



# Laparoscopic pancreas-preserving near total duodenectomy for large villous adenoma in patients with total colectomy for familial adenomatous polyposis

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Most familial adenomatous polyposis (FAP) patients undergo total colectomy, but duodenal polyposis develops in up to 90% of patients with FAP and a 4% to 18% risk of duodenal and ampullary cancer remains. Laparoscopic pancreas-preserving near total duodenectomy is thought to be a potential option and can be an effective approach to preserve the pancreas. A 48-year-old male patient, who underwent laparoscopic total colectomy with end ileostomy because of FAP with colorectal cancer, was diagnosed with a 20 mm-sized duodenal adenoma in the second to the third portion. The operation was performed on December 27, 2021. Near total duodenectomy was done and type II Billroth gastrojejunostomy was done. Laparoscopic pancreas-sparing duodenectomy is shown to be safe, with favorable short-term oncologic outcome compared to laparoscopic pancreatoduodenectomy in terms of less blood loss, faster recovery time, and much less total cost.

**Keywords:** Duodenal neoplasms, Minimally invasive surgery procedure, Duodenum

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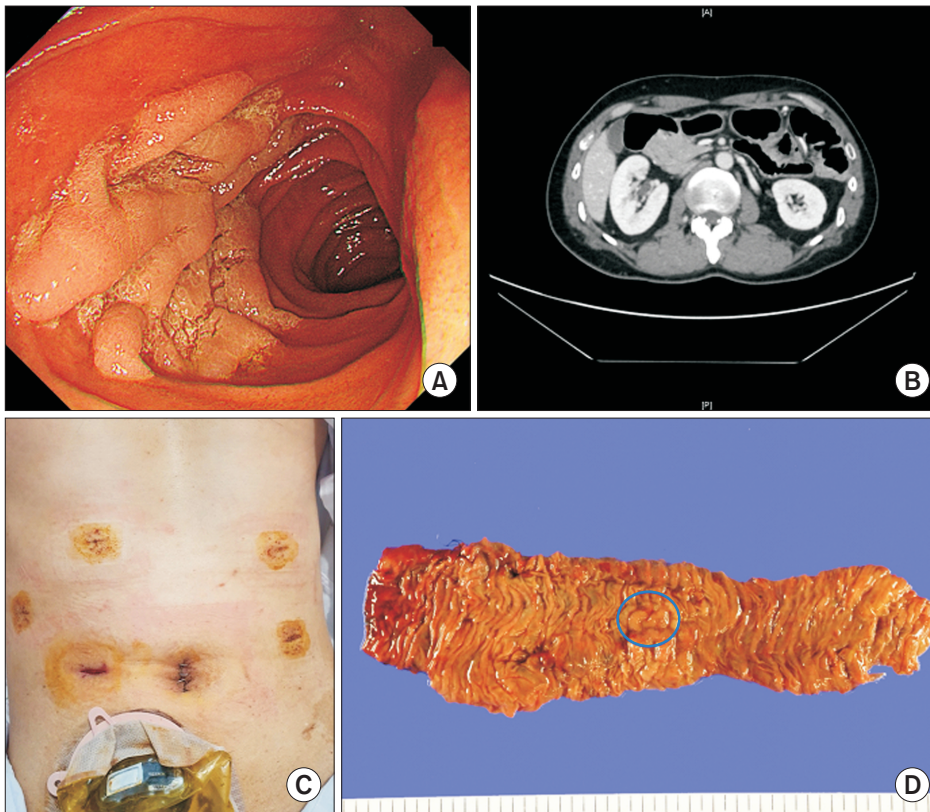
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## INTRODUCTION

Familial adenomatous polyposis (FAP) is characterized by the development of thousands of adenomas in the rectum and colon during the second decade of life. FAP is inherited in an autosomal dominant manner and results from a germline mutation in the adenomatous polyposis gene. Most patients with

FAP receive total colectomy, but duodenal polyposis develops in up to 90% of patients with FAP, and with a 4% to 18% risk of duodenal and ampullary cancer remains [1].

The endoscopic approach is good for resection of a duodenum mass in FAP patients, but the surgical option should be considered when the number of tumors to be resected or the tumor is large. In managing premalignant lesions of the duode-



**Fig. 1.** (A) Preoperative endoscopy finding. (B) Preoperative computed tomography finding. (C) Post-operative patient operation wound. (D) Pathological gross image.

num, a function-preserving and minimally invasive approach can be an ideal surgical option, because these patients are expected to have long-term survival. Not only oncologic outcome but also the quality of life should be considered in choosing a treatment option.

In this case, we present a laparoscopic pancreas-preserving near total duodenectomy (LPPTD) in a patient with previous total colectomy for FAP. This approach is thought to be a potential option and can be an effective approach to preserve the pancreas. Some concerns related to the present surgical approach will be discussed together.

