



Acute Richter's Incisional Hernia Trough Trocar Site after Laparoscopic Gastric Surgery: A Futile Complication or with a Fatal Risk?

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Abstract

Trocar Site Hernia (TSH) is an important yet under-recognized complication, reported in 0.3% to 6% of laparoscopic surgery, depending on patients characteristics (age, BMI), trocar type and diameter. The objective of this paper is to report the incidence and clinical presentation of acute Richter's TSH after laparoscopic gastric resection analyzing the diagnosis, surgical procedures, postoperative complications and outcome. This study is based on the experience on 1612 patients submitted to laparoscopic gastric surgery performed by a single surgeon (IB) for different causes. For these procedures 5 trocars were used. Four out of 1612 patients were re-operated due to acute small bowel obstruction (0.24%) confirmed with CTscan and submitted to laparoscopic exploration, soon after diagnosis confirmation that are the subject of analysis. TSH occurred at 12-mm ports, all patients were submitted to re-operation for treatment of complications secondary to small bowel obstruction, two had severe septic complications due aspirative pneumonia and disruption of previous gastrojejunal anastomosis. All patients were submitted to re-operation for early recognition and surgical management. Despite the severe complications patient outcomes was favorable without postoperative mortality. The hospital stay ranged from 10 to 82 days. TSH is an uncommon event but carries substantial morbidity and potentially fatal consequences, should be recognized as a serious postoperative threat rather than a benign technical inconvenience. Early diagnosis, routine fascial closure of large ports, and heightened vigilance in postoperative gastric surgery patients could improve outcomes.

Keywords: Complications; Hernia; Laparoscopy; Site; Trocar

Introduction

Laparoscopic surgery is widely practiced and offers realistic benefits over conventional surgery. Port site hernia is an important yet under-recognized complication of laparoscopic surgery, which carries a high risk of strangulation due to the small size of the defect involved. There is considerable variation in results between surgeons, concerning port-site complications. Trocar Site Hernias (TSH) are reported in 0.3% to 6% of laparoscopic cases, depending on patients characteristics (age, BMI), trocar diameter and type. Most occur with trocars over 10 mm in diameter [1-5].

The Objective Of This Paper Is:

1. To calculate the incidence and clinical presentation of acute Richter's incisional hernia after laparoscopic gastric resection
2. To analyze the performed surgical procedure after diagnosis confirmation, postoperative complications and outcome.

Material and Methods

This study is based on the experience with laparoscopic procedures with resectional gastric surgery performed by a single surgeon for different indications including a total universe

of 1612 patients, divided as: Sleeve gastrectomy (683 patients), Resectional Gastric bypass, (551 patients), Fundoplication + distal gastrectomy for Barrett's esophagus, (151 patients), Conversion to Toupet's fundoplication+distal gastrectomy due to failed Nissen fundoplication, (81 patients), Conversion to resectional GBP after failed Sleeve gastrectomy due to reflux esophagitis, (66 patients) and Total gastrectomy for gastric cancer, (80 patients). The procedures were performed according to the indications and protocols established in our Department and published previously [6-11]. The trocars used (Single Use sterile laparoscopic System Class IIa, Surgaid Medical, Xiamen, Co China) were inserted as follow: trocar 1, supra-umbilical (11mm); trocar 2, sub-xiphoid (5mm); Trocar 3(12mm), left subcostal axillary line(11mm); Trocar 4, mid-clavicular left upper abdominal quadrant (12mm between trocars 1 and 3);and trocar 5, mid-clavicular right upper quadrant of the abdomen (11mm) (Figures 1-3).

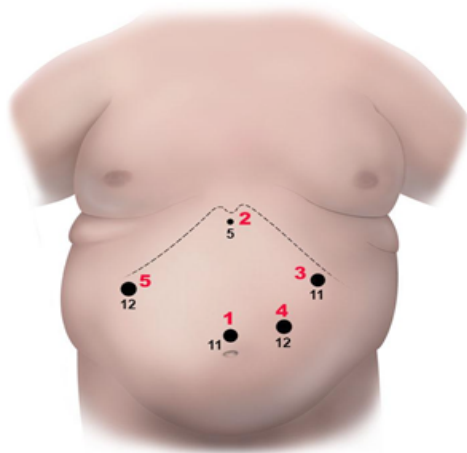


Figure 1: Trocar site location and diameter of each one (mm) for laparoscopic gastric resection.

