Incarcerated 5-mm Port Site Hernia: A Systematic Literature Review and Case Report

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Background: Port site hernias are a recognized complication of laparoscopic surgery and carry a high risk of strangulation because of the small size of the defect involved. Most hernias occur in trocar sites that are larger than 10 mm. This has resulted in the accepted practice that fascial defects larger than 10 mm are closed, incorporating the peritoneum and fascia, whereas defects less than 10 mm are not closed.

Results: We report a port site hernia at a 5-mm port site in a 90-year-old woman after ventral rectoplexy. A systematic review of literature found 27 cases of 5-mm port site herniation: 10 cases in general surgery and 17 cases in gynecological surgery.

Conclusion: The possibility of herniation through 5-mm port sites should be known to avoid a delay in recognition, diagnosis, and treatment.

Key words: Laparoscopic surgery – Port site hernias – Surgical complications

The incidence of trocar site hernias ranges from 0.65% to 2.8%. The rates are related to trocar size. A meta-analysis of port site hernias in gastrointestinal surgery found that 18 hernias occurred in 1780 port sites larger than 10 mm, whereas no hernias occurred at the 4444 ports sites smaller than 10 mm. It is widely accepted that it is not necessary to close fascial defects in adults in port sites <10 mm. We present a case report of a 5-mm trocar site hernia.

Case Report

A 90-year-old woman underwent ventral rectoplexy after a 2-week history of full-thickness rectal prolapse. A 10–12 Hassan umbilical port was inserted, followed by three 5-mm ports in the right upper quadrant, left flank, and suprapubic regions. There was extensive adhesiolysis (secondary to previous midline exploratory laparotomy for appendicitis and laparoscopic-assisted vaginal hysterectomy). The total operative time was 120 minutes. The 10- to 12-mm port site fascia was closed using 1-0 Vicryl with a Karta Thompson laparoscopic suture passer, and the anterior recuts sheath was closed with interrupted 1-0 Maxon sutures. The 5-mm incisions were not closed at the fascial level. All sites were closed using INSORB 3-0 monocryl subcuticular sutures. The patient’s recovery was unremarkable.
As an inpatient, at postoperative day 5, the patient reported abdominal pain and vomiting and had not opened her bowels in the preceding 24 hours. On examination, she was afebrile, with a distended abdomen and a tender palpable mass at her left flank port site. A computed tomography scan was performed, which suggested a small bowel obstruction from an incarcerated hernia in the left iliac fossa (Figs. 1 and 2). An emergency laparotomy identified the hernia, and the defect was enlarged transversely. The erythematous, not edematous, bowel was reduced, and the hernial orifice closed with 1-0 interrupted mattress sutures Polydioxanone (PDS), mass closure of abdominal wall, and subcuticular INSORB 3-0 monocryl sutures. The patient was admitted to the intensive care unit postoperatively for 3 days and then discharged to the ward for postsurgical optimization before her return to independent living.

Literature Review

A literature search was conducted in Ovid and Cochrane databases using the following search strategy: ((Port site hernia) OR (Laparoscopic port hernia) OR (trocar site hernia)) AND ((5-mm) OR (5mm) OR (five mm)). The date last searched was 29 May 2016. Reference lists of relevant studies were searched by hand to identify additional publications. Studies were excluded if they were not written in English or did not specify port size. Studies included reported laparoscopic port site hernias in an adult population.

Data were extracted on the surgical specialty, type of operation, port size and type where available, port site, patient characteristics (age, body mass index), time from surgery to hernia presentation, presence of organ evisceration in hernia, management of the hernia, and any comments on the case.

Databases and reference lists searched yielded 358 articles, and the full text of 105 studies were examined. Based on the inclusion and exclusion criteria, 20 studies were included (Tables 1–3). One study was a retrospective review, 1 was a prospective cohort study, and the remaining 18 were case reports.

There were 27 cases of 5-mm trocar site hernias. There were 10 cases in general surgery: 9 case reports and 1 case in a prospective cohort trial. There were 17 cases in gynecological surgery: 12 case reports and 5 cases in a retrospective cohort trial.

Discussion and Conclusion

Surgical factors contributing to the development of hernias include the number of trocars, trocar size, location, trocar type, manipulation, the duration of procedure, drain positioning through the port sites,
### Table 1: General surgery case reports

| Study                  | Operation               | Port size (mm) | Age (yr)/BMI (kg/m²) | Site                        | Delay after laparoscopy (days) | Evisceration | Management                                      | Comments                                                                 |
|------------------------|-------------------------|----------------|----------------------|-----------------------------|--------------------------------|--------------|------------------------------------------------|--------------------------------------------------------------------------|
| Abdel-Halim et al⁷     | Appendectomy            | 5              | 44                   | Left iliac fossa port       | 6                              | SI           | Laparoscopic reduction and repair of incision   | Previous drain site                                                      |
| Coda et al⁸            | Cholecystectomy         | 5              | 62/ >30              | Right lateral trochanter    | 2 years                       | Omentum      | Laparoscopic reduction and repair of incision   | COPD, incidental finding while reducing hernia as 10-mm port site        |
| Dulskas et al⁵         | Cholecystectomy         | 5              | 63/36                | Right subcostal margin      | 10                             | SI           | Midline laparotomy                             |                                                                          |
| Fleming and Winter⁹    | Right hemicolecotomy    | 5              | 63/ >30              | Right iliac fossa           | 21                             | SI (Richter’s hernia)         | Laparotomy                                      | Cecal carcinoma                                                         |
| Matter et al¹⁰         | Cholecystectomy         | 5              |                      | Right upper quadrant        | 5                              | Richter hernia                        |                                                               | Reinsertion of cannula may widen initial fascial defect                  |
| Mehmet¹¹               | Cholecystectomy         | 5              | 58                   | Right upper quadrant        | 5                              | Meckels diverticulum (Littre’s hernia) | Laparotomy                                      |                                                                          |
| Plaus¹²                | Cholecystectomy and pelvic laparotomy | 5              | 46                   | Suprapubic                  | Omentum                       | Repair under local and sedation      |                                                                |                                                                          |
| Ravichandran et al¹³   | Appendectomy            | 5              | 58/36                | Lateral                      | 1 year                        | Omentum and LI                      | Midline laparotomy                              |                                                                          |
| Reardon et al⁴         | Paraesophageal hernia repair | 5              |                      | 2                             | SI obstruction                  |                                                       |                                                              |                                                                          |

