Available online at www.sciencedirect.com

SciVerse ScienceDirect

journal homepage: www.JournalofSurgicalResearch.com

Association for Academic Surgery

Laparoscopic ventral hernia repair: Primary *versus* secondary hernias

Anuradha Subramanian, MD,[a] *Marissa L. Clapp, PA-C,*[a] *Stephanie C. Hicks, MS,*[b] *Samir S. Awad, MD,*[a] *and Mike K. Liang, MD*[a,*]

[a] *Michael E. DeBakey Department of Surgery, Baylor College of Medicine, Michael E. DeBakey Veterans Affairs Medical Center, Houston, Texas*

[b] *Department of Statistics, Rice University, Houston, Texas*

ARTICLE INFO

Article history:
Received 5 January 2012
Received in revised form
18 April 2012
Accepted 15 June 2012
Available online 6 July 2012

Keywords:
Hernia
Incisional hernia
Ventral hernia
Umbilical hernia
Epigastric hernia
Spigelian hernia
Laparoscopy
Laparoscopic
Recurrence

ABSTRACT

Background: Most studies regarding laparoscopic ventral hernia repair (LVHR) have merged primary hernias (PHs) and secondary (incisional) hernias (SHs) into one group of ventral hernias. This grouping could produce falsely favorable results for LVHR. Our objective was to review and compare the outcomes of laparoscopic repair of PHs and SHs.

Methods: A retrospective chart review of patients from 2000 to 2010 identified the cases of LVHR at two affiliated institutions. The demographics, comorbidities, type of hernia (PH *versus* SH), and short- and long-term complications were analyzed. The postoperative pain, cosmetic satisfaction, and Activities Assessment Scale scores were assessed by telephone survey.

Results: A total of 201 cases of LVHR were identified: 73 PHs (36%) and 128 SHs (64%). No difference was found in the mean age between the two groups. The PH group had a greater percentage of black patients (34% *versus* 14%; $P < 0.05$), and the SH group had a greater percentage of white patients (85% *versus* 65%; $P < 0.05$). More female patients had SHs (34% *versus* 14%; $P < 0.05$), and more male patients had PHs (86% *versus* 66%; $P < 0.05$). More patients in the SH group had chronic obstructive pulmonary disease (19% *versus* 7%; $P < 0.05$) and prostate disease (32% *versus* 9%; $P < 0.05$). Overall, the SHs were larger (37.9 ± 4.9 cm^2 *versus* 11.5 ± 1.9 cm^2; $P < 0.01$). No differences were found in early postoperative complications, including pneumonia, urinary tract infection, surgical site infection, and seromas between the two groups. However, those with SHs had a greater incidence of recurrence (16% *versus* 5%; $P < 0.05$) and mesh explantation (7% *versus* 0%; $P < 0.05$). The patients who also underwent SH repairs had greater postoperative pain scores when followed up for a median of 25 mo than those who underwent PH repairs when followed up for a median of 24 mo (3.5 ± 0.4 *versus* 1.8 ± 0.4; $P < 0.05$). More patients in the SH group had chronic pain issues (26% *versus* 5%; $P = 0.0003$) and had lower satisfaction scores (7.5 ± 0.3 *versus* 8.6 ± 0.3; $P < 0.05$). Overall, the Activities Assessment Scale scores were not significantly different.

Conclusions: Our data have demonstrated that PHs and SHs are different. LVHR of SHs is associated with increased recurrence, greater postoperative pain scores, chronic pain issues, and lower patient satisfaction scores. We recommend that future studies evaluate LVHR for PHs separate from those for SHs.

Published by Elsevier Inc.

* *Corresponding author*. Michael E. DeBakey Department of Surgery, Baylor College of Medicine, 2002 Holcombe Boulevard, OCL (112), Houston, TX 77030. Tel.: +1 713 794 8017; fax: +1 713 794 7352.
E-mail address: ml3@bcm.edu (M.K. Liang).
0022-4804/$ – see front matter Published by Elsevier Inc.
http://dx.doi.org/10.1016/j.jss.2012.06.028

1. Introduction

Ventral hernias pose a challenge to the general surgeon. These hernias occur through the anterior abdominal wall either through a natural weakness or defect (primary hernia [PH]) or through a previous incision (secondary hernia [SH]). Between these two subtypes, there are likely differences, not only in terms of size, but also in the clinical presentation and inherent characteristics.

