

World Journal of *Clinical Cases*

World J Clin Cases 2020 December 26; 8(24): 6213-6545



MINIREVIEWS

- 6213 Role of gut microbiome in regulating the effectiveness of metformin in reducing colorectal cancer in type 2 diabetes

Huang QY, Yao F, Zhou CR, Huang XY, Wang Q, Long H, Wu QM

ORIGINAL ARTICLE**Retrospective Cohort Study**

- 6229 Impact factors of lymph node retrieval on survival in locally advanced rectal cancer with neoadjuvant therapy

Mei SW, Liu Z, Wang Z, Pei W, Wei FZ, Chen JN, Wang ZJ, Shen HY, Li J, Zhao FQ, Wang XS, Liu Q

Retrospective Study

- 6243 Three-year follow-up of Coats disease treated with conbercept and 532-nm laser photocoagulation

Jiang L, Qin B, Luo XL, Cao H, Deng TM, Yang MM, Meng T, Yang HQ

- 6252 Virus load and virus shedding of SARS-CoV-2 and their impact on patient outcomes

Chen PF, Yu XX, Liu YP, Ren D, Shen M, Huang BS, Gao JL, Huang ZY, Wu M, Wang WY, Chen L, Shi X, Wang ZQ, Liu YX, Liu L, Liu Y

- 6264 Risk factors for *de novo* hepatitis B during solid cancer treatment

Sugimoto R, Furukawa M, Senju T, Aratake Y, Shimokawa M, Tanaka Y, Inada H, Noguchi T, Lee L, Miki M, Maruyama Y, Hashimoto R, Hisano T

- 6274 Cause analysis and reoperation effect of failure and recurrence after epiblepharon correction in children

Wang Y, Zhang Y, Tian N

Clinical Trials Study

- 6282 Effects of different acupuncture methods combined with routine rehabilitation on gait of stroke patients

Lou YT, Yang JJ, Ma YF, Zhen XC

Observational Study

- 6296 Application of endoscopic submucosal dissection in duodenal space-occupying lesions

Li XY, Ji KY, Qu YH, Zheng JJ, Guo YJ, Zhang CP, Zhang KP

- 6306 Early renal injury indicators can help evaluate renal injury in patients with chronic hepatitis B with long-term nucleos(t)ide therapy

Ji TT, Tan N, Lu HY, Xu XY, Yu YY

Prospective Study

- 6315** Neoadjuvant chemoradiotherapy plus surgery in the treatment of potentially resectable thoracic esophageal squamous cell carcinoma
Yan MH, Hou XB, Cai BN, Qu BL, Dai XK, Liu F

CASE REPORT

- 6322** Uterine rupture in patients with a history of multiple curettages: Two case reports
Deng MF, Zhang XD, Zhang QF, Liu J
- 6330** Pleural effusion and ascites in extrarenal lymphangiectasia caused by post-biopsy hematoma: A case report
Lin QZ, Wang HE, Wei D, Bao YF, Li H, Wang T
- 6337** Eighty-year-old man with rare chronic neutrophilic leukemia caused by CSF3R T618I mutation: A case report and review of literature
Li YP, Chen N, Ye XM, Xia YS
- 6346** Sigmoid colon duplication with ectopic immature renal tissue in an adult: A case report
Namgung H
- 6353** Paraplegia from spinal intramedullary tuberculosis: A case report
Qu LM, Wu D, Guo L, Yu JL
- 6358** Confocal laser endomicroscopy distinguishing benign and malignant gallbladder polyps during choledochoscopic gallbladder-preserving polypectomy: A case report
Tang BF, Dang T, Wang QH, Chang ZH, Han WJ
- 6364** Sclerosing stromal tumor of the ovary with masculinization, Meig's syndrome and CA125 elevation in an adolescent girl: A case report
Chen Q, Chen YH, Tang HY, Shen YM, Tan X
- 6373** Primary pulmonary malignant melanoma diagnosed with percutaneous biopsy tissue: A case report
Xi JM, Wen H, Yan XB, Huang J
- 6380** SRY-negative 45,X/46,XY adult male with complete masculinization and infertility: A case report and review of literature
Wu YH, Sun KN, Bao H, Chen YJ
- 6389** Refractory case of ulcerative colitis with idiopathic thrombocytopenic purpura successfully treated by Janus kinase inhibitor tofacitinib: A case report
Komeda Y, Sakurai T, Sakai K, Morita Y, Hashimoto A, Nagai T, Hagiwara S, Matsumura I, Nishio K, Kudo M
- 6396** Immunotherapies application in active stage of systemic lupus erythematosus in pregnancy: A case report and review of literature
Xiong ZH, Cao XS, Guan HL, Zheng HL

- 6408** Minimally invasive maxillary sinus augmentation with simultaneous implantation on an elderly patient: A case report
Yang S, Yu W, Zhang J, Zhou Z, Meng F, Wang J, Shi R, Zhou YM, Zhao J
- 6418** Congenital nephrogenic diabetes insipidus due to the mutation in *AVPR2* (c.541C>T) in a neonate: A case report
Lin FT, Li J, Xu BL, Yang XX, Wang F
- 6425** Primary gastric melanoma in a young woman: A case report
Long GJ, Ou WT, Lin L, Zhou CJ
- 6432** Extreme venous letting and cupping resulting in life-threatening anemia and acute myocardial infarction: A case report
Jang AY, Suh SY
- 6437** Novel conservative treatment for peritoneal dialysis-related hydrothorax: Two case reports
Dai BB, Lin BD, Yang LY, Wan JX, Pan YB
- 6444** Clinical characteristics of pulmonary cryptococcosis coexisting with lung adenocarcinoma: Three case reports
Zheng GX, Tang HJ, Huang ZP, Pan HL, Wei HY, Bai J
- 6450** Fracture of the scapular neck combined with rotator cuff tear: A case report
Chen L, Liu CL, Wu P
- 6456** Synchronous colonic mucosa-associated lymphoid tissue lymphoma found after surgery for adenocarcinoma: A case report and review of literature
Li JJ, Chen BC, Dong J, Chen Y, Chen YW
- 6465** Novel mutation in the *ASXL3* gene in a Chinese boy with microcephaly and speech impairment: A case report
Li JR, Huang Z, Lu Y, Ji QY, Jiang MY, Yang F
- 6473** Recurrent thrombosis in the lower extremities after thrombectomy in a patient with polycythemia vera: A case report
Jiang BP, Cheng GB, Hu Q, Wu JW, Li XY, Liao S, Wu SY, Lu W
- 6480** Status epilepticus as an initial manifestation of hepatic encephalopathy: A case report
Cui B, Wei L, Sun LY, Qu W, Zeng ZG, Liu Y, Zhu ZJ
- 6487** Delayed diagnosis of prosopagnosia following a hemorrhagic stroke in an elderly man: A case report
Yuan Y, Huang F, Gao ZH, Cai WC, Xiao JX, Yang YE, Zhu PL
- 6499** Oral myiasis after cerebral infarction in an elderly male patient from southern China: A case report
Zhang TZ, Jiang Y, Luo XT, Ling R, Wang JW
- 6504** Rare case of drain-site hernia after laparoscopic surgery and a novel strategy of prevention: A case report
Gao X, Chen Q, Wang C, Yu YY, Yang L, Zhou ZG

