Case Report

DOI: 10.5582/bst.2012.v6.1.44

Resection of the second portion of the duodenum sacrificing the minor papilla but preserving the pancreas for a recurrent duodenal adenocarcinoma: Report of a case

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Summary **Duodenal adenocarcinoma is a relatively rare malignancy and pancreaticoduodenectomy would be a standard procedure to achieve curative resection. We report a case of resection of the 2nd portion of the duodenum with nodal dissection preserving the pancreas. The patient was a 75-year-old man with right-sided paresis suffering from early cancer in the 2nd portion of the duodenum. Despite 3 times of endoscopic mucosal resections, mucosal local recurrence was found. The depth of the tumour involvement continued to be limited within the mucosal layer. We performed segmental duodenal resection with nodal dissection sacrificing the minor papilla, while preserving the pancreas and the major papilla. The pathological diagnosis was primary intramucosal adenocarcinoma; the surgical margin was negative for cancer and there was no nodal metastasis. This procedure can be an alternative to pancreaticoduodenectomy in patients with early-stage adenocarcinoma in the 2nd portion of the duodenum when the major papilla can be spared, especially in high-risk patients.**

Keywords: Duodenal resection, adenocarcinoma, major papilla, pancreaticoduodenectomy, pancreas-sparing duodenectomy

1. Introduction

Duodenal adenocarcinoma is a relatively rare digestive malignancy and pancreaticoduodenectomy (PD) would be a standard curative procedure (*1*). Recent insights into the surgical anatomy of the pancreaticoduodenal region (*2*) have permitted pancreas-sparing duodenectomy (PSD) for low grade malignancies (*3-7*). Some authors suggested that surgical indications of PSD can be divided into 3 categories: early-stage neoplasms, isolated duodenal neoplasms in high-risk patients, and duodenal involvement from adjacent organ malignancies (*5*). Herein, we report a case of resection of the 2nd portion of the duodenum with nodal dissection for a recurrent intramucosal adenocarcinoma in the duodenum for a high-risk patient.

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2. Case report

2.1. *Patient and present illness*

An asymptomatic 75-year-old man was admitted to a local hospital for the endoscopic treatment of a papillary tumour, measuring 3 cm in diameter, in the second portion of the duodenum. He underwent endoscopic piecemeal mucosal resection 3 times, however a local recurrence was found on the primary site. The pathological finding of the piecemeal specimen was adenocarcinoma with a tubulovillous adenoma component. He was referred to our hospital for radical resection of the recurrent lesion. He had been suffering from lumbar canal stenosis and cerebral infarction since he was 60 and 70 years old, respectively. Because he had right-sided paresis, he used a wheelchair in his

daily life. He also had moderate dementia associated with cerebral vascular disease. The patient's laboratory data showed slight anemia and hypo-albuminemia; serum albumin, 3.6 g/dL and hemoglobin, 12.7 g/dL. Serum level of carbohydrate antigen 19-9 (CA19-9) was 65 U/mL (normal range, < 37 U/mL).

Upper gastrointestinal fiberscope revealed a papillary tumour, 3 cm in diameter, originating from the 2nd portion of the duodenum. Endoscopic ultrasonography showed no extraduodenal involvement, and the tumour appeared to be limited within the mucosal layer (Figure 1A). On enhanced abdominal CT, no apparent nodal metastasis or distant metastasis was found. Coronal Magnetic Resonance Images revealed that the tumour was located 1.5 cm proximal to the minor papilla (Figure 1B). The existence of pancreatic divisum was denied by Magnetic Resonance Cholangio pancreatography. Thus, the preoperative diagnosis was recurrent duodenal cancer involving the mucosal layer without nodal or distant metastasis (T1N0M0).