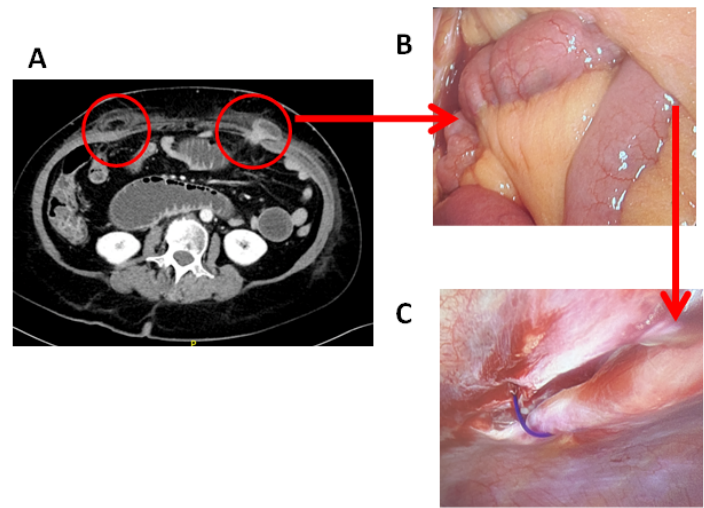


Figure 2: CT scan demonstrating two trocar site hernias demonstrating: A) right upper abdominal quadrant, and left upper abdominal quadrant with Richter's small bowel hernia B) Intra-operative finding demonstrating small bowel obstruction and C) Closure of the trocar site hernia.

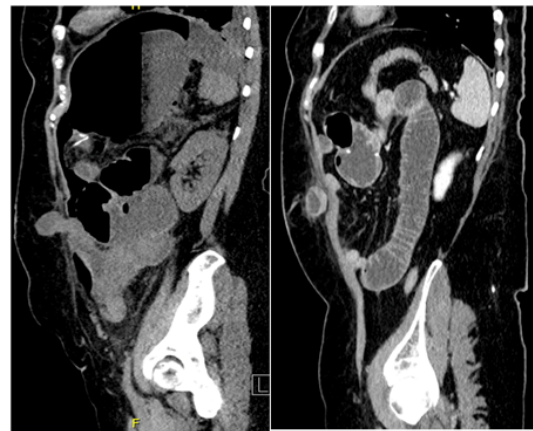


Figure 3: CT scan lateral vision demonstrating trocar site hernia at left upper abdominal quadrant demonstrating small bowel obstruction.

Results

Four out of 1612 patients have been re-operated due to acute small bowel obstruction (0.24%, one of the lowest rate published) confirmed with CT scan and submitted to laparoscopic exploration soon after diagnosis confirmation that are the subjects of analysis. Table 1 presents the demographic characteristics of four female patients who developed acute Richter’s trocar-site hernia. In this cohort, all cases were female and half presented obesity, aligning with reports showing higher incidence in women and individuals with BMI >30. Patient profile correlates with known epidemiologic risk factors, suggesting that preoperative identification of high-risk individuals may guide preventive closure strategies.

Table 1. Patient Demographics characteristic of patients included

Case	Age	Sex	BMI	Diagnosis	Operation
Case 1 (CA)	47	Female	27.9	LSBE Esophagitis D	Nissen Fundoplication + Antrectomy
Case 2 (XC)	61	Female	25.3	Esophagitis grade D + Type III Hiatal Hernia	Hiatoplasty + Nissen fundoplication
Case 3 (JG)	45	Female	38.8	Morbid obesity + Esophagitis	Sleeve Gastrectomy
Case 4 (MLG)	60	Female	30	HH + Esophagitis post SG	Sleeve gastrectomy

LSBE : Long segment Barrett’s esophagus. SG: Sleeve gastrectomy. HH: Hiatal hernia.

All hernias occurred at 12-mm ports, consistent with evidence indicating port sizes ≥ 12 mm significantly increase hernia risk. Two patients presented trocar hernia after conversion or reoperation procedure that agree with supporting literature that secondary procedures and repeated manipulation may weaken fascial integrity. All patients were submitted to re-operation for treatment of the described complications as is shown in Table 2.

Table 2. Surgical Details and Trocar Characteristics: Relationship between surgical technique, trocar placement, and hernia development.

