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CASE REPORT

A rare case of acute presentation of trocar site hernia from robot-assisted laparoscopic partial nephrectomy

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Abstract

Trocar site hernia is not a common acute complication encountered after robot-assisted surgery, especially in the urological cohort of patients. A few case reports of small bowel obstruction secondary to incarceration by trocar site hernia have been described in gynaecological surgery and prostatectomies. As the clinical presentation is non-specific, late diagnosis has significant implication on morbidity and mortality. Here, we present a rare case of a patient with recent robot-assisted laparoscopic partial nephrectomy for a renal cell carcinoma presented with features of impending bowel obstruction secondary to incarcerated small bowel in the trocar site. We also reviewed the literature focusing on clinical features of trocar site hernia and preventive measures.

Keywords Trocar · Hernia · Robot assisted · Bowel obstruction · Nephrectomy

Introduction

The innovation of technology continues to revolutionize the management of urological cancers. There has been a marked increase in the use of robot-assisted approaches in the urological setting. Despite the known benefits of minimally invasive approaches such as quicker convalescent, lesser post-operative pain and better cosmetic results, it has led to uncommon complications such as trocar site hernia (TSH) [1]. TSH in robot-assisted operations is rare but can lead to bowel incarceration and strangulation that carries a significant morbidity and mortality [2–5]. The literature evidence of TSH in robot-assisted urological surgeries are sparse, and are mostly reported in robot-assisted prostatectomy [3–5]. Here we describe a case of TSH occurring 10 days following robot-assisted partial nephrectomy, and we aim to review the literature on the incidence, clinical presentation, management and prevention strategies.

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Case report

A 71-year-old man underwent an elective robot-assisted laparoscopic partial left partial nephrectomy (RLPN) for a renal cell carcinoma (papillary type, Fuhrman grade II). The operation was carried out via the standard transperitoneal approach with six ports; the 12-mm camera port located lateral to the umbilicus was extended to 20 mm for specimen extraction. All the ports used were bladeless radially dilating trocars, and the camera port was closed at the fascial layer with 0 Vicryl suture. He was discharged on day 3 post-operation. Important past medical history includes previous laparoscopy-assisted anterior resection (LAR) 6 months ago for a sigmoid adenocarcinoma (pT2, pN0, Mx). Previous operative report for LAR documented Hasson port via the umbilicus and he was noted to have prolonged post-operative ileus. On day 10 post-RLPN, he presented with worsening nausea and vomiting. He had not opened his bowels and reported increased bowel distention but denied any abdominal pain. Clinical examination revealed normal vital signs and a soft and mildly distended abdomen. There was no significant bulge felt around the wound sites. Plain radiograph of abdomen (Fig. 1a) showed faecal loading but no signs of bowel obstruction. Initial findings were thought to be constipation and/or ileus. He was managed conservatively with laxatives and fleet enemas without marked improvement over the next 3 days. A computed tomography (CT)

