



## Severe bowel incarceration in an eight-millimeter left-lateral trocar site after robot-assisted laparoscopic colposacropexy: A case report

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### ABSTRACT

Over the last twenty years, robotic surgery has become an increasingly important form of surgical intervention. However, it can have complications. Trocar site hernia (TSH), also known as port site hernia (PSH), is an uncommon complication, but in the case of bowel incarceration or strangulation it can cause significant morbidity. The lateral trocar sites usually do not need fascial closure, given their low susceptibility to hernia development. In this paper, we present a rare case of an incarcerated TSH from an 8 mm left lateral port after robotic colposacropexy. The patient was a 74-year-old woman with fourth-degree vaginal vault prolapse. She underwent robot-assisted colposacropexy and adnexectomy and was eventually discharged 3 days after surgery, with flatus. A few hours later, the woman developed generalized malaise and acute abdominal pain in the lower left quadrant, with no flatus or bowel movements. CT imaging revealed a small bowel dilatation with a transition point along the left lateral 8 mm trocar site. Laparotomy confirmed an incarcerated ischemic small bowel loop. This required a surgical 40 cm small bowel resection. Although uncommon, TSH is an important clinical entity to recognize after minimally invasive surgery. While it is known that a trocar site port of 10 mm or more does require fascial closure, it is not known whether the same is true of lateral 8 mm sites. Further studies are needed to reconsider the importance of lateral trocar site port fascial closure after robot-assisted surgery.

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### 1. Introduction

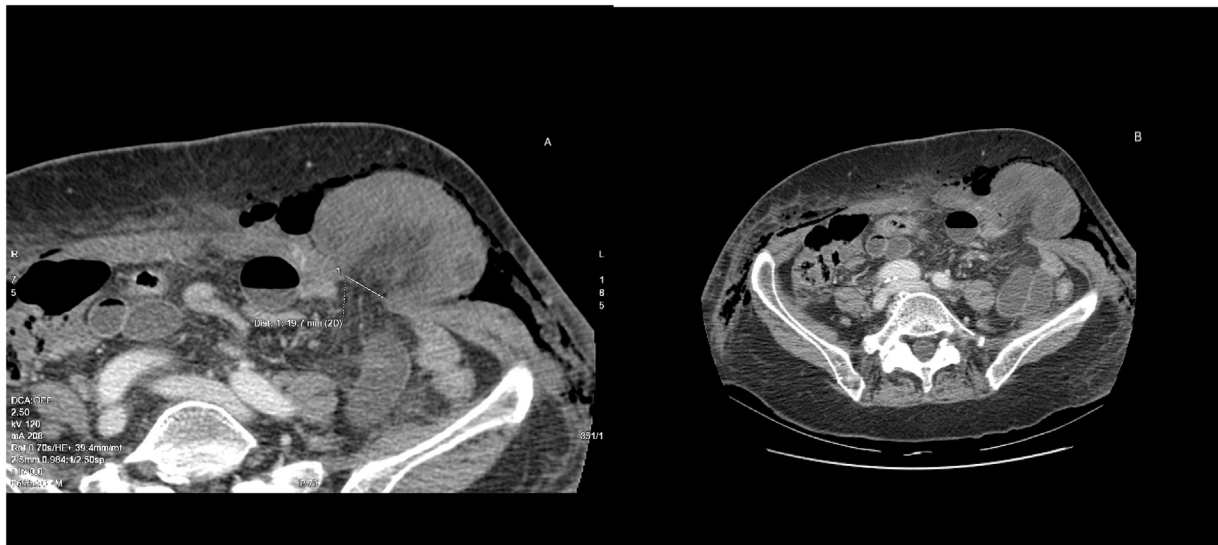
During the past two decades, there has been a considerable increase in the use of robotic surgery in many surgical disciplines, and in particular, in oncological, benign and urological gynecological conditions, due to the known benefits of minimally invasive surgery, including shorter hospitalization periods, less blood loss, faster patient recovery, and fewer intra- and post-operative complications [1]. Also, minimally invasive surgery has been shown to reduce the rate of post-surgical hernias compared with open surgery, where the literature reports higher rates of incisional hernias [2]. However, port site hernias (PSH), also known as trocar site hernias (TSH), while rare, are still possible and, if complicated by intestinal incarceration and strangulation, can be a serious complication, burdened by high rates of morbidity. The incidence of

post-operative trocar site hernia is estimated to be around 0.23% for 10 mm trocars, rising to 3.1% for 12 mm trocars [3]. Most of the literature concerns laparoscopic surgery, in which the majority of hernias are located along the trocar site if the incision is at least 10 mm, or in cases with port extension for specimen extraction [3]. For this reason, guidelines indicate the need for fascial closure of 10 mm port sites for laparoscopic surgery, while those of 5 mm should not be closed [4]. No such rules exist for 8 mm robotic port sites. No definitive assessment of the incidence and characteristics of robotic TSH has yet been done.