- 6511** Extracorporeal shock wave therapy treatment of painful hematoma in the calf: A case report
Jung JW, Kim HS, Yang JH, Lee KH, Park SB
- 6517** Takotsubo cardiomyopathy associated with bronchoscopic operation: A case report
Wu BF, Shi JR, Zheng LR
- 6524** Idiopathic adulthood ductopenia with elevated transaminase only: A case report
Zhang XC, Wang D, Li X, Hu YL, Wang C
- 6529** Successful endovascular treatment with long-term antibiotic therapy for infectious pseudoaneurysm due to *Klebsiella pneumoniae*: A case report
Wang TH, Zhao JC, Huang B, Wang JR, Yuan D
- 6537** Primary duodenal tuberculosis misdiagnosed as tumor by imaging examination: A case report
Zhang Y, Shi XJ, Zhang XC, Zhao XJ, Li JX, Wang LH, Xie CE, Liu YY, Wang YL

ABOUT COVER

Peer-Reviewer of *World Journal of Clinical Cases*, Dr. Adonis Protopapas is a gastroenterology Resident at the first Propaedeutic Department of Internal Medicine of the Aristotle University of Thessaloniki (Greece), located at the A.H.E.P.A Hospital. He earned his Bachelor's degree in 2015 from the Democritus University of Thrace, followed by three Master's of Science degrees, with specializations in clinic pharmacology, medical research methodology, and healthcare management. His research interests are mainly focused on the area of hepatology, although he also participates in various projects related to endoscopy and inflammatory bowel disease. He is particularly fascinated by research on cirrhosis and its complications. (L-Editor: Filipodia)

AIMS AND SCOPE

The primary aim of *World Journal of Clinical Cases* (*WJCC*, *World J Clin Cases*) is to provide scholars and readers from various fields of clinical medicine with a platform to publish high-quality clinical research articles and communicate their research findings online.

WJCC mainly publishes articles reporting research results and findings obtained in the field of clinical medicine and covering a wide range of topics, including case control studies, retrospective cohort studies, retrospective studies, clinical trials studies, observational studies, prospective studies, randomized controlled trials, randomized clinical trials, systematic reviews, meta-analysis, and case reports.

INDEXING/ABSTRACTING

The *WJCC* is now indexed in Science Citation Index Expanded (also known as SciSearch®), Journal Citation Reports/Science Edition, PubMed, and PubMed Central. The 2020 Edition of Journal Citation Reports® cites the 2019 impact factor (IF) for *WJCC* as 1.013; IF without journal self cites: 0.991; Ranking: 120 among 165 journals in medicine, general and internal; and Quartile category: Q3.

RESPONSIBLE EDITORS FOR THIS ISSUE

Production Editor: *Ji-Hong Liu*; Production Department Director: *Xiang Li*; Editorial Office Director: *Jin-Lai Wang*.

NAME OF JOURNAL

World Journal of Clinical Cases

ISSN

ISSN 2307-8960 (online)

LAUNCH DATE

April 16, 2013

FREQUENCY

Semimonthly

EDITORS-IN-CHIEF

Dennis A Bloomfield, Sandro Vento, Bao-gan Peng

EDITORIAL BOARD MEMBERS

<https://www.wjgnet.com/2307-8960/editorialboard.htm>

PUBLICATION DATE

December 26, 2020

COPYRIGHT

© 2020 Baishideng Publishing Group Inc

INSTRUCTIONS TO AUTHORS

<https://www.wjgnet.com/bpg/gerinfo/204>

GUIDELINES FOR ETHICS DOCUMENTS

<https://www.wjgnet.com/bpg/GerInfo/287>

GUIDELINES FOR NON-NATIVE SPEAKERS OF ENGLISH

<https://www.wjgnet.com/bpg/gerinfo/240>

PUBLICATION ETHICS

<https://www.wjgnet.com/bpg/GerInfo/288>

PUBLICATION MISCONDUCT

<https://www.wjgnet.com/bpg/gerinfo/208>

ARTICLE PROCESSING CHARGE

<https://www.wjgnet.com/bpg/gerinfo/242>

STEPS FOR SUBMITTING MANUSCRIPTS

<https://www.wjgnet.com/bpg/GerInfo/239>

ONLINE SUBMISSION

<https://www.f6publishing.com>

Observational Study

Application of endoscopic submucosal dissection in duodenal space-occupying lesions

Xiao-Yu Li, Kai-Yue Ji, Yu-Hu Qu, Juan-Juan Zheng, Ying-Jie Guo, Cui-Ping Zhang, Kun-Peng Zhang

ORCID number: Xiao-Yu Li 0000-0001-8017-207X; Kai-Yue Ji 0000-0002-8622-5213; Yu-Hu Qu 0000-0002-4557-9306; Juan-Juan Zheng 0000-0001-9623-794X; Ying-jie Guo 0000-0003-2909-9887; Cui-ping Zhang 0000-0002-1328-0991; Kun-Peng Zhang 0000-0002-3438-1601.

Author contributions: Li XY and Ji KY contributed equally to this work and should be regarded as co-first authors, and they collected the clinical data and wrote the manuscript; Qu YH, Zheng JJ, and Guo YJ contributed to clinical data collection and follow-up; Zhang CP directed the study and reviewed the final manuscript; Zhang KP performed the endoscopic resection for the patient and revised the article.

Supported by the National Natural Science Foundation of China, No. 81802777; the Shandong Higher Education Research Center Scientific Research Project, No. YJKT201953; the Shandong Province 2018 Professional Degree Postgraduate Teaching Case Library Project, No. SDYAL18049; the Shandong Province 2018 Postgraduate Mentoring Ability Improvement Project, No. SDYY18073; and the "Clinical Medicine + X" project of Qingdao University Hospital.

Xiao-Yu Li, Kai-Yue Ji, Juan-Juan Zheng, Ying-Jie Guo, Cui-Ping Zhang, Kun-Peng Zhang, Department of Gastroenterology, The Affiliated Hospital of Qingdao University, Qingdao 266003, Shandong Province, China

Yu-Hu Qu, Endoscopy Center, Shandong Qingdao Sanatorium, Qingdao 266000, Shandong Province, China

Corresponding author: Kun-Peng Zhang, PhD, Doctor, Department of Gastroenterology, The Affiliated Hospital of Qingdao University, No 16 Jiangsu Road, Qingdao 266000, Shandong Province, China. zhangkp17@126.com

Abstract

BACKGROUND

Endoscopic submucosal dissection (ESD) has been advocated by digestive endoscopists because of its comparable therapeutic effect to surgery, reduced trauma, faster recovery, and fewer complications. However, ESD for lesions of the duodenum is more challenging than those occurring at other levels of the gastrointestinal tract due to the thin intestinal wall of the duodenum, narrow intestinal space, rich peripheral blood flow, proximity to vital organs, and high risks of critical adverse events including intraoperative and delayed bleeding and perforation. Because of the low prevalence of the disease and the high risks of severe adverse events, successful ESD for lesions of the duodenum has rarely been reported in recent years.

AIM

To investigate the efficacy and safety of ESD in the treatment of duodenal space-occupying lesions.

