

Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

International Journal of Surgery Case Reports

journal homepage: www.casereports.com

Hybrid laparoscopic pancreas-preserving subtotal duodenectomy for suspected early duodenal cancer: A case report

Ayato Obana*, Yoshinobu Sato, Tomonori Matsumura, Motoi Koyama, Tatsushi Suwa

Department of Surgery, Kashiwa Kousei General Hospital, Chiba, Japan

ARTICLE INFO

Article history:

Received 14 October 2020
 Received in revised form 1 November 2020
 Accepted 1 November 2020
 Available online 11 November 2020

Keywords:

Duodenum
 Adenoma
 Laparoscopy
 Cancer
 Malignancy
 Case report

ABSTRACT

INTRODUCTION: Non-ampullary duodenal adenomas rarely show malignant potential. However, such adenomas located in the periampullary area are suspected of being malignant and require surgical treatment.

PRESENTATION OF CASE: A 75-year-old man presented with a 30-mm wide, endoscopically-unresectable laterally spreading tumor in the periampullary area. Biopsy showed a tubular adenoma; however, the size and color of the tumor strongly suggested malignancy. Therefore, a hybrid laparoscopic pancreas-preserving subtotal duodenectomy (HLPPSD) was performed. Laparoscopically, a Kocher maneuver was performed. The jejunum was divided 10 cm distal to the ligament of Treitz, and the duodenum was also divided at the supraduodenal-angle. The Shuriken method was applied, and the surgery converted to an open procedure. The common bile and pancreatic ducts were divided, and the subtotal duodenum and 10 cm of the jejunum were removed. Thereafter, the jejunal stump was hand-sutured to the duodenal stump. Cholangiojejunostomy and pancreatojejunostomy were performed under direct vision. Finally, an umbilicoplasty was performed. The histology revealed that the tumor was a carcinoma *in situ*.

DISCUSSION: Endoscopic resection is the first-choice for duodenal adenoma suspected of malignant potential. When the endoscopically-unresectable tumor is located in periampullary area, pancreatoduodenectomy is generally selected because ampulla cannot be preserved. However, HLPPSD is an alternative option.

CONCLUSIONS: Non-ampullary duodenal adenomas can be malignant when the tumor is large and red. In these cases, HLPPSD can be useful; less invasive than conventional pancreaticoduodenectomy; leaves only a 3-cm, round scar, in addition to the laparoscopic port scars; and combines the benefits of both open and laparoscopic surgeries.

© 2020 The Authors. Published by Elsevier Ltd on behalf of IJS Publishing Group Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

1. Introduction

Duodenal adenomas are frequently identified incidentally during routine upper endoscopies. Non-ampullary adenomas are associated with a lower risk of malignant transformation than are ampullary adenomas; however, they may have malignant potential [1–3]. Although endoscopic management is the first-line therapeutic approach for these tumors [4], surgical management may be required [5]. Generally, if a large tumor suspected of malignancy is in the periampullary area, pancreatoduodenectomy (PD) is performed because the ampulla cannot be preserved.

Here, we report a case involving an endoscopically-unresectable, large, duodenal adenoma in the periampullary area with highly suspicion of malignancy. Hybrid laparoscopic pancreas-preserving subtotal duodenectomy (HLPPSD) was performed, and histological results confirmed carcinoma *in situ*. Duodenal non-ampullary adenomas are potentially malignant when the tumor is red and large. HLPPSD can be alternative option in selected cases.

This manuscript was prepared in line with SCARE guidelines [6].

2. Case report

A 75-year-old Asian man, with a history of hypertension, presented for a medical checkup.

He had no significant past surgical history and no family history. An upper endoscopy detected a 30-mm wide, laterally spreading tumor (LST), with a diverticulum in the periampullary area; part of the tumor was red (Fig. 1). No abnormalities were identified during contrast-enhanced thoracoabdominal computed tomography (CT)

Abbreviations: HLPPSD, hybrid laparoscopic pancreas preserving subtotal duodenectomy; PD, pancreaticoduodenectomy; LST, laterally spreading tumor; SMA, superior mesenteric artery; SMV, superior mesenteric vein; P-J, pancreatojejunostomy; C-J, cholangiojejunostomy.

