Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.JournalofSurgicalResearch.com

Gender disparities in the utilization of laparoscopic groin hernia repair

Cornelius A. Thiels, DO,[a,b,*] Kimberly A. Holst, MD,[a] Daniel S. Ubl, MPH,[b] Travis J. McKenzie, MD,[a] Martin D. Zielinski, MD,[a] David R. Farley, MD,[a] Elizabeth B. Habermann, PhD,[b] and Juliane Bingener, MD[a]

[a] Department of Surgery, Mayo Clinic, Rochester, Minnesota
[b] Health Services Research, The Robert D. and Patricia E. Kern Center for the Science of Health Care Delivery, Mayo Clinic, Rochester, Minnesota

ARTICLE INFO

Article history:
Received 20 July 2016
Received in revised form
14 October 2016
Accepted 27 October 2016
Available online 5 November 2016

Keywords:
Inguinal hernia
Hernia
Gender
Women
NSQIP
Disparities

ABSTRACT

Background: Clinical treatment guidelines have suggested that laparoscopic hernia repair should be the preferred approach in both men and women with bilateral or recurrent elective groin hernias. Anecdotal evidence suggests, however, that women are less likely to undergo a laparoscopic repair than men, and therefore, we aimed to delineate if these disparities persisted after controlling for patient factors and comorbidities.

Materials and methods: The American College of Surgeons National Surgical Quality Improvement Project data were abstracted for all elective groin hernia repairs between 2005 and 2014. Univariate analysis was used to compare rates of laparoscopic surgery between men and women. Multivariable analysis was performed, controlling for patient demographics, preoperative comorbidities, and year of surgery.

Results: Over the 10-y period, 141,490 patients underwent elective groin hernia repair, of which 13,325 were women (9.4%). The rate of general anesthesia utilization was high in both men (81.3%) and women (77.2%) with 75.1% of open repairs being performed under general anesthesia. Overall, 20.2% of women underwent laparoscopic repair compared with 28.0% of men ($P < 0.01$). Women tended to be older, had a lesser body mass index, and slightly greater American Anesthesia Association (all $P < 0.05$). On multivariable regression, women had decreased odds of undergoing a laparoscopic approach compared with men (odds ratio: 0.70; 95% confidence interval, 0.67-0.73, $P < 0.01$).

Conclusions: In the elective setting, women were less likely to undergo laparoscopic repair of groin hernias than men. Although we are unable to ascertain underlying causes for these gender disparities, these data suggest that there remains a disparity in the management of groin hernias in women.

This work has not previously or concurrently been submitted for publication. The work was presented as a plenary presentation at the IATSIC World Congress of Surgery in Bangkok Thailand in August 2015.

* *Corresponding author*. Department of Surgery, Mayo Clinic, 200 First St SW, Rochester, MN 55905. Tel.: 507-284-2511; fax: 507-284-5196.
E-mail address: thiels.cornelius@mayo.edu (C.A. Thiels).

0022-4804/$ – see front matter © 2016 Elsevier Inc. All rights reserved.
http://dx.doi.org/10.1016/j.jss.2016.10.028

Introduction

Groin hernias are one of the most prevalent surgical conditions, affecting up to one-third of men and 3% of women.[1,2] Surgical management is typically recommended for symptomatic hernias; however, the utilization rates of laparoscopy to repair groin hernias vary greatly.[3] There has been a significant increase in utilization of laparoscopic techniques to repair groin hernias in the last decade because of a variety of factors including patient preference, surgeon preference, and data suggesting improved outcomes.[4-6] Specifically, studies have found that laparoscopic hernia repairs are associated with reduced postoperative pain and recovery time[7-9] but increased cost,[5] surgeon experience,[10] and the required use of general anesthesia for laparoscopic repairs have limited the widespread use of laparoscopy. This has resulted in the continued use of open inguinal hernia repairs in most patients.[5]

