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# The Risk of Umbilical Hernia and Other Complications with Laparoendoscopic Single-Site Surgery

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**ABSTRACT** **Study Objective:** To estimate the risk of umbilical hernia and other latent complications in women who underwent laparoendoscopic single-site surgery (LESS) for a gynecologic indication.
**Design:** Retrospective, nonrandomized clinical study (Canadian Task Force classification II-2).
**Setting:** Four tertiary care academic medical centers.
**Patients:** Women undergoing LESS for a benign or malignant gynecologic indication from 2009 to 2011.
**Interventions:** A total of 211 women underwent LESS via a single 1.5- to 2.0-cm umbilical incision. All surgeries were performed by advanced gynecologic laparoscopists. Incisions were repaired with a running, delayed absorbable suture. Subject demographics and clinical variables were collected and surgical outcomes analyzed.
**Measurements and Main Results:** Median age and body mass index were 45 years and 30 kg/m$^2$, respectively. Approximately half of study subjects underwent a hysterectomy with or without salpingo-oophorectomy, and 15% had a diagnosis of cancer. Overall, 0.9% of women were diagnosed with a preoperative umbilical hernia, and 2.4% of women experienced a major perioperative complication. After a median postoperative follow-up time of 16 months, 2.4% had development of an umbilical hernia. However, 4/5 of these women had significant risk factors for fascial weakening independent of LESS, including requirement for a second abdominal surgery in 1