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CASE STUDY

LAPAROSCOPIC MANAGEMENT OF GE JUNCTION GISTS- A CASE SERIES

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ABSTRACT

Gastrointestinal Stromal Tumors (GISTs) are rare neoplasms accounting for only 0.1 to 3 % of Gastrointestinal Malignancies but they account for 80% of Gastrointestinal Mesenchymal Neoplasms. The only principle and curative treatment available for GISTs is Surgical R_0 Clearance.Laparoscopic Resection of GIST is routinely advocated only for tumours at favourable locations and smaller sizes(Less than 5 cm). But the Gastro-Esophageal (GE)Junctional tumours poses a special risk of involving the Lower Esophageal sphincter while resection, thereby causing Reflux or late Stenosis. These tumours had been traditionally dealt with more morbid Total Esophagectomy and Gastrectomy procedures. But with advent of newer refined techniques of Laparoscopy and its instrumentation, these tumours can be handled with minimally invasive approaches without compromising the oncological and functional perspectives. We here discuss two of such innovative approaches to deal with the GE Junctional GISTs in our experience, namely the Trans-gastrotomy stapled Resection and Endoscopy assisted Laparoscopic Wedge Resection.

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INTRODUCTION

The term GIST was originally used by Mazur & Clark in 1983 to describe the intra-abdominal non epithelial neoplasms that also lacked the ultramicroscopic details of smooth muscle cells and immunohistochemical features of Schwann cells. Untill then GIST tumors were misclassified as one of the soft tissue tumors namely, leiomyomas, schwannomas, autonomic nerve tumors etc (Mazur, 1983). Based on the histologic and immunohistochemistry features, GISTs have been identified to originate from the interstitial cells of Cajal, the pacemakers of intestine.GIST tumors can arise anywhere throughout the gastrointestinal tract starting from the Esophagus to the internal anal sphincter. But themost common location of GISTs is the stomach (55~60%) followed by the jejunum and ileum (30%), duodenum (5%), and colorectum (5%),and rarely in the esophagus, appendix, gallbladder, and extragastrointestinal organs such as the mesentery, omentum, and retroperitoneum ("Extra"- GISTs) (Corless, 2004; Tran, 2005; Judson, 2002 and Joensuu, 2006). The treatment outcomes have dramatically improved sincethe introduction of a tyrosine kinase inhibitor imatinib.

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However, surgeryremains the main treatment modality for primary GIST along withmultidisciplinary approach, and is also important for metastatic disease withresistant tumour cell clone. The concept of surgical clearance for GIST involves performing a microscopically margins negative wide local excision or enucleation without spillage of the tumour. Surgical techniques have evolved from the more morbid procedures to function and anatomy preserving surgeries. Such a choice of anatomy and function preserving surgery will be well appreciated, given the fact that GIST tumors very rarely metastasize to the regional nodes. Recently, Laparoscopic techniques have seemed to break through the earlier limitations of tumor rupture, inability to handle large tumours& difficulty in retrieval of specimens. Combining the minimally invasive approaches with more refined organ conserving surgeries has given new ray of hope and confidence to the diseased and also to the operating surgeon. Yet there are areas of definite difficulties such as the Gastro- esophageal junction for both open & laparoscopic approaches posing risk of functional loss (reflux or late stenosis). Overcoming challenges of these grey areas and at the same time giving the benefits of the minimally invasive surgery to the suffering patients has been a test of skill and knowledge for the surgeon and his team. Here we describe our experience of handling two of the Gastro-esophageal junctional GIST tumors with laparoscopic novel

techniques of 1) Trans-gastrotomy Stapled Resection & 2) Endoscopy assisted Laparoscopic Wedge Resection.

Case Series

CASE 1

A 45 year old male presented with new onset dyspepsia and Abdominal bloating for 2 months. He had history of coronary artery disease. His endoscopy revealed a 2 x 3 cm endophytic submucosal growth near the cardia of the stomach along its Lesser Curvature and posterior wall. Imaging with contrast CT confirmed the same and suggestive of stromal tumor. We proceeded with Laparoscopic Trans- gastrostomy Stapled resection of the Tumor for this patient.