* Corresponding author at: Department of General Surgery, Kashiwa Kousei General Hospital, 617, Shikoda, Kashiwa, Chiba, 277-8551, Japan.

E-mail address: a.obana@kashiwakousei.or.jp (A. Obana).

<https://doi.org/10.1016/j.ijscr.2020.11.029>

2210-2612/© 2020 The Authors. Published by Elsevier Ltd on behalf of IJS Publishing Group Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

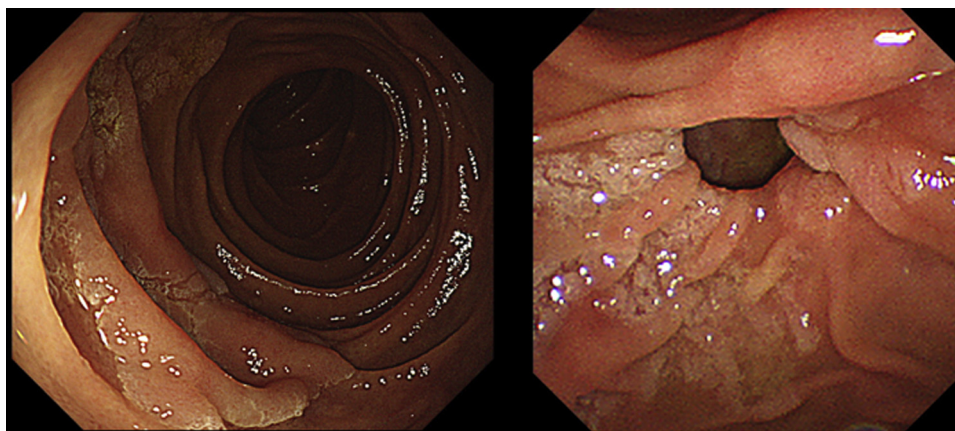


Fig. 1. A 30-mm laterally spreading tumor and a diverticulum in the periampullary area.

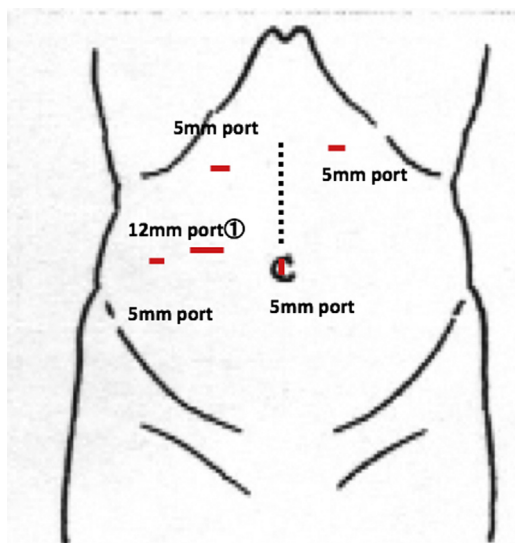


Fig. 2. Port placement schema.

or colonoscopy. A biopsy revealed that the lesion was a tubular adenoma with moderate-grade dysplasia. Given the size and color of the tumor, we suspected that this tumor had malignant potential [2,3]; tumor resection was thus indicated. CT showed no lymph node or other organ metastasis, and a diagnosis of cT1N0M0 (stage I) was established. As the surgical treatment aimed to completely remove this large tumor, preserve the pancreas, and avoid duodenal stenosis, the HLPPSD procedure was indicated. The ethics review board of Kashiwa Kousei General Hospital approved our procedure, which conforms to the provisions of the Declaration of Helsinki. Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

The primary surgeon was Dr. Sato, with 30-year of experience. The patient was placed in the modified lithotomy position. A 12-mm camera port was placed in the right abdomen, *via* the open method, and a carbon dioxide-induced pneumoperitoneum (12 mmHg) was created. The laparoscope was introduced, and four additional 5-mm ports were introduced in the right and left subcostal margins, along the right anterior axial line, and in the supraumbilical area (shown in Fig. 2).

