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A case of primary adenocarcinoma of the third portion of the duodenum resected by laparoscopic and endoscopic cooperating surgery



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ABSTRACT

INTRODUCTION: We report a case of primary adenocarcinoma in the third portion of the duodenum (D3) curatively resected by laparoscopic and endoscopic cooperating surgery (LECS).

PRESENTATION OF CASE: A 65-year-old woman had a routine visit to our hospital for a follow-up of rectal cancer resected curatively 2 years ago. A routine screening gastroduodenal endoscopy revealed an elevated lesion of 20 mm in diameter in the D3. The preoperative diagnosis was adenoma with high-grade dysplasia; however, suspicion about potential adenocarcinoma was undeniable. Curative resection was performed by LECS. Pathological examination revealed intramucosal adenocarcinoma arising from normal duodenal mucosa. The tumor was stage I (T1/N0/M0) in terms of the tumor, nodes, metastasis (TNM) classification. LECS for duodenal tumor has seldom been reported previously, and this is the first report of LECS for primary adenocarcinoma in the D3. The transverse mesocolon was removed from the head of pancreas to expose the duodenum, and the accessory right colic vein was cut; this was followed by the Kocher maneuver for mobilization of the lesion site.

DISCUSSION: LECS enabled en bloc resection with adequate surgical margins and secure intra-abdominal suturing. Thorough mobilization of the mesocolon and pancreas head is essential for this procedure because it facilitates correct resection and suturing.

CONCLUSION: LECS is a feasible treatment option for duodenal neoplasms, including intramucosal adenocarcinoma, even though it exists in the D3.

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1. Introduction

Except for carcinoma of the ampulla of Vater, primary duodenal adenocarcinomas are rare and account for only 0.3% of carcinomas of the digestive tract [1]. In recent years, the increased use of endoscopies has led to an increased identification of duodenal tumors [2]; however, a neoplasm in the third or fourth portion of the duodenum is an extremely rare entity and is sometimes difficult to treat [3]. Endoscopic treatment is generally appropriate for dysplastic polyps or intramucosal adenocarcinomas, although some cases may be difficult to resect endoscopically because of the thinness of the duodenal wall and the narrow working space [4]. We report a case of primary adenocarcinoma of the third portion of the duodenum (D3), resected curatively using the laparoscopic and endoscopic cooperating surgery (LECS) technique.

2. Report of a case

A 65-year-old woman had a routine visit to our hospital for a follow-up of the rectal cancer that was resected by laparoscopic surgery 2 years ago. The rectal cancer was stage I (T1/N0/M0) in terms of the tumor, nodes, metastasis (TNM) classification of the International Union Against Cancer (UICC) and we had found no sign of recurrence during the periodical surveillance after surgery. She had been in good health for the past 2 years. A gastroduodenal endoscopy as routine screening revealed an elevated lesion that was 20 mm in diameter in the D3 (see Fig. 1A); this was shown to be located on the lateral side of the tract by hypotonic duodenography (see Fig. 2). Endoscopic narrow-band imaging showed rough micro surface pattern (see Fig. 1B). Furthermore, chromoendoscopy revealed that the tumor was spreading laterally (see Fig. 1C). It was diagnosed as adenoma with high-grade dysplasia by biopsy. No local lymph node swelling or distinct metastasis was detected by contrast-enhanced computed tomography. All laboratory data were normal, including carcinoembryonic antigen (CEA) and cancer