Trans-gastrotomy Stapled Resection

Laparoscopically stomach was dissected and released along its greater and lesser curvature up to the crux of the diaphragm, where the Gastro- Esophageal (GE) junction was mobilised all around and retracted down with help of umbilical tape. Then a gastrotomy made along the anterior wall of the stomach near to GE junction. A smooth fleshy submucosal tumor of 2 x 3 cm was seen at the cardia of the stomach posteriorly with a margin 2 cm from the GE junction. A soft bowel holding forceps was cautiously used to prolapse the tumor out of the gastrotomy wound, without rupturing it. Maintaining the retraction, 2 x roticulating green staplers fired beneath the tumor involving the indrawn folds of the posterior wall to remove the tumor in Toto along with the posterior wall. Hemostasis verified and the anterior gastrostomy closed with 1-0 PDS with interrupted sutures intracorporeally. Specimen was removed in toto with help of an endobag and drain was kept along the stomach bed. Post operatively patient was started on clear liquids from day 2 and discharged on day 5 after removing the drain. Oncological clearance of the specimen was perfect with 1 cm tumor free margin all around.

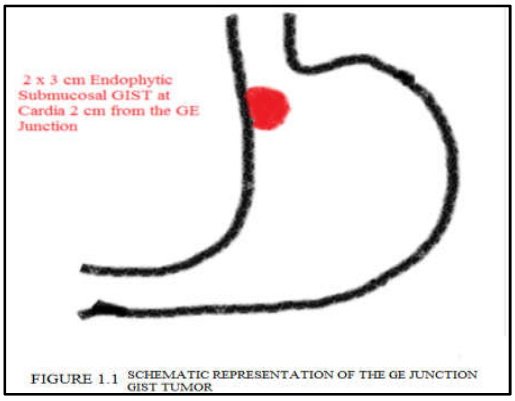


