Case Report

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# A Case Of Endoscopic Full-Thickness Resection The Gastric Fundus Stromal Tumor With Preset Clip-Thread Traction Assisted

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**1. Abstract:**

Gastrointestinal stromal tumors (GISTs) are the most common mesenchymal tumors in the gastrointestinal tract, and about 60% of them are found in the stomach. endoscopic resection is a minimally invasive method compared with the conventional surgical approaches (open or laparoscopic), and has been demonstrated to be safe and effective for treating gastric GISTs. Endoscopic full-thickness resection (EFTR) is required for extraluminal GIST type. Preset clip-thread traction assisted can fully expose the surgical cutting line, provide enough surgical space, and improve surgical safety,and reduce operation time. In addition, clip-thread traction can prevent the tumor from falling into the abdominal cavity after resection.

**2. Keywords:**

Gastrointestinal stromal tumor (GIST); Endoscopic full-thickness resection (EFTR); endoscopic submucosal dissection (ESD); preset clip-thread traction

**3. Introduction**

Gastrointestinal stromal tumors (GISTs) are the most common mesenchymal-derived tumor of the gastrointestinal tract and is thought to originate from Cajal cells or their precursor cells [1]. Clinical manifestations are related to tumor growth site, size and growth pattern [2]. GIST accounts for 0.1% to 3% of gastrointestinal malignancies. The average age of onset is about 60 to 65 years old, and the incidence is basically the same for men and women. GIST can occur anywhere in the gastrointestinal tract, but is most common in the stomach (60%) and small intestine (20% to 30%) [2,3]. The diagnosis of GIST mainly relies on pathological examination, combined with histomorphology, immunohistochemistry(CD117, DOG1 and CD34 molecules) and molecular biology detection(c-Kit and PDGFRA genes)[4].

**4. Material of case**

A 54-year-old male patient was hospitalized for a gastric fundus submucosal tumor (SMT). Gastric fundus SMT was found by gastroscopy due to upper abdominal discomfort, which size is about 2.5cm*2.0cm, with a smooth surface and a concave in the center. He had a history of hypertension for 5 years, the highest blood pressure was 140/100mmHg, and he usually took irbesartan hydrochlorothiazide tablets and amlodipine besylate tablets, and the blood pressure was stable in the normal range. No history of surgery, drug allergy, or family history of genetic disease. Physical examination: Temperature(T) 37°C, Heart rate (HR) 78 beats/min, Respiration(R) 18 beats/min, Blood pressure (BP) 112/80mmHg, no special positive signs in heart, lung and abdomen. Serum biochemistry: Blood routine, liver and kidney function, blood sugar, coagulation function, and tumor markers were within the normal range. Computed Tomography (CT) enhancement of the upper abdomen showed that nodular protrusions were seen on the posterior wall of the gastric fundus, the shape was irregular, and the size was 28mm*15mm, with an average CT value of about 45HU. After enhancement, the lesions in the arterial and venous phases were significantly enhanced. The lesions are connected with the gastric wall by a wide base, most of them grow into the gastric cavity, and a small part grows outside the gastric cavity, abutting the spleen (Figure 1).

**Figure1:** Enhanced CT scan of upper abdomen

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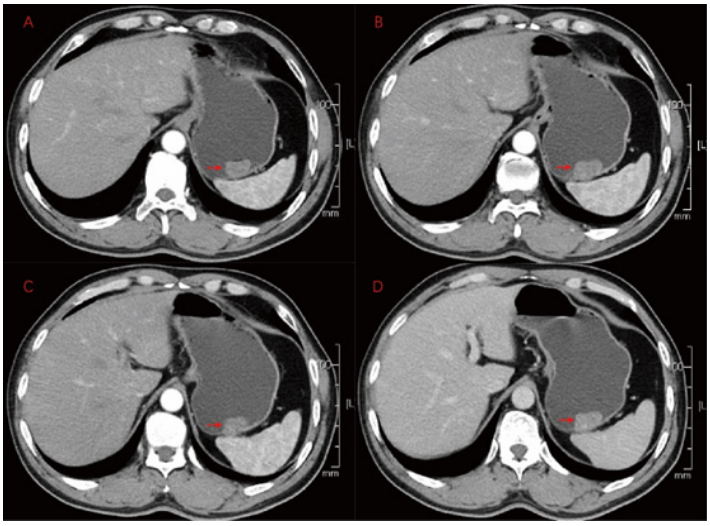

**Figure1:** Enhanced CT scan of upper abdomen: (A,B) Arterial phase shows the tumor is in the posterior wall of the fundus, as indicated by arrows; (C) Arterial phase showing a small portion of the tumor is extraluminal, abutting the spleen, indicated by arrows; (D) The venous phase shows the fundus tumor, indicated by the arrow.