Laparoscopically, hepatic flexure of colon was mobilized, and the gastrocolic omentum was widely divided to expose the pancreas. An extensive Kocher maneuver was performed for the third

and fourth duodenal portions being mobilized from the retroperitoneum. The transverse colon was then retracted upwards to expose the ligament of Treitz and jejunum. The ligament of Treitz was divided using laparoscopic coagulation shears. Approximately 10 cm distal to the ligament of Treitz, the jejunum was divided using an Endo-GIA linear stapler (75 mm, Medtronic, Minneapolis, MN, USA) after appropriate mesenteric dissection. The mesentery of the proximal jejunal stump was divided and mobilized close to the duodenum. Thereafter, the proximal jejunum and distal duodenum were passed behind the superior mesenteric artery (SMA) and superior mesenteric vein (SMV) to the patient's right side. The transverse colon was retracted inferiorly, and the attachments between the distal duodenum and pancreas were dissected to completely mobilize the distal duodenum. The adhesion between the duodenum and the pancreas at the supraduodenal angle was also dissected. With appropriate mesenteric dissection, the duodenum was divided using the same type of Endo-GIA linear stapler at the supraduodenal angle.

The 5-mm supraumbilical port was removed, and a Shuriken-shaped umbilicoplasty with sliding windows was performed [7,8]. A Shuriken-shaped umbilical skin incision (6-cm wide, 4-cm long, with a 3-cm diameter center) was made and the skin removed (shown in Fig. 3a). The subcutaneous tissues around the umbilicus and in the upper abdominal region were also dissected. The upper abdominal fascia was exposed, and an 8-cm upper abdominal mini-laparotomy was performed (Fig. 3b). A Gelport (Applied Medical, Rancho Santa Margarita, CA, USA) was placed, and the second portion of the duodenum and pancreatic head was confirmed under direct vision, using the sliding window method. The adhesion between the second-portion duodenum and pancreas was dissected, except for the areas near the minor and major papillae. Next, the Santorini duct was identified, ligated, and divided. The common channel and parapapillary duodenal diverticulum were also confirmed (Fig. 4). The common channel was removed, and the subtotal duodenum was removed. After removal of the common channel, the common bile and pancreatic ducts were identified.

At this point, the jejunal stump was advanced behind the SMA and SMV to the patient's right side and was manually anastomosed to the proximal duodenum, end-to-end, using an Albert–Lembert anastomosis and 4-0 vicryl sutures. To prevent mixing of the bile and pancreatic juice, a pancreatojejunostomy (P-J) and cholangio-jejunostomy (C-J) were performed, under direct vision, using the punctured stent slide guiding method [7,8] (9-Fr stent for the bile duct, 7.5-Fr stent for the pancreatic duct). The abdominal cavity was irrigated, and hemostasis was ensured. Fibrin glue was sprinkled onto the anastomotic sites, and a closed drain was placed in Morrison's pouch. The abdominal fascia then was closed, and a sub-

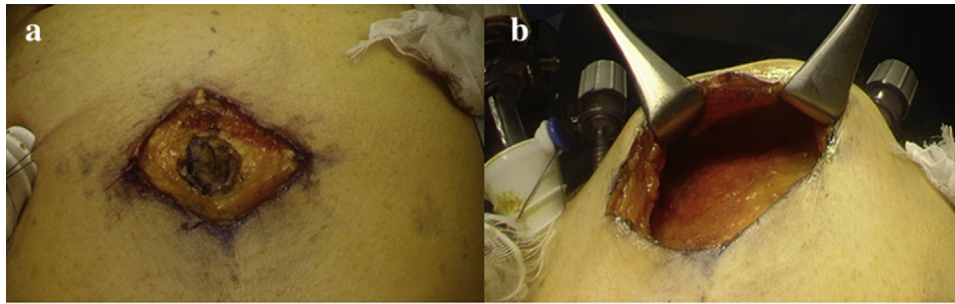


Fig. 3. a) A Shuriken-shaped skin incision is created. b) A mini-laparotomy is performed through Shuriken-shaped skin incision.

