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Microscopic transduodenal excision of an ampullary adenoma: A case report and review of the literature

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Abstract

BACKGROUND

Transduodenal local excision is an alternative treatment approach for benign ampullary tumors. However, this procedure has technical difficulties, especially during reconstruction of the pancreaticobiliary ducts. An operating microscope has been widely used by surgeons for delicate surgery due to its major advantages of magnification, illumination, and stereoscopic view. The application of an operating microscope in transduodenal excision of ampullary tumors has not been reported.

CASE SUMMARY

A 55-year-old woman was admitted for investigation of recurrent upper abdominal pain. Physical examination and laboratory tests found no abnormalities. Imaging identified a large mass in the descending part of the duodenum. Esophagogastroduodenoscopy revealed a 3.5-cm-sized villous growth over the major duodenal papilla. Pathology of the endoscopic biopsy indicated a villous adenoma with low-grade dysplasia. Microscopic transduodenal excision of the ampullary tumor was performed. The final pathological diagnosis was villous-tubular adenoma with low-grade dysplasia. The patient was discharged on postoperative day 12 after an uneventful recovery. Endoscopic retrograde cholangiopancreatography was performed 3 mo postoperatively and showed no bile duct or pancreatic duct strictures and no tumor recurrence. The patient is continuing follow-up at our clinic and remains well.

CONCLUSION

Operating microscope-assisted transduodenal local excision is a feasible and effective option for benign ampullary tumors.

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Core Tip: Operating microscope-assisted transduodenal excision of ampullary tumors has not been reported. We present our experience of microscopic transduodenal local excision in a case of ampullary adenoma. The application of an operating microscope provides significant technical advantages, particularly in the reconstruction of pancreaticobiliary ducts. The successful outcome in this case suggests that microscopic transduodenal excision is feasible and effective for patients with ampullary tumors.

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INTRODUCTION

Ampullary tumors have been increasingly encountered as esophagogastroduodenoscopy (EGD) is widely used in the clinic, of which adenomas are the most common tumors[1]. Complete resection of ampullary adenomas is necessary as they are potentially malignant[2]. Currently, there are three approaches to manage ampullary neoplasms: Endoscopic papillectomy (EP), pancreaticoduodenectomy (PD), and transduodenal excision. Although EP is globally recognized as the first choice for treatment of benign ampullary tumors, it can only be carried out on small tumors confined to the papilla and not involving the common bile duct or pancreatic duct[3, 4]. Traditional PD is a standard surgical approach for malignant ampullary tumors. However, the application of PD in patients with benign lesions remains controversial given the significant postoperative morbidity and mortality. Compared to PD, transduodenal excision of ampullary tumors offers significantly lower morbidity and mortality. Several reports have indicated that transduodenal excision can be used as an alternative treatment approach for benign or ampulla of Vater neoplasms[5-7]. However, widespread use of this procedure has failed as it is technically demanding. Suboptimal dissection and reconstruction of the pancreaticobiliary duct system can lead to tumor residues and life-threatening complications.

An operating microscope has the major advantages of magnification, illumination, and stereoscopic view, and is now widely used in various surgical sub-specialties such as neurosurgery, ophthalmology, plastic surgery, and orthopedics[8,9]. The application of high-definition microscopes has provided surgeons with greater anatomical detail, which is particularly helpful during the execution of finer dissection and reconstruction techniques, as is required when treating ampullary lesions. We report a case of operating microscope-assisted transduodenal excision of an ampullary tumor, and evaluate the safety and efficacy of this approach.

CASE PRESENTATION

Chief complaints

A 55-year-old woman was admitted to our hospital with a history of recurrent upper abdominal pain for 1 year. The patient had no symptoms of fever, nausea, vomiting, or weight loss.

History of present illness

The patient's symptoms started 1 year ago, with recurrent episodes of upper abdominal pain that were relieved spontaneously.

History of past illness

The patient had no previous medical history.

