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Incarcerated ventral wall hernia after robotic urogynecologic surgery: A case report

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ABSTRACT

Trocar site hernia is a rare complication of minimally invasive surgery, with incidence estimates varying widely. Studies have demonstrated rates of up to 1.2% in patients undergoing gynecologic surgery. Yet, little is known about hernia risk in the urogynecologic patient population who undergo robotic reconstructive surgery. Risk factors for the development of trocar site hernia include both incisional risk factors (trocar placement location, trocar diameter, intraoperative trocar manipulation) and patient risk factors (obesity, pelvic organ prolapse or other hernia). This report presents a case of large incarcerated small bowel hernia at a trocar site following robotic urogynecologic surgery and the resulting interventions, including repeat surgery, to reduce the hernia. This case should prompt urogynecologic surgeons to check port sites after extensive dissections to assess if large peritoneal or fascial defects need additional closure.

1. Introduction

With advancing surgical technology, minimally invasive procedures have become the preferred mode of surgery over exploratory laparotomy for many gynecologic procedures. Advantages of minimally invasive surgery include decreased recovery time, length of hospital stay and postoperative infection rate [1].

Postoperative incisional hernia is a major complication of surgery. Estimates of the incidence of incisional ventral hernias vary depending on the size and location of incision. 10–15% of patients undergoing surgery will develop an incisional hernia, with midline location, vertical incision, and placement in the upper abdomen all associated with higher risk of hernia [2]. Multiple studies have demonstrated that the incidence of trocar site hernia (TSH) after minimally invasive surgery is lower than the incidence of incisional hernia after exploratory laparotomy, though estimates of this incidence vary widely. Studies of gynecologic minimally invasive procedures have estimated the incidence of TSH at up to 1.2% [3]. Patients with pelvic organ prolapse, itself a type of hernia, are at increased risk of hernia compared with patients without prolapse; one study found a 31.6% hernia prevalence rate compared with 5% in patients without prolapse [4].

This report presents a case of a large incarcerated peritoneal incisional hernia with resulting high-grade small bowel obstruction after robotic supracervical hysterectomy and sacrocolpopexy. The patient provided informed consent for this publication.

2. Case presentation

The patient was a 66-year-old woman (G2P2), whose past medical history was notable for hypertension, cataracts and vocal cord polyp and no prior abdominal surgeries. She had stage 3 uterovaginal prolapse that had not responded to conservative management with Gellhorn pessary. Both her mother and her grandmother had also had pelvic organ prolapse. She was counseled about options for surgical repair, including a vaginal approach via vaginal hysterectomy with uterosacral ligament suspension and anterior and posterior colporrhaphy or a robotic-assisted laparoscopic abdominal approach via supracervical hysterectomy, sacrocolpopexy, and posterior colporrhaphy. Given her age and active lifestyle, she was counseled that the abdominal approach might provide a more durable repair. Therefore, after informed consent, she underwent a scheduled robotic-assisted laparoscopic supracervical hysterectomy, bilateral salpingo-oophorectomy, sacrocolpopexy with Y-mesh, cystoscopy and posterior colporrhaphy with the Intuitive Surgical Da Vinci Robot Xi System. Five port sites were placed: one umbilical 8 mm Da Vinci robotic trocar, three additional 8 mm Da Vinci robotic trocar sites, and one 5 mm valveless trocar (Fig. 1). The case was notable for a difficult posterior dissection due to elongated cervix of about 8 cm. Due to the elongated cervix, visualization was especially difficult during

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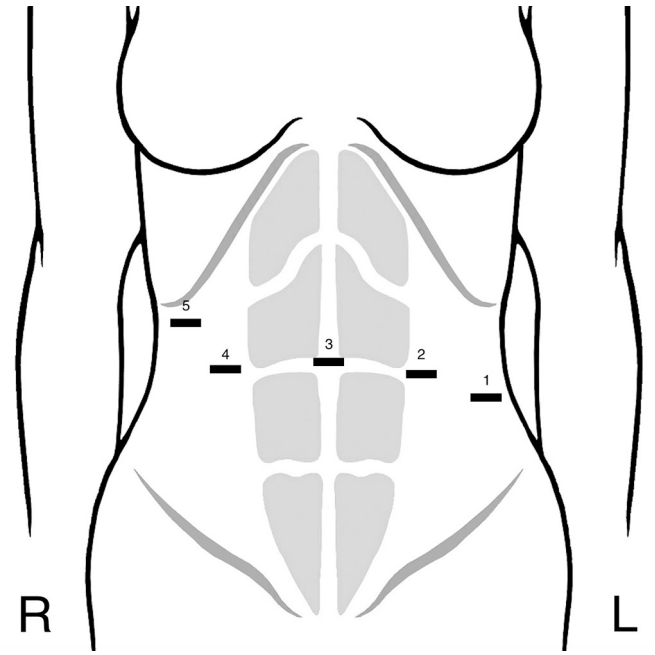