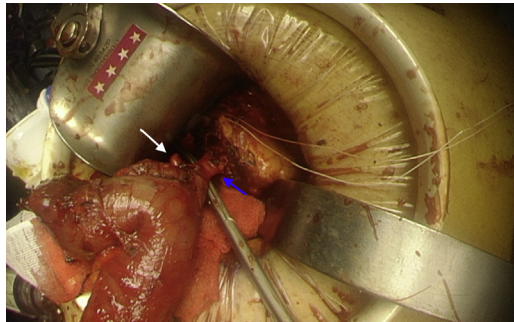


Fig. 4. The common channel (blue arrow) and the diverticulum (white arrow) were identified under direct vision.

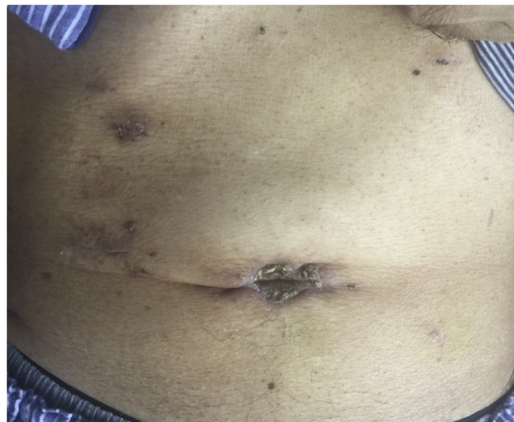


Fig. 5. Postoperative skin scars.

cutaneous closed drain tube was placed. Finally, an umbilicoplasty was performed using reefing skin incisions and interrupted subcuticular sutures (5-0 polydioxanone).

The operation duration was 6 h 55 min, with intraoperative blood loss of 210 mL. Histological examination confirmed a carcinoma *in situ*. Post-operatively, only a 3-cm round scar around the umbilicus and the four port scars remained (Fig. 5). The patient tolerated the procedure well with an uneventful postoperative course and was discharged on postoperative day 14. The patient has been followed in our hospital outpatient clinic and, 1 year after surgery, remains healthy. No tumor recurrence or anastomotic stricture was detected by CT and upper endoscopy.

3. Discussion

This case demonstrates that duodenal, non-ampullary adenomas can have malignant potential when the tumor is large and

red. Further, in patients with endoscopically-unresectable, periampullary, duodenal tumors, HLPPSD could be considered as an alternative treatment to conventional PD.

Duodenal, non-ampullary adenomas may be malignant when the tumor size exceeds 20 mm and is red. However, management of non-ampullary duodenal adenomas remains controversial. When the tumor is suspected to have a high risk of malignant transformation, tumor resection is indicated [5]. In our case, a large LST (30 mm) with a diverticulum was in the periampullary area and was endoscopically-unresectable due to the tumor's location and size. A biopsy indicated a tubular adenoma with moderate dysplasia; however, the tumor size and color [2,3] suggested malignant potential, necessitating surgical resection. As expected, histology confirmed an adenocarcinoma.

For potentially malignant, endoscopically-unresectable, duodenal adenomas in the periampullary area, HLPPSD may be an appropriate treatment option instead of conventional PD. In cases such as ours, PD is usually indicated because the periampullary diverticula should also be resected to completely remove the adenoma, as the ampulla and common channel cannot be preserved. However, PD is highly invasive and is associated with high morbidity and mortality [9], as well as decreased pancreatic exocrine and endocrine functions [10]. Hence, we selected HLPPSD as it is less invasive, and Billroth-1 reconstruction was selected to restore gastrointestinal continuity. Additionally, postoperative endoscopic management is available for anastomotic strictures. Endocrine and digestive functions of the proximal duodenum were also preserved.