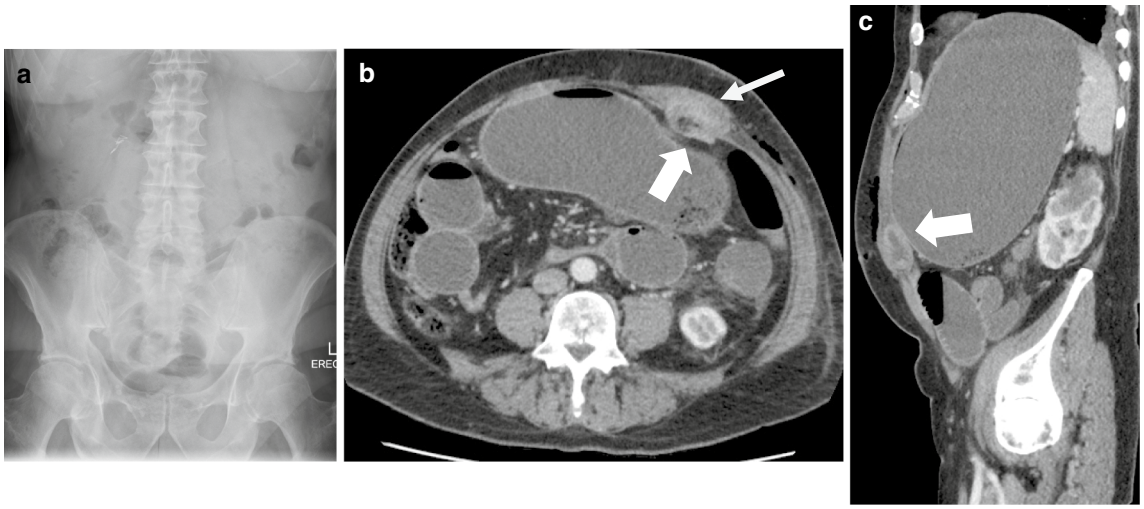

Fig. 1 **a** Abdominal X-ray showing faecal loading but no signs of bowel obstruction. **b**, **c** Coronal and sagittal views of CT abdomen/pelvis demonstrating an incarcerated small bowel loop at the periumbilical port-site (thick arrows). It was also noted that the external oblique aponeurosis was intact (thin arrow)

of abdomen/pelvis (Fig. 1b, c) was organized and depicted small bowel obstruction secondary to an incarcerated loop of small bowel in the periumbilical port-site hernia. Nasogastric tube was inserted to decompress the stomach. Biochemistry examination was unremarkable.

A mini-laparotomy over the port-site wound was performed. On exploration, the external oblique was intact and a loop of small bowel was discovered to have herniated through the peritoneal and internal oblique defect. The affected segment of small bowel was dissected free of the fascia and linear stapler (Covidien, DST Series™ GIA™) was used to resect the segment of small bowel and perform a side-to-side anastomosis. The port-site mini-laparotomy was then closed in layers. He recovered progressively and went home on day 8 post-operation.

Discussion

The incidence of trocar site hernia in the setting of urologic surgery has been reported to be in the range of 0.4–0.66% with a predilection towards periumbilical ports [6]. The overall incidence of TSH inclusive of laparoscopy and robot-assisted surgeries ranges from 0 to 5.2% [1, 7]. However, the true incidence may have been clouded by under-reporting.

Our review of the literature revealed that most TSH in the urology literature occurred in robot-assisted prostatectomy [8]. Besides, only a handful of acute TSH cases have been described in urological and gynaecological surgeries (Table 1). A few cases of early TSH secondary to drain insertion at the port site have also been reported in the laparoscopic paediatric urological setting [7]. To the best of our knowledge, our case is the first case of acute TSH after RLPN in the literature as the TSH in RLPN described were mostly incidental finding on oncological follow-up [9, 10]. In the study, only one out of six TSHs was present on clinical finding and of the six TSHs, four occurred in the periumbilical ports [9].

Various factors have been implicated in the development of TSH including the type of trocar used (blade vs bladeless), the site of trocar insertion and site of specimen extraction (midline vs paramedian), angle of port insertion, size of trocar and the need of fascial layer closure in ports less than 10 mm [8, 9].

Certain patient factors are thought to increase the TSH incidence such as obesity, conditions that increase intra-abdominal pressure and issues affecting wound healing (i.e. infection, diabetes mellitus, malnutrition and smoking) [8]. Another factor considered was if previous abdominal surgery would predispose to higher rates of TSH. A study investigating the outcomes of 95 RLPNs in patients with previous abdominal surgery did not report any TSH or incisional hernia [11].