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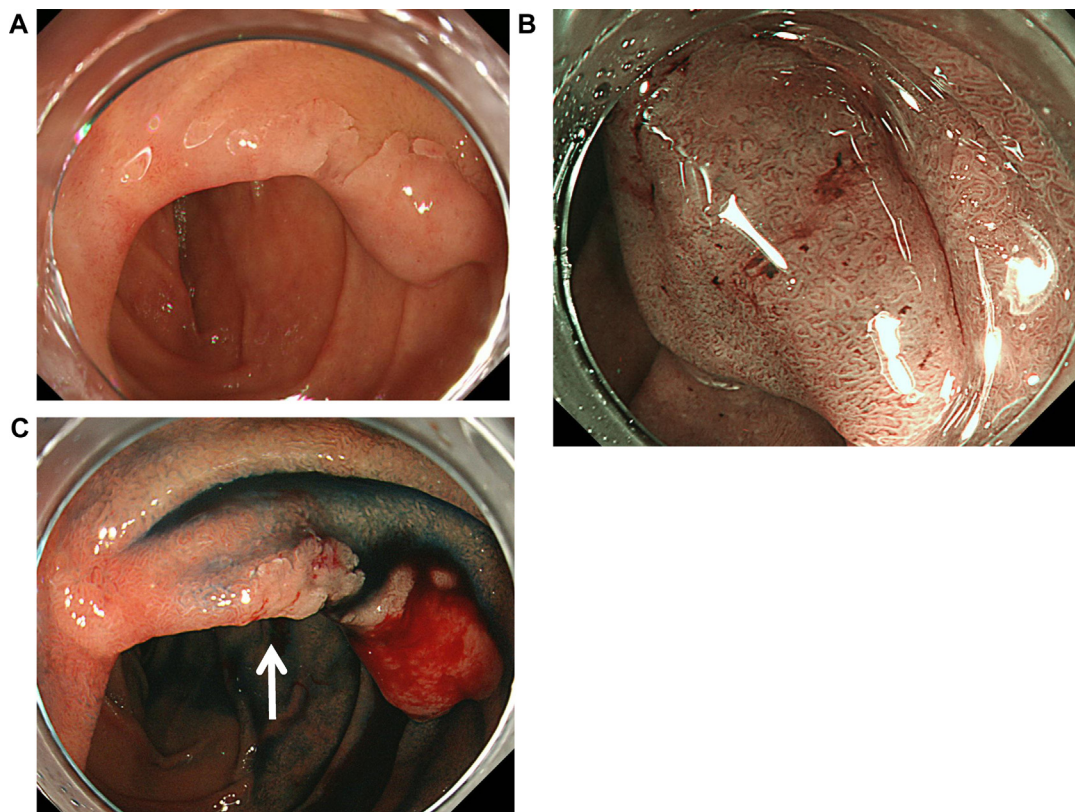


Fig. 1. Gastroduodenoscopy.

(A) Gastroduodenoscopy in white-light. A 20 mm sessile tumor in the third portion of the duodenum was shown.

(B) Endoscopic narrow-band imaging showed a rough micro surface pattern.

(C) Chromoendoscopy revealed that the tumor was spreading laterally (arrow).

antigen 19-9 (CA19-9). We first considered endoscopic submucosal dissection (ESD) for the treatment of this duodenal tumor to achieve an *en bloc* resection with negative surgical margin. However, due to a measurable risk of perforation, we decided to perform a curative resection using LECS after obtaining informed consent.

After the induction of general anesthesia, the patient was kept supine with the lower limbs spread laterally apart with a levitator. A 12 mm trocar was inserted through the umbilicus using an open technique, and pneumoperitoneum was established with carbon dioxide at a 10 mmHg abdominal pressure. No intra-abdominal adhesions were found. Two 5 mm trocars were placed into the left lateral upper quadrant, and one 5 mm trocar and one 12 mm tro-

car were then placed into the right upper quadrant (see Fig. 3). The greater omentum was dissected using ultrasonic laparoscopic coagulation shears (LCS) (SonoSurg®, Olympus, Tokyo, Japan). The hepatocolic ligament was dissected for the mobilization of the right colic flexure. The accessory right colic vein was then cut with a vessel clip to allow enough mobilization of the mesocolon from the head of pancreas to isolate the anterior wall of the D3. The Kocher maneuver was performed and the duodenum together with the head of pancreas was mobilized from the retroperitoneum to lift the area of the lesion. The endoscope was inserted through the oropharynx into the stomach with insufflation of carbon dioxide. The upper jejunum was clamped beforehand with silicon tape, preventing the flow of carbon dioxide gas to the lower jejunum. The tumor was confirmed in the D3 and marked endoscopically. Additional mobilization of the duodenum was performed laparoscopically. First, an ESD procedure was performed as much tissue removed as possible by the Dualknife® (Olympus, Tokyo, Japan) to minimize the time exposing the tumor intra-abdominally with safety surgical margin. After that, a whole layer excision was performed for an *en bloc* resection of the disease. A full-thickness excision approximately two-thirds circumference around the tumor was performed endoscopically and the tumor was inverted into the abdominal cavity. The final part was dissected by LCS using laparoscopic vision, and an adequate resection margin was acquired (see Fig. 4). The specimen was carefully placed in the retrieval bag to avoid the risk of tumor cell dissemination, and then removed through the 12 mm trocar. The post-excisional defect in the duodenal anterior wall was closed with a continuous full-thickness suture laparoscopically. The endoscope was inserted into the duodenum again to confirm the airtightness and the patency of the suture site. Blood loss was 6 ml. The operation time was 322 min, including preparing the