BMI, body mass index; SI, small intestine; LI, large intestine; L, left; R, right, BSO, bilateral salpingo-oophorectomy.
| Study                | Operation (laparoscopic) | Port size (mm)/type | Age (yr)/BMI (kg/m²) | Site                  | Delay after laparoscopy (days) | Evisceration | Management                                                                 | Comments                                           |
|---------------------|--------------------------|---------------------|----------------------|-----------------------|-------------------------------|--------------|---------------------------------------------------------------------------|----------------------------------------------------|
| Bergemann et al     | Tubal ligation           | 3                   | 32                   | Umbilicus             | 2                             | Omentum      | Preexisting umbilical herniation                                           |                                                   |
| Eltabbakh           | Hysterectomy, BSO, lymph node biopsy | 5                   | 54                   |                       | 7                             | SI           | Exploratory laparotomy                                                    | Prolonged operation                                |
| Huang et al         | BSO, lymph node biopsy   | 5/nonbladed trocars | 63                   | Right lower quadrant  | 1                             | SI           | Laparoscopic reduction and repair of incision                             |                                                   |
| Khurshid et al      | Tubal ligation (15 min)  | 5                   | 36/33.1              | Lateral               | 0                             | LI           | Laparoscopic reduction and repair of incision                             | Corrected in surgery                               |
| Kanis et al         | Laparoscopic BSO (100 min) | 5/nonbladed balloon trocars | 70/22               | Right lower quadrant  | 1                             | SI           | Laparoscopic reduction and repair of incision                             |                                                   |
|                     | Laparoscopic radical hysterectomy, BSO, lymph node dissection, adhesion lysis | 5/nonbladed balloon trocars | 84/20               | Left lower quadrant     | 5                             | SI           | Laparoscopy, segmental bowel resection and primary anastomosis           | Incidental omental tissue found when examining right-sided 5-mm port, repaired in theater |
| Moreaux et al       | Laparoscopic hysterectomy, BSO, pelvic lymphadenectomy (240 min) | 5                   | 63/26                | Lateral               | 6                             | SI           | Laparoscopy                                                               | Previous drain site                                 |
|                     | Laparoscopic hysterectomy, BSO, pelvic lymphadenectomy (120 min) | 5                   | 74/20                | Right lower abdomen    | 6                             | SI           | Laparotomy                                                                | Previous drain site                                 |
| Plaus               | Pelvic laparoscopy       | 5                   | 27                   | Suprapubic             | Omentum                      | Repair under local anaesthesia with sedation                           |                                                   |
| Sayaneh and Abdel-Rahman | Ovarian cystectomy      | 5                   | 43/26                | Lateral               | 2                             | SI           | Laparoscopic reduction and repair of incision                             | No risk factors, short uncomplicated procedure     |
| Thapar et al        | Laparoscopic ovarian cystectomy | 5                   | 38/23                | Right lower quadrant  | 2                             | SI           | Laparoscopic reduction and repair of incision                             | Previous drain at site                              |
| Toub               | Radical hysterectomy     | 5                   |                      | Left lower quadrant    | Omentum                      |                                           | Began chemotherapy day 2                                 |
| Yamamoto et al      | Hysterectomy             | 5                   | 43                   | Right lateral abdominal wall |                              | SI           | Laparoscopic reduction and repair of incision                             | Extensive trocar manipulation                       |

Table 2 Gynecological surgery case reports
entry, and closure techniques. Additionally, patient factors contributing to an increased rate of trocar site herniation’s may include preexisting fascial defects, obesity, and surgical site infections.

Extensive manipulation of trocar sites may widen the port site incision fascia and peritoneum beyond the initial length. Stretching may occur secondary to specimen removal, multiple insertions of the sheath, increased force and torque on the fascia, and prolonged operative time. The retrospective review by Nezhat et al. noted that each of the 5 surgeries resulting in trocar site hernias were associated with surgical difficulties. For example, extensive adhesions, as seen in our case, required extensive manipulation from the trocar sites.

Laparoscopic port site herniation is a preventable cause of morbidity that requires a second, often emergent (or unplanned), surgical procedure to repair. All fascial defects larger than or equal to 10 mm should be closed at the fascial level. Smaller defects may require closure in certain circumstances to prevent subsequent herniation; in particular, where port sites have been subjected to additional unanticipated mechanical stress throughout the procedure. After laparoscopic procedures, patients reporting postoperative incisional swelling or gastrointestinal obstructive symptoms should be expediently evaluated for possible bowel herniation, regardless of port size used to avoid delays in diagnosis and treatment.

Observational case report ethics approval from an ethics committee or institutional review board was not required.

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