Personal and family history

The personal and family history was unremarkable.

Physical examination

The patient's physical examination was unremarkable.

Laboratory examinations

The laboratory findings, including liver function tests and tumor markers (carcinoembryonic antigen, alpha fetoprotein, and carbohydrate antigen 19-9), were all within normal limits.

Imaging examinations

On computed tomography (CT) (Figure 1A) and magnetic resonance imaging (Figure 1B), a large mass with contrast enhancement was observed in the descending part of the duodenum. On magnetic resonance cholangiography (Figure 1C), no cut-off sign or stricture was found on either the bile duct or pancreatic duct except for a mild dilation of the common bile duct.

Further diagnostic work-up

EGD revealed a 3.5-cm-sized villous growth over the major duodenal papilla (Figure 1D). Pathology of the endoscopic biopsy indicated a villous adenoma with low-grade dysplasia.

FINAL DIAGNOSIS

Based on the radiographic and pathological findings, an ampullary adenoma was diagnosed.

TREATMENT

Microscopic transduodenal excision of the ampullary tumor was performed (Figure 2). The patient was placed in the supine position under general anesthesia. After a midline laparotomy, the duodenum was mobilized with the Kocher maneuver. The ampullary lesion was identified by palpation of the descending part of the duodenum. A 4-cm longitudinal duodenotomy was performed over the anterolateral wall and stay sutures were then placed to keep the duodenotomy open (Figure 2A). A Zeiss operating microscope (OPM2 VARIO 700, Carl Zeiss Meditec AG, Jena, Germany) was used. The ampullary tumor was excised using monopolar cautery and microscopic scissors under the operating microscope (Figure 2B). The pancreaticobiliary duct was identified by high magnification, and dissected carefully to ensure an adequate margin (Figure 2C and D). The specimen was sent for intraoperative pathological examination with the tumor orientation details. Intraoperative frozen section confirmed a villous adenoma with a negative margin. The pancreaticobiliary duct was sutured to the surrounding duodenal mucosa with an interrupted 6/0 prolene suture to reconstruct the ampulla (Figure 2E). A gauge 12 silicone catheter was inserted through the orifice into the pancreatic duct for stenting, and was anchored with 5/0 PDS sutures. The duodenotomy incision was closed with a one-layer transverse suture with interrupted 5/0 prolene stitches (Figure 2F). Anterior and posterior silicone drains were placed near the duodenotomy. The operative time was 160 min. The blood loss was 30 mL.

OUTCOME AND FOLLOW-UP

Postoperative pathology showed a villous-tubular adenoma with low-grade dysplasia. The patient started to take a semi-fluid diet 6 d post-operation. An abdominal CT scan was performed on postoperative day 7, and showed no leakage or passage disturbance. The patient was discharged on postoperative day 12 after an uneventful recovery. An endoscopy was performed 3 mo after surgery to remove the pancreatic