Fig. 1. Diagram of trocar placement. 1–4: 8 mm Da Vinci Robotic Trocar; 5: 5 mm AirSeal Valveless Trocar.

suturing of the Y-mesh to the posterior vagina. The umbilical incision was extended by 2 cm to assist with removal of the specimen. The fascia of the umbilical incision was closed by the abdominal route with 0-Vicryl suture due to omental adhesions obscuring the umbilical port site. The 8-mm ports were closed at the skin with 4–0 Biosyn suture. The case was overall uncomplicated, and the patient was discharged home in stable condition on the day of surgery after passing an active trial of void.

On postoperative day 1, the patient called to reported persistent nausea. She was tolerating only fluids and minimal solid oral intake. She denied fevers, emesis, flatus, or abdominal pain.

On postoperative day 3, the patient called again, to report obstipation since the day of her surgery. Her last bowel movement had been prior to surgery. She reported an inability to tolerate any oral intake, now with persistent emesis. She was instructed to present to the emergency room for evaluation, given concern for possible bowel obstruction.

Physical exam in the emergency room was notable for a soft, distended abdomen, nontender to palpation, with hypoactive bowel sounds throughout. A mass extending below the two left lateral port sites was palpable. Laboratory tests demonstrated leukocytosis with left shift (15.83*10 [3]/μL, 82.8% neutrophils) and mild acute kidney injury (creatinine 1.12 mg/dL), but were otherwise within normal limits, including normal lactate. Chest and abdominal x-rays demonstrated extensive subcutaneous emphysema and dilated loops of small bowel. CT scan demonstrated dilated stomach and small bowel to the level of an incarcerated ventral abdominal wall hernia with transition point at the level of the hernia, consistent with a high-grade small bowel obstruction (Fig. 2). There was no evidence of pneumatosis or hypoenhancement of the bowel wall to suggest ischemia or bowel injury.

The patient was taken to the operating room emergently for diagnostic laparoscopy and reduction of incarcerated hernia. Upon placement of an orogastric tube, there was immediate return of over 1300 cc of bilious output. The prior umbilical incision was opened, and a trocar was introduced into the abdomen under direct visualization. Upon entry into the abdomen, incarcerated small bowel was immediately noted through the peritoneal hernia at the left midline port site (Fig. 3). Over three feet of small bowel were carefully reduced laparoscopically with gentle traction via an atraumatic bowel grasper. All bowel appeared healthy, without evidence of necrosis or injury.

After reduction of the hernia contents, a 10 cm peritoneal defect was noted, associated with the prior left medial robotic port, through which the bowel had herniated. An additional 3 cm peritoneal defect and fascial defect were noted at the most lateral left port site. On the right

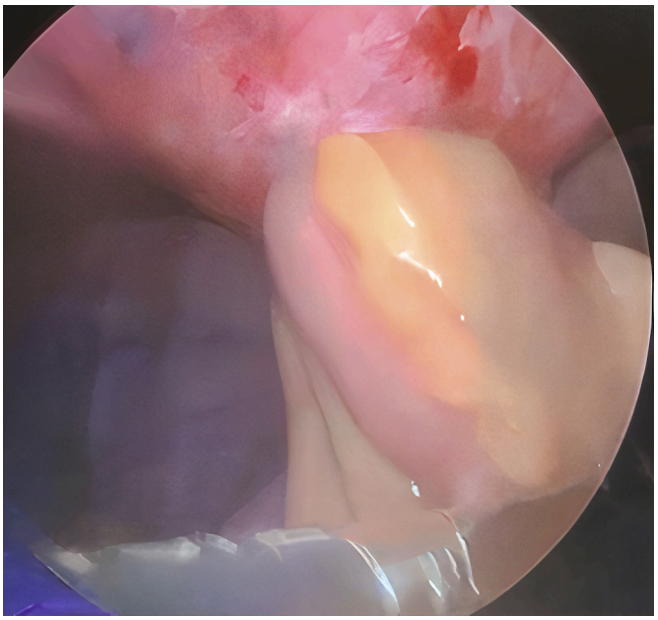

Fig. 3. Incarcerated herniated small bowel at the left medial trocar site. Bowel noted to be herniated through the peritoneal defect only. Bowel was reduced laparoscopically using atraumatic bowel graspers.