**4.1. Informed consent for surgery and alternative surgical options**

Before surgery, patients and their families were fully informed of the risks and complications of surgery, and informed consent was obtained from the patients and their families. In addition, we have established a multidisciplinary cooperative relationship with gastrointestinal surgery to discuss surgical methods and risks. When endoscopic surgery cannot be completed or serious complications occur, laparoscopic surgeons are needed for surgical help when endoscopic surgery cannot be handled.

**4.2. Gastroscope and accessories**

PENTAX EPK-i Endoscopy Processor and PENTAX EG-2990i(PENTAX Medical Company,Japan), ERBE VIO 200S and APC 2 Electrosurgical Units(ERBE Elektromedizin GmbH, Germany), Argon Plasma Coagulation Knife(APC probe 2200 C, ERBE, Germany), Carbon dioxide gas supply device for endoscopy(CR4500,Angels,China), Water supply device for endoscope(UW600, Angels,China), AcuJect Variable Injection Needle(VIN-23,G22525,Cook Medical,USA), Disposable high frequency incision knife(Golden knife,MK-T-2-195, Nanjing MicroPort,China), Rotatable Reopening and Closing Soft Tissue Clip(Harmony Clip,ROCC-F-26-195-C, Nanjing MicroPort,China), Captura Hot Biopsy Forceps 230(HDBF-2.4-230-S,G31583,Cook Medical,USA), ligation device(REF-LOOP-30, Changzhou Leao Medical Technology Company, China), polypectomy snares(GPS-11-35-230,Medi-Globe,Germany).

**4.3. Preset clip-thread-assisted endoscopic full-thickness tumor resection techniques**

The patient was placed in the left lateral decubitus position after intravenous anesthesia and tracheal intubation in the operating room. A transparent cap is installed at the front end of the endoscope. The clip extends out of the transparent cap through the biopsy channel. Open the clip, tie one end of the thread to one side of the clip, pull the clip back into the transparent cap, and then carefully insert the endoscope into the gastric cavity. Extend the clip, clamp the mucosa of the anal end of the tumor and release the clip. Then, the gastric cavity and the tumor site were repeatedly washed with normal saline and simethicone, the assistant gently pulled the thread to fully expose the tumor, and APC was used to mark the entire circumference of the tumor, and then injection needle was used to submucosally inject 0.9% normal saline + methylene blue + 0.01% adrenaline mixed liquid. The golden knife incised the entire circumference of the mucosa along the markings, gradually peeled off the submucosa to expose the tumor, peeled off the muscularis propria to the serosa along the edge of the lesion, and made a full-thickness incision of the serosa to the part that grew outside the tumor cavity.

Appropriately pull the thread gently, first, to achieve sufficient operational space and exposure the cutting line, and ensure a clear surgical field of vision,carefully observe whether there are blood vessels, and be careful when encountering thick blood vessels, it is necessary to use hot biopsy forceps for preventive hemostasis to prevent massive bleeding.Second, the tumor can be prevented getting lost into the peritoneal cavity. After complete tumor resection, the serosal surface was carefully observed for bleeding, and the surgical wound was treated with hot biopsy forceps and APC to stop the bleeding. The ligation device REF-LOOP-30 was used to fix the wound with clips along the incisal edge, and the wound surface was carefully closed to prevent the clips from falling to the wound surface and the outside of the cavity. Then, the mucosa on the outside of the ligation device wound was closed by clips, which to prevent the gastric juice from leaking into the abdominal cavity if the wound was not tightly closed. Finally, rinse the wound with normal saline to observe the closure of the wound and observe whether there is bleeding. The specimen was taken out together with the clip-thread by polypectomy snares. Then the clip-thread was cut off, the tumor was fixed with a specimen plate, placed in a specimen bag containing formaldehyde liquid for fixation, and the patient information label is pasted on the specimen bag, and then sent to the pathology department for pathological examination (Figure 2).

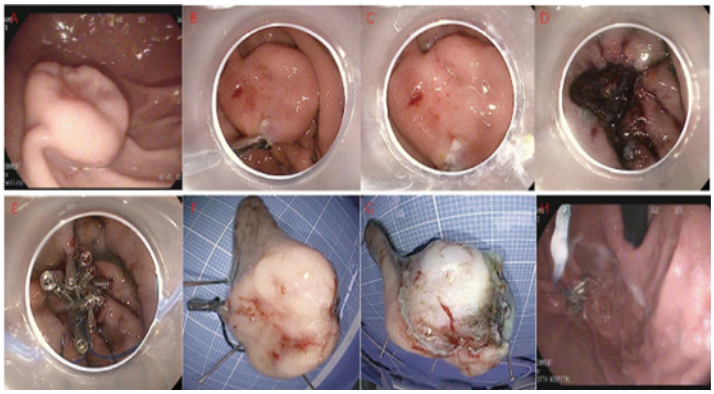

**Figure2:** Gastroscopy and treatment pictures:(A) The first gastroscopy at the outpatient clinic showed a gastric fundus tumor;(B) Preset clip-thread traction assisted;(C) Marking tumor resection boundaries with APC;(D) The defect after endoscopic full-thickness resection of tumor

