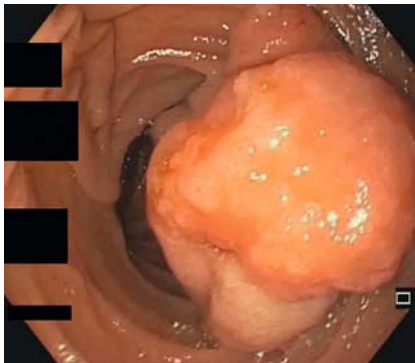
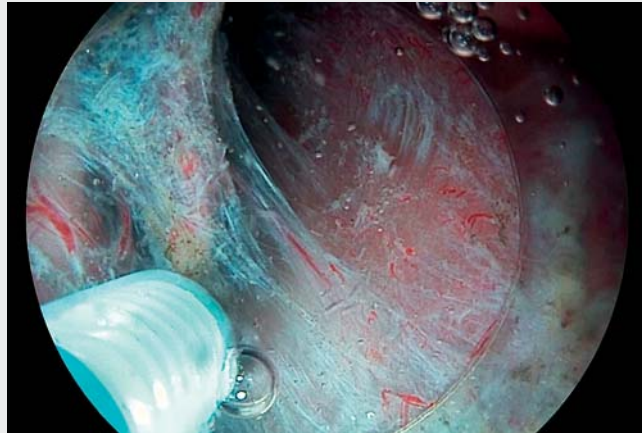


Laparoscopic and endoscopic combined surgery to treat a large superficial nonampullary duodenal tumor

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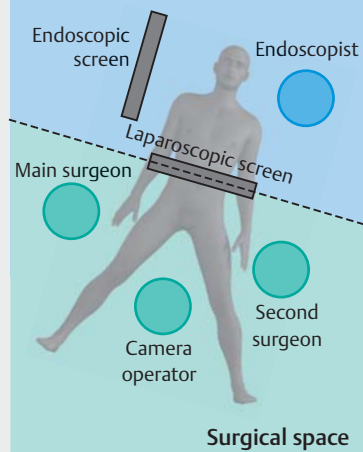


► **Fig. 1** Large superficial nonampullary duodenal tumor, 60 mm 0-Ia + IIa, located in the second portion of the duodenum in a 72-year-old man.



► **Video 1** Large superficial nonampullary duodenal tumor treated by combined laparoscopic and endoscopic surgery.

Endoscopic and anesthesias space



► **Fig. 2** Schema of the operating room setup for duodenal laparoscopic and endoscopic combined surgery.

Endoscopic resection of large superficial nonampullary duodenal tumors is clinically challenging as the unique anatomical features of the duodenum (thin wall, narrow lumen, exposure to biliary and pancreatic fluids, and small operating space) increase the risks of intra- and

post-procedural complications [1]. As conventional surgical methods of resecting superficial nonampullary duodenal tumors are associated with high morbidity and mortality [2], novel combined laparoscopic and endoscopic approaches have recently been developed in specialized centers in an attempt to overcome these limitations [3, 4].

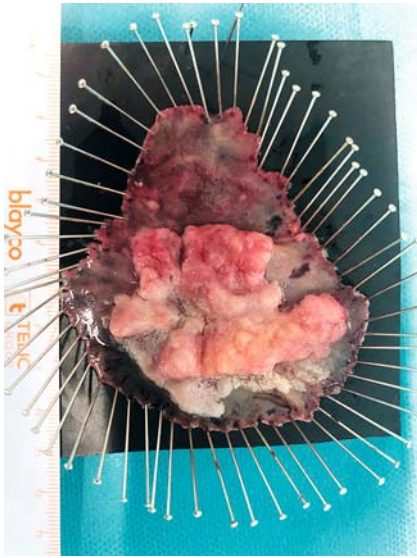
Herein, we report the case of a 72-year-old man referred to our institution for endoscopic resection of a 60-mm superficial nonampullary duodenal tumor located in the second portion of the duodenum (D2) (► **Fig. 1**, ► **Video 1**).

The operating room was equipped for duodenal laparoscopic and endoscopic combined surgery (D-LECS) (► **Fig. 2**). The surgical team first exposed D2 using the Kocher maneuver with a Sonicision Dissector (Medtronic, Minneapolis, USA) and Storz laparoscopy equipment (Karl Storz SE, Tuttlingen, Germany). Duodenal endoscopic submucosal dissection (ESD) was then performed using an EG-500 gastroscope (Sonoscope Medical Co., Shenzhen, China) and a 1.5-mm Flush Knife BTS (Fujifilm, Tokyo, Japan)

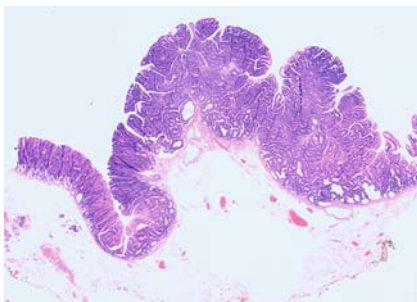
connected to a VIO 3 electro-surgical unit (ERBE Elektromedizin, Tübingen, Germany). En bloc resection was achieved in 183 min with no significant intra-procedural complications other than bleeding which was managed endoscopically. Finally, the mucosal-submucosal defect was identified laparoscopically and a seromuscular reinforced suture was placed. A single episode of upper gastrointestinal bleeding occurred 72 hours post-procedure and was successfully managed conservatively. The patient was discharged without further events. Histological examination demonstrated a 60×47-mm tubulovillous adenoma with high grade dysplasia and free margins (► **Fig. 3 a, b**, ► **Fig. 4**).

D-LECS may have utility in selected cases in reducing ESD-related delayed complications and the morbidity and mortality associated with surgical procedures with large superficial nonampullary duodenal tumors. D-LECS requires close coordination between surgical and endoscopic teams at specialized centers.

Endoscopy_UCTN_Code_TTT_1AO_2AG



► **Fig. 3** The 82×75 mm resected specimen containing a 60×47×13 mm lesion.



► **Fig. 4** Histology showed a tubulovillous adenoma with high grade dysplasia and tumor-free margins; hematoxylin and eosin staining.

Competing interests

The authors declare that they have no conflict of interest.

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Endoscopy 2023; 55: E429–E430
DOI 10.1055/a-2008-7810
ISSN 0013-726X
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