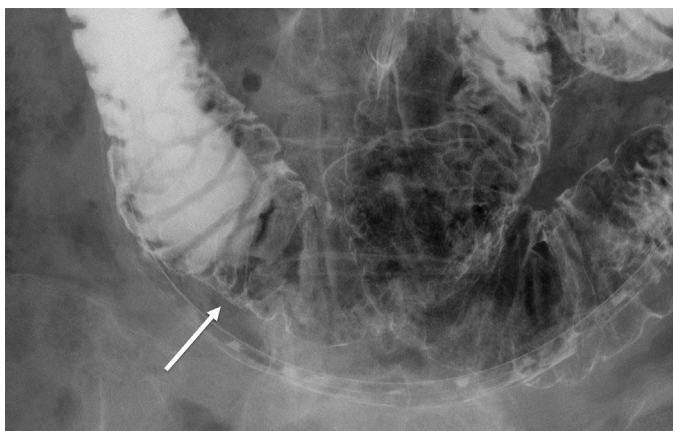


Fig. 2. Hypotonic duodenography showed an elevated lesion on the lateral side of the third portion of the duodenum.

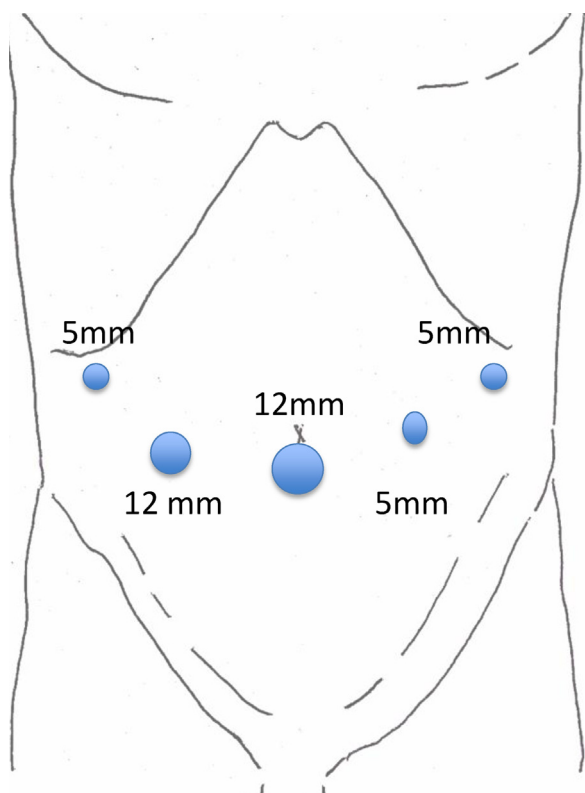


Fig. 3. The trocar arrangement. A 12 mm trocar was placed in the umbilicus as a camera port. Two 5 mm trocars were placed in the left lateral upper quadrant (operation port). One 5 mm trocar and one 12 mm trocar were placed in the right upper quadrant (operation port).

endoscopy devices and performing the ESD procedure. The postoperative course was uneventful and the patient was discharged on the 13th postoperative day. A postoperative contrast study did not show stenosis or deformity of the duodenum.

Pathological examination revealed an intramucosal adenocarcinoma arising from the normal duodenal mucosa (see Fig. 5). Vascular or lymphatic invasion was not detected in the specimen and the surgical margin was histologically negative. The tumor was stage I (T1/N0/M0) according to the TNM classification of the UICC.