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completely;(E) The defect was closed completely with ligation device loop and clips;(F) The tumor was removed en bloc with a size of 3.0 *3.0 cm;(G)The resected tumor with intact capsule;(H) On the sixth day after the operation, the gastroscope showed that the wound had recovered well.

### 4.4. Postoperative treatment and changes in vital signs

Postoperative fasting, nasogastric tube placement for gastrointestinal decompression for 2 days, lansoprazole acid suppression 30mg intravenous drip twice a day,Levofloxacin Sodium Chloride Injection (Colobitux) 0.5 intravenous infusion once a day, Metronidazole Sodium Chloride Injection 0.5 intravenous infusion once a day, and preventive anti-inflammatory treatment for 3 days. On the second day after the operation, there was mild fever, mild abdominal discomfort, no obvious abdominal pain and abdominal distension, slightly increased white blood cells (WBC), neutrophils(N), and C-reactive protein (CRP), and slightly decreased red blood cells (RBC) (Figure 3). On the third day after the operation, started to eat a liquid diet, and body temperature returned to normal without abdominal discomfort.On the sixth day after the operation, the blood routine was returned to normal, and the wounds were recovered well under gastroscopy(Figure 2 H). After discharge, oral rabeprazole sodium enteric-coated tablets 10 mg were given orally twice a day, and rebamipide 0.1g was orally 3 times a day for 8 weeks, and repeat gastroscopy after 3 months.

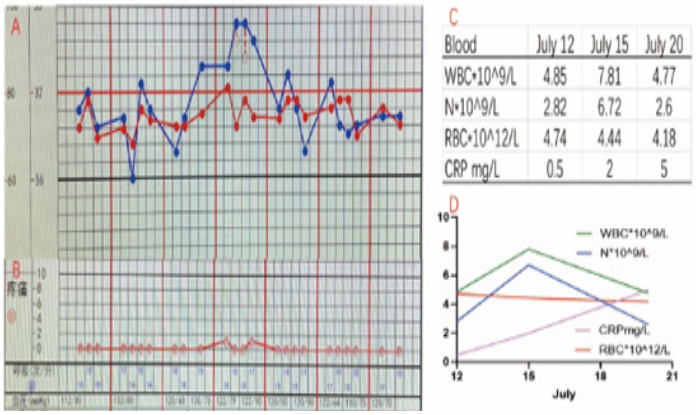


**Figure3:** Changes of vital signs and blood routine before and after endoscopic full-thickness resection: (A) Display body temperature and heart rate changes, on the second day after the operation, the body temperature increased slightly and returned to normal on the third day;(B) It showed no obvious changes in breathing and blood pressure before and after endoscopic surgery, on the second day after the operation, there was mild pain, and it recovered on the third day;(C,D) Changes of blood routine and CRP before and after endoscopic surgery, the blood routine white blood cells and neutrophils were slightly increased on the second postoperative day, and recovered on the sixth day.

### 4.5. Postoperative pathology and diagnosis

Specimens observed with naked eyes: mucosal tissue 4.5cm*2.7cm*1.8cm, the surface mucosa is rough, the submucosal nodule size is 2.4cm*2cm*1.5cm on the cut surface, the cut surface is gray, solid and medium. Pathological diagnosis of gastric fundus gastrointestinal stromal tumor (low risk), size 2.4cm*2cm*1.5cm, mitotic rate <5/50HPF, resection margin negative (Figure 4).

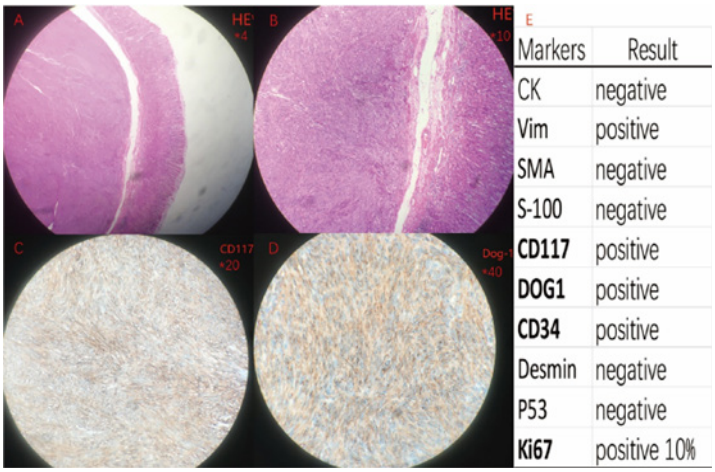


**Figure4:** Pathology and Immunohistochemistry: (A,B) HE staining;(C) Immunohistochemistry showed CD117 positivity; (D) Immunohistochemistry showed DOG1 positivity;(E) Immunohistochemistry shows the markers and results.