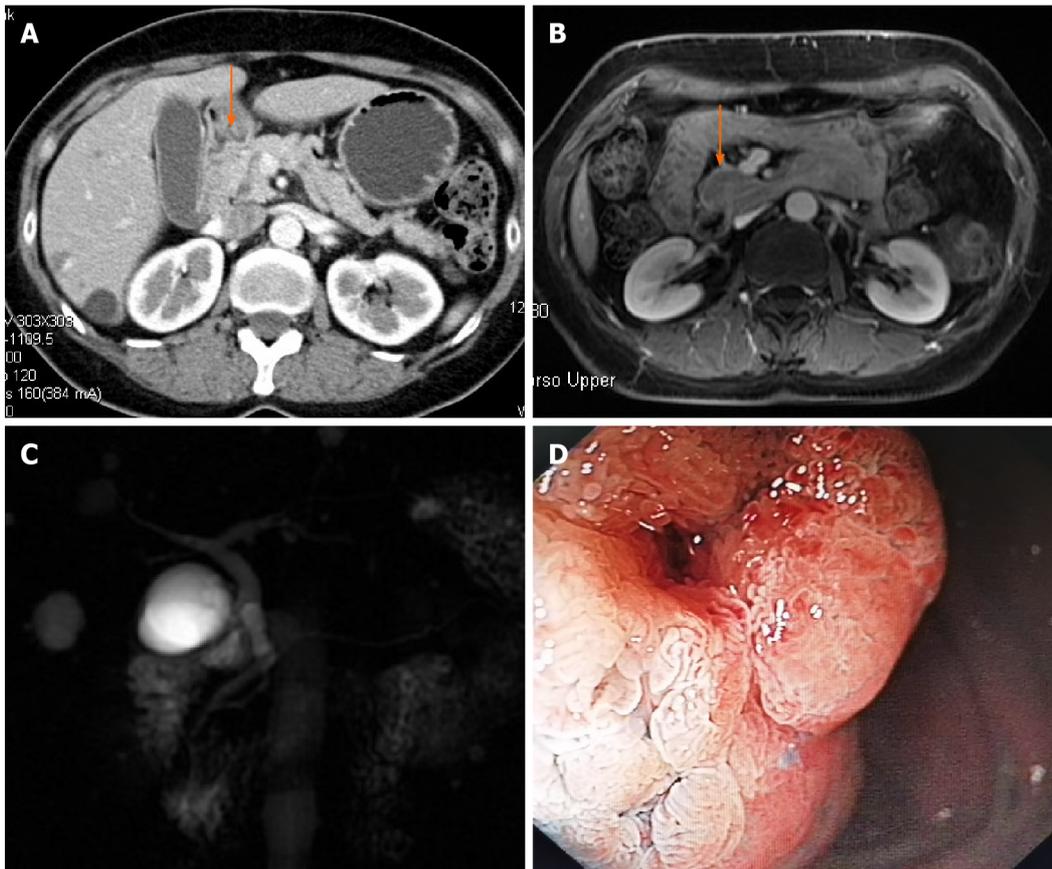


Figure 1 Preoperative examination of the ampullary tumor. A and B: Contrast-enhanced computed tomography and magnetic resonance imaging showing an enhanced lesion (arrow) located in the descending part of the duodenum; C: Magnetic resonance cholangiography revealing a mild dilation of the common bile duct, and no cut-off sign or stricture of either the bile duct or pancreatic duct; D: Endoscopic view of the ampullary adenoma.

duct stent, and endoscopic retrograde cholangiopancreatography was performed, which showed no recurrence of the ampullary lesion and no bile duct or pancreatic duct stricture. She is continuing follow-up at our clinic and remains well.

DISCUSSION

Adenomas are the most common ampullary tumors[10]. Complete resection is required to treat ampullary adenomas as they are premalignant[11]. Currently, the management strategies include EP, PD, and transduodenal excision. Although EP is an attractive option as it is minimally invasive, it is limited to patients with smaller lesions confined to the papilla and without involvement of the duodenal muscularis or pancreaticobiliary ducts. PD is a standard procedure for malignant ampullary tumors. However, the treatment of benign tumors by PD is still debated. It could be considered as overtreatment given the high postoperative morbidity (32.6%-57.6%)[12-15] and mortality (2%-5%)[16-19] rates associated with PD. Therefore, transduodenal excision has emerged as an alternative treatment option for ampullary adenomas.