### 2. Case presentation

A 74-year-old Caucasian woman presented with fourth-degree vaginal vault prolapse, a fourth-degree cystocele and a second-degree rectocele. She had a body mass index (BMI) of 21 and had had a hysterectomy for fibromatosis at the age of 46. The patient underwent robot-assisted colposacropexy and adnexectomy. No intraoperative issues arose with any of the trocar sites. On the third

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**Fig. 1.** (A, B): Contrast-enhanced axial CT scan showing a transition tract along the abdominal wall with herniation of small bowel loops.

postoperative day, her blood tests were within normal range; the patient had no fever but did have flatus. She was discharged but a few hours later she reported acute abdominal pain, so she made her way to a hospital emergency department with an absence of flatus and no bowel movements for at least 4 h.

At assessment, she was hypotensive, in a tachycardic and tachypnoic state, and showed the Blumberg sign. Laboratory exams indicated an acute kidney injury, with creatinine levels elevated to 2.0 mg/dl, WBC 12.000 /mm<sup>3</sup> but normal hemoglobin levels. An abdominopelvic CT scan identified significant stomach distension and small bowel dilatation with a transition tract along the left lower quadrant abdominal wall, at the 8 mm left lateral trocar site (Figs. 1A, B, 2 A, B, 3). Physical examination revealed no cutaneous hematoma along the left lateral incision. The patient was taken to the operating room and an umbilico-pubic laparotomy was immediately performed by the local team of emergency general surgeons. At celiotomy, incarcerated small bowel loops were identified, with clear signs of ischemia. The woman underwent a 40 cm small bowel resection, and the left lateral wall defect was closed. Her general condition improved, with bowel functions re-established within four days. She was discharged on the sixth day after laparotomy.

### 3. Discussion

TSH is a rare complication of laparoscopic and robotic surgery. Its actual prevalence is difficult to ascertain, as it is often asymptomatic [5]. Uslu et al. showed that the prevalence of TSH is at least 5.2%. However, patients with intra-operative detection and correction of fascial trauma or defects were excluded in that study. Post-operative clinical examination of patients, after one week and after one month, indicated the prevalence of TSH to be 17.5% [6]. This highlights that, due to its asymptomatic nature, TSH can be underestimated. Furthermore, statistical data on the incidence of TSH are often based not on clinical detection but on the number of patients who require corrective surgery.

Great efforts have been made to identify the risk factors for TSH. There are well established patient-related factors such as: obesity; risk factors for increased abdominal tension; advanced age; malnourishment; and ascites [7]. In addition, there are more controversial surgical risk factors: trocar positioning; duration of surgery; closure of the fascia; and the size of the trocar. Concerns have emerged surrounding the trocar placement site. Some authors hypothesized a greater exposure to herniation in umbilical and