### 5. Discussion

Treatment options for GIST include surgery, drug and endoscopic therapy. Surgery is the main treatment method at present, and its goal is to achieve complete tumor resection. Surgical treatment is suitable for localized tumors with a diameter of ≥2 cm in the stomach; tumors that grow in a short time or have malignant manifestations, such as those found under white light endoscopy. See lesions with irregular edges, ulcers, hemorrhage, necrosis, cystic degeneration or heterogeneous echoes in endoscopic ultrasound (EUS); all extragastric tumors; acute abdomen caused by GIST, such as gastrointestinal perforation, complete intestinal obstruction, etc. The surgical method is mainly open surgery, and laparoscopic surgery can be considered for lesions located on the greater curvature of the stomach and fundus, and the jejunum, the diameter of the anterior body wall ≤5 cm [5]. Drugs such as imatinib are often used in adjuvant or neoadjuvant chemotherapy for surgery and are the first-line treatment options for recurrent, metastatic or unresectable GIST [5]. Endoscopic treatment of GIST includes endoscopic submucosal dissection (ESD), endoscopic full-thickness resection (EFTR), Submucosal tunneling endoscopic resection (STER) and laparoscopic and endoscopic cooperative surgery (LECS) and so on. Endoscopic treatment has the advantages of short operation time, less intraoperative blood loss, shorter hospital stay and low cost [6, 7].

Indications for endoscopic treatment of GIST: [1] units with mature endoscopic treatment and pathological diagnosis techniques; [2] experienced endoscopists (for example, the cumulative amount of gastric ESD should be greater than 300 cases);[3] GISTs with a diameter of ≤2cm, the tumor size increases in a short time and the patient's willingness to treat is strong;[4] Low-risk GIST with a diameter of >2 cm and ≤5 cm should be comprehensively evaluated before surgery to exclude lymph

node or distant metastasis, and the tumor should be completely resected. EUS can help define the origin and internal characteristics of tumors while assessing tumor size, shape, and margins [8]. CT is a routine imaging examination method for the evaluation of GIST before treatment. It is of great value in the localization of GIST, the evaluation of growth patterns, and the determination of recurrence and metastasis. Enhanced CT scans include plain scan, arterial and venous phases, with a slice thickness of ≤5 mm, the axial, coronal and sagittal views can be reconstructed to comprehensively assess the characteristics of the lesion [9]. Common complications of EFTR include hemorrhage, pneumoperitoneum, intra-abdominal infection and adjacent tissue or organ damage.

Most patients can be relieved after conservative treatment or endoscopic treatment. Liu [10]. et al found that EFTR was significantly superior to surgery for patients with a diameter of ≤3 cm, and surgery was superior to EFTR in terms of complete resection rate and tumor rupture rate for patients with a diameter of >3 cm. Preset clip-thread traction can reduce the number of times to insert gastroscopy, thereby reducing operation time. In addition, the operation field of vision can always be fully exposed from the beginning of surgery, providing enough surgical space, and improving surgical safety. At the same time, preset clip-thread traction can also prevent tumors from falling into the abdominal cavity. After the full-thickness incision, the patient's vital signs and anesthesia should be observed. If the intra-abdominal pressure is too large to affect anesthesia, reduce the gas injection during the operation and use carbon dioxide gas as much as possible. If necessary, a 20ml syringe needle needs to be punctured in the patient's right upper quadrant abdominal wall to exhaust and decompress. During postoperative follow-up, all patients should undergo endoscopic examinations at 3, 6, and 12 months after surgery within one year after endoscopic treatment to evaluate wound healing and tumor recurrence. For high-risk patients, contrast-enhanced CT scans of the abdomen and pelvis should be performed every 3 to 6 months within 3 years after surgery, and then twice a year thereafter; For low-risk patients, CT scans can be performed every 6 to 12 months for 5 years after surgery [11]. For patients with intermediate and high-risk GIST after endoscopic treatment, additional treatment is recommended, such as molecularly targeted drug therapy or surgical evaluation[12].

**6. Acknowledgments**

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