Transduodenal excision has advantages over PD in terms of less invasiveness and organ preservation. Its safety and efficacy have been investigated in several case series [7,20,21]. The largest series of transduodenal excision was reported by the Heidelberg group[22]. Eighty-three patients were included in this study, of which 44 patients had adenomas. The postoperative morbidity and mortality rate were 24% and 1.2%, respectively, and were much lower than those following PD. A recent study reported by the Milan group confirmed the safety of transduodenal excision, with an overall morbidity rate of 44.4% and no mortality[6]. With regard to long-term outcomes, the local recurrence rate of adenomas after transduodenal excision was 4.5% in the Heidelberg study and 11.1% in the Milan study, lower than that following excision by EP (17%-45%) reported in a series including more than 20 cases[23-25]. These results suggest that transduodenal excision of ampullary tumors is an alternative treatment

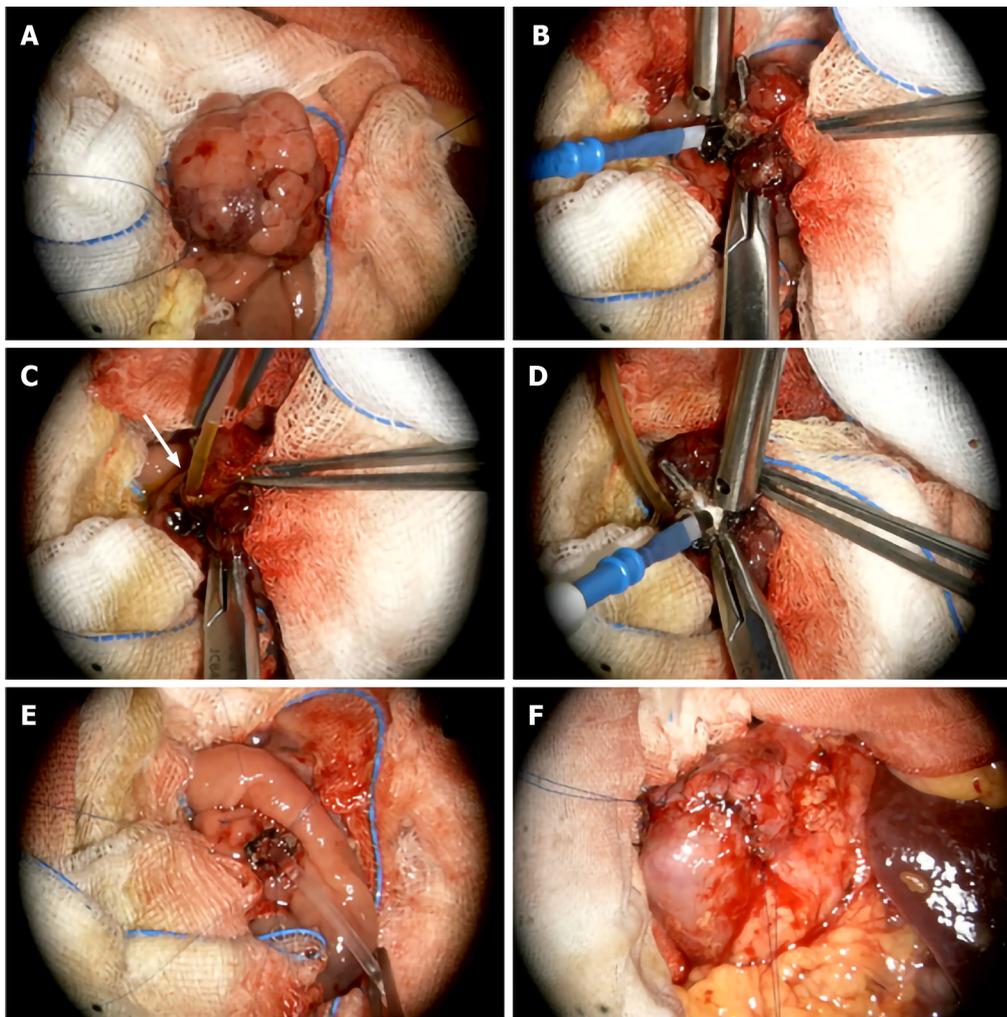


Figure 2 Steps of the surgical procedure under the operating microscope. A: Exposure of the duodenal papillary adenoma; B: Kelly forceps placed under the tumor to raise the ampulla of Vater; C: Identifying the pancreaticobiliary duct (arrow) by insertion of a silicone catheter. One orifice was created in this case; D: Dissecting the ampullary adenoma carefully to ensure an adequate margin; E: Suturing the pancreaticobiliary duct to the surrounding duodenal mucosa with 6/0 prolene sutures; F: Closure after the duodenotomy.

option in patients who are unsuitable for EP but too extensively treated by PD.