METHODS

Clinical data of 24 cases of duodenal lesions treated by ESD at the Digestive Endoscopy Center of the Affiliated Hospital of Qingdao University from January 2016 to December 2019 were retrospectively analyzed.

RESULTS

All of the 24 cases from 23 patients underwent ESD treatment for duodenal space-occupying lesions under general anesthesia, including 15 male and 8 female patients, with a mean age of 58.5 (32.0-74.0) years. There were 12 lesions (50%) in the duodenal bulb, 9 (37.5%) in the descending part, and 3 (12.5%) in the ball-

Institutional review board

statement: The study was reviewed and approved by the Affiliated Hospital of Qingdao University Institutional Review Board.

Informed consent statement:

Informed written consent was obtained from the patient for publication of this report and any accompanying images.

Conflict-of-interest statement: The authors declare that they have no conflict of interest.

Data sharing statement: No additional data are available.

Open-Access: This article is an open-access article that was selected by an in-house editor and fully peer-reviewed by external reviewers. It is distributed in accordance with the Creative Commons Attribution NonCommercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>

Manuscript source: Unsolicited manuscript

Specialty type: Gastroenterology and hepatology

Country/Territory of origin: China

Peer-review report's scientific quality classification

Grade A (Excellent): 0
Grade B (Very good): 0
Grade C (Good): C
Grade D (Fair): 0
Grade E (Poor): 0

Received: August 26, 2020

Peer-review started: August 26, 2020

First decision: September 13, 2020

Revised: September 15, 2020

Accepted: September 25, 2020

Article in press: September 25, 2020

Published online: December 26,

descending junction. The mean diameter of the lesion was 12.75 (range, 11-22) mm. Thirteen lesions originated from the mucosa, of which 4 were low-grade intraepithelial neoplasia, 3 were hyperplastic polyps, 2 were chronic mucositis, 2 were adenomatous hyperplasia, 1 was high-grade intraepithelial neoplasia, and 1 was tubular adenoma. Eleven lesions were in the submucosa, including 5 neuroendocrine neoplasms, 2 cases of ectopic pancreas, 1 stromal tumor, 1 leiomyoma, 1 submucosal duodenal adenoma, and 1 case of submucosal lymph follicular hyperplasia. The intraoperative perforation rate was 20.8% (5/24), including 4 submucosal protuberant lesions and 1 depressed lesion. The mean length of hospital stay was 5.7 (range, 3-10) d, and the average follow-up time was 25.8 (range, 3.0-50.0) mo. No residual disease or recurrence was found in all patients, and no complications, such as infection and stenosis, were found during the follow-up period.

CONCLUSION

ESD is safe and effective in the treatment of duodenal lesions; however, the endoscopists should pay more attention to the preoperative preparation, intraoperative skills, and postoperative treatment.

Key Words: Endoscopic resection; Submucosal dissection; Space-occupying lesions; Duodenal adenoma; Duodenal lesions; Complications

©The Author(s) 2020. Published by Baishideng Publishing Group Inc. All rights reserved.

Core Tip: Endoscopic submucosal dissection (ESD) has been advocated by digestive endoscopists because of its comparable therapeutic effect to surgery, reduced trauma, faster recovery, and fewer complications. ESD for lesions of the duodenum is challenging due to the thin intestinal wall of the duodenum, narrow intestinal space, rich peripheral blood flow, and proximity to vital organs, such as the common bile duct and pancreas. Therefore, the duodenal lesion biopsy before ESD should be small and parallel to the fold to avoid scarring and hindering subsequent dissection. Duodenal ESD should be performed quickly to shorten the operation time and reduce delayed perforation and bleeding caused by electrocoagulation syndrome and intestinal wall edema, especially when the lesions are on the medial side of the descending segment of the duodenum because of proximity to huge arteries, the common bile duct, and pancreas tissues. The wounds after ESD should be sutured with metal clips to avoid late perforation.

Citation: Li XY, Ji KY, Qu YH, Zheng JJ, Guo YJ, Zhang CP, Zhang KP. Application of endoscopic submucosal dissection in duodenal space-occupying lesions. *World J Clin Cases* 2020; 8(24): 6296-6305

URL: <https://www.wjgnet.com/2307-8960/full/v8/i24/6296.htm>

DOI: <https://dx.doi.org/10.12998/wjcc.v8.i24.6296>

INTRODUCTION

Currently, with the technological development of digestive endoscopy and the increasing awareness of timely gastrointestinal tumor screening, more patients with early gastrointestinal tumors and precancerous lesions have been promptly detected and treated by minimally invasive endoscopy. Endoscopic submucosal dissection (ESD) has been advocated by digestive endoscopists because of its comparable therapeutic effect to surgery, reduced trauma, faster recovery, and fewer complications^[1,2]. The incidence of duodenal space-occupying lesions is low^[3], however, due to special anatomical characteristics, such as the abundant blood supply to the duodenum, thin intestinal wall, and small intestinal cavity space, the incidence of complications such as perforation and bleeding is high^[4], and ESD treatment is challenging, though this has rarely been reported in recent years. Twenty-three patients (24 sites) with duodenal space-occupying lesions were treated by ESD in the Digestive Endoscopy Center of the Affiliated Hospital of Qingdao University from

2020

P-Reviewer: Hirasawa K**S-Editor:** Zhang H**L-Editor:** Wang TQ**P-Editor:** Ma YJ

January 2016 to December 2019. In the present study, the clinical data of these cases, including therapeutic effect and postoperative follow-up, were analyzed to summarize the safety and clinical experience of ESD in the treatment of duodenal space-occupying lesions.

MATERIALS AND METHODS

General information

Patients with duodenal space-occupying lesions admitted to the Digestive Endoscopy Center of the Affiliated Hospital of Qingdao University were included in the study from January 2016 to December 2019. Patients with duodenal papillary lesions were excluded. A total of 23 patients were included, including 16 male and 7 female patients, with a mean age of 58.5 (range, 32-74) years. Among them, 15 cases had dull epigastric pain, abdominal distension, belching, and other atypical symptoms usually seen in the upper gastrointestinal tract disorders; 1 had black stools; and 7 did not complain of any obvious discomfort. Twenty-four lesions were noted in 23 patients, including 12 (50%) in the duodenal bulb, 9 (37.5%) in the descending part, and 3 (12.5%) in the ball-descending junction. The mean diameter of the lesions was 12.75 (range, 11-22) mm.

Devices and equipment

Gastroscope (Olympus GIF-H290, GIF-Q260J), duodenoscope (Olympus TJF-260V), ultrasonic endoscope (Olympus GF-UE260), ultrasonic small probe (UM-DP20-25R, 20MHZ), high-frequency electrotome (ERBE VIO-200D), flush knife, dual knife, transparent cap, injection needle, snare, hemostats, and harmonic clamp were used.

Endoscopic ultrasonography

Conventional white light endoscopy revealed 11 cases of duodenal submucosal protuberant lesions, and so ultrasound endoscopy was performed. Using the degassed water filling method, an ultrasound endoscope was employed to scan at a distance of 2.0-3.0 cm from the lesion, and the location, source, boundary, size, echo, and blood supply of the lesion were recorded.