Case	Initial Operation	Second Operation	Trocar Site Hernia	Trocar Diameter	Complication	Re-operation
Case 1	Nissen Fundoplication + Antrectomy	No	Right upper quadrant	12mm	Bowel obstruction	Bowel reduction
Case 2	Hiatoplasty + Nissen fundo- plication	Redo hiato- plasty +Toupet fundoplication+Distal Gastrectomy Roux –en- Y gastrojeju- nostomy	Left upper quadrant	12mm	Bowel ob- struction + Anterior par- tial dehiscence gastrojejunal anastomosis + Subhepatic perigastric abscess.	Bowel reduction + Resuturing dehiscence+ Peritoneal lavage + Drainage + antibiotics.

Case 3	Sleeve Gastrectomy	Conversion to Roux-Y distal gastrectomy	Left upper quadrant (Figure 2)	12mm	Bowel obstruction	Bowel reduction
Case 4	Sleeve Gastrectomy	Conversion to Roux-Y distal gastrectomy	Left paraumbilicalRight upper quadrant (Figure 3)	12mm	Bowel obstruction Omental hernia	Bowel reduction Omental reduction

Complications ranged from minor to life-threatening situations. Despite low overall incidence, severe complications such as septic shock and multi-organ failure were observed All patients were submitted to re-operation for treatment of the described complications. Patients recovered successfully after timely early recognition and surgical management had outcomes ultimately favorable, however others with severe complication should be considered a potentially lethal event requiring urgent evaluation and treatment. No mortality was observed despite presenting severe complications. (Table 3)

Table 3. Postoperative Complications and Outcomes

Case	Surgical procedure	Complication	Management	Hospital Stay (days)	Clavien Dindo	Outcome
Case 1	Bowel reduction	Localized bowel pneumatosis	Conservative medical treatment	10	IV	Good
Case 2	Bowel reduction. Resuturing dehiscence. Peritoneal lavage. Drainage + antibiotics.	Wound infection	Repeated wound lavage + antibiotics	25	IV	Good
Case 3	Bowel reduction	No major complication	Uneventful recovery	7	IV	Good
Case 4	Bowel reduction Omental reduction	Severe septic shock, pneumonia, multi-organ distress	ICU care, ventilation, antibiotics+ Antifungals+ amputations	82	IV	Good

Discussion

Incidence and Timing Across Laparoscopic Procedures

TSH remains an infrequent but clinically significant complication of laparoscopic surgery can occur promoting serious risk of bowel obstruction eventually involving during the early postoperative period the anastomotics integrity. Reported incidences range widely- from 0.14% to 6%-depending on patient-related factors. Female sex and elevated BMI, age, co-morbidities, trocar diameter, surgical technique are risk factors for trocar-site hernias, especially in bariatric and foregut surgery. While many port-site hernias become apparent only months after surgery, acute Richter-type herniation represents a unique presentation characterized by early onset, minimal external findings, and a disproportionately high risk of strangulation due to entrapment of the anti-mesenteric bowel wall. This sharp contrast between low incidence and potentially catastrophic outcomes underscores the importance of early recognition [4,5,12-15]. Large series confirm that TSH may occur both early and late. Zareen et al [12]. reported an incidence of 0.14% during 43 months of follow-up with no associated mortality, whereas Pilone et al [13]. found a higher prevalence of 1.6% but also without acute complications. In contrast, studies focused on bariatric and complex upper gastrointestinal surgery report variable incidence ranging from 0.2 to 39.3% depending on the time of symptoms presentation, diagnosis methodology, risk factors and follow-up. By ultrasound or CT scan the incidence is so high as 39%. Clinically early hernias with relevant symptoms or its consequences receiving surgical treatment is 0.5 to 3% early hernias, likely reflecting larger trocar diameters (≥ 12 mm), prolonged manipulation, and elevated intra-abdominal pressure [5,14,16]. Our incidence of 0.0024% (4/1612) acute Richter's hernias fits within the lower range of reported rates, yet the severity of presentations positions this as a complication underestimated in its clinical significance [13-17].

Risk Factors

As we mention before, risk factor analysis in the literature consistently highlights trocar diameter, obesity, female sex, and advanced age as major contributors to TSH development [1,2,13,17-19]. Most symptomatic TSHs occur at ≥ 10 -12 mm ports, a finding corroborated by our serie.

