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Robotic port-site hernias after general surgical procedures

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ABSTRACT

Background: With the increasing use of the robotic platform in general surgery, whether 8-mm ports should be closed comes into question. We sought to characterize the incidence of port-site hernias (PSHs) among patients undergoing robotic-assisted general surgery.

Methods: A retrospective chart review of a single institutional database identified patients who underwent robotic-assisted general surgery from July 2010 to December 2016. For each patient, the number, type, location, and size of all ports were collected. Twelve-millimeter port sites were routinely closed, whereas 5-mm and 8-mm port sites were not. PSH was detected on review of documented physical examination and of postoperative cross-sectional imaging, when available, in which case it was defined as a disruption of the fascia with or without eventration of tissue at a site of prior port placement.

Results: One hundred and seventy-eight patients underwent robotic-assisted general surgery, with 725 total ports: 433 8-mm working ports, 72 12-mm working ports, 178 12-mm camera ports, and 42 5-mm assistant ports. Ninety-four percent of the patients were men, the mean age was 63 ± 12, body mass index was 29 ± 7 kg/m^2, and the median American Society of Anesthesiologists score was 3. Types of cases included 68 rectal (38.2%), 36 colon (20.2%), 25 hepatopancreatobiliary (14.0%), 21 inguinal hernia (11.8%), and 28 "other" (15.7%) operations. At a median follow-up of 193 d, there were three PSHs through 8-mm port sites (0.7%), two PSHs through 12-mm port sites (0.8%), and no PSH through 5-mm port sites. Two of the three 8-mm PSHs occurred in the early postoperative period and required emergent repair due to small bowel incarceration.

Conclusions: PSHs through 8-mm robotic port sites occur infrequently but can cause significant morbidity. Further investigation with longer follow-up is warranted to better understand the true incidence of robotic PSH.

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Background

Robotic surgery is being applied increasingly in the performance of various general surgical procedures (GSPs), with its use expected to continue to rise especially for colorectal surgery.[1] Both robotic and laparoscopic surgeries have been reported to be associated with decreased postoperative pain and length of stay, and lower rates of cardiac complications, pneumonia, and wound complications, with better cosmetic outcomes when compared to open surgery.[2] In addition, minimally invasive surgery techniques are associated with a lower rate of incisional hernias compared to open surgery. Still, port-site hernias (PSHs) may occur after minimally invasive surgery and can lead to bowel incarceration and need for emergent surgery.[3,4] Studies of PSH have mostly been derived from the laparoscopic experience, where PSH rates are reported to range from 0% to 5.2% across all procedures, with the highest rates detected in colorectal surgery (1.5%-5.2%).[5,6] A systematic review of PSH attributed 96% of all laparoscopic PSHs to port sites measuring 10-mm or larger, and 82% to the umbilical region.[7] Still, the true incidence of PSH may be underappreciated, as asymptomatic hernias can be difficult to diagnose clinically. A recent study reported rates of clinically diagnosed PSHs of 1.9% and occult hernias of 6.7% after laparoscopic surgery.[8]

The incidence of robotic PSH, on the other hand, is not well established. Although the robotic platform offers advantages over standard laparoscopy, including greater degrees of freedom permitting better instrument articulation, it relies on larger working ports measuring 8 mm in cross-sectional diameter or greater.[9] This has led to varying opinions regarding the need for fascial closure of these ports, with some authors advocating for routine closure, whereas others arguing against the need to close the fascia due to a low perceived risk of PSH at these sites.[10-12]

As the use of the robotic platform continues to gain popularity in general surgery, the incidence of PSH following robotic-assisted GSPs, especially in relation to the size of the trocars used, must be better defined. The purpose of this study was to determine the effect of port size and location, as well as patient and operative characteristics, on the incidence of PSH in robotic-assisted general surgery.

Methods

With approval from the Institutional Review Board, a retrospective chart review of surgical patients who underwent robotic-assisted GSPs at the Michael E. DeBakey VA Medical Center was performed for the period from July 2010 to December 2016. Patient, operative, and perioperative data were obtained. These included demographic characteristics, indication for surgery, procedure performed, intraoperative data, extraction site, and patient risk factors including body mass index (BMI), smoking status, diabetes mellitus, and immunosuppression and other comorbidities. In addition, for each patient, the number, type, location, and size of all trocars were collected.

The incidence of robotic PSH, both clinical and occult, was recorded from review of electronic medical records and imaging. Clinically detected PSHs were obtained from records of postoperative clinical evaluations by a surgical team member in any setting (surgery clinic, nonsurgical clinic, emergency room, and inpatient hospital stay). Radiographically detected PSHs were based on review of the most recent postoperative cross-sectional abdominal imaging study available, where a PSH was defined as a clear disruption of the abdominal fascia, with or without eventration of bowel, fat, or other tissues. All cross-sectional images were reviewed by the authors to assess for hernias independently from radiology reports.

Robotic surgery at our institution during the study period was conducted using the da Vinci Si robotic platform (Intuitive Surgical, Sunnyvale, CA). In our group practice, the fascia is routinely sutured closed at all port sites of 10-mm or greater with 0-Vicryl suture, whereas no port site of 8-mm or smaller was closed. All camera ports were 12 mm in size, and all assistant ports were 5 mm in size. All 8-mm robotic trocars were placed off the midline.

Results

One hundred and seventy-eight patients underwent robotic-assisted GSPs, using a total of 725 ports, including 433 8-mm working ports, 72 12-mm working ports, 178 12-mm camera ports, and 42 5-mm assistant ports. One hundred and sixty-seven patients (94%) were men, the mean age was 63 ± 12 years, BMI was 29 ± 7 kg/m^2, and the median American Society of Anesthesiologists (ASA) score was 3. Sixty percent of the operations were performed for malignancy (Table 1). Procedures included 68 rectal (38.2%), 36 colon (20.2%), 25

Table 1 – Patient demographic characteristics.

Characteristics	Number of patients (n = 178)
Gender	
Male	167 (94%)
Female	11 (6%)
Age (mean ± SD), in years	63 ± 12
Race	
White	121 (68%)
Black	45 (25%)
Other	12 (7%)
BMI (mean ± SD), in kg/m^2	29 ± 7
ASA	
ASA 1-2	38 (21%)
ASA 3	119 (67%)
ASA 4	21 (12%)
Major comorbidities	
Malignancy	106 (60%)
Chronic obstructive pulmonary disease	20 (12%)
Obstructive sleep apnea	18 (10%)
Diabetes mellitus	51 (29%)
Steroid use	5 (3%)
Smoker	104 (58%)