Preoperative preparation

The patient's general health, underlying diseases, and lesion location, size, depth of invasion, and preoperative pathology were assessed. All patients who had surgical indications, with no surgical contraindications, were informed of endoscopic and alternative treatment options, and all signed the informed consent form. Antiplatelet and anticoagulant medications were discontinued 1 wk prior to surgery. Routine preoperative blood tests, coagulation function tests, ultrasound, computed tomography, and other auxiliary examinations were completed. Diet was prohibited for 8 h preoperatively.

Endoscopic procedures

Twenty-three patients underwent ESD for duodenal space-occupying lesions under general anesthesia with endotracheal intubation. Surgical procedures conducted were as follows: (1) Marker: A flush knife or dual knife was used to coagulate an area 5 mm around the lesion; (2) Submucosal injection: Submucosal injection with normal saline containing methylene blue and sodium hyaluronate was administered; (3) Mucosal layer incision; (4) Lesion dissection: The lesion was gradually dissected along the submucosa with a flush knife or dual knife. Owing to the thin wall of the duodenum, adequate submucosal injection was required to avoid injury of the muscle layer. Small submucosal vessels, especially the muscularis communicating branches, should be coagulated in advance to cut off the vessels to avoid blurred vision owing to blood in the area as well as shrinking or even vascular stump perforation after electrocoagulation. In cases of difficult dissection, after incising the whole peripheral mucosa and dissecting to a certain extent, the remaining lesions were removed with a snare (Hybrid ESD); and (5) Wound treatment: The exposed vessels on the wound surface were coagulated using hemostatic forceps. The exposed wound surface was mainly closed with a harmonious clamp or the Boston Scientific hemostatic clip. If further closure was needed, a nylon rope purse-string suture was used.

Postoperative treatment and follow-up

Oral intake was not permitted post-surgery. Moreover, acid suppression, gastrointestinal decompression, antibiotics to prevent infection, and water and electrolyte supplementation were employed. A liquid diet was started after exsufflation, although the fasting time was prolonged in those patients with intraoperative perforation and large wounds. Gastroscopy was performed 3 mo after the surgery to observe wound healing and detect the presence or absence of residual lesions, and endoscopy was performed every 6 mo or 1 year to review the status based on the results of the initial reexamination and postoperative pathology.

Statistical analysis

Continuous variables are expressed as the median [interquartile range (IQR)] and were compared using Student's *t* test or the Mann-Whitney *U* test. Stata software version 22 (Stata Corp., College Station, TX, United States) was used for all statistical analyses.

RESULTS

A total of 24 lesions in 23 patients were removed using the ESD method: 12 (50%) duodenal bulb lesions, including 7 in the anterior wall, 3 in the greater curvature, 1 in the posterior wall, and 1 in the lesser curvature; 3 (12.5%) descending junction lesions; and 9 (37.5%) descending lesions, including 3 in the proximal segment and 6 in the distal segment (papilla side, 2 cases; opposite side of the papilla, 4 cases). The mean lesion diameter was 12.75 (range, 11-22) mm. Thirteen lesions were originating from the mucosa, of which 4 were low-grade intraepithelial neoplasia, 3 were hyperplastic polyps, 2 were chronic mucositis, 2 were adenomatous hyperplasia, 1 was high-grade intraepithelial neoplasia, and 1 was tubular adenoma. Eleven lesions were in the submucosa, including 5 neuroendocrine neoplasms, 2 cases of ectopic pancreas, 1 stromal tumor, 1 leiomyoma, 1 submucosal duodenal adenoma, and 1 case of submucosal lymphofollicular hyperplasia. The demographics and treatment strategies for the 23 patients are shown in [Table 1](#).

Endoscopic treatment

Surgery time was 30-96 min. The mean postoperative hospital stay was 5.7 (range, 3-10) d. There were 5 (5/24, 20.8%) cases of intraoperative perforation, 4 of which were in those with submucosal protuberant lesions (1 case each of ectopic pancreas, stromal tumor, and neuroendocrine tumor located in the submucosa; 1 case of tubular adenoma located in the mucosa), and 1 in a patient with a depressed lesion. The submucosal lesion shown in [Figure 1](#) was located on the anterior wall of the greater curvature of the duodenal bulb, with a diameter of approximately 12 mm, and so a diagnosis of a duodenal submucosal mass (bulb stromal tumor was likely) was made. During ESD, the white tumor was in the muscularis propria, and a perforation of approximately 5 mm in size was observed after stripping the lower tumor. The perforation was sutured with nylon suture and a metal clip following the straight-line method, and the wound was clamped with the Boston Scientific hemostatic clip and metal clip.

Furthermore, a gastric tube was indwelled under endoscopic monitoring. Postoperative pathology was consistent with gastrointestinal stromal tumor (size, 2 cm × 1 cm × 1 cm).

As shown in [Figure 2](#), for the depressed lesion in the descending segment of the duodenum, after marking the boundary with a flush knife and administering the submucosal injection, the mucosal layer was incised along the whole circumference and dissected along the submucosa. Because it was contralateral to the duodenal papilla, the visual field of endoscopy was not clearly exposed; this led to intraoperative perforation, and the remaining lesion was snared after perforation. Later, the wound was closed with nylon suture, harmonious clip, or Boston Scientific hemostatic clip. A nasogastric tube was then indwelled, and postoperative gastrointestinal decompression was performed. After adequate intake of a restricted diet and provision of medical symptomatic treatment, good recovery was noted. No patient in the study had delayed postoperative hemorrhage or perforation.

Follow-up results

The mean follow-up time was 25.8 (range, 3.0-50.0) mo. All patients showed no residual or recurrent disease, and all had good quality of life. There were no

Table 1 Demographics and treatment strategy for the 23 patients

Serial number	Gender	Age(yr)	Lesion location	Diameter (mm)	Pathological hierarchy	Pathological result	<i>En bloc</i> resection/R0 resection	Complication	Length of hospital stay (d)	Follow-up time (mo)
1	Male	46	Descending distal segment	11	Mucosa	Low-grade intraepithelial neoplasia	Yes		5	21
2	Male	41	Anterior wall of the bulb	12	Submucosa	Gastrointestinal stromal tumors	Yes	Perforation	7	13
3	Male	63	Superior wall of the bulb	11	Submucosa	Neuroendocrine tumor	Yes		3	9
4	Female	65	Anterior wall of the bulb	11	Submucosa	Neuroendocrine tumor	Yes		5	39
5	Female	70	Anterior wall of the bulb	12	Mucosa	Adenomatous hyperplasia	Yes	Perforation	5	36
6	Male	69	Proximal descending segment	15	Mucosa	Tubular adenoma	Yes	Perforation	7	24
7	Male	74	Descending distal segment	11	Mucosa	Low-grade intraepithelial neoplasia	Yes		8	14
8	Female	45	Descending distal segment	16	Mucosa	Low-grade intraepithelial neoplasia	Yes		5	24
9	Male	49	Anterior wall of the bulb	15	Submucosa	Neuroendocrine tumor	Yes		7	29
10	Female	70	Anterior wall of the bulb	11	Mucosa	Adenomatous hyperplasia	Yes		3	46
11	Male	71	Superior angle of the bulb	12	Mucosa	Hyperplastic polypModerate chronic inflammation	Yes		7	45
			ProximalDescending segment	15	Mucosa					
12	Female	71	Superior angle of the bulb	11 12	Submucosa	Ectopic pancreas	Yes	Perforation	7	39
13	Male	32	Ball-descending junction	11 12	Submucosa	Ectopic pancreas	Yes		6	6
14	Male	69	Descending distal segment	11	Mucosa	Low-grade intraepithelial neoplasia	Yes		4	45
15	Male	73	Anterior wall of the bulb	13	Mucosa	Hyperplastic polyp	Yes		6	27
16	Male	54	Anterior wall of the bulb	12	Submucosa	Neuroendocrine tumor	Yes		5	11
17	Female	47	Descending distal segment	11	Mucosa	Glandular hyperplasia with polypoid changes	Yes		4	34
18	Male	48	Proximal descending segment	20 22	Submucosa	Leiomyoma	Yes		10	11
19	Male	59	Posteriorwall of the bulb	11	Submucosa	Submucosal duodenal adenoma	Yes		6	8
20	Male	63	Descending distal segment	12	Mucosa	Low- and high-grade intraepithelial neoplasia	Yes		5	3
21	Female	66	Anterior wall of the bulb	12	Submucosa	Neuroendocrine tumor	Yes	Perforation	7	50

