Clinical Case Report

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# Endoscopic full-thickness resection for a gastrointestinal stromal tumor in a liver transplant recipient

## A case report

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**Abstract**

**Rationale:** With the development of endoscopic technique and the improvement of available accessories, endoscopic therapy became to play an important role in the management of gastrointestinal submucosal tumors (SMTs).

**Patients concerns:** A gastric SMT which was suspected to be gastrointestinal stroma tumor (GIST) was diagnosed in a liver transplant recipient who received transplanted operation 11 months ago.

**Diagnosis:** gastric SMT, post-liver transplantation

**Interventions:** Endoscopic full-thickness resection (EFR) was preformed to remove the tumor. The operation time was 50 minutes and oral immunosuppressant drug was not interrupted in the postoperative period.

**Outcomes:** The clinical course was uneventful and slightly elevated liver enzyme was observed on the fourth day after operation. The pathological diagnosis was GIST with complete capsule.

**Lessons:** Our successful experience showed that EFR is a feasible, safe and efficacious treatment for small (<2 cm) gastric GIST in liver transplant recipients, providing the advantages of little damage, short operative time, stable graft function, without compromising postoperative outcomes.

**Abbreviations:** DILI = drug-induced liver injury, EFR = endoscopic full-thickness resection, EUS = endoscopic ultrasonography, EUS-FNA = EUS-guided fine-needle aspiration, GIST = gastric gastrointestinal stroma tumor, LT = liver transplantation, MP = muscularis propria, PPI = proton pump inhibitor, SMTs = submucosal tumors.

**Keywords:** endoscopic full-thickness resection, gastrointestinal stroma tumor, liver transplantation

## 1. Introduction

Gastric gastrointestinal stroma tumor (GIST) is a rare de novo tumor after liver transplantation. Up to now, no consensus is available on the management of small (<2 cm)gastric gastrointestinal stroma tumor (GIST).[1–4] The treatment strategies include periodic surveillance, conventional surgery (laparotomy or laparoscopic surgery) and emerging endoscopic therapy.[1–3,5] Although there are a lot of controversies on the necessity and safety of surgical resection for these small suspected GIST, more and more scholars tend to perform endoscopic diagnostic treatment in China, because of the relatively low malignance potential of those lesions and the maturity of endoscopic therapy.[5,6] In fact, in addition to offering a definitely pathological result and risk classification, endoscopic resection could eliminate the probability of long-term malignant transformation, reduce economic and psychological stress caused by repeated endoscopic examinations during follow-up. Here, we presented our successful experience of endoscopic full-thickness resection (EFR) for gastric GIST in a liver transplant recipient for whom the risk of malignancy theoretically elevated during the long-term follow-up.

## 2. Case presentation

A 60-year-old man received liver transplantation (LT) for HBV related end stage liver disease 11 months before the screening esophagogastroduodenoscopy in our center. An SMT located in posterior wall of fundus was revealed which was not diagnosed during the last endoscopic examination 2 years ago. Endoscopic ultrasonography (EUS) thereafter identified a homogenous hypoechoic, spherical and well demarcated mass, which was 0.6 × 1.0 cm in diameter, originated from muscularis propria (MP) layer with exophytic growth. According to location and manifestation of EUS, gastric GIST

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was the initial suspected diagnosis. Medical history included chronic hepatitis B virus infection lasted for 38 years, 2 episodes of mild acute rejection occurred after LT, and immunosuppressive regimen consisted of tacrolimus (1.5 mg q12 h), sirolimus (1 mg qd), and mycophenolate mofeil (360 mg q12 h), with mild elevated liver enzyme before the endoscopic examination.

Informed written consent was obtained from the patient for publication of this case report and accompanying images. After informed consent forms were signed, EFR was successfully performed to remove the tumor. The following steps were taken according to the previous described technique:[5] marking around the lesion with hook-knife (KD-620LR, Olympus); submucosal injection with a mixture solution (normal saline and methylene blue); circumferential incision; unroofing the superficial mucosa with a snare (PFS01-024232320, Micro-tech, Nanjing, China); dissecting in the submucosal layer to expose the tumor and excavating it under direct visualization; creating active perforation; changing insulation-tipped knife (KD-611, Olympus) and cutting around the lesion which could avoid damaging the adjacent organs and structures in the peritoneal cavities. Removing the lesion completely with snare before the final cut for fear of the tumor sliding into abdominal cavity; closing the defect of stomach with 5 metallic clips (ROCC-D-26-195-C, Micro-tech) (Fig. 1). A nasogastric tube was placed to deflate the stomach. A broad-spectrum antibiotic and proton pump inhibitor (PPI) were given intravenously half hour before operation and for the next 3 days. The patient fasted for 3 days, however, oral immunosuppressive drugs were given with little water. His postoperative course was uneventful without analgesic requirement and the nasogastric tube was removed on the third day after EFR procedure. The patient was discharged 5 days after operation, and oral PPI was prescribed for the next 3 weeks.

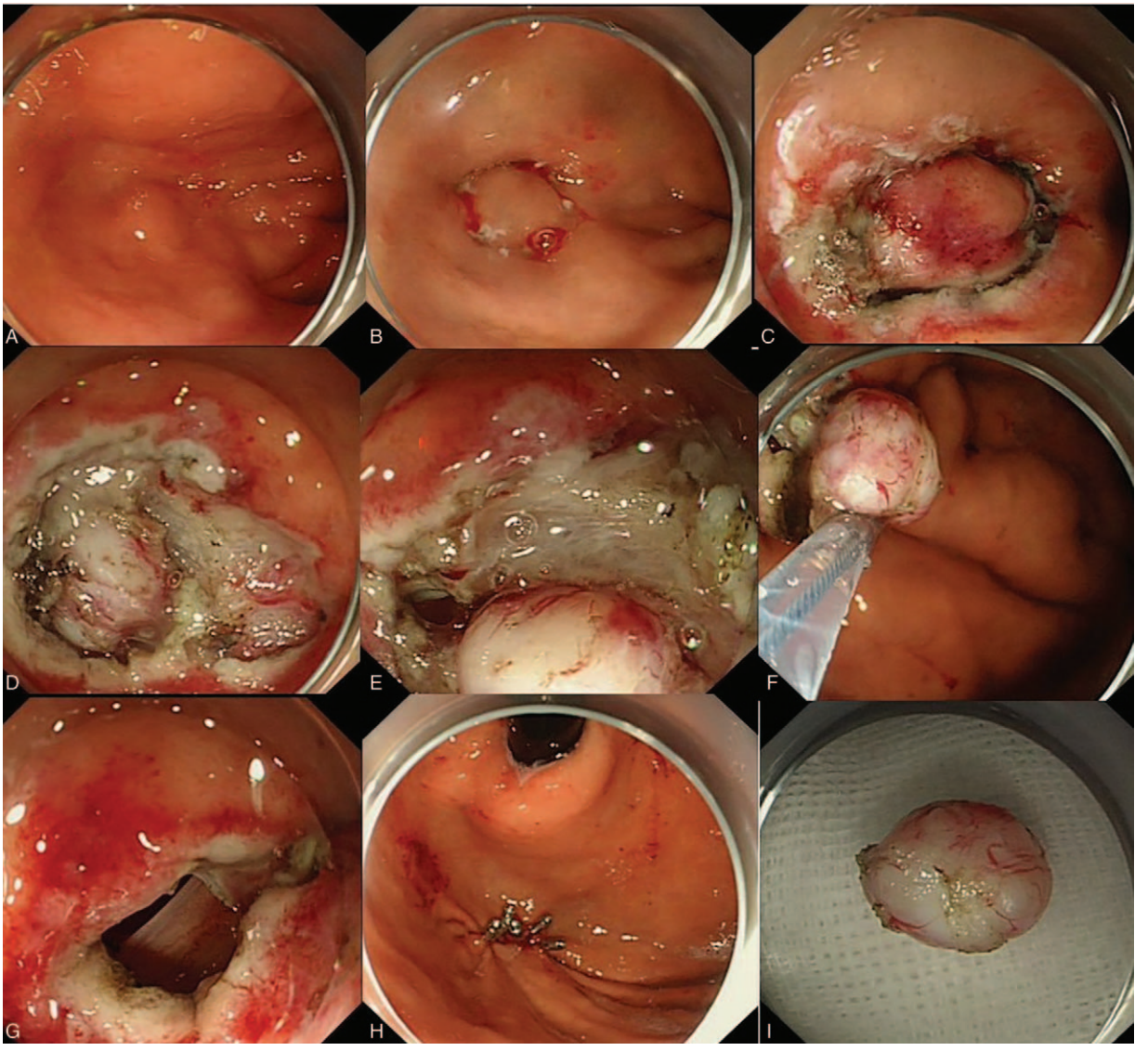


**Figure 1.** Procedure of the EFR. A. the lesion located in the posterior wall of gastric fundus. B. Marking and submucosal injection. C. Circumferential incision. D. Unroofing to expose the tumor. E. Active perforation. F. The tumor was removed with snare before the final cut. G.H. Defect of gastric wall was closed by clips. I. Macroscopic appearance of the resected specimen. EFR = endoscopic full-thickness resection.

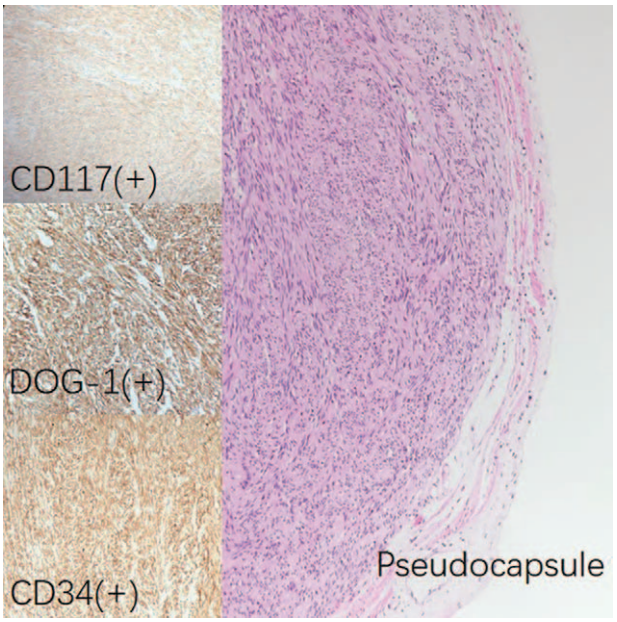


**Figure 2.** Histologic examination of resected specimen reveals a gastrointestinal stromal tumor with complete capsule (H&E, original magnification×100); immunohistochemical studies reveal the presence of CD117, DOG-1 andCD34 (magnification×200).

The resected tumor was 1.0*0.7 cm in size and R0 resection was confirmed during the pathologic examination (Fig. 2). Immunohistochemical staining showed presence of CD117, DOG-1, and CD34, which indicted GIST. Mitotic index was <5/50HPF (Fig. 2). Genotyping test showed mutated *KIT* exon 11. According to risk classification of GIST which was published in 2008, GIST was classified as very low risk, low risk, moderate risk, and high risk, and our patient belonged to very low-risk category.[7]

The immunosuppressive protocol remained the same as before the EFR procedure. Before operation, liver function was mildly abnormal (ALT:89U/L, AST:56U/L, TBIL:29.2umol/L) and the blood drug concentration of tacrolimus and sirolimus were 6.2 ng/mL and 7.22 ng/mL respectively, while the blood drug concentration was 4.2 ng/mL and 6.13 ng/mL on the fourth day after procedure. Liver function was slightly elevated on the fourth day after operation (ALT:133U/L, AST:88U/L, TBIL:26.3umol/L) and recovery of liver function (ALT:87U/L, AST:78U/L, TBIL:25.2umol/L) was observed 2 weeks later.

Until Jan 2019, no GIST recurrence was observed and the function of liver graft was normal at the last follow-up.

## 3. Discussion

GIST is the most common mesenchymal tumors of gastrointestinal tract, of which the predominant localization seems to be stomach (60~70%), and could have malignant transformation in up to 10% to 30% of cases.[4] Curative surgical resection was the standard approach for the histological or clinical suggestive GIST,[2,3] however, for the lesion less than 2 cm in diameter and lacking of high-risk features in EUS assessment, the guidelines suggested that periodic follow up could be adopted after fully informed about the possibility of malignancy. In fact, when small gastric nodules were detected, endoscopic deep biopsy was too complicated to be performed, and the moderate accuracy of EUS-guided fine-needle aspiration (EUS-FNA) was observed for the SMTs of upper gastrointestinal tract. In most cases, the diagnosis could be confirmed just by postoperative pathologic examination. Additionally, the clinical significance of small GIST was unclear and the optimal follow-up strategy remained obscure. Either active follow-up strategy or EUS-FNA procedure for histological result would create large medical burden and uncertain clinical course.

In term of surgical treatment, none of the guideline recommended endoscopic resection as a treatment option for GIST. The majority of small GIST was indolent, considering the operative damage and the possible postoperative sequelae, conservative surveillance strategy seemed to be reasonable for small GIST with low-risk features. However, the medical history of orthotopic LT and long-time of immunosuppressive status complicated our clinical decision-making. As we all know, transplant recipients carried a risk of malignancy that is 2 to 4 times higher than in an age-matched and sex-matched population.[8] However, new-onset GIST occurring in the organ transplantation patients was rarely described in the previous literature. Until now, only 3 cases of de novo GIST in liver transplanted recipient could be reviewed.[9–11] The locations of the tumor were hepatic flexure of colon, jejunum and subcutaneous tissue nearly anus, respectively. All of them were localized and complete resected surgically. Herein, we presented the first gastric GIST in liver transplant recipients which was resected endoscopically.

Although the technique of EFR without laparoscopic assistance was introduced in 2011[5], most practitioners have avoided this procedure on account of positive margins and iatrogenic spillage of tumor cells during the procedure. Nonetheless, a systemic review which including 208 lesions of gastric SMT originated from MP layers showed the complete resection rate of EFR was 96.8%. Moreover, a study concerning the long-term (36.15–12.92 months) outcomes of endoscopic resection of gastric GIST was published recently, in which the authors concluded that endoscopic resection was a safe and effective approach for removing gastric stromal tumors (<5 cm).[6]

Although the laparoscopic wedge resection was widely accepted for the gastric GIST small than 5 cm, our patients may be not amenable to conventional laparoscopic therapy because of the severe intra-abdominal adhesions after LT and the posterior location of the tumor. Endoscopic resection was performed from mucosal side to serosal side, and the laparoscopic pneumoperitoneum was unnecessary for endoscopic resection. Actually, in absence of other comorbidities and contraindication of anesthesia, if the patient could complete diagnostic endoscopy and had normal coagulation function was eligible for endoscopic resection. Therefore, we shared information with patient and his family about the potential oncological risk of follow up and the therapeutic options, then diagnostic endoscopic resection was performed to obtain pathological result and minimized procedure-related invasiveness. In fact, it was difficult for us to determine the diagnosis of SMT in gastrointestinal tract before the pathological examination, and benign tumor could not be excluded, therefore, it was reasonable for the skilled endoscopists to perform diagnostic resection for whom the success rate of completed resection was satisfied high and the damage of the procedure was minimized. Although endoscopic resection of GIST was not commonly accepted worldwide, it has several advantages. First, it was less invasive

and minimized the manipulation in the abdominal cavity, which significantly reduced operation-related damage, operative duration, and hospital stay. Second, compared to laparoscopic surgery, an intact stomach could be preserved after endoscopic resection and the complications such as deformity of the remaining stomach and gastric malfunction were unlikely to occur. Third, endoscopic treatment was most cost-effective which could significantly reduce medical burden.

The postoperative recovery process was uneventful and inflammatory response was not obvious. A slight fluctuation of liver enzyme was observed after EFR procedure which may be due to the drug-induced liver injury (DILI) rather than acute rejection. In fact, several categories of medicine were prescribed during the perioperative period, including drugs related to anesthesia, antibiotic and PPI, which were a burden to liver. Additionally, oral immunosuppressive drugs were not interrupted during the perioperative period and the liver function returned to be normal 2 weeks after EFR procedure which suggested that the factor affected liver function was transient. Therefore, the slightly elevated liver enzyme was believed to be induced by DILI. Actually, normal liver enzyme was observed during the last follow-up after further adjusting immunosuppressive regiment.

In conclusion, we first presented a case of EFR for gastric GIST in a liver transplant recipient. Oral immunosuppressant was not interrupted during whole clinical process which was helpful in keeping the blood concentration of immunosuppressants and graft function stable. With the accumulation of clinical experience and the in-depth understanding of the SMTs in gastrointestinal tract, the treatment concept may be changed, however, our experience showed endoscopic diagnostic resection for gastric SMTs for some special patients offered significant clinical benefits currently.

### *3.1. Consent for publication*

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

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## Author contributions

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**Writing – original draft:** Man Xie.
**Writing – review & editing:** Man Xie, Wei Rao, Peng Zhang, Qingxi Zhao, Zibin Tian.

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