3. Discussion

Primary duodenal adenocarcinoma is uncommon, and only 14–45% occurs in the third or the fourth portion of the duodenum [3,5]. Anemia is one of the most common presenting symptoms and is associated with gastrointestinal bleeding [6,7]. Weight loss, anorexia, and abdominal pain are other prominent complaints, but more than half of the patients showed no digestive symptoms [8]. Duodenal neoplasms have diagnostic difficulties because of the rarity of the disease and the non-specific symptoms [9]. For advanced duodenal cancer, pancreatoduodenectomy or partial duodenal segmentectomy, including regional lymph node dissection, is a standard surgery for curative intent [10]. Kawahira reported the prognosis of primary duodenal cancer after curative resection in a retrospective review. The 5-year survival rate of patients with T1/T2 tumors and T3/T4 tumors was 76.3% and 18.5%, respectively, whereas, the number of lymph nodes that were negative and positive was 84.6% and 21.9%, respectively [11]. Ryder also reported the prognostic factors for primary duodenal cancer, including histological grade, transmural invasion, and tumor diameter [12].

In our case, the preoperative diagnosis was adenoma with high-grade dysplasia, but there was a high suspicion of potential adenocarcinoma. ESD was considered difficult to perform due to

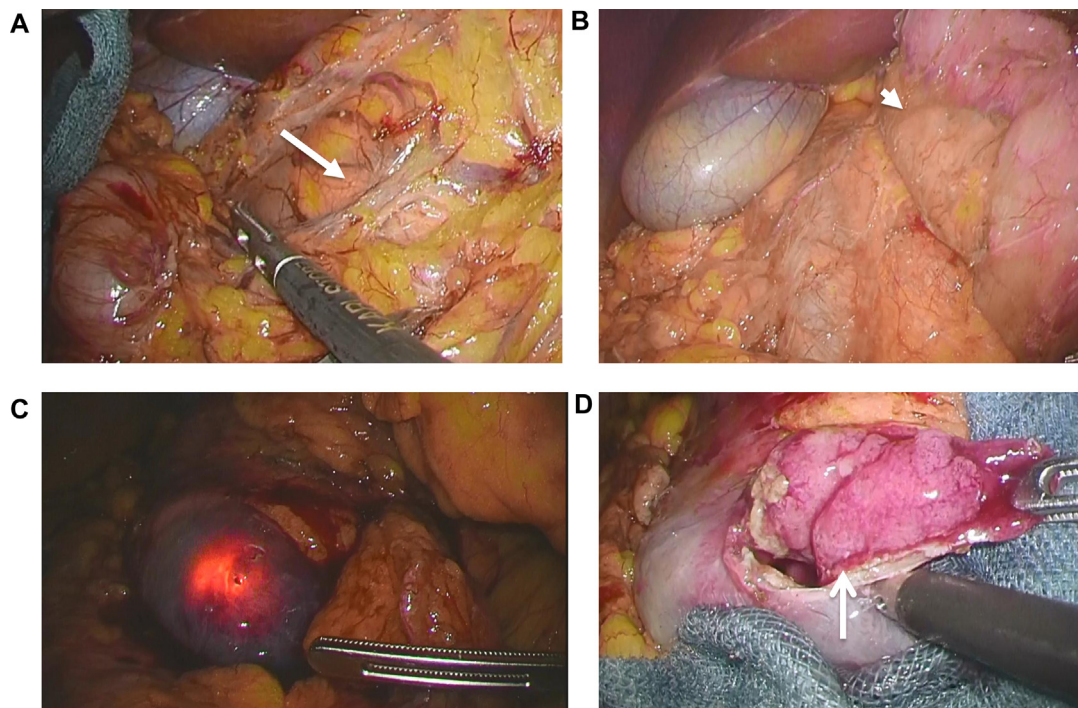


Fig. 4. Operative procedures. (A) Mobilization of the transverse colon. The accessory right colic vein is seen (arrow). (B) Head of pancreas (arrowhead) is dissected from the retroperitoneum. (C) The transmitting light of the endoscope indicated that the tumor sight could be seen in the laparoscopic view. (D) Full-thickness excision approximately two-thirds circumference around the tumor is finished endoscopically and the tumor is inverted into abdominal cavity (arrow).