22	Female	40	Ball-descending junction	15	Submucosa	Submucosal lymphofollicular hyperplasia	Yes	5	34
23	Male	60	Ball-descending junction	11	Mucosa	Chronic inflammation of the mucosal tissue	Yes	5	26

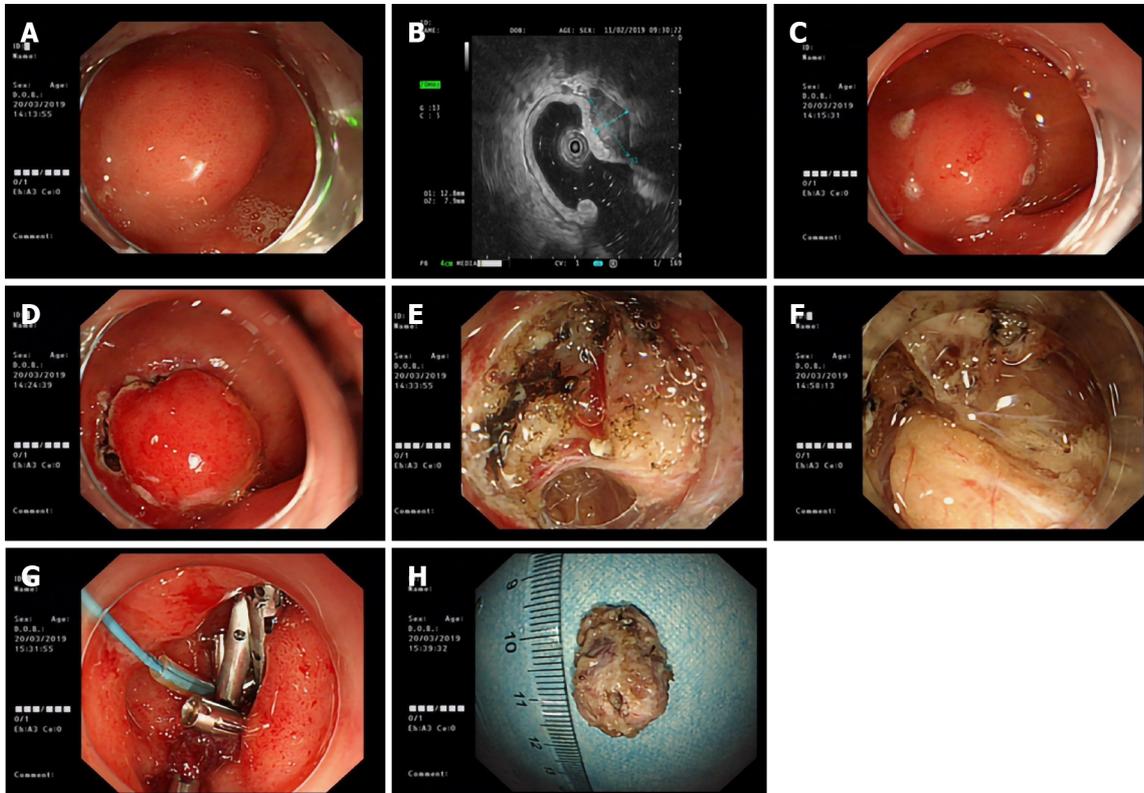


Figure 1 Endoscopic submucosal dissection was performed for a duodenal submucosal mass. The duodenal bulb showed a submucosal elevation approximately 12 mm in diameter, and pathology suggested a stromal tumor. A: Submucosal tumor on the anterior wall of the greater curvature of duodenum; B: Endoscopic ultrasonography showed that the lesion originated from the lamina propria; C: Mark the lesion boundary; D: The mucosa layer was incised circumferentially; E: Resect the tumor; F: Muscular perforation; G: Cover the perforation with nylon rope and metal clips; H: Resected specimen for pathological examination.

complications, such as infection and stenosis.

DISCUSSION

The incidence of duodenal space-occupying lesions is low, with most being benign lesions and having nonspecific early clinical symptoms and signs. Of the 23 patients in this group, 15 showed atypical symptoms of upper gastrointestinal disorders, such as dull epigastric pain, abdominal distension, and belching; 1 had melena; and the remaining 7 had no obvious symptoms. Therefore, the diagnosis of duodenal space-occupying lesions was mainly based on endoscopic and histopathological examinations^[5,6]. The pathological types observed were as follows: 5 cases of high and low-grade intraepithelial neoplasia, 5 neuroendocrine tumors, 4 adenomas, 3 hyperplastic polyps, 2 cases of ectopic pancreas, 2 cases of chronic inflammation of the mucosal tissue, 1 stromal tumor, 1 leiomyoma, and 1 submucosal lymph follicular hyperplasia. This is like case reports detailed in earlier studies^[7-9]. The bulb was the most common lesion location (50%).

The duodenum is in the retroperitoneum, surrounded by abundant blood vessels, adjacent to the pancreas and common bile duct^[10]. Surgery (Whipple's operation, pylorus-preserving pancreaticoduodenectomy, *etc.*) for the treatment of duodenal lesions is invasive, and serious complications, such as pancreatic fistula, intestinal

