

Laparoscopy Assisted Transduodenal Resection of a Periapillary Tumor at the Inferior Duodenal Angulus

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Abstract

Background: Duodenal adenoma is a rare lesion that requires resection because of its malignant potential. Minimally invasive surgery is desirable for such lesions.

Case summary: A 52-year-old man underwent esophagogastroduodenoscopy, which revealed a 30-mm 0-IIa-like lesion at the inferior duodenal angulus. Examination of the biopsy specimen revealed a Group IV adenoma. The tumor was treated by laparoscopic transduodenal ampullectomy, which was performed under general anesthesia and via 5 trocars. After laparoscopic mobilization of the duodenum and pancreas head, the duodenum was externalized through a mini-laparotomy. A longitudinal incision was placed in the duodenum, and the tumor was excised extracorporeally under direct vision; submucosal dissection was achieved with an electrocautery device. The mucosal defect and duodenal wall were closed with interrupted sutures. The tumor measured 26 mm × 25 mm and was diagnosed histologically as a tubular adenoma with low grade atypia. The surgical margin was adenoma-negative. The postoperative course was uneventful.

Conclusion: From our experience in this case, we deem laparoscopy-assisted transduodenal ampullectomy to be a feasible and safe procedure for a periampullary duodenal tumor.

Keywords: Duodenal tumor; Laparoscopic resection; Transduodenal approach

Introduction

Endoscopic Submucosal Dissection (ESD) of duodenal lesions is difficult because of the thinness of the duodenal wall and the narrow working space [1,2]. In cases in which the tumor exists in the third or fourth portion of the duodenum, endoscopic removal is especially difficult and sometimes even impossible. Further, endoscopic removal of a tumor at the inferior duodenal angulus on the ampullary side is extremely difficult if not impossible. Laparoscopic-Endoscopic Cooperative Surgery (LECS) has been described as a minimally invasive and reliable means of resecting non-ampullary duodenal tumors [3,4]. However, removal of a tumor located at the ampulla or on the distal side is difficult to achieve with LECS.

We describe successful laparoscopy-assisted transduodenal excision of a tumor situated at the inferior duodenal angulus on the ampullary side.

Case Report

The patient was a 52-year-old man who had been referred to us in October 2016 after a duodenal lesion was detected by esophagogastroduodenoscopy during a health screening. There was no family history of such a lesion. The lesion was located at the inferior duodenal angulus on the ampullary side. At the time of admission to our hospital, the patient appeared to be in good health, and results of blood tests were normal. Upper gastrointestinal endoscopy confirmed the presence of a 30-mm type 0-IIa-like lesion at the inferior duodenal angulus on the ampullary side (Figures 1a and 1b). The tumor reached 1 mm below the ampulla. Endoscopic biopsy was performed, and the lesion was diagnosed as a Group IV tubular adenoma, with a potential for conversion to adenocarcinoma. Contrast-enhanced computed tomography was performed and showed no evidence of lymph node swelling around the duodenum. We informed the patient of the malignant potential and that surgical resection was necessary. We also informed the patient that the standard surgery for duodenal adenocarcinoma is pancreatoduodenectomy and that laparoscopy-

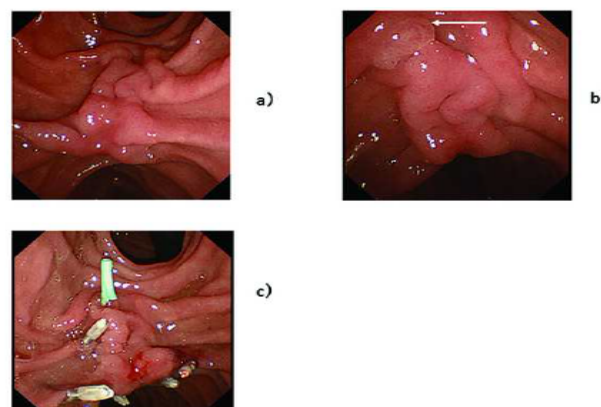


Figure 1: Appearance of the tumor upon endoscopic examination: a) A 30-mm 0-IIa type lesion was seen at the inferior duodenal angulus. b) The tumor was quite close to the ampulla of Vater (arrow). c) Marker clips were placed near the tumor and a drainage tube was placed in the main pancreatic duct via the ampulla of Vater.

assisted transduodenal ampullectomy, a minimally invasive procedure, is appropriate for benign tumors of the duodenum. He requested the laparoscopic surgery and provided written informed consent for the procedure.