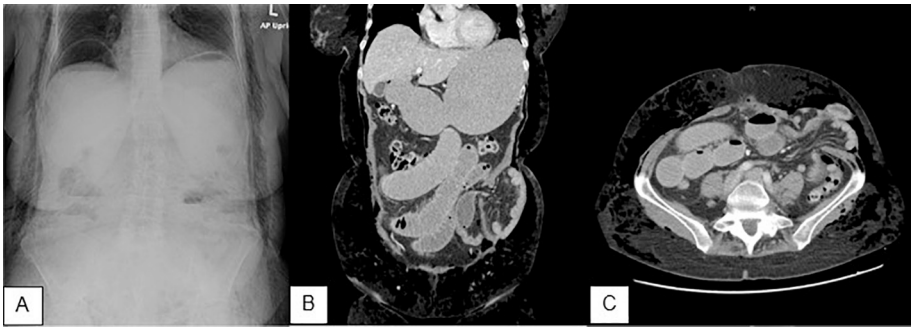

Fig. 2. A: CXR/KUB demonstrating extensive subcutaneous emphysema throughout chest and abdominopelvic walls, significant pneumoperitoneum, and air-fluid levels suggestive of bowel obstruction. B/C: CT demonstrating dilated stomach and small bowel to the level of a LLQ ventral abdominal wall hernia with transition point at hernia neck, suspicious for incarcerated hernia.

abdominal wall, an additional 3 cm defect was noted in both the peritoneum and fascia. All defects were noted to be located approximately 4–6 cm caudally from the skin incisions, indicating that the trocars had tracked significantly during placement. The left peritoneal and fascial defects were closed laparoscopically with 0-V-Loc barbed suture in a running continuous fashion. The umbilical fascia and right fascial defects were closed primarily with 0-Vicryl suture in a running continuous fashion. Although no bowel had herniated through the additional defects, all fascial and peritoneal defects were closed in an effort to prevent additional hernias. All defects were confirmed to be closed on abdominal palpation.

The patient was taken intubated to the surgical intensive care unit (SICU) postoperatively as there was concern for a possible aspiration event during induction of anesthesia. Her SICU course was uncomplicated, and the patient was extubated without issue by midday on the day of surgery and transferred to the floor. Diet was advanced with return of bowel function and the patient was discharged without issue on postoperative day 3.

3. Discussion

There is a lower incidence of postoperative incisional hernia following minimally invasive surgery compared with laparotomy, though the true incidence of trocar site hernia is not known. One report analyzing the available literature determined that the incidence of TSH in gynecologic surgery ranged from 0% to 1.2% [3]. Studies of general surgery procedures have found the incidence of TSH to be as high as 39.3% in patients undergoing Roux-en-Y gastric bypass [3]. In a case series of women undergoing robotic sacrocolpopexy, two developed TSH, an incidence of 1.6% [5]. Failure to close fascia, trocar diameter $\geq$ 10 mm, factors related to increased intra-abdominal pressure (including obesity and cough/Valsalva), and factors related to poor tissue healing have been identified as major risk factors for TSH [3,6,7].

The case presented here highlights the importance of precise technique during laparoscopy and some of the aforementioned risk factors for TSH. The Intuitive Da Vinci robotic trocars are designed to rotate around a central point during surgery. Correct placement requires that the trocar be placed perpendicular to the abdominal wall, so that the length of trocar within the abdominal wall is minimized. The same is true for any accessory ports, including valveless trocars. During this patient's hernia repair, the peritoneal entry sites were noted to be centimeters from the fascial and skin incisions.

Surgeons are particularly at risk for incorrect trocar placement, or "tracking" from skin entry to fascial entry, in patients with pelvic organ prolapse given the laxity of their weakened connective tissue [8]. Inadvertent insufflation of the peritoneum may occur due to trocar tracking, which can expand peritoneal entry sites throughout the surgery, predisposing patients to hernia formation, especially with the use of a valveless endoscopic dynamic pressure system. Robotic sacrocolpopexy often requires extensive retroperitoneal dissection and operating time [9]. The robotic arm associated with the 10 cm defect was used to assist with providing a fair amount of traction, adjusting back and forth multiple times during the sacrocolpopexy and attachment of the Y-mesh. These repetitive, extensive robotic arm motions, combined with increased tissue laxity, likely also contributed to trocar entry site widening and eventual hernia.