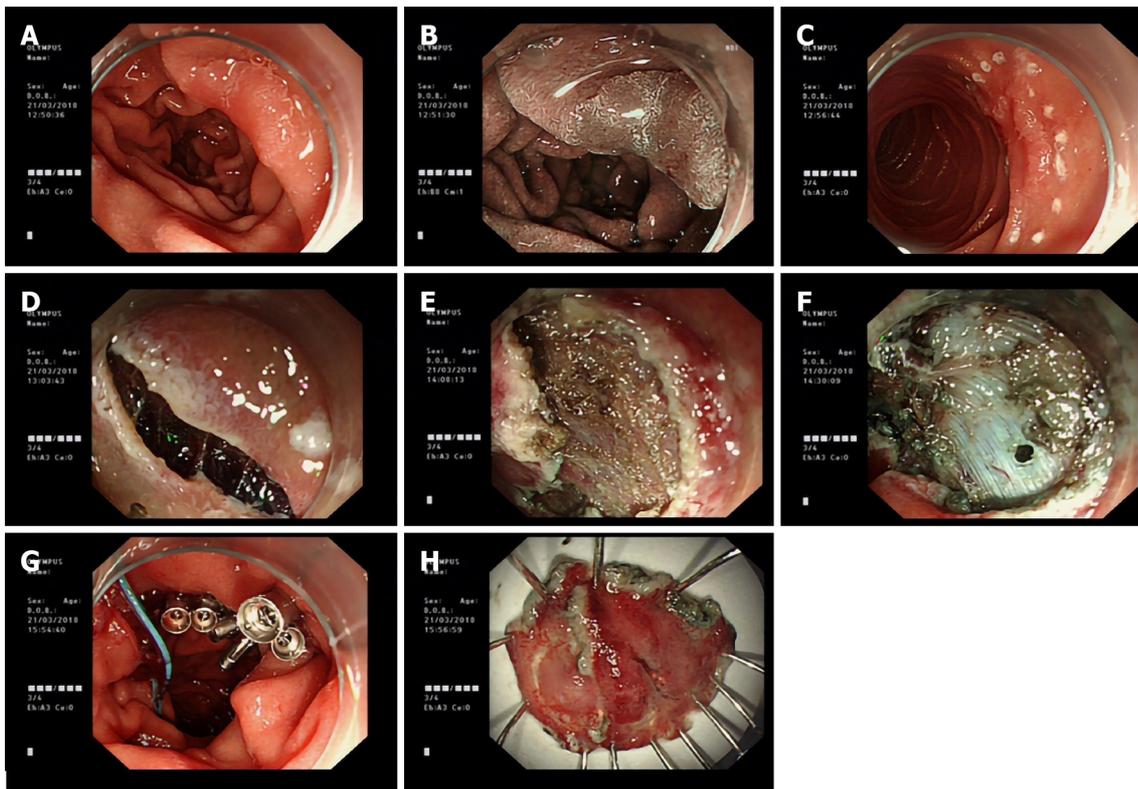


Figure 2 Endoscopic submucosal dissection was performed for a depressed lesion in the descending duodenum. A flat polypoid elevation approximately 15 mm in diameter with central depression was observed in the duodenal bulb, hybrid endoscopic submucosal dissection was performed, and pathology suggested a tubular adenoma. A: A depressed lesion in the descending duodenum; B: NBI showed that the lesion boundary was clear; C: Mark the lesion boundary; D: The mucosa layer was incised circumferentially; E: Dissect the lesions along the submucosa; F: Muscular perforation; G: Cover the perforation with nylon rope and metal clips; H: Resected specimen for pathological examination.

fistula, and retroperitoneal infection, can easily occur after surgery^[11]. Endoscopic treatment of duodenal lesions has the advantages of less trauma and higher safety. For smaller lesions, EMR is simple and convenient^[12,13]. However, for larger, irregularly shaped lesions, the complete resection rate with EMR is low, and the resection depth is shallow, thus leading to limitations. ESD can completely remove the lesion, which is conducive to the evaluation of postoperative pathology. Backes *et al*^[14] reported that ESD can aid in complete removal of the lesion and that it has significant advantages over EMR in long-term prognosis.

ESD for duodenal lesions is associated with a higher incidence of bleeding and perforation than those occurring at other levels of the gastrointestinal tract^[15-17]. This is because the duodenum is located in the retroperitoneum, especially on the papillary side, adjacent to the abdominal large vessels, common bile duct, pancreas, and other vital organs, the duodenal bowel cavity has a large curvature, thin intestinal wall, and rich peripheral blood flow, and the bile and pancreatic juice are strongly corrosive^[18,19]. The occurrence of duodenal ESD complications is mainly affected by the following factors of the lesions: Size, location, depth of invasion, and positional relationship with the surrounding vascular organs^[20-22].

According to previous reports, the incidence of duodenal ESD perforation is 21%-35.7%^[23]. The perforation rate in our study was 20.8%, which was consistent with the data reported in the literature. Among the 5 cases of perforation, 4 were submucosal protuberant lesions and 1 was a depressed lesion. Perforation occurs in 80% of submucosal protuberant lesions, and this is due to the thin duodenal intestinal wall and deep infiltration of the lesion. For the submucosal lesions, such as GISTs, which are extensively adhesive to muscularis propria or serosa, we usually actively perform full-thickness resection or choose laparoscopic endoscopic cooperative surgery in order to ensure complete resection of lesions.

For the lesions originating from the mucosal layer, an important reason for intraoperative perforation is that the submucosal layer is severely adherent and difficult to dissect. Therefore, when taking the biopsy for the first time when duodenal lesions are detected, it should be noted that the biopsy tissue sample should be small and parallel to the folds^[24]. If the biopsy is taken across the folds, a post-biopsy scar is

easily formed, causing the submucosal layer to be adherent to the muscular layer, which makes the dissection layers unclear. It will be difficult to enter the submucosal layer, and be easy to damage the muscle layer, resulting in extended operation time and intraoperative perforation. This is our operation experience, and more scientific research data will be collected in future research. We also suggest that the duodenal ESD should be performed quickly to shorten the operation time and reduce delayed perforation or bleeding caused by electrocoagulation syndrome and intestinal wall edema^[25,26].

The incidence of delayed postoperative perforation is also high due to the continuous intestinal lumen dilatation, erosion of the wound by digestive juices, and electrocoagulation syndrome during surgery. Therefore, the wound after duodenal ESD should be closed with metal clips, even there were no perforation when just finishing ESD^[27,28]. Of the 23 patients in this group, 13 were treated with prophylactic metal clips to close the wound, and 4 were treated with prophylactic metal clips combined with nylon suture to close the wound. No delayed perforation occurred in these patients. Japanese scholars advocated laparoscopic endoscopic cooperative surgery for duodenal lesions^[29,30]; that is, after ESD, the part of the lesion missing the mucosa and submucosa layers is sutured from the abdominal cavity with the help of laparoscopy to avoid delayed postoperative perforation^[31].

CONCLUSION

ESD is safe and effective for the treatment of duodenal lesions and is characterized with less trauma and rapid recovery compared with surgery. However, ESD is challenging to perform due to the thin intestinal wall of the duodenum, narrow intestinal space, rich peripheral blood flow, and proximity to vital organs, such as the common bile duct and pancreas. Therefore, the duodenal lesion biopsy should be done parallel to the fold and should be small to avoid scarring and prevent from subsequent dissection. Duodenal ESD should be performed quickly to shorten the operation time and reduce delayed perforation and bleeding caused by electrocoagulation syndrome and intestinal wall edema, especially when the lesions are on the medial side of the descending segment of the duodenum because of proximity to huge arteries, the common bile duct, and pancreas tissues. The wounds after ESD should be sutured with metal clips to avoid delayed postoperative perforation.