Due to its rarity in occurrence, especially in the acute post-operative setting, a high degree of suspicion is required for diagnosing TSH. Often, patients present with non-specific signs and symptoms of nausea, vomiting and abdominal distention which can be confused with post-operative ileus. Clinical examination can be tricky as often the blunt and bladeless trocars cause interparietal "spigelian-type hernia where the hernia contents penetrate through the transversus abdominis and internal oblique muscle but not the external oblique aponeurosis [5]. As there maybe an absence of clinical finding due to the intact external oblique aponeurosis,

Table 1 Acute presentation of trocar site hernia in robotic-assisted surgery in the literature

No.	References	Age/gender	Previous surgery	Operation	Trocar size (mm)	Trocar type	Fascial closure	Clinical presentation	Management	Outcome	Recurrence
1.	Seamon et al. [2]	67 female	Not reported	Robotic hysterectomy, bilateral salpingo-oophorectomy	8	Bladeless	No	Nausea, vomiting and abdominal distention POD 4	Wound exploration over the port-site and primary repair of hernia	Uneventful and discharged POD 3	Not reported
2.	Spaliviero et al. [3]	71 male	Not reported	RALP	8	Not reported	No	Nausea, vomiting, anorexia, abdominal discomfort and constipation for 1 week post-discharge (POD 13)	Exploratory laparotomy and bowel resection (type of hernia repair not mentioned)	Uneventful	Not reported
3.	Fuller et al. [4]	Not specified	Not reported	RALP	8	Not reported	No	Small bowel obstruction POD 30	Laparotomy and bowel resection	Uneventful and discharged POD 5	Not reported
4.	Tsu et al. [5]	75 male	Bilateral inguinal hernia repair	RALP	8	Sharp	No	Small bowel obstruction POD 4	Mini-laparotomy over the port-site and primary repair of hernia	Uneventful and discharged POD 7	Not reported

RALP robot-assisted laparoscopic radical prostatectomy, *POD* post-operative day

the cross sectional computed tomography may be the most reliable imaging modality for diagnosis.

The gold standard of TSH management remains surgical intervention. In majority of cases, the TSH repair can be performed through a mini-laparotomy or wound exploration of the hernia site. In elective cases, a mesh is usually utilized for reinforcement of the primary repair. However, in emergency settings where bowel resection is involved, a mesh is not generally placed due to concerns of contamination.

A few preventative strategies have been suggested to reduce TSH, which include use of bladeless radially dilating trocars to reduce muscular and fascial defect, inserting the port at a steep (60°–90°) angle and closure of fascial layers in ports more than 10 mm [1]. There is little evidence to demonstrate closure of fascial layers in smaller ports will absolve the risk of TSH [5]. Nevertheless, Lim and colleagues proposed to remove the ports under direct visualization to assess the degree of peritoneal defect [12]. Of which, large defects are recommended to be closed. As it is often challenging to close the fascial layers of small ports, some port closure devices and needles are available to assist with the passing of the suture and needle uniformly through the fascial layer for closure. The efficacy of a novel technique of utilizing a Surgicel® plug in obese patients for port-site closure has also been reported [10]. Moreover, it is crucial to optimize and avoid the abovementioned patient factors post-operatively such as avoiding constipation and cough and any factors affecting wound healing.

Currently, no long-term robotic urological studies have evaluated that incidence of recurrence in TSH.

In our case, given that the patient was fit peri-operatively with no obvious risk factors for the development of hernia, it was believed that he developed mild post-operative ileus which increased the intra-abdominal pressure and contributed to the TSH.

Conclusion

In summary, trocar site hernia is considered as a relatively uncommon complication but it could be due to under-reporting or under-diagnosis. Acute presentation of trocar site hernia post-robotic urological surgery is exceedingly rare. Often, clinical presentation can be easily masked by non-specific signs and symptoms and the clinical examination is limited due to the "Spigelian-type" hernia where the external oblique aponeurosis remains intact. Surgical repair remains the gold standard and long-term studies evaluating the recurrence rate of TSH repair are required.

Authors' contribution Zi Qin NG designed the study, collected and analyzed the data, drafted the article and approved the final version of the article to be published. Richard PEMBERTON analyzed the data, critically reviewed the article and approved the final version of the article to be published. Patrick TAN co-designed the study, analyzed the data, critically reviewed the article, supervised the study and approved the final version of the article to be published.

Compliance with ethical standards

Conflict of interest Authors ZN, RB and PT declare that they have no conflict of interest.

Statement of ethics All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975. Informed consent was obtained from the patient for being included in the study.

Consent section Written informed consent was obtained from the patient for publication of this Case Report and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

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