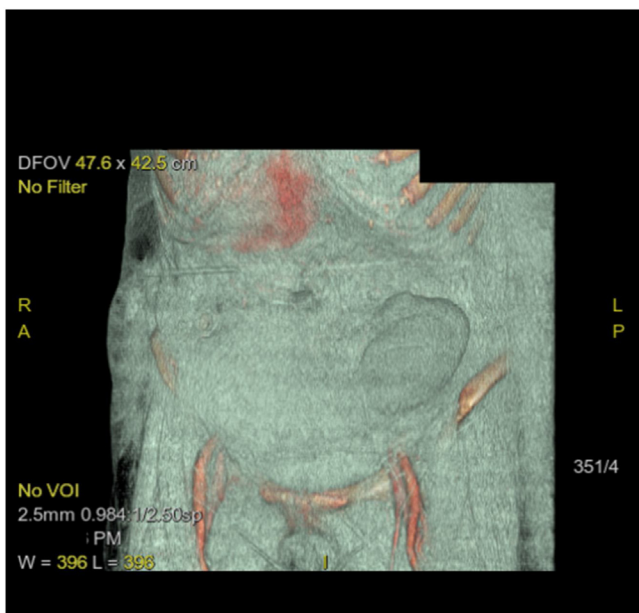
median incisions, due to a lack of abdominal wall musculature. However, Kadar et al. showed that the development of TSH is not usual in umbilical sites. Rather, it occurs only with offline positioning, and in particular when a 12 mm port is used [3]. On the other hand, Kang et al. did not detect lateral port site hernias even with 12 mm ports. They, in fact, described the skin, the peritoneum, and the muscle sliding in a caudal direction during the release of the pneumoperitoneum as a factor protecting against wall defects [8]. Stress at the trocar site, especially with prolonged operating times, can induce a mechanical insult; repetitive movements in multiple directions can lead to greater fascial and peritoneal defects. This also prolongs the time needed for the tissues to heal. As a result, surgical operations of longer duration, in particular more than 90 min, significantly influence the development of TSH [9,10].

The factor of major interest in the prevention of port site hernia is the length of the site incision. This relates to the fascial closure controversy. Most TSH occurs when trocars of 10 mm or more are used [11,12]. Consequently, there is unanimous agreement on the need for fascial closure of incisions of 10 mm or more [4]. However, it has been questioned whether it is safe to use only this dimensional criterion in deciding on the need for fascial closure. Some studies underline that 10 mm incisions present no higher rates of herniation even when not closed [13–15]. Moreover, cases have been reported in the literature of trocar herniation at incisions of less than 10 mm, and there is even a report of a pediatric case of omentum herniation at a 2 mm port site [16–20].

Guidelines are lacking on safe and efficient robotic interventions. The use of 8 mm trocar ports in robotic-assisted surgery has not been examined in the literature. A few studies have examined the presence of TSH after robotic surgery. A search of the literature, however, produces few results. Harr et al. found an incidence of 5.8% of incisional hernias at the specimen extraction site among 259 patients, but not TSH [21]. One review reported five clinical cases of 8 mm TSH, four involving urological patients and one a gynecological patient [22]. A review of 500 patients undergoing robot-assisted gynecological surgery found only three TSH, all occurring at 12 mm trocar site incisions, giving an incidence of 0.6%. In those studies, there was no 8 mm TSH [23]. On the other hand, Ramon Diez-Barroso et al. reported the three cases of herniation at 8 mm lateral port sites, at a point near the iliac crest. They illustrated how the anatomical factors of this particular point combined with the mechanical insults contribute to this occurrence [24]. That is because the external oblique, the internal oblique and



**Fig. 2.** (A, B): Contrast-enhanced sagittal abdominal CT scan with an absence of contrast enhancement in small bowel loops.



**Fig. 3.** 3D volume-rendering CT scan showing small bowel herniation.

the transversus abdominis, with their different origins and with their different fiber orientations, move separately during insufflation and desufflation, sliding over one another. Therefore, if a small incision is made across the three muscle walls during insufflation, the muscle fibers move to cover the incisional hole, thereby avoiding hernia development at the moment of desufflation. However, this movement is limited in the muscle tissue surrounding the point of insertion on aponeuroses and tendons, leading the authors to hypothesize that incisions near the anterior half of the iliac crest are more likely to develop hernias [24].

#### 4. Conclusions

TSH hernia is a widely and well studied phenomenon in laparoscopic surgery. However, there is little knowledge about the impact of the robotic approach on the development of this complication. For this reason, a dimensional evaluation criterion alone cannot establish the need for fascial closure. Therefore, a careful closure of the fascial defect can be essential if large peritoneal or fascial holes emerge at surgery, especially should it happen in the course of a

long surgical procedure. This applies also in the case of 8 mm trocar or non-midline sites. In this setting, there is no conclusive data and further studies should reconsider the importance of fascial closure of lateral trocar site ports after robotic surgery.

#### Contributors

All authors were involved in the clinical care of the patient and contributed to the conception, drafting, review and revision of the manuscript. All authors saw and approved the final version of the paper and take full responsibility for the work.

#### Conflict of interest

The authors declare that they have no conflict of interest regarding the publication of this case report.

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#### Patient consent

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