ARTICLE HIGHLIGHTS

Research background

Endoscopic submucosal dissection (ESD) for lesions of the duodenum is more challenge than those occurring at other levels of the gastrointestinal tract due to the thin intestinal wall of the duodenum, narrow intestinal space, rich peripheral blood flow, proximity to vital organs, and high risks of critical adverse events including intraoperative and delayed bleeding and perforation. Because of the low prevalence of the disease and the high risks of severe adverse events, successful ESD for lesions of the duodenum has rarely been reported in recent years.

Research motivation

To investigate the efficacy and safety of ESD in the treatment of duodenal space-occupying lesions.

Research objectives

Based on the research background, we analyzed the clinical data of 24 cases of duodenal lesions treated by ESD and investigated the effectiveness of ESD in these cases.

Research methods

This study analyzed the clinical data of 24 cases of duodenal lesions treated by ESD at the Digestive Endoscopy Center of the Affiliated Hospital of Qingdao University from January 2016 to December 2019 and investigated the complications and hands-on experiences.

Research results

Bleeding and perforation were the main adverse events. The intraoperative perforation rate was 20.8% (5/24), including 4 submucosal protuberant lesions and 1 depressed lesion. No residual disease or recurrence was found in all patients, and no complications, such as infection and stenosis, were found during a median follow-up period of 25.8 mo. No patient died due to tumor recurrence.

Research conclusions

ESD is safe and effective in the treatment of duodenal lesions; however, the endoscopists should pay more attention to the preoperative preparation, intraoperative skills, and postoperative treatment.

Research perspectives

For duodenal lesions, ESD is safe and effective.

ACKNOWLEDGEMENTS

We thank all the authors for helping with the writing and publication of this article.

REFERENCES

- 1 **Kakushima N**, Kanemoto H, Tanaka M, Takizawa K, Ono H. Treatment for superficial non-ampullary duodenal epithelial tumors. *World J Gastroenterol* 2014; **20**: 12501-12508 [PMID: 25253950 DOI: 10.3748/wjg.v20.i35.12501]
- 2 **Nonaka S**, Oda I, Tada K, Mori G, Sato Y, Abe S, Suzuki H, Yoshinaga S, Nakajima T, Matsuda T, Taniguchi H, Saito Y, Maetani I. Clinical outcome of endoscopic resection for nonampullary duodenal tumors. *Endoscopy* 2015; **47**: 129-135 [PMID: 25314330 DOI: 10.1055/s-0034-1390774]
- 3 **Yahagi N**, Kato M, Ochiai Y, Maehata T, Sasaki M, Kiguchi Y, Akimoto T, Nakayama A, Fujimoto A, Goto O, Uraoka T. Outcomes of endoscopic resection for superficial duodenal epithelial neoplasia. *Gastrointest Endosc* 2018; **88**: 676-682 [PMID: 29753040 DOI: 10.1016/j.gie.2018.05.002]
- 4 **Chen WC**, Wallace MB. Endoscopic management of mucosal lesions in the gastrointestinal tract. *Expert Rev Gastroenterol Hepatol* 2016; **10**: 481-495 [PMID: 26581857 DOI: 10.1586/17474124.2016.1122520]
- 5 **Goda K**, Kikuchi D, Yamamoto Y, Takimoto K, Kakushima N, Morita Y, Doyama H, Gotoda T, Maehata Y, Abe N. Endoscopic diagnosis of superficial non-ampullary duodenal epithelial tumors in Japan: Multicenter case series. *Dig Endosc* 2014; **26** Suppl 2: 23-29 [PMID: 24750144 DOI: 10.1111/den.12277]
- 6 **Matsumoto S**, Yoshida Y. Selection of appropriate endoscopic therapies for duodenal tumors: an open-label study, single-center experience. *World J Gastroenterol* 2014; **20**: 8624-8630 [PMID: 25024618 DOI: 10.3748/wjg.v20.i26.8624]
- 7 **Honda T**, Yamamoto H, Osawa H, Yoshizawa M, Nakano H, Sunada K, Hanatsuka K, Sugano K. Endoscopic submucosal dissection for superficial duodenal neoplasms. *Dig Endosc* 2009; **21**: 270-274 [PMID: 19961529 DOI: 10.1111/j.1443-1661.2009.00908.x]
- 8 **Ichikawa T**, Kudo M, Matsui S, Okada M, Kitano M. Endoscopic ultrasonography with three miniature probes of different frequency is an accurate diagnostic tool for endoscopic submucosal dissection. *Hepatogastroenterology* 2007; **54**: 325-328 [PMID: 17419284]
- 9 **Park SM**, Ham JH, Kim BW, Kim JS, Kim CW, Kim JI, Lim CH, Oh JH. Feasibility of endoscopic resection for sessile nonampullary duodenal tumors: a multicenter retrospective study. *Gastroenterol Res Pract* 2015; **2015**: 692492 [PMID: 25810715 DOI: 10.1155/2015/692492]
- 10 **Klein A**, Nayyar D, Bahin FF, Qi Z, Lee E, Williams SJ, Byth K, Bourke MJ. Endoscopic mucosal resection of large and giant lateral spreading lesions of the duodenum: success, adverse events, and long-term outcomes. *Gastrointest Endosc* 2016; **84**: 688-696 [PMID: 26975231 DOI: 10.1016/j.gie.2016.02.049]
- 11 **Cloyd JM**, Kastenberg ZJ, Visser BC, Poultides GA, Norton JA. Postoperative serum amylase predicts pancreatic fistula formation following pancreaticoduodenectomy. *J Gastrointest Surg* 2014; **18**: 348-353 [PMID: 23903930 DOI: 10.1007/s11605-013-2293-3]
- 12 **Tomizawa Y**, Ginsberg GG. Clinical outcome of EMR of sporadic, nonampullary, duodenal adenomas: a 10-year retrospective. *Gastrointest Endosc* 2018; **87**: 1270-1278 [PMID: 29317270 DOI: 10.1016/j.gie.2017.12.026]
- 13 **Jamil LH**, Kashani A, Peter N, Lo SK. Safety and efficacy of cap-assisted EMR for sporadic nonampullary duodenal adenomas. *Gastrointest Endosc* 2017; **86**: 666-672 [PMID: 28257791 DOI: 10.1016/j.gie.2017.02.023]
- 14 **Backes Y**, Moons LM, van Bergeijk JD, Berk L, Ter Borg F, Ter Borg PC, Elias SG, Geesing JM, Groen JN, Hadithi M, Hardwick JC, Kerkhof M, Mangen MJ, Straathof JW, Schröder R, Schwartz