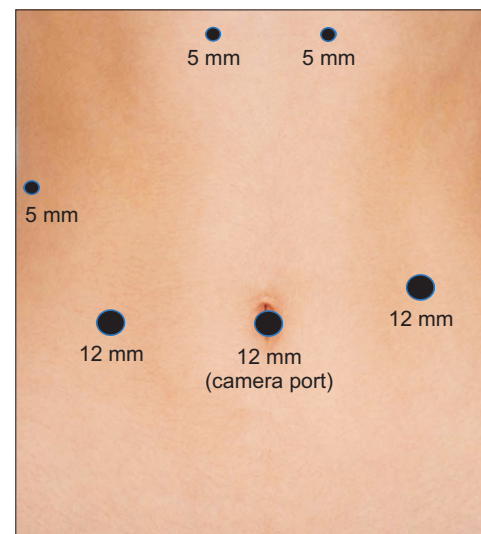
## CASE REPORT

### Patient presentation

A 48-year-old male patient, who underwent laparoscopic total colectomy with end ileostomy because of FAP with colorectal cancer, was diagnosed with a 20 mm-sized duodenal adenoma in the second to the third portion. Biopsy result was tubular adenoma with low-grade dysplasia (Fig. 1A, B).

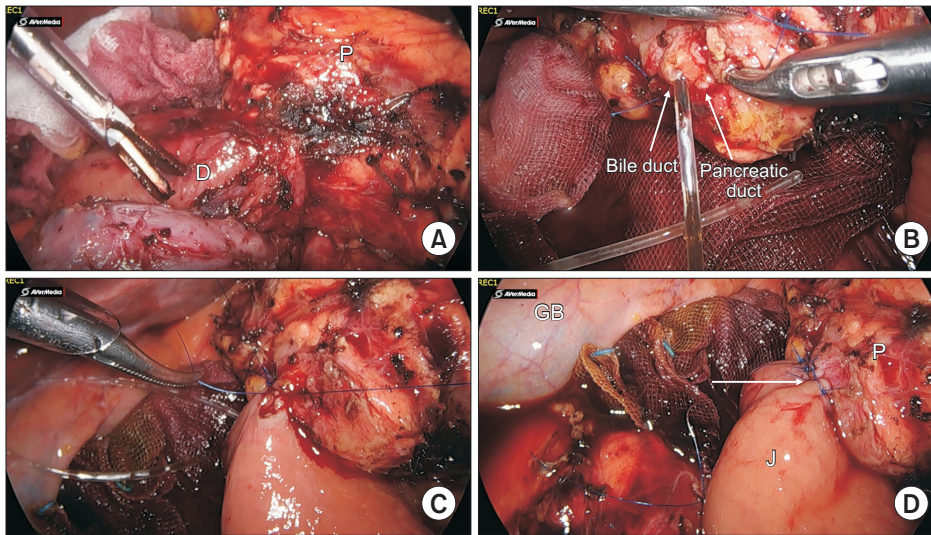
### Surgical technique

The operation was performed on December 22, 2021. With the



**Fig. 2.** Location of the trocar during surgery.

patient in the supine position, we used total of six trocar ports (Fig. 2). First, we performed Kocherization until the inferior vena cava and aorta were visible. Then, performed near total duodenectomy was with careful dissection from normal pancreas parenchyma, including part of ampulla of Vater. Then performed subserosal dissection separately (Fig. 3A, B). Pancreatico-



**Fig. 3.** Finding during operation of laparoscopic total duodenectomy. (A) Resection phase. D, dissected duodenum; P, pancreas. (B) After resection, check the position of the ducts (pancreatic duct). (C) Reconstruction phase. (D) After reconstruction. J, jejunum; P, pancreas; GB, gallbladder; arrow, anastomosis site.

biliary-jejunal anastomosis with one-layer, duct-to-mucosa anastomosis with all interrupted sutures was performed. Finally, duodenojejunosomy was done (Fig. 3C, D; Fig. 4).

### Postoperative outcomes

The postoperative period was uneventful. The patient started a soft diet four days after operation. On the 5th day after operation, the silastic open drain was removed and at the 6th postoperative day, routine postoperative computed tomography was done. There were no specific findings, so the patient was discharged in good health on the 7th postoperative day (Fig. 1C).

