

Review Article

5-millimeter Trocar-site Hernias After Laparoscopy Requiring Surgical Repair

Nigel Pereira, MD*, Anne P. Hutchinson, MD, Mohamad Irani, MD, Eric R. Chung, BS, Jovana P. Lekovich, MD, Pak H. Chung, MD, Rasa Zarnegar, MD, and Zev Rosenwaks, MD

From The Ronald O. Perelman and Claudia Cohen Center for Reproductive Medicine, Weill Cornell Medical College, New York, New York (Drs. Pereira, Irani, Chung, Lekovich, Chung, and Rosenwaks), Department of Obstetrics and Gynecology, New York Presbyterian Hospital/Weill Cornell Medical College, New York, New York (Dr. Hutchinson), and Department of Surgery, New York Presbyterian Hospital/Weill Cornell Medical College, New York, New York (Dr. Zarnegar).

ABSTRACT Trocar-site hernias are rare complications of laparoscopic surgery. Although trocar-site hernias occur more often at >10-mm sites, hernias can still develop at 5-mm sites after laparoscopy and can lead to serious complications. The primary objective of this review is to summarize the current medical literature pertaining to the clinical presentation and predisposing risk factors of trocar-site hernias at 5-mm sites after laparoscopy. A total of 295 publications were identified, 17 (5.76%) of which met the inclusion criteria. Twenty-seven patients with trocar-site hernias were identified after laparoscopic cases. The median age (interquartile range) for all adult patients with trocar-site hernias was 63 years (interquartile range, 39.5–66.5 years). Eight of the 18 patients (44.4%) undergoing gynecologic laparoscopy were parous although details of parity were not reported in most publications. Simple manual reduction or laparoscopic reduction with fascial closure (21 patients [84%]) was used more often compared with exploratory laparotomy (4 patients [16%], $p < .001$) to manage trocar-site hernias. There was no statistical difference in the location of trocar-site hernias (i.e., umbilical [14 patients, 56%] vs nonumbilical/lateral [11 patients, 44%], $p = .12$). Findings of this review suggest that increased operative times and excessive manipulation can extend 5-mm fascial incisions, thereby increasing the risk of trocar-site hernias. Parous women older than 60 years may have unrecognized fascial defects, which confer a higher risk of trocar-site hernias after laparoscopic surgery, even in the absence of incision manipulation or prolonged surgical duration. Such patients may benefit from closure of 5-mm fascial incisions although prospective data are required to validate the overall generalizability of this management strategy. *Journal of Minimally Invasive Gynecology* (2016) 23, 505–511 © 2016 AAGL. All rights reserved.

Keywords: 5-mm; Fascial defects; Incisional hernia; Laparoscopy; Management; Trocar-site hernia

Laparoscopy is frequently used for the diagnosis and treatment of various gynecologic conditions [1,2]. The laparoscopic approach offers smaller incisions, decreased blood loss, and shorter hospitalizations over traditional laparotomy [3]. Occasionally, laparoscopic surgery can be complicated by vascular, bowel, bladder, or nerve injuries [3]. Incisional hernias or trocar-site hernias are rare complications of laparoscopic surgery, with an estimated inci-

dence ranging between 1% and 6% [4–6]. Trocar-site hernias occur most often at incision sites ≥ 10 mm and have previously been reported in the gynecologic [7], oncologic [8], urologic [9], and general surgical [10,11] literature. However, trocar-site hernias at incision sites <10 mm, specifically 5-mm sites, are reported infrequently. Currently, there are sparse data regarding the technical and patient-related risk factors for the development of trocar-site hernias at 5-mm sites. Furthermore, avoiding trocar-site hernias at 5-mm sites is a perennial topic of interest for any gynecologic surgeon willing to decrease postoperative complications. Thus, the primary objective of this review article was to identify and summarize the current medical literature pertaining to the clinical presentation and predisposing risk factors of trocar-site hernias at 5-mm sites.

The authors declare that they have no conflict of interest.

Corresponding author: Nigel Pereira, MD, Weill Cornell Medicine, The Ronald O. Perelman and Claudia Cohen Center for Reproductive Medicine, 1305 York Ave, New York, NY 10021.