2.2. *Surgical procedure*

Considering the poor-risk of the patient and the limited extent of tumour spread, we conducted duodenal resection concomitant with antrectomy of the stomach and nodal dissection, as a substitute procedure for PD. After complete mobilization of the duodenum, cholecystectomy was performed, and a 6Fr feeding tube was inserted from the cystic duct to find out the position of the major papilla by manipulation, which should be preserved. The lymph nodes along the right gastroepiploic arteries (#No. 6 and No. 4) and some of the nodes along the right gastric artery (#No. 5 and No. 3) were dissected. After antrectomy using a linear stapler, the duodenum was dissected from the pancreatic head preserving the pancreatic parenchyma. The root of the minor papilla, connecting to the duct of Santorini, was identified along the dissecting plane, which was situated about 2 cm ventroproximal to the major papilla. It was encircled by vessel loop (Figure 2A) and was clipped. To confirm the preservation of the major papilla, intraoperative cholangiography was performed by using above-mentioned 6Fr feeding tube. And the root of the minor papilla was ligated and divided. The anal side of the duodenum was divided using another linear stapler, preserving the orifice of the major papilla. An ante-colic Roux-en-Y loop was then made, and an end-to-side gastro-jejunostomy was performed using a circular stapler (Figure 2B) (*8*). The operative time and intraoperative blood loss were 355 min and 100 mL, respectively.

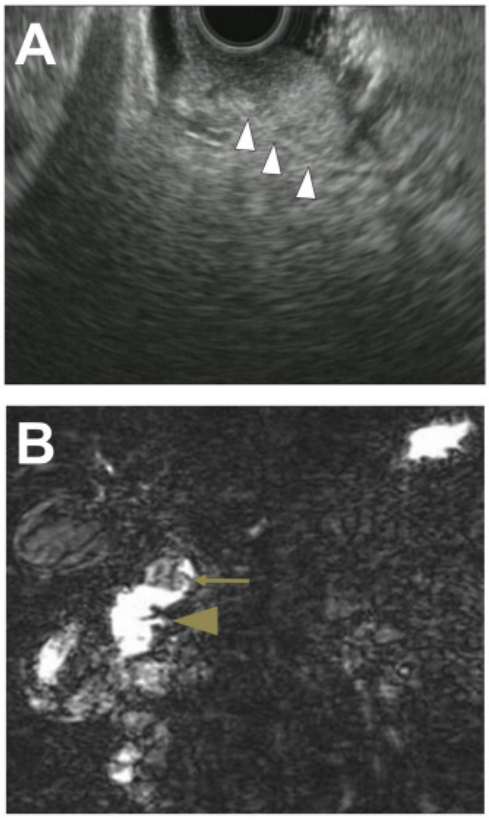

Figure 1. Endoscopic ultrasonography and coronal-view MR diagnosis. (A) Endoscopic ultrasonography revealed that the tumour had not invaded the proper muscular layer of the duodenum. The hypoechoic line (arrowhead), which suggested the proper muscular layer, was intact. **(B)** Coronal-view MR showed that the tumour (arrow) existed in the second portion of the duodenum, 1.5 cm proximal to the minor papilla (arrowhead).

2.3. *Postoperative outcome immunohistochemistry*

The postoperative course was uneventful, except for delayed gastric emptying. Neither pancreatitis nor pancreatic leakage was documented. The patient was transferred to a local hospital on day 31 for further rehabilitation. The pathological diagnosis was primary duodenal intramucosal adenocarcinoma with tubulovillous adenomas. There was no nodal metastasis (= 0/6). The proximal and distal resection margins were negative for cancer (Figure 2C). There was neither perineural nor microvascular invasion.

3. Discussion

We successfully performed resection of the 2nd portion of the duodenum with nodal dissection sacrificing the minor papilla, while preserving the pancreas and the major papilla for a recurrent duodenal cancer limited within the mucosal layer. The patient had poor surgical risks and was not a candidate for an extensive resection. Surgical margins were negative for cancer and there was no nodal involvement. The postoperative course was uneventful. The present PSD with nodal dissection would be a less invasive surgery feasible in a poor risk patient and could be an alternative procedure for adenocarcinoma in the 2nd portion of the duodenum.

