

CASE REPORT

Acute appendicitis within a robotic port-site hernia: a case report

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Abstract

Trocar-site hernias are uncommon complications of minimally invasive surgery. The potential for incarceration or strangulation of intra-abdominal contents within trocar-site hernias can lead to major morbidity. We present a case of acute, strangulated appendicitis within a right lower quadrant 8 mm robotic trocar site following robot-assisted laparoscopic cholecystectomy. We additionally perform a brief review of the literature regarding the optimal approach to trocar-site closure.

INTRODUCTION

Trocar-site hernias are rare, but well-recognized, complications of minimally invasive surgery. With an overall reported incidence of 0.5–3%, the prevalence of these hernias continues to increase with the rise in adoption of minimally invasive approaches [1]. The potential for incarceration or strangulation of intra-abdominal contents within trocar-site hernias can lead to major morbidity; however, this is rarely seen with ≤ 10 mm sites [2]. We present a case of acute, strangulated appendicitis within a right lower quadrant 8 mm robotic trocar site following robot-assisted laparoscopic cholecystectomy.

CASE REPORT

A 71-year-old woman with a past medical history of morbid obesity presented to the emergency department with a 1 day history of severe right lower quadrant pain. Her symptoms started abruptly with no inciting event and were associated with nausea, anorexia and low-grade fever. She had focal tenderness in the right lower quadrant over a healed surgical scar without frank peritonitis. There were no overlying skin changes or masses. Her prior surgical history was significant for robotic-assisted laparoscopic cholecystectomy performed 8 months prior. During that operation, six robotic port sites (due to inadvertent enterotomy

necessitating additional ports) were used. Only the fascia of the 12 mm midline port was closed. The remainder were 8 mm and closed at the skin only.

CT scan revealed a right lower quadrant abdominal wall hernia containing the appendix, with periappendiceal fluid, fat stranding and appendiceal wall thickening. Based on her clinical presentation and radiographic findings, she was diagnosed with acute appendicitis and taken to the operating room for open appendectomy and incisional hernia repair. A transverse incision was made in the right lower quadrant to include the prior port site and carried through the subcutaneous tissue. The hernia was encountered and the sac opened revealing a strangulated appendix. This was circumferentially dissected free to healthy fascia. The cecum was brought into the field to identify the base of the appendix, and a standard appendectomy was performed with primary repair of the hernia. She was discharged home on postoperative day 4. Her postoperative course was complicated by a wound infection treated with reopening of the incision, drainage and negative-pressure wound therapy.

DISCUSSION

The small orifice of trocar-site hernias makes them prone to severe consequences when intra-abdominal contents are

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incarcerated or strangulated, as illustrated in this case. Most commonly, omentum or small intestine are the involved structures and usually present asymptotically—the description of appendix within a trocar-site hernia is rare. Case reports have characterized the presence of the appendix within laparoscopic trocar-site hernias, though most occurred at 12 mm ports. At least one prior case report described the appendix within a robotic trocar-site hernia, also at a 12 mm site [3]. At the time of surgery, appendectomy was performed in all cases. To our knowledge, this is the first report of a case of acute, strangulated appendicitis within an 8 mm trocar-site hernia. Given the unique propensity of the appendix for acute inflammation, we propose appendectomy in any case when the appendix is found within a trocar-site hernia in order to mitigate future surgical risk.

With the advent in recent years of robotic minimally invasive surgery, special consideration regarding robotic trocar-sites warrants discussion. Several studies across robotic colorectal, urologic and gynecologic surgery have reported extremely low incidence of trocar-site hernia, ranging from 0% to 0.6% [4]. When present, hernias occurred at the 12 mm trocar site. In none of these studies were sites <10 mm routinely closed, which adheres to lessons learned from laparoscopy and small clinical series in which routine fascial closure of 8 mm robotic ports has not been recommended. However, trocar-site hernias arising from 8 mm robotic ports have certainly been described, demonstrating the importance of critically evaluating the practice of managing these sites [3,4]. Several facilitating factors unique to robotic surgery have been postulated to impact the development of a hernia. First, longer operative times may increase the strain on the fascia, leading to higher likelihood of hernia formation. Second, robotic arms may exert higher force on fascia with increased torque, which may inadvertently widen the fascial defect. Third, while traditional cutting trocars were thought to result in a larger fascial incision, hernias have also been described in 8 mm sites created using bladeless technology [2]. We therefore suggest that closure of 8 mm trocar sites should be strongly considered by the operating surgeon to reduce the possibility of trocar-site hernia.

The optimal approach to trocar-site closure remains unknown. Complete fascial closure may be challenging depending on the patient's body habitus, and blind suturing of the fascial

defect can not only lead to incomplete closure but also larger skin incisions. Closure techniques can be categorized into the following three groups: extracorporeal with visualization inside the abdomen (i.e. Carter-Thomason CloseSure System), intracorporeal with visualization inside the abdomen (i.e. Gore Surgical Suture Passer) and standard closure. Small studies, both with and without the use of specialized devices, show promise in reducing the incidence of hernia with novel closure techniques [5]; however, at the time of this writing, no single approach can be recommended as standard.

As robotic-assisted surgical platform adoption increases, the potential morbidity related to trocar-site hernias correspondingly increases. Based on lessons from the described case and review of the literature, we recommend the following: first, all robotic port sites > 10 mm, regardless of location, should be closed. Closure should be performed using a technique the surgeon is comfortable and familiar with, whether or not a device is used to assist in closure. Second, closure of 8 mm port sites should strongly be considered as the sequelae related to incarceration of these hernias are potentially severe. Similar to port sites > 10 mm, technique for closure should be tailored to the individual surgeon. Lastly, in cases where the appendix is suspected or known to be involved with an incarcerated trocar-site hernia, appendectomy should be discussed with the patient prior to operation.

REFERENCES

1. Tonouchi H, Ohmori Y, Kobayashi M, Kusunoki M. Trocar site hernia. *Arch Surg* 2004;139:1248–56.
2. Swank H, Mulder I, La Chapelle C, Reitsma J, Lange J, Bemelman W. Systematic review of trocar-site hernia. *Br J Surg* 2012;99:315–23.
3. Schmocker RK, Greenberg JA. An unusual trocar site hernia after prostatectomy. *Case Rep Surg* 2016;2016. doi: 10.1155/2016/3257824.
4. Chang MD, Morin N, Liu S, Shehebar J. Port site hernias following robotic colorectal surgery in people with obesity. *BMJ Case Rep* 2018;2018. doi: 10.1136/bcr-2018-226155.
5. Mouanness M, Khoury S, Nassif J. Abdominal fascia closure techniques during laparoscopy. *Surg Technol Int* 2019;35:17–26.