Few reports of laparoscopic total or subtotal duodenectomy preserving the pancreas have been published [11–13]. One involved a laparoscope-assisted hybrid procedure [11] wherein P-J and C-J anastomoses were performed under direct vision; the surgery left a 6-cm scar, in contrast to the 3-cm round scar and port scars in our patient. Another two reports described laparoscopic pancreas-preserving total duodenectomies [12,13]. In both reports, P-J and C-J anastomoses were performed laparoscopically, which is technically demanding; leakage from these anastomoses may cause fatal complications, necessitating secure suture placement [14]. In contrast, the Shuriken procedure used in our case, with its real-time sliding window method, allows the P-J and C-J anastomoses to be performed safely under direct vision (for instance, during an open surgery), while creating only a small scar (similar to those created following a total laparoscopic procedure) [7,8].

In our patient, histology revealed invasion of the submucosal layer; if lymph node metastasis was suspected, additional surgery would have been indicated to remove the regional lymph nodes. Furthermore, cholecystectomy should be performed simultaneously to prevent delayed cholelithiasis due to biliary stasis caused by sphincter of Oddi removal and decreased cholecystokinin secretion due to the subtotal duodenectomy [15].

4. Conclusion

Duodenal, non-ampullary adenomas can be malignant when the tumor is large and red. In patients with potentially malignant, periampullary, duodenal early tumor, HLPPSD could be considered as an alternative treatment to conventional PD. Some duodenal non-ampullary adenoma with malignant potential may remain unrecognized. Further reports should be accumulated to determine whether hidden duodenal non-ampullary adenomas with malignant potential may be more frequently present.

Declaration of Competing Interest

The authors report no declarations of interest.

Funding

Not applicable.

Ethical approval

The ethics review board of Kashiwa Kousei General Hospital approved our procedure, which conforms to the provisions of the Declaration of Helsinki.

Consent

Written informed consent was obtained from the patient for publication of this case report and any accompanying images. A copy of written consent is available for review by Editor-in-Chief of this journal on request.

Author contribution

AO and YS conceived and designed the work. TM, MK, and TS contributed to the acquisition and interpretation of the data. AO and YS drafted the paper. TM, MK, and TS revised it.

All authors approved the final version of the manuscript to be published and all agree to be accountable for all aspects of the paper.

Registration of research studies

resertchregistry6170.

Guarantor

Ayato Obana.

Provenance and peer review

Not commissioned, externally peer-reviewed.

Acknowledgments

I would like to thank S. Kawa for carefully proofreading the manuscript. I am deeply grateful to Kenta Kitamura, Shinsuke Usui, Kenichi Iwasaki, Norimasa Koide, Dr. Hiroaki Nomori for helpful discussions.