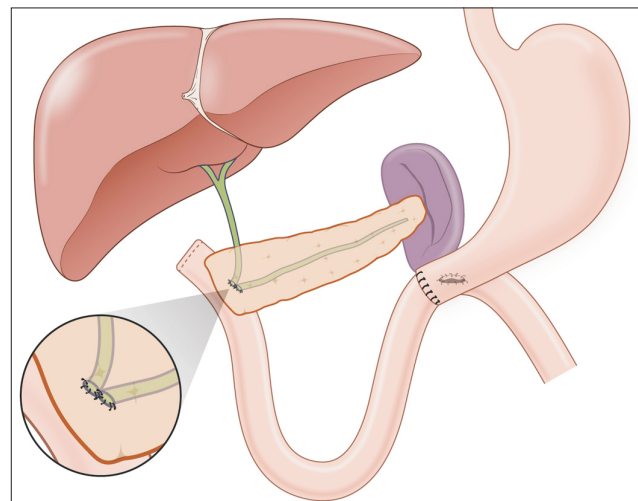
### Pathological examination

Grossly, a 4.5 × 2.5-cm well-demarcated nodular mass was revealed, and the final diagnosis was tubulovillous adenoma of duodenum (Fig. 1D), and Spigelman classification of this patient was stage III.

## DISCUSSION

Pancreatoduodenectomy (PD) is standard option for treating periampullary pathologic conditions. However, in specific cases of benign or low-grade malignant tumor arising from the duodenum, a more limited alternative surgical procedure is thought to be ideal, because these patients are expecting long-term survival and the function of the gastrointestinal organs need to be preserved for the patients' quality of life. Moreover, a minimally invasive approach is the best option.

The Spigelman classification [2] is the standard for classifying the presence of duodenal polyps in FAP patients. This clas-



**Fig. 4.** Anatomical illustration after pancreas-preserving total duodenectomy.

sification divides patients into five stages according to the size, number, and degree of differentiation. Using this classification can help determine the procedure according to the tumor condition.

In line with this concept, we previously reported the technical feasibility and safety of laparoscopic partial sleeve duodenectomy for an infraampullary gastrointestinal stromal tumor of the duodenum [3], and laparoscopic pancreas-sparing duodenectomy is shown to be comparable safe and favorable short-term oncologic outcome comparing with laparoscopic PD in terms with less blood loss, much faster recovery time, and much less total cost [4].

The report of pancreas-preserving total duodenectomy was published in 1995 [5]; however, laparoscopic pancreas-sparing total duodenectomy was first described by Benetatos et al. [6] in a patient with FAP for duodenal polyposis. Similarly, Vega et al. [7] recently reported laparoscopic total duodenectomy by prepyloric gastric transection for two symptomatic duodenal adenomas.

Whether the method is pyloric preserving or not is still controversial in performing pancreas-preserving total duodenectomy. Traditionally, the pyloric ring is resected when total duodenectomy is recommended due to potential appearance of duodenal cancer arising from the duodenal remnant in FAP [8]. It is reported that duodenal cancer occurs in as many as 5% of cases of duodenal polyposis in FAP. However, in the present case, we performed LPPTD in patients with solitary large duodenal villous adenomatous polyp, who had undergone laparoscopic total colectomy with end ileostomy for FAP. We preserved the pylorus by leaving a 1- to 2-cm proximal duodenal cuff instead of pyloric-ring transaction. The main functions of the pylorus are to prevent intestinal contents from reentering the stomach when the small intestine contracts and to limit the passage of large food particles or undigested material into the intestine. Therefore, a pylorus-preserving procedure was thought to be ideal for this patient. A small proportion of duodenal cuff is also sure to be easily accessed and evaluated by endoscopic gastroduodenoscopic surveillance. Further study is necessary about these issues by way of more experiences and long-term follow-up results.

Some literatures have reported laparoscopic total duodenectomy, two-layered, duct-to-mucosa, pancreatico- and choledochojejunostomy [6,7,9]. However, we only performed duct-to-mucosa reimplantation for the biliary and pancreatic duct into the jejunum by single layer all interrupted sutures. It is thought that it is not necessary to perform two-layered anastomosis, because there is no pancreatic division as PD, and the whole pancreas is intact. Additional outer layer sutures may be somewhat more dangerous because there is a pancreatoduodenal vascular arcade between the gastroduodenal artery and inferior pancreatoduodenal artery around the pancreatic head.

In summary, LPPTD seems to be a feasible and safe procedure, and LPPTD can be an option when a duodenal lesion occurs in FAP patients who have undergone total colectomy.

## NOTES

### Ethical statements

This study was approved by the Institutional Review Board of Yonsei University College of Medicine with a waiver of informed consent (No. 4-2022-0301).

### Authors' contributions

Conceptualization, Project administration, Supervision: CMK

Formal analysis, Investigation: JEJ

Methodology: DJ

Writing—original draft: DJ

Writing—review & editing: All authors

All authors read and approved the final manuscript.

### Conflict of interest

All authors have no conflicts of interest to declare.

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