However, to date, there are limited reports on transduodenal excision in the English-language literature, and wide use of this procedure as standard has failed. This is due to the complex anatomy of the ampulla and the location of the tumor which is deep within the duodenum. In addition, the size of the pancreatic and biliary duct might be too small to be identified and delicately sutured to the duodenal mucosa. These features make the surgical procedure complex and technically demanding. Risks can arise from suboptimal dissection and reconstruction of the ampulla. In Lee *et al*[26], one (16.7%) of six patients developed biliary stricture 3 mo after the operation[26]. Operation-associated ductal strictures can be complicated by pancreatitis and cholangitis. The postoperative pancreatitis and cholangitis rate was 2.3% and 4.5%, respectively, in the Heidelberg study. In the Milan study, two (5.6%) of 36 patients developed acute pancreatitis postoperatively. In other studies, similar complications have been reported. Grobmyer *et al*[27] reported that three (10.3%) of 29 patients undergoing ampullectomy had postoperative pancreatitis[27]. Hong *et al* reported that one (3.8%) patient was readmitted with cholangitis 28 mo after the operation[21]. The difficulty in pancreaticobiliary duct reconstruction and the operation-associated complications prevent the widespread use of transduodenal excision.

Optical magnifying tools, such as laparoscopes, robot surgical systems, or operating microscopes, might be helpful when rebuilding the pancreaticobiliary duct system. Laparoscopic and robotic transduodenal excision of ampullary tumors is minimally invasive and facilitates recovery; however, only a few cases have been reported [26,28-31]. Transduodenal excision has been mainly performed by open laparotomy to date.

This is probably due to the difficulty in proper exposure of the ampulla and the complicated procedures involved in delicate resection and reconstruction of fine pancreaticobiliary structures. Microsurgery has been widely used in clinical surgery, and is particularly favorable in dealing with delicate tissues. The application of operating microscopes provides surgeons with a more magnified and clearer view of the anatomy. Thus, operating microscopes are favorable in the field of neurosurgery, ophthalmology, plastic surgery, and orthopedics. Theoretically, the high magnification and illumination can help in the most complex and difficult part of the ampulla operation, namely, dissection of the ampulla and reconstruction of the pancreatic and biliary duct. However, to date, there have been no publications in the English-language literature to demonstrate the potential advantages of the operating microscope in local resection of ampullary tumors.

We report the first case of transduodenal excision of an ampullary tumor with the assistance of an operating microscope. The optimal exposure and magnification with the microscope facilitated identification of the tumor margin; therefore, an adequate margin was obtained. Most importantly, the magnified ductal structures are easier to identify and reconstruct, thus optimal suturing can be achieved when performing choledochoduodenostomy and pancreaticoduodenostomy. In the present case, the patient had an uneventful postoperative recovery and was discharged. Compared to the existing data, the application of an operating microscope neither increased the operation time nor the complications. No signs of tumor recurrence and ductal stricture were found during the follow-up period. These results suggest that our proposal of using an operating microscope during transduodenal excision is advantageous in this group of patients. However, microsurgical applications also have limitations. For example, surgeons require precise technical skills and continuous training to complete the resection. The use of an operating microscope may increase the operation time and operation-associated contamination[32,33]. Thus, more cases are needed for analysis to demonstrate the potential benefits.

CONCLUSION

We demonstrated that transduodenal excision is an ideal approach for treating patients with benign ampullary tumors who are not amenable to EP. The use of an operating microscope provides significant technical advantages, particularly in dissecting and rebuilding the pancreaticobiliary ducts.

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