References

- [1] E. Seifert, F. Schulte, M. Stolte, Adenoma and carcinoma of the duodenum and papilla of Vater: a clinicopathologic study, *Am. J. Gastroenterol.* 87 (1) (1992) 37–42, Jan.
- [2] K. Okada, J. Fujisaki, A. Kasuga, M. Omae, M. Kubota, T. Hirasawa, et al., Sporadic nonampullary duodenal adenoma in the natural history of duodenal cancer: a study of follow-up surveillance, *Am. J. Gastroenterol.* 106 (2) (2011) 357–364, <http://dx.doi.org/10.1038/ajg.2010.422>, Feb.
- [3] K. Goda, D. Kikuchi, Y. Yamamoto, K. Takimoto, N. Kakushima, Y. Morita, et al., Endoscopic diagnosis of superficial non-ampullary duodenal epithelial tumors in Japan: multicenter case series, *Dig. Endosc.* 26 (Suppl. 2) (2014) 23–29, <http://dx.doi.org/10.1111/den.12277>, Apr.
- [4] Y. Yamamoto, N. Yoshizawa, H. Tomida, J. Fujisaki, M. Igarashi, Therapeutic outcomes of endoscopic resection for superficial non-ampullary duodenal tumor, *Dig. Endosc.* 26 (Suppl. 2) (2014) 50–56, <http://dx.doi.org/10.1111/den.12273>, Apr.
- [5] E.L. Culver, A.S. McIntyre, Sporadic duodenal polyps: classification, investigation, and management, *Endoscopy* 43 (2) (2011) 144–155, <http://dx.doi.org/10.1055/s-0030-1255925>, Feb.
- [6] R.A. Agha, M.R. Borrelli, R. Farwana, K. Koshy, A. Fowler, D.P. Orgill, For the SCARE Group, The SCARE 2018 statement: updating consensus surgical CAse REport (SCARE) guidelines, *Int. J. Surg.* 60 (2018) 132–136, <http://dx.doi.org/10.1016/j.ijsu.2018.10.028>, Dec.
- [7] Y. Sato, N. Sawada, M. Shimada, D. Takayanagi, S. Mukai, C. Maeda, et al., Hybrid laparoscopic complete untinatectomy of pancreas by Shuriken shaped umbilicoplasty with sliding windows method, *Hepatogastroenterology* 61 (134) (2014) 1486–1488, Sep.
- [8] Y. Sato, Y. Hara, N. Sawada, S. Shimada, K. Nakahara, D. Takayanagi, et al., New surgical procedure for pancreas head, in: A. Seicean (Ed.), *Challenges in Pancreatic Pathology*, 26, InTech, Rijeka, 2017, pp. 181–194, Apr.
- [9] T.E. Newhook, D.J. LaPar, J.M. Lindberg, T.W. Bauer, R.B. Adams, V.M. Zaydfudim, Morbidity and mortality of pancreaticoduodenectomy for benign and premalignant pancreatic neoplasms, *J. Gastrointest. Surg.* 19 (6) (2015) 1072–1077, <http://dx.doi.org/10.1007/s11605-015-2799-y>, Jun.
- [10] L. Scholten, T.H. Mungroop, S.A.L. Haijink, Y. Issa, L.B. van Rijssen, B.G. Koerkamp, et al., New-onset diabetes after pancreatoduodenectomy: a systematic review and meta-analysis, *Surgery* 164 (1) (2018) 6–16, <http://dx.doi.org/10.1016/j.surg.2018.01.024>, Jul.
- [11] Y. Uesato, H. Sunagawa, T. Nishimaki, Laparoscopic assisted pancreas preserving total duodenectomy for duodenal cancer, *Nippon Shokaki Geka Gakkai zasshi* 50 (5) (2017) 372–378, <http://dx.doi.org/10.5833/jjgs.2016.0023>, May (in Japanese).
- [12] N. Benetatos, M.B. Ammori, B.J. Ammori, Laparoscopic pancreas-preserving total duodenectomy for familial adenomatous polyposis, *Surg. Laparosc. Endosc. Percutan. Tech.* 21 (6) (2011) e332–e335, <http://dx.doi.org/10.1097/SLE.0b013e3182397771>, Dec.
- [13] C. Copaesu, B. Smeu, A. Constantin, A. Saftoiu, Laparoscopic pancreas-sparing duodenectomy with Roux en Y reconstruction for duodenal polyposis, *Chirurgia (Bucur)* 114 (4) (2019) 494–505, <http://dx.doi.org/10.21614/chirurgia.114.4.502>, Jul.
- [14] B. Al-Sarireh, P. Ghaneh, J. Gardner-Thorpe, M. Raraty, M. Hartley, R. Sutton, et al., Complications and follow-up after pancreas-preserving total duodenectomy for duodenal polyps, *Br. J. Surg.* 95 (12) (2008) 1506–1511, <http://dx.doi.org/10.1002/bjs.6412>, Dec.
- [15] J.M. Sarmiento, G.B. Thompson, D.M. Nagorney, J.H. Donohue, M.B. Farnell, Pancreas-sparing duodenectomy for duodenal polyposis, *Arch Surg.* 137 (5) (2002) 557–563, <http://dx.doi.org/10.1001/archsurg.137.5.557>, May.

Open Access

This article is published Open Access at [sciencedirect.com](https://www.sciencedirect.com). It is distributed under the [IJSCR Supplemental terms and conditions](#), which permits unrestricted non commercial use, distribution, and reproduction in any medium, provided the original authors and source are credited.