FIGURE 1.1 SCHEMATIC REPRESENTATION OF THE GE JUNCTION GIST TUMOR

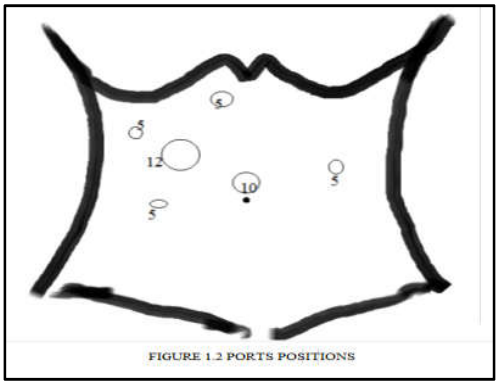


FIGURE 1.2 PORTS POSITIONS

FIGURE 1.3

FIGURE 1.4

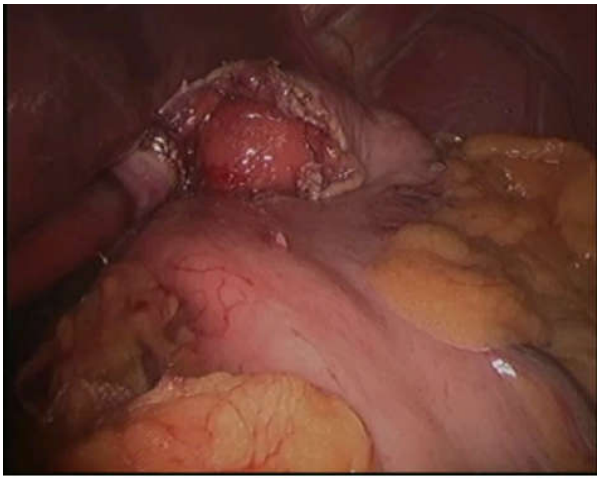


FIGURE 1.5 TUMOR VISUALIZED THROUGH THE GASTROSTOMY

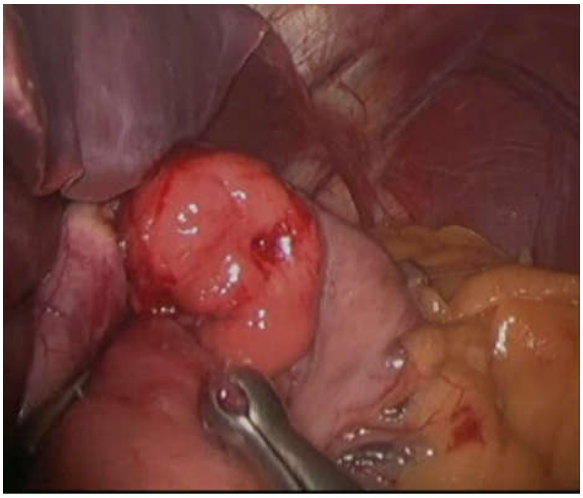


FIGURE 1.6 TUMOR PROTRACTED OUT OF THE GASTROSTOMY

FIGURE 1.7

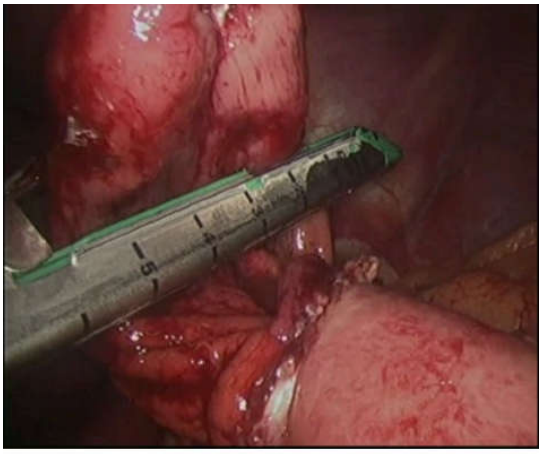


FIGURE 1.8 STAPLED RESECTION OF THE TUMOR

FIGURE 1.9

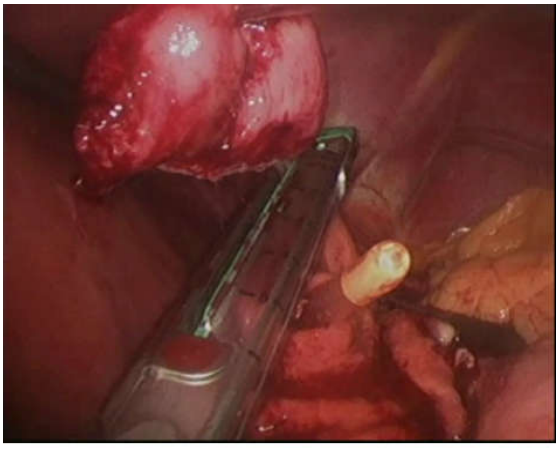


FIGURE 1.10 RESECTION COMPLETED

FIGURE 1.11

FIGURE 1.12 SPECIMEN REMOVED IN TOTO WITH ENDOBAG

CASE 2

A 78 year old male with no comorbidities presented with melena and left upper quadrant mass. On upper GI endoscopy he had extraneous compression along the greater curvature& fundus of the stomach. Contrast enhanced CT abdomen picked up 6 x 5 cm exophytic stromal tumor along the greater curvature of the stomach near the OG junction.

Endoscopy assisted Laparoscopic Wedge Resection

Intra-operatively a large tumor was found hanging along the greater curvature near the Gastro-esophageal junction. The procedure involved complete mobilization of the stomach on both sides along the greater curvature and lesser curvature.