- MP, Spanier BW, de Vos Tot Nederveen Cappel WH, Wolfhagen FH, Koch AD. Endoscopic mucosal resection (EMR) versus endoscopic submucosal dissection (ESD) for resection of large distal non-pedunculated colorectal adenomas (MATILDA-trial): rationale and design of a multicenter randomized clinical trial. *BMC Gastroenterol* 2016; **16**: 56 [PMID: 27229709 DOI: 10.1186/s12876-016-0468-6]
- 15 **Tashima T**, Ohata K, Sakai E, Misumi Y, Takita M, Minato Y, Matsuyama Y, Muramoto T, Satodate H, Horiuchi H, Matsuhashi N, Nonaka K, Ryozaawa S. Efficacy of an over-the-scope clip for preventing adverse events after duodenal endoscopic submucosal dissection: a prospective interventional study. *Endoscopy* 2018; **50**: 487-496 [PMID: 29499578 DOI: 10.1055/s-0044-102255]
 - 16 **Dohi O**, Yoshida N, Naito Y, Yoshida T, Ishida T, Azuma Y, Kitae H, Matsumura S, Takayama S, Ogita K, Mizuno N, Nakano T, Majima A, Hirose R, Inoue K, Kamada K, Uchiyama K, Takagi T, Ishikawa T, Konishi H, Morinaga Y, Kishimoto M, Itoh Y. Efficacy and safety of endoscopic submucosal dissection using a scissors-type knife with prophylactic over-the-scope clip closure for superficial non-ampullary duodenal epithelial tumors. *Dig Endosc* 2019; : [PMID: 31883154 DOI: 10.1111/den.13618]
 - 17 **Lépilliez V**, Chemaly M, Ponchon T, Napoleon B, Saurin JC. Endoscopic resection of sporadic duodenal adenomas: an efficient technique with a substantial risk of delayed bleeding. *Endoscopy* 2008; **40**: 806-810 [PMID: 18828076 DOI: 10.1055/s-2008-1077619]
 - 18 **Kim GH**, Kim JI, Jeon SW, Moon JS, Chung IK, Jee SR, Kim HU, Seo GS, Baik GH, Lee YC; Korean College of Helicobacter and Upper Gastrointestinal Research. Endoscopic resection for duodenal carcinoid tumors: a multicenter, retrospective study. *J Gastroenterol Hepatol* 2014; **29**: 318-324 [PMID: 24117946 DOI: 10.1111/jgh.12390]
 - 19 **Inoue T**, Uedo N, Yamashina T, Yamamoto S, Hanaoka N, Takeuchi Y, Higashino K, Ishihara R, Iishi H, Tatsuta M, Takahashi H, Eguchi H, Ohigashi H. Delayed perforation: a hazardous complication of endoscopic resection for non-ampullary duodenal neoplasm. *Dig Endosc* 2014; **26**: 220-227 [PMID: 23621427 DOI: 10.1111/den.12104]
 - 20 **Hoteya S**, Furuhashi T, Takahito T, Fukuma Y, Suzuki Y, Kikuchi D, Mitani T, Matsui A, Yamashita S, Nomura K, Kuribayashi Y, Iizuka T, Kaise M. Endoscopic Submucosal Dissection and Endoscopic Mucosal Resection for Non-Ampullary Superficial Duodenal Tumor. *Digestion* 2017; **95**: 36-42 [PMID: 28052275 DOI: 10.1159/000452363]
 - 21 **Yamamoto Y**, Yoshizawa N, Tomida H, Fujisaki J, Igarashi M. Therapeutic outcomes of endoscopic resection for superficial non-ampullary duodenal tumor. *Dig Endosc* 2014; **26** Suppl 2: 50-56 [PMID: 24750149 DOI: 10.1111/den.12273]
 - 22 **Ahmad NA**, Kochman ML, Long WB, Furth EE, Ginsberg GG. Efficacy, safety, and clinical outcomes of endoscopic mucosal resection: a study of 101 cases. *Gastrointest Endosc* 2002; **55**: 390-396 [PMID: 11868015 DOI: 10.1067/mge.2002.121881]
 - 23 **Ohata K**, Murakami M, Yamazaki K, Nonaka K, Misumi N, Tashima T, Minato Y, Shozushima M, Mitsui T, Matsuhashi N, Fu K. Feasibility of endoscopy-assisted laparoscopic full-thickness resection for superficial duodenal neoplasms. *ScientificWorldJournal* 2014; **2014**: 239627 [PMID: 24550694 DOI: 10.1155/2014/239627]
 - 24 **Kakushima N**, Kanemoto H, Sasaki K, Kawata N, Tanaka M, Takizawa K, Imai K, Hotta K, Matsubayashi H, Ono H. Endoscopic and biopsy diagnoses of superficial, nonampullary, duodenal adenocarcinomas. *World J Gastroenterol* 2015; **21**: 5560-5567 [PMID: 25987780 DOI: 10.3748/wjg.v21.i18.5560]
 - 25 **Kakushima N**, Ono H, Takao T, Kanemoto H, Sasaki K. Method and timing of resection of superficial non-ampullary duodenal epithelial tumors. *Dig Endosc* 2014; **26** Suppl 2: 35-40 [PMID: 24750146 DOI: 10.1111/den.12259]
 - 26 **Miura Y**, Shinozaki S, Hayashi Y, Sakamoto H, Lefor AK, Yamamoto H. Duodenal endoscopic submucosal dissection is feasible using the pocket-creation method. *Endoscopy* 2017; **49**: 8-14 [PMID: 27875854 DOI: 10.1055/s-0042-116315]
 - 27 **Ichikawa D**, Komatsu S, Dohi O, Naito Y, Kosuga T, Kamada K, Okamoto K, Itoh Y, Otsuji E. Laparoscopic and endoscopic co-operative surgery for non-ampullary duodenal tumors. *World J Gastroenterol* 2016; **22**: 10424-10431 [PMID: 28058023 DOI: 10.3748/wjg.v22.i47.10424]
 - 28 **Andrisani G**, Di Matteo FM. Endoscopic full-thickness resection of duodenal lesions (with video). *Surg Endosc* 2020; **34**: 1876-1881 [PMID: 31768725 DOI: 10.1007/s00464-019-07269-w]
 - 29 **Hiki N**, Nunobe S. Laparoscopic endoscopic cooperative surgery (LECS) for the gastrointestinal tract: Updated indications. *Ann Gastroenterol Surg* 2019; **3**: 239-246 [PMID: 31131352 DOI: 10.1002/ags3.12238]
 - 30 **Otowa Y**, Kanaji S, Morita Y, Suzuki S, Yamamoto M, Matsuda Y, Matsuda T, Oshikiri T, Nakamura T, Kawara F, Tanaka S, Ishida T, Toyonaga T, Azuma T, Kakeji Y. Safe management of laparoscopic endoscopic cooperative surgery for superficial non-ampullary duodenal epithelial tumors. *Endosc Int Open* 2017; **5**: E1153-E1158 [PMID: 29124126 DOI: 10.1055/s-0043-117957]
 - 31 **Yanagimoto Y**, Omori T, Jeong-Ho M, Shinno N, Yamamoto K, Takeuchi Y, Higashino K, Uedo N, Sugimura K, Matsunaga T, Miyata H, Ushigome H, Takahashi Y, Nishimura J, Yasui M, Asukai K, Yamada D, Tomokuni A, Wada H, Takahashi H, Ohue M, Yano M, Sakon M. Feasibility and Safety of a Novel Laparoscopic and Endoscopic Cooperative Surgery Technique for Superficial Duodenal Tumor Resection: How I Do It. *J Gastrointest Surg* 2019; **23**: 2068-2074 [PMID: 30859426 DOI: 10.1007/s11605-019-04176-2]



Published by **Baishideng Publishing Group Inc**
7041 Koll Center Parkway, Suite 160, Pleasanton, CA 94566, USA

Telephone: +1-925-3991568

E-mail: bpgoffice@wjgnet.com

Help Desk: <https://www.f6publishing.com/helpdesk>

<https://www.wjgnet.com>