Two days before the operation, marker clips were placed

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Received: July 13, 2017; **Accepted:** August 13, 2017; **Published:** August 20, 2017

Citation: Sakon M, Sekino Y, Seki H, Seki A, Munakata Y, et al. (2017) Laparoscopy Assisted Transduodenal Resection of a Periapillary Tumor at the Inferior Duodenal Angulus. J Clin Case Rep 7: 1001. doi: [10.4172/2165-7920.10001001](https://doi.org/10.4172/2165-7920.10001001)

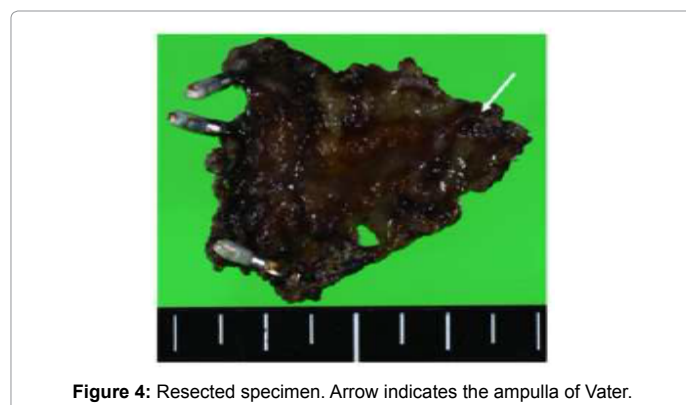
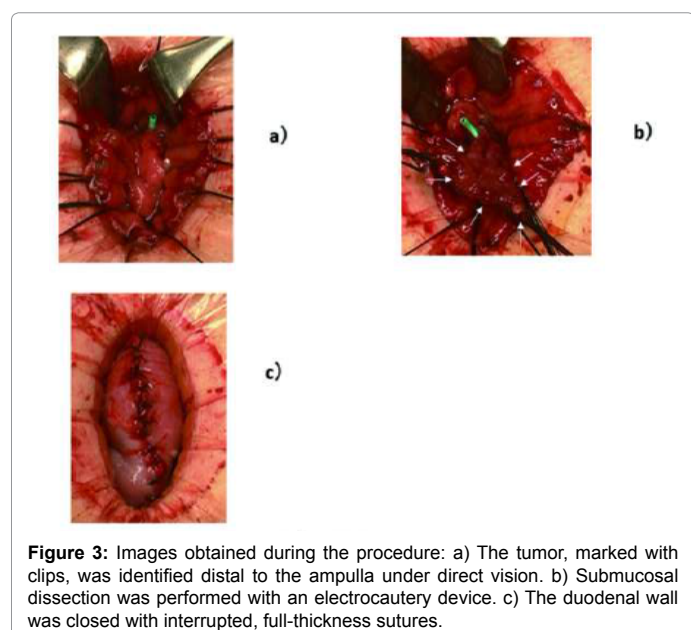
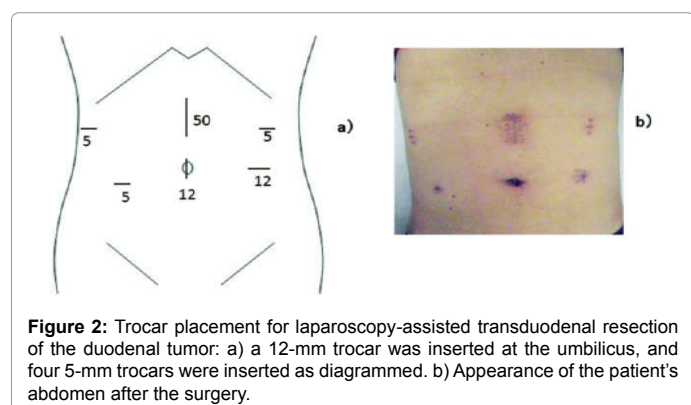
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endoscopically at 5 points near the tumor, and a surgical drain was placed in the main pancreatic duct *via* the ampulla of Vater (Figure 1c).

The surgery was performed under general anesthesia. The patient was placed in the supine position with his legs spread apart. The primary surgeon stood first on the patient's left and then moved to the patient's right, and the assistant surgeon stood opposite the primary surgeon. An incision was made in the patient's umbilicus, and a 12-mm trocar was inserted to accommodate a flexible scope. Four other trocars were inserted (Figures 2a and 2b). Pneumoperitoneum was established and maintained at 10 mmHg by insufflation of CO₂.

The laparoscopic surgery began with dissection of the greater omentum was dissected with the use of ultrasonic coagulation shears (SonoSurg, Olympus, Tokyo, Japan). The hepatocolic ligament was then dissected for mobilization of the right colic flexure. The Kocher maneuver was performed, and the duodenum with the pancreas head was freed from the retroperitoneum.