Additional procedural factors noted in bariatric and gastric surgery include:

- High intra-abdominal pressure due to pneumoperitoneum
- Repetitive torquing at working ports
- Prolongued manipulation
- Thick abdominal walls making fascial closure difficult [19-21]

Our cohort, composed exclusively of female patients with BMI ranging from normal to obese (25-38 kg/m²), aligns with established epidemiologic trends.

Acute vs Chronic Clinical Presentation

Chronic TSH tends to present with a palpable mass or discomfort, often diagnosed months to years after surgery. In contrast, acute TSH Richter's hernia lacks classical obstructive symptoms because only part of the bowel circumference is incarcerated. Prior case reports emphasize how subtle symptoms may progress abruptly to ischemia or perforation. All patients in our series presented with acute small-bowel obstruction, confirmed by CT scan, highlighting the typical but nonspecific early manifestations [21-24]. One unique case in our series showed two simultaneous Richter's hernias in different trocar sites, reinforcing the need for meticulous evaluation in symptomatic postoperative patients.

Diagnostic Approach

CT scan remains the diagnostic modality of choice, with a high index of suspicion required in the early postoperative period. Ultrasound has been validated for late-detection screening in bariatric patients [25,26] but has limited sensitivity in acute settings. Rapid diagnosis is essential because Richter's hernias may progress to necrosis without complete obstruction.

Complication Severity: Minor Event or Fatal Risk?

While many studies describe TSH as a minor complication, the literature clearly documents cases of strangulation, necrosis, perforation, peritonitis, and even mortality when diagnosis is delayed [22,23]. Our experience strongly reinforces this. Although all patients ultimately survived, one case evolved into bilateral pneumonia due to bile aspiration secondary to bowel obstruction, septic shock, multi-organ dysfunction, and distal limb necrosis, requiring

prolonged ICU care and amputations due to . This case demonstrates that TSH, particularly of the Richter type, can trigger life-threatening systemic complications. Thus, despite low incidence, the potential severity elevates trocar-site Richter's hernia from a trivial technical complication to a genuinely fatal risk.

Prevention and Role of Fascial Closure

Routine fascial closure of 12-mm ports, particularly in upper abdominal locations, may reduce postoperative Richter-type hernia incidence but no consensus exists. The debate about routine closure of ≥ 10 -12 mm trocar sites remains active. Survey data [1] confirm inconsistent practice patterns across specialties. Recent multicenter evidence [20] supports the use of 12-mm trocars with integrated fascial closure, demonstrating improved prevention rates in overweight patients. However, some bariatric surgery groups argue that non-closure may be acceptable due to postoperative weight loss decreasing wall tension [13].

Nonetheless, literature consensus indicates

- Closure of fascial defects ≥ 10 mm is recommended, particularly in the upper abdomen.
- Closure is crucial in obese patients due to thick adipose layers that mask early signs of herniation.
- Sharp or bladed trocars carry higher risk than conical dilating trocars [25-28].

In our series, all hernias occurred in 12-mm trocars, reinforcing the necessity for consistent and meticulous closure in high-risk cases.

Lessons Learned from our Experience

Several insights emerged from this analysis

1. Early postoperative bowel obstruction after gastric surgery should raise immediate suspicion for Richter-type TSH, even in the absence of classic symptoms.
2. CT confirmation is mandatory, as clinical evaluation alone may underestimate severity.
3. Prompt laparoscopic reduction is safe, feasible, and avoids bowel loss in most cases.
4. Severe systemic complications may occur, even in the absence of bowel necrosis, due to aspiration, delayed diagnosis, or physiologic stress from obstruction.
5. Prevention through systematic closure of all ≥ 12 mm trocar sites should be strongly considered.

The strength of this study is because analyses the experience in a large number of patients, only one surgeon participating and only one single center. The limitation is because it includes only acute

complication missing a follow-up for detection of undiagnosed presence of TSH

Conclusions

Richter's trocar-site hernia is an uncommon event but carries substantial morbidity and potentially fatal consequences. Our series confirms that even in experienced hands and high-volume practice, acute TSH can develop and lead to severe complications. Given the low but real risk of strangulation, TSH should be recognized as a serious postoperative threat rather than a benign technical inconvenience. Early diagnosis, routine fascial closure of large ports, and heightened vigilance in postoperative gastric surgery patients are essential to improve outcomes.

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