The overwhelming majority of reports analyzing the outcomes of open ventral hernia repairs have evaluated PHs and SHs separately. For example, Farrow *et al.* [1] performed a retrospective review of only primary umbilical hernia repairs and reported a 9.2% recurrence rate after suture repair and 1.5% recurrence rate after mesh repair. They also documented a 20% incidence of surgical site infection, and 7% of those patients required mesh removal [1].

A Cochrane analysis in 2008 only included SHs in their review of open hernia repairs [2]. Open incisional hernia repairs have historically had a 32–54% recurrence rate [2] and 2–27% wound infection rate [3]. Since the use of prosthetic mesh, the recurrence rates have decreased by approximately 10%; however, the extensive tissue dissection required for mesh placement can lead to increased wound infection and other wound-related complications [4].

Laparoscopic ventral hernia repair (LVHR), which was introduced in 1993, has rapidly gained acceptance because of the resulting decrease in wound-related complications [4]. The decrease has been thought to result mostly because it minimizes the extensive dissection, undermining of the skin and subcutaneous tissue, and wide surgical wounds [5,6]. In recent published data, the recurrence rates have ranged from 4% to 16% [4,7,8] and the wound infection rates from 4% to 10% [3].

Many reports of LVHR combined PHs and SHs into one group. The vast majority of retrospective studies have done this, with 9–80% of their cohort composed of PHs [4,5,7,9–14]. This has produced lower recurrence and complication rates. The outcomes from such mixed studies would typically compare their results with those from studies of open SH repairs. A recent Cochrane review analyzed 10 prospective randomized controlled trials of LVHR. Of these, 5 included primary ventral hernia repairs in their study but did not control for hernia type (PH *versus* SH) in their randomization. The merging of PHs and SHs into one cohort could have produced falsely favorable results. Pring *et al.* [10] recognized this as a limitation in their study comparing laparoscopic and open ventral hernia repairs but anticipated that recruitment would have been a problem and, therefore, included both PHs and SHs. Our objective was to review and compare laparoscopic primary and secondary ventral hernia repairs to determine whether the demographics, hernia characteristics, and outcomes are different.

2. Methods

After approval from the Baylor College of Medicine institutional review board, the operative records of two affiliated institutions from 2000 to 2010 were reviewed to identify cases of LVHR. All patients who underwent successful LVHR were included for analysis. No exclusion criteria were used. The medical records were reviewed for patient demographics, comorbidities, hernia characteristics, surgical history, operative details, imaging data, and surgical outcomes. Alcohol abuse was recorded as more than 2 drinks per night. We used the definition from the Centers for Disease Control and Prevention for surgical site infection (SSI). Small bowel obstruction (SBO) was defined by radiography. Early SBO was defined as occurring within 30 d postoperatively, and late SBO as occurring after 30 d. An ileus was considered present if the patient was unable to tolerate oral intake by postoperative day 3. A pulmonary infection was recorded if the patient had documented respiratory symptoms with an elevated white blood cell count and the initiation of antibiotics. A seroma was recorded if a clinical or radiographic bulge was identified and the bulge was not a hernia recurrence or eventration (as determined by computed tomography scan or clinical examination). Eventration was defined as a patient complaint of a bulge without a diagnosis of hernia recurrence or seroma from the physical or radiographic examination findings. Only central recurrences (i.e., nonport site) were included in the present study. Computed tomography and clinical evaluation were both used to determine whether the patient had a hernia recurrence.

The postoperative pain, cosmetic satisfaction, and Activities Assessment Scale (AAS) score were assessed verbally during clinical follow-up. The postoperative pain scores were obtained at late follow-up ($\geq$6 mo from surgery), with the level of worst pain experienced assessed on a 10-point Likert-type scale (1 = least pain and 10 = most pain). Overall satisfaction with the surgery and with the cosmetic results were also recorded using a 10-point Likert-type scale (1 = least satisfied and 10 = most satisfied). Patient functional status was assessed using a series of 13 questions in accordance with the AAS.

An analysis of the categorical variables between the two groups was done using Fisher's exact test or the chi-square test. Continuous variables were analyzed using Student's *t*-test. Nonparametric variables were analyzed using the Mann-Whitney *U* test.

3. Results

3.1. *Demographics and comorbidities*

The overall group, PH, and SH demographics and comorbidities are listed in Table 1. Patients with SH were more likely to be white and women and to have chronic obstructive pulmonary disease and prostate disease.

3.2. *Postoperative complications*

Overall, 157 early complications developed in 45% of the patients (Table 2). Early complications were all complications noted within the first 30 d after surgery, including, but not limited to, pulmonary infections, urinary tract infection, urinary retention, seromas, ileus, early SBO, and superficial and deep SSIs. No statistically significant differences in the incidence of