E-mail: nip9060@med.cornell.edu

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Materials and Methods

Inclusion and Exclusion Criteria

We searched PubMed, EMBASE, and Google Scholar for all English-language publications between January 1980 and December 2015 with the following keywords: “hernia,” “incisional hernia,” “trocar-site hernia,” “port-site hernia,” “laparoscopic incisional hernia,” “laparoscopy,” “5 mm,” and “five millimeter.” Using the same keywords, we also searched the US Food and Drug Administration’s Manufacturer and User Facility Device Experience database. The authors independently reviewed the preliminary search results and article titles. Of the initial pool of publications, relevant studies reporting trocar-site hernias at 5-mm sites were identified and read by all authors. Publications were included in this review if patients underwent surgical repair of the hernia. All study types (i.e., case reports, case series, retrospective cohort studies, prospective case-control studies, and prospective randomized control trials) were included. We excluded publications reporting trocar-site hernias at >5-mm sites. In addition, we excluded any publications in which reoperations occurred because of reasons deemed unrelated to the trocar-site hernia. The review was performed according to Preferred Reporting Items for Systematic Reviews and Meta-Analysis guidelines [12].

Measurements and Statistical Analyses

For each publication, the following data were recorded: study type, patient age, original surgical procedure, and indication for surgery when available. When patients presented with a trocar-site hernia, the clinical presentation, type of hernia, subsequent surgical treatment, and outcome were recorded. Descriptive statistics (medians), percentages, and 95% confidence intervals were calculated when appropriate. Student *t* tests and chi-square tests were also used when indicated, with $p < .05$ considered statistically significant.

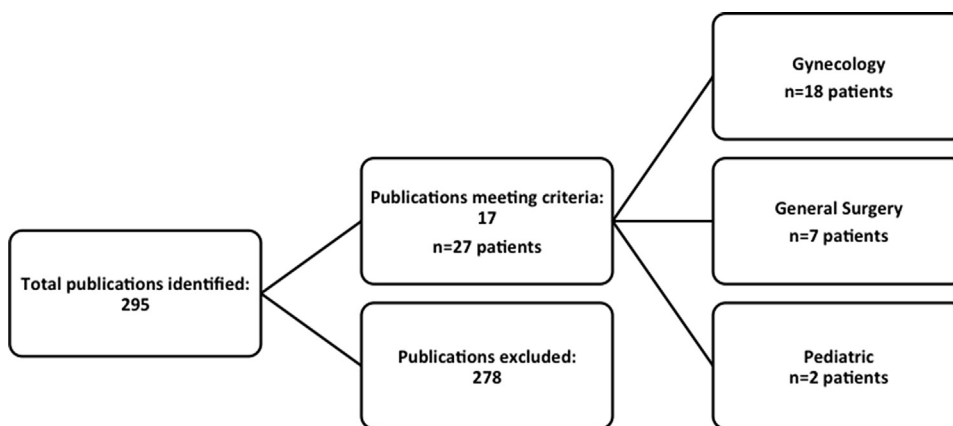
Results

A total of 295 publications were identified using the previously mentioned keywords. Publications reporting trocar-site hernias at >5-mm incision sites outnumbered those reporting hernias at 5 mm and smaller incision sites by 16 to 1. Seventeen (5.76%) publications met the inclusion criteria. These publications included 15 case reports (88.2%) and 2 case series (11.8%). Twenty-seven patients with trocar-site hernias were identified after laparoscopic cases: 18 (66.7%) gynecologic cases [13–23], 2 (7.40%) pediatric cases [24,25], and 7 (25.9%) general surgery cases [22,26–28]. Figure shows the selection of publications and the distribution of patients. Only gynecologic and general surgery cases were included in the subsequent analysis ($n = 25$).

Table 1 lists the original surgical procedure and indication, the type of trocar-site hernia, subsequent surgical treatment, and outcome for each publication identified. The median age (interquartile range) for all adult patients with trocar-site hernias was 63 (interquartile range, 39.5–66.5) years. Eight of the 18 patients (44.4%) undergoing gynecologic laparoscopy were parous although details of parity were not reported in most publications. More benign surgical cases were noted compared with surgeries performed for cancer (20 vs 5 cases, respectively; $p < .001$). Trocar-site hernias were managed more often with simple manual reduction or laparoscopic reduction and fascial closure (21 patients [84%]) compared with exploratory laparotomy (4 patients [16%], $p < .001$). Of the 4 patients who underwent exploratory laparotomy, 2 patients required segmental bowel resection and primary anastomosis along with reduction of the hernia and fascial closure; 1 patient required partial omentectomy and fascial closure; and the final patient required exploratory laparotomy, reduction of the hernia, and fascial closure. There was no statistical difference in the location of trocar-site hernias (i.e., umbilical [14 patients, 56%] vs nonumbilical/lateral [11 patients, 44%], $p = .12$). Nonbladed trocars were used in 3 cases. The

Fig

A flowchart showing the distribution of identified publications and patients.



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