Although several authors have reported PSDs for

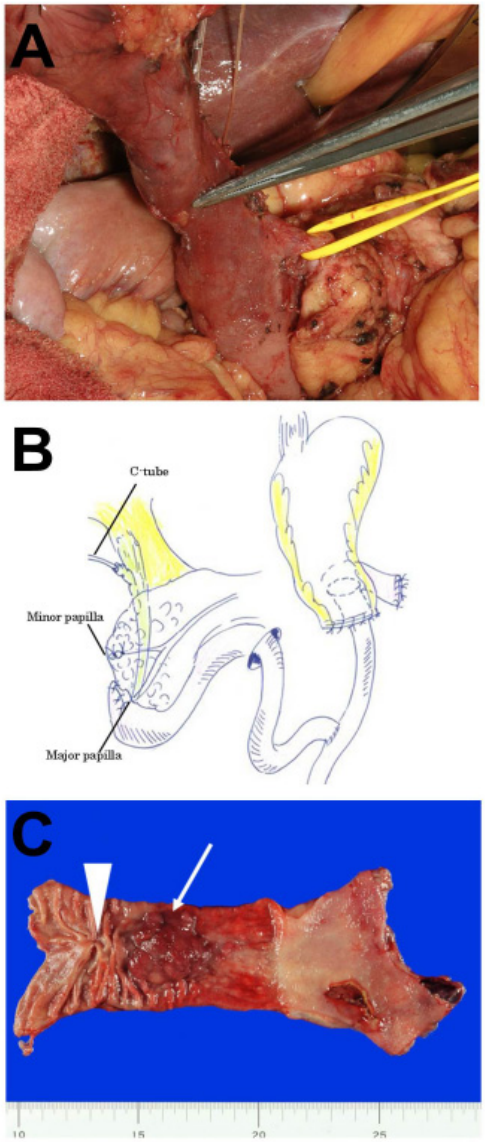

Figure 2. Intraoperative surgical findings. (A) Intraoperative findings showed the anal margin of the tumour, indicated by the forceps, and encirclement of the duct of Santorini by vessel loop. **(B)** Roux-en-Y reconstruction was performed to separate the alimentary root from the stump of the duodenum. **(C)** Macroscopic findings showed that the papillary elevated tumour (arrow) was located 1 cm proximal to the minor papilla (arrowhead) (Right side: oral side).

various duodenal malignancies, reports on resection of the 2nd portion of the duodenum for a duodenal adenocarcinoma are very limited. Only 1 report of segmental resection of the 2nd portion of the duodenum has been found in 2 patients in the literature to our knowledge (*5*). However, techniques for dividing the minor papilla have not been clearly described in the previous report. The key of the present surgical procedure was safely sacrificing the minor papilla and sparing the major papilla. In the present case, minor papilla had to be resected to secure adequate surgical margins. To safely sacrifice the minor papilla, it is very important to confirm the position of the major papilla, using the tube in the duodenum through the cystic duct and the major papilla. Adequate nodal dissection would be necessary in case of adenocarcinoma, not likely in case of duodenal gastrointestinal stromal tumour (GIST) (*7*).

The definition of the term PSD is variable. Chung *et al*. first used PSD in 1995 and described the procedure as near total duodenectomy (*9*). Tsiotos *et al*. used the term PSD to mean almost complete resection of the duodenum (*10*). Meanwhile, Maher *et al*. and we used PSD to describe resection of only the third and fourth portions of the duodenum (*7,11*). This procedure has also been named segmental duodenectomy (*12-14*). Cho *et al*. reported proximal segmental duodenectomy under the term PSD (*15*). In addition, the reported PSD involves operations with and without reconstruction of the major papilla. Papilloplasty and implantation of the major papilla would be technically too complicated, and severe surgical complications have been reported, such as bile leakage, pancreatic fistula, acute pancreatitis, and passage disturbance at the anastomotic site (*9,12,16-18*). Therefore, we consider that not PSD, but PD should be indicated when the major papilla cannot be preserved. As for the alimentary reconstruction in the present method, Asakawa *et al*. described the possible advantage of Roux-en-Y reconstruction to separate the alimentary root from the stump of the duodenum (*6*).

Surgical indication of PSD for primary early adenocarcinoma arising from the duodenum remains controversial. PD would be necessary in patients with duodenal cancer invading the pancreas or with possible nodal metastases. Ryu *et al.* observed no nodal metastasis in 122 patients with duodenal cancer limited in the mucosal layer (*19*). Just when the intramucosal duodenal cancer is confirmed preoperatively, we might be able to omit the nodal dissection. However when the submucosal minimal invasion couldn't be denied completely, perilesional nodal dissection would be efficient. In these patients, less invasive surgery by use of PSD offers the good chance for a cure and good postoperative quality of life.

In conclusion, we successfully performed a resection of the 2nd portion of the duodenum with nodal dissection sacrificing the minor papilla, while preserving the pancreas and major papilla, for a recurrent duodenal cancer limited within the mucosal layer. This procedure can also be an alternative to PD in patients with low grade-malignancy in the 2nd portion of the duodenum when the major papilla can be spared.

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(Received February 10, 2012; Revised February 16, 2012; Accepted February 22, 2012)