucosal defect after underwater endoscopic mucosal resection.
- **b** A reopenable clip was initially used to grasp the central muscle layer of the ulcer. The muscle layer was thus folded.
- **c** Another reopenable clip was added over the folded muscle layer.
- **d** Conventional endoscopic clips were used to reinforce the closure. Complete closure was achieved.