After mobilization of the duodenum, a 5-cm mini-laparotomy incision was made in the upper abdomen. A wound retractor (Alexis, Applied Medical Resources Corporation, Rancho Santa Margarita, California, USA) was used to open the wound, and a part of the duodenum was externalized through the mini-laparotomy. Under direct vision, a 5-cm longitudinal incision was made in the duodenal wall



at the inferior angulus on the side opposite the ampulla. The marker clips surrounding the tumor made detection of the tumor fairly easy. Stay sutures were placed around the tumor to stretch the duodenal wall (Figure 3a). Submucosal dissection to remove the tumor was performed extracorporeally with an electrocautery device under direct vision (Figure 3b). The tumor was excised with a safety margin. The mucosal defect was closed with absorbable interrupted sutures, and the incision in the duodenal wall was closed with interrupted Albert-Lembert sutures (Figure 3c).

An endoscope was inserted into the duodenum to confirm airtightness and patency at the site of repair. An omental patch was used to cover the suture site. A soft, flexible drainage tube was placed near the duodenum and left in place for 7 days.

The total operation time was 300 minutes, and the blood loss volume was limited. The surgical specimen measured 37 mm in length, and the 0-IIa lesion at the center was 26 mm in length (Figure 4). The postoperative course was uneventful, and the patient was discharged on postoperative day 11. Histopathologic examination of the surgical specimen confirmed that the lesion was a tubular adenoma with low grade atypia. It measured 26 mm × 25 mm, and the surgical margin was adenoma-negative.

Discussion

In digestive tract tumors, the incidence of duodenal carcinoma is 0.019% to 3.1%. Duodenal neoplasms are rare lesions. The duodenal tumors in 32 of 75 patients was malignant, excluding lesions of the ampulla of Vater. Benign tumors were found in 43 patients [5]. The symptoms of duodenal tumors were non-specific, therefore rendering early diagnosis and treatment difficult. Due to jaundice, periampullary duodenal tumors were diagnosed earlier than non-ampullary duodenal tumors. Gastroduodenoscopy and CT may be used to diagnose duodenal tumors.

The standard surgical treatment for carcinoma of the duodenum that involves the ampulla of Vater is pancreatoduodenectomy. Transduodenal local resection, a less invasive surgery, can be performed for benign ampullary tumors [6,7]. The tumor in our case, an adenoma located at the inferior duodenal angulus close to the ampulla of Vater, was treated successfully by means of minimally invasive submucosal dissection. Generally, endoscopic removal of a tumor at this site is very difficult if not impossible.

Although ESD is widely accepted for gastric tumors, whether this approach is applicable to duodenal tumors is controversial. There appears to be an increased risk of perforation when ESD is performed for duodenal tumors [1,2]. In the small duodenal lumen, maneuvering

the flexible endoscope is technically difficult. Endoscopic papillectomy can be applied to small (<2 cm) villous or tubulovillous adenomas of the papilla [8,9] but endoscopic excision of a tumor located at the inferior duodenal angulus is generally not feasible.

Laparoscopic transduodenal ampullectomy has been reported, but not often [10,11]. Rosen et al. were the first to report laparoscopic transduodenal resection of a periampullary lesion, and they concluded that the procedure provides advantages similar to those of endoscopic resection because the tumor is removed in a minimally invasive manner [10]. Ahn et al. reported two cases of totally laparoscopic transduodenal ampullectomy for benign ampullary tumors [11]. They excised the tumors and anastomosed the bile and pancreatic ducts to the duodenal wall laparoscopically. Laparoscopic suturing of the bile and pancreatic ducts is very difficult, and a procedure that provides for easy, less invasive tumor excision is desirable. Therefore, resection of a tumor near the ampulla of Vater under direct vision is a reasonable approach. Abe et al. reported laparoscopy-assisted transduodenal excision of superficial non-ampullary duodenal epithelial tumors [12]. They excised tumors through a 4-cm mini-laparotomy after mobilizing the duodenum laparoscopically. We used a transduodenal approach to excise the periampullary tumor. Under direct vision, we were able to resect the tumor safely and achieve a negative surgical margin. Complete mobilization of the duodenum and pancreas head is essential for this procedure, and we found that by externalizing the duodenum (thru a mini-laparotomy), we can resect the tumor under direct vision as well as we can in open surgery.

The LECS approach was reported by Hiki et al. for gastric submucosal tumors [13]. Application of LECS to non-ampullary duodenal tumors has also been reported [3,4]. LECS is a very useful procedure for duodenal tumors. However, LECS cannot be performed for tumors located at the inferior duodenal angulus or in the third portion of the duodenum.

We believe that when ampullary resection is performed, drainage of the pancreatic juice and bile is necessary to prevent postoperative pancreatitis and cholangitis. In the case described herein, we placed drainage tube only in the pancreatic duct *via* the ampulla of Vater. Ideally, we should have placed a drainage tube in the common bile duct also.

Conclusion

Laparoscopic transduodenal ampullectomy allowed for reliable

and adequate resection of our patient's periampullary tumor, which was located at the inferior duodenal angulus. We believe our success in this case can be replicated in other cases and that studies assessing the reliability and benefits of laparoscopy-assisted transduodenal ampullectomy in such cases are warranted.

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