Considerable debate remains regarding the true benefits of the laparoscopic approach for groin hernia across all patients groups.[11] There is a growing body of evidence, however, suggesting that laparoscopy should be strongly considered as the treatment of choice for select patients.[12] For example, the National Institute for Health and Care Excellence (NICE) guidelines recommend that surgeons consider a laparoscopic approach in elective patients with bilateral groin hernias and for recurrent groin hernias previously treated by an open approach.[7,13] In addition, the European Hernia Society has recommended that women should undergo laparoscopic repair to allow for the evaluation for a femoral hernia at the time of surgical intervention.[14,15] Some studies have even suggested that all elective hernia repairs in women should be done laparoscopically if the woman is able to tolerate general anesthesia.[16,17]

Although men are considerably more likely to require a groin hernia repair during their life than women,[18] women represent almost 10% of all groin hernia repairs.[12] As a result, women are often underrepresented in hernia research and are often even excluded from prospective trials.[19,20] Groin hernias in women are also unique as they are more likely to present later in life, are more likely to require emergent operations, and have significantly greater rates of femoral defects than in men.[21] The greater rates of femoral hernia in women are of particular concern given that femoral hernias are rarely diagnosed preoperatively.[16] As a result, femoral hernias are often missed when performing a Lichtenstein repair, leading to potentially greater failure rates in women undergoing open repair.[22] Although laparoscopy has been suggested as a means to mitigate this increased risk,[16,17] the appropriateness of a laparoscopic approach is complicated by the ability of the patient to tolerate the increased risk of general anesthesia[23,24] and the limited surgeon experience with laparoscopic repairs.[25,26] Despite these factors, there remains evidence to support the preferential use of laparoscopic repair in women.

Anecdotal evidence suggests that women are actually less likely to undergo a laparoscopic repair than men, despite guidelines to the contrary. Therefore, this study was designed to assess adherence to these guidelines and determine if there remains a disparity in the treatment of women undergoing groin hernia repair in the elective setting.

Materials and methods

Database and inclusion criteria

The American College of Surgeons National Surgical Quality Improvement Project (ACS-NSQIP) database was queried for all patients who underwent repair of a groin hernia, including inguinal and femoral, between 2005 and 2014. Patients with groin hernia were identified using the International Classification of Diseases, Ninth Revision (ICD-9) codes for inguinal or femoral hernias (ICD-9550.0X, 550.1X, 550.9X, 551.0X, 552.0X, 553.0X) and associated primary Current Procedural Terminology (CPT) codes for inguinal hernia or femoral hernia repair (CPT 49505, 49507, 49520, 49521, 49525, 49550, 49553, 49555, 49557, 49650, 49651, 49659). NSQIP does not contain data on the preoperative diagnosis, and, therefore, postoperative diagnosis was used. Both open and laparoscopic procedures were included, regardless of laparoscopic technique (transabdominal preperitoneal and totally extraperitoneal repairs). Patients having both primary postoperative ICD-9 diagnosis and CPT procedure code for hernia repairs were included.

Emergent hernia repairs were identified by the presence of ICD-9 diagnosis codes for gangrenous or obstructed hernia or the presence of a flag for an emergent operation and were subsequently excluded from the primary analysis. In addition, patients who met the following preoperative criteria were also considered nonelective and excluded: American Anesthesia Association (ASA) class V patients and those with preoperative ventilator dependence, sepsis, septic shock, systemic inflammatory response syndrome, pneumonia, open and/or infected wound, acute renal failure, >4 U red blood cell transfusion in prior 72 h, coma, or disseminated cancer. Finally, patients aged <18 y, pregnant women, and those with a missing gender were excluded.

Initial analysis was done across all elective groin hernia repairs. Subsequently, the cases were classified into primary unilateral, primary bilateral, recurrent unilateral, or recurrent bilateral hernia repair for analysis. See Figure 1 for greater detail on diagnosis and procedure groupings.

Outcomes

The primary outcome was the operative approach (laparoscopic *versus* open). Secondary outcomes included major morbidity, minor morbidity, 30-d readmission rates, and 30-d mortality. Major morbidity was defined as unplanned intubation, ventilator >48 h, pneumonia, deep incisional surgical site infection (SSI), organ space SSI, wound disruption, progressive renal insufficiency, deep vein thrombosis or thrombophlebitis, pulmonary embolism, cardiac arrest requiring cardiopulmonary resuscitation, myocardial infarction, stroke and/or cerebrovascular accident with neurologic deficit, return to operating room, acute renal failure, and