It is proposed that a major contributing factor to the formation of the patient's hernia was the fact that the trocars tracked through the subcutaneous and subfascial tissues in a patient with weak connective tissue. Because the trocar tracked during placement, the fascial and peritoneal entry sites were widened during surgery. This was further exacerbated by the extensive dissection carried out by the left robotic arm, predisposing the patient to hernia formation. From this, it is recommended that all trocars are removed under direct visualization over a blunt probe to minimize the chances of immediate bowel or omental herniation. It is also proposed that surgeons inspect all peritoneal and fascial incisions to the best of their ability at the conclusion of the procedure, and that surgeons consider closing any incisions that appear to have extended beyond 10 mm.

In conclusion, trocar site hernia is a major complication of minimally invasive surgery with the potential to cause major bowel sequelae. Surgeons must take care to inspect trocar sites for peritoneal and/or fascial extension at the conclusion of the case. If significant extension has occurred, the surgeon should consider closing the peritoneal and/or fascial extension, even if the original trocar placed is under 10 mm in diameter.

Contributors

Nora Badiner participated in the direct care of the patient and was involved in the conception of the case report, drafting the article, making the figures, and incorporating critical edits.

Stephanie Sansone participated in the direct care of the patient and was involved in performing background research for the article in terms of its relation to urogynecology, crafting the discussion, editing the figures, and formatting.

Tamatha Fenster was involved in the direct care of the patient, assisted with writing the patient's course and timeline, and edited areas related to surgical technique.

Saya Segal was involved in the direct care of the patient and assisted with all critical edits, particularly related to the discussion points, and helped write the important intellectual content to learn from the case.

All authors approved of the final article.

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

Obtained.

Provenance and peer review

This case report was peer reviewed.

References

[1] J.W. Aarts, T.E. Nieboer, N. Johnson, et al., Surgical approach to hysterectomy for benign gynaecological disease, in: Cochrane Gynaecology and Fertility Group, Cochrane Database Syst Rev, 2015, https://doi.org/10.1002/14651858.CD003677.pub5. Published online August 12.

[2] S. Nachiappan, S. Markar, A. Karthikesaligam, P. Ziprin, O. Faiz, Prophylactic mesh placement in high-risk patients undergoing elective laparotomy: a systematic review, World J. Surg. 37 (8) (2013) 1861–1871, https://doi.org/10.1007/s00268-013-2046-1.

[3] J.L. Holihan, J.S. Chen, J. Greenberg, et al., Incidence of port-site hernias: a survey and literature review, Surg Laparosc Endosc Percutan Tech. 26 (6) (2016) 425–430, https://doi.org/10.1097/SLE.0000000000000341.

[4] Y. Segev, R. Auslender, B. Feiner, A. Lissak, O. Lavie, Y. Abramov, Are women with pelvic organ prolapse at a higher risk of developing hernias? Int. Urogynecol. J. Pelvic Floor Dysfunct. 20 (12) (2009) 1451–1453, https://doi.org/10.1007/s00192-009-0968-9.

[5] P.G. Barboglio, A.J.W. Toler, V. Triaca, Robotic Sacrocolpopexy for the Management of Pelvic Organ Prolapse: a review of midterm surgical and quality of life outcomes, Female Pelvic Med Reconstr Surg. 20 (1) (2014) 38–43, https://doi.org/10.1097/SPV.0000000000000047.

[6] P.M. Yuen, Early incisional hernia following laparoscopic surgery, Aust. N. Z. J. Obstet. Gynaecol. 35 (2) (1995) 211–212, https://doi.org/10.1111/j.1479-828X.1995.tb01875.x.

[7] A.M.D. Coda, M.M.D. Bossotti, F.M.D. Ferri, R.M.D. Mattio, G.M.D. Ramellini, A.M. D. Poma, F.M.D. Quaglino, C.M.D. Filippa, A.M.D. Bona, Incisional Hernia and Fascial Defect Following Laparoscopic Surgery, Surg. Laparosc. Endosc. Percutan. Tech. 10 (1) (2000) 34–38.

[8] M.H. Kerkhof, L. Hendriks, H.A.M. Brölmann, Changes in connective tissue in patients with pelvic organ prolapse–a review of the current literature, Int. Urogynecol. J. Pelvic Floor Dysfunct. 20 (4) (2009) 461–474, https://doi.org/10.1007/s00192-008-0737-1.

[9] H. Celik, A. Cremins, K.A. Jones, O. Harmanli, Massive subcutaneous emphysema in robotic Sacrocolpopexy, JSLS. 17 (2) (2013) 245–248, https://doi.org/10.4293/108680813X13654754535151.