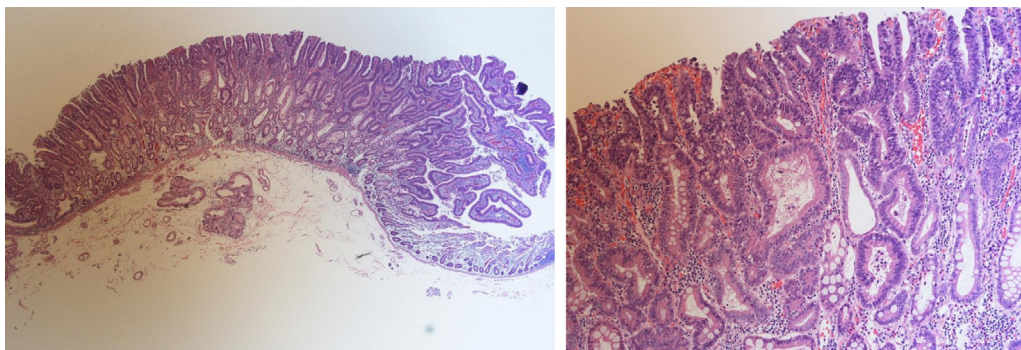


Fig. 5. Hematoxylin-eosin staining. Intramucosal adenocarcinoma with increasing nuclear pleomorphism and loss of polarity is shown.

a narrow working space and the thinness of the duodenal wall. Nonaka reported the clinical outcomes of endoscopic resection, including endoscopic mucosal resection (EMR) and ESD, for non-ampullary duodenal tumors in 113 patients. *En bloc* resection was achieved only in 64%. There were 14 cases of delayed bleeding and 2 cases of perforation [13]. Hiki developed the LECS procedure in 2008, which used an ESD technique [14]. This procedure enabled us to perform an *en bloc* resection with an adequate surgical margin and also decrease the risk of postoperative stenosis or deformity in a less invasive way [15].

The intra-abdominal inversion of the tumor site may raise concerns about abdominal tumor cell dissemination. An article mentioned that a small amount of tumor cells, which may be contained in resection-associated debris, may be unlikely to induce tumor recurrence [16]. However, in our operation, extreme care was taken to avoid the risk of tumor cell dissemination by dissecting the tumor endoscopically as much as possible using ESD procedure, minimizing the tumor exposure intra-abdominally, and avoiding direct contact with the tumor site.

Intra-abdominal suturing *via* laparoscopy is minimally invasive, and final confirmation by endoscopy makes this procedure more safe.

Although there have been many articles about the use of LECS for gastric lesions, only six cases have been previously reported for duodenal tumors: two adenomas, one gastrointestinal stromal tumor (GIST), and three neuroendocrine tumors (NET) located in the first or second portion of the duodenum [4]. This is the first case of primary adenocarcinoma in the D3 that was successfully resected by LECS. Thorough mobilization of the mesocolon and pancreas head is essential for this procedure because it facilitates correct resection and suturing.

4. Conclusion

LECS is considered as a safe and feasible procedure to achieve negative surgical margins and adequate dissection lines for intramucosal duodenal adenocarcinoma, even when the tumor is located in the D3. In practice, great care has to be taken in handling the specimens in the abdominal cavity, during resection, and after resection, to avoid possible dissemination of tumor cells.

Conflicts of interest

Nothing to declare.

Funding

Nothing to declare.

Ethical approval

This case was reviewed and approved in our hospital's cancer board meeting (# 645).

Consent

Informed consent has been obtained from the patient and a copy of this document is available when requested. The figures related to the article do not contain any information that may affect the patient's privacy in any way.

Author contributions

Study conception and design: Tamaki and Obama. Acquisition of data: Tamaki, Obama, Sato, Kami, Ito, Kubota, Inoue. Analysis and interpretation of data: Tamaki, Obama. Drafting of manuscript: Tamaki. Critical revision: Obama, Yamamoto, Morimoto.

Guarantor

Not applicable.

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