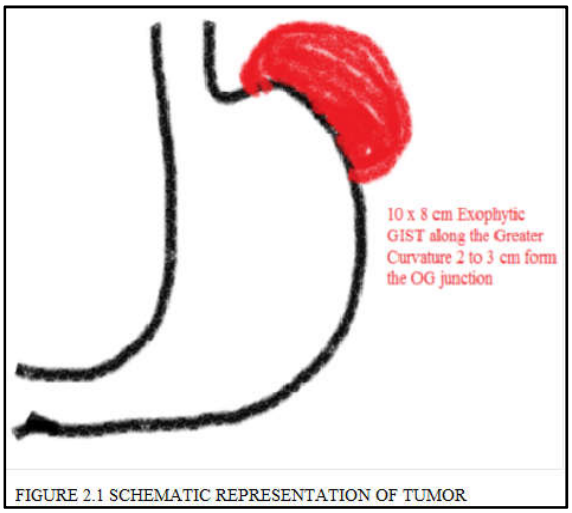


FIGURE 2.1 SCHEMATIC REPRESENTATION OF TUMOR

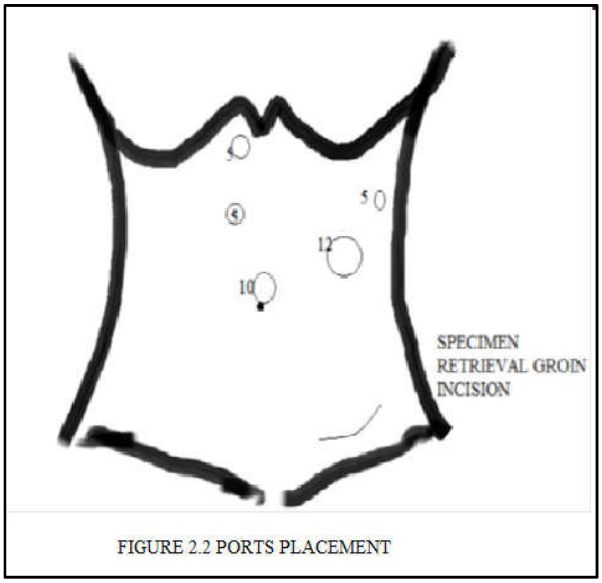


FIGURE 2.2 PORTS PLACEMENT

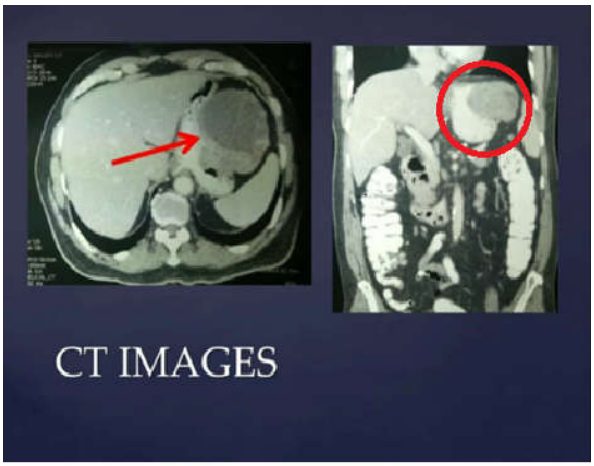


FIGURE 2.3

FIGURE 2.4

Intra-operative Endoscopy was done to confirm the tumor location with respect to the GE junction. Under the Endoscopic guidance, laparoscopic wedge resection of the tumor close to but avoiding the GE junction was done. 2 x tristapling purple staplers used to complete the wedge resection. The resected tumor was removed in toto in a endobag through a separate groin incision. Post-operatively the patient was started on clear liquids from day 2 and discharged on day7.

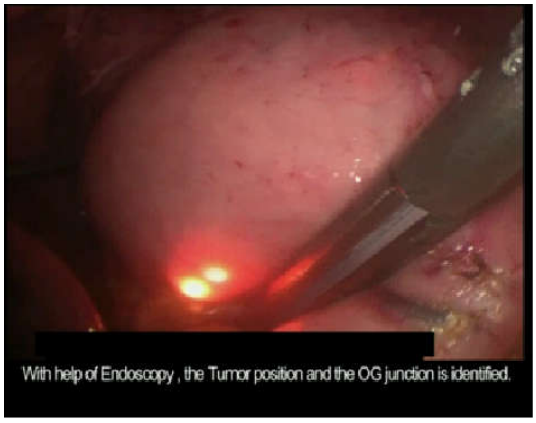


FIGURE 2.5

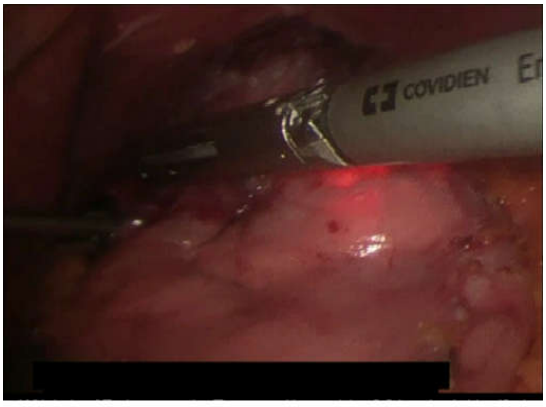


FIGURE 2.6 TUMOR ASSESSED FOR RESECTION

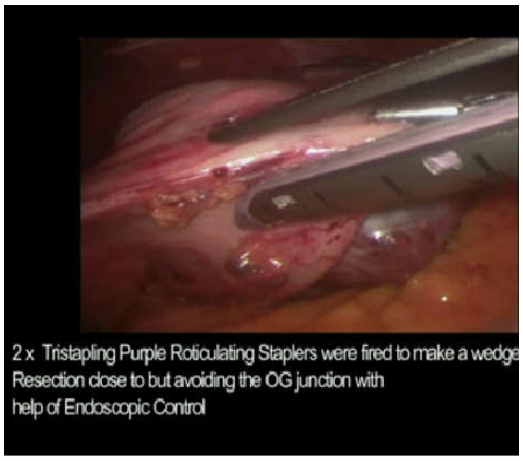


FIGURE 2.7

FIGURE 2.8

FIGURE 2.9

FIGURE 2.10

DISCUSSION

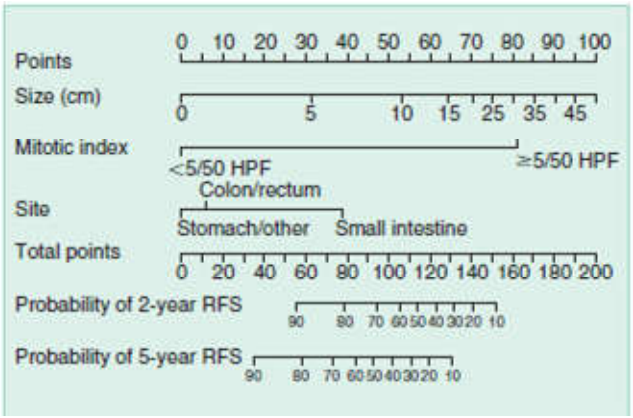
Management of GISTs

All GISTs have some ability to metastasize and hence should not be considered benign. However, small (less than 1 cm) and incidentally detected GISTs can be followed up, given the probability of overt malignancy is low. Watchful follow up for small GIST is supported by the observation of Lim et al.,reporting increasing size in only 8 out of 252 (3.2%) gastric submucosal tumors after a mean interval of 59.1±27.5 months (range, 12~86 months). Gill et al.reported increasing sizein 7 out of 51 (13.7%) submucosal tumors that were <3 cm during mean period of 29.7 months. (range, 3~84 months) (Lim, 2010 and Gill, 2009). The malignant potential of the GISTs can be best determined by its size, mitotic index and the site of origin. Fletcher et al (2002), followed by Gold et al (2009) used these indicators as the predictors for recurrence in a nomogram. It was later validated by the (NCCN) National Comprehensive Cancer Network GIST task force in 2010, which supported its clinical implementation. The size of more than 5 cm, mitotic count of more than 5/50 per high power field and small bowel location are the most dreaded combination embarking aggressive behaviour of the GISTs. The role of surgery in GISTs is crucial as it is the sole treatment for GIST, though with the advent of tyrosine kinase inhibitors such as imatinib better control of local & metastatic GISTs are possible. All GISTs more than 2 cm in size are to be resected when possible (Miettinen, 2006). GISTs less than 1 cm at favourable sites (Stomach) can be watched (Fujimoto, 2003 and Agaimy, 2007). Management of GISTs between 1 to 2 cm may be little confusing. The NCCN guidelines suggests the removal GISTs less than 2 cm with high risk features such as irregular borders, cystic areas, ulceration, echogenic foci or heterogeneity on (EUS) Endoscopic ultrasound (NCCN, 2013).

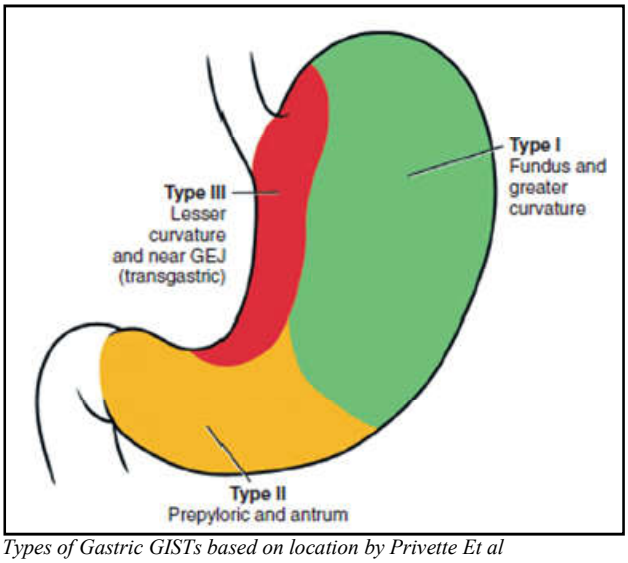
	Size*	Mitotic Count†
Very low risk	<2 cm	<5/50 HPF
Low risk	2-5 cm	<5/50 HPF
Intermediate risk	<5 cm	6-10/50 HPF
	5-10 cm	<5/50 HPF
High risk	>5 cm	>5/50 HPF
	>10 cm	Any mitotic rate
	Any size	>10/50 HPF

FLETCHER et al

Figure 3.1.



GOLD et al - Nomogram



Types of Gastric GISTs based on location by Privette Et al

Figure 3.2

Management of Resectable Gastric Gists

For a submucosal tumor, suspected to be a GIST and is larger than 2 cm on endoscopy, surgery is considered to be necessary, and CT and chest X-ray (or chest CT) is needed for metastasis workup.The principles of surgical treatment for primary resectable GIST are completeresection without causing tumor rupture and to acquire negative margins.Gastric GISTs being

the most common location, the tumors can be broadly classified as Endophytic, Exophytic or Dumble bell tumors. Because GISTs are not infiltrating to the gastric wall like adenocarcinoma, a wide normal mucosal margin is not needed. Although acquirement of gross negative margins is suggested and some recommend 1 cm margins for convenience and safety, microscopic negative margins are sufficient to ensure R0 resection (Blay, 2012). Because the frequency of lymph node involvement is low, systemic lymphadenectomy is not generally required. Instead, the removal of enlarged lymph nodes near the tumor, if notified, isusually warranted.

Minimally Invasive Targeted Approaches

A consensus meeting in 2004 by ESMO recommended laparoscopic resection only for GISTs ≤2 cm because of the concerns about tumor rupture from the use forceful laparoscopic forceps. Two of the early studies by Otani et al [15]and Novitsky et al established the safety and feasibility of the Laparoscopic removal of GISTsof size upto 5 cm. In 2007, Privette et al again re -established the successful application of Laparoscopic resection of primary GISTs maintaining the oncologic principles. He also classified the Gastric GIST tumors into three types based on the tumor location and the surgery contemplated. Type I tumors were located in the fundus or greater curvature and were treated using a laparoscopic stapled partial gastrectomy. Type II tumors were located in the antrum/prepyloric region and were approached using laparoscopic distal gastrectomy. Type III tumors were located in the lesser curvature and near the gastroesophageal junction and were resected by laparoscopic transgastric resection (Privette, 2008). The size of the tumor cannot be the sole indicator for laparoscopic procedurebecause laparoscopic partial or even total gastrectomy can be performed with minimal manipulation of the tumor. Current guidelines and consensus favor recommendations to keep tight principles of surgical resectionwithout limiting the indications for laparoscopic surgery by size. However, five centimeters seems to be remaining a practical reference.

Gastro- Esophageal (Ge) Junction Tumors

GE junction GIST poses a special risk of injury to the (LES) Lower Esophageal Sphincter mechanism and Vagus nerve due to its close proximity. Various techniques of laparoscopy can be applied for tumor resection based on the tumor morphology. Broadly the approaches can be classified as Exo gastric, Intra-gastric and trans- gastric. Exo-gastric approach involves stapled wedge resection of an externally visible overhanging (exophytic) tumor and it involves full thickness resection. Intra- gastric approach involves making a gastrotomy, everting the tumor of the posterior wall and the resecting the tumor with stapler. Trans- gastric approach requires specialized trocars wherein the stomach docked and distended with gas for intraluminal working (Kakeji, 2012; Hyung, 2005; Hepworth, 2000 and Ibrahim, 1997). Hybrid approaches combining endoscopy with laparoscopy are increasingly being used.For GISTs near the GE junction, endoscopy is helpful for identifying the location of the tumor, for using as a bogie to maintain the passage of the lumen during resection with linear staplers, and for observing bleeding or stenosisafter surgery.Therapeutic endoscopic techniques have also been used for endoluminal resection. Endoscopy assisted Laparoscopic wedge Resection (EALR) is a procedure where we utilize the direct inside visualization of the endoscope as a guide to fire the stapler thereby avoiding the LES and GE junction.Laparoscopy assisted Endoscopic Enuceation / Resection (LAER) technique is similar to the Endoscopic Submucosal dissection (ESD) where trans-gastric Laparoscopic instruments are used to assist the dissection. But the specimen retrieved here is not of full thickness and the risk ofincomplete resection and peritoneal dissemination when accompanied with simultaneous gastric wall perforation should be considered.In contrast, by a method reported by Hiki's group described as "laparoscopic endoscopic cooperative surgery (LECS)", a full-thickness resection is performed by sequential endoscopic and laparoscopic dissection. At first, both the mucosal and submucosal layers around the tumor were circumferentially dissected using ESD via intraluminal endoscopy. Subsequently, the seromuscularlayer was laparoscopically dissected. Abe et al.also reported a similar technique named "laparoscopy-assisted endoscopic full-thickness resection (LAEFR)". The differences are that the full thickness resection is performed by an endoscopic method and that the gastric wall defect is closed by handsewn techniques (Li, 2008; Tagaya, 2004; Hiki, 2008; Abe, 2009). Thus the armamentarium of the minimally invasive techniques offers the feasibility of achieving the resection of the GE junction GISTs with microscopically negative margins and at the same time ensures the preservation of the physiological functions of LES.

Conclusion

GE junction GISTs are a special entity and needs particular care and assessment to plan the resection. The Minimally invasive techniques are loaded with enough technology and understanding of the GISTs to handle all tumors irrespective of its size and location. Application of minimally invasive techniques to the GE junction GISTs has dramatically changed the perspective of the treatment from morbid, exhaustive yet functionally incapacitating surgeries to a minimally scarred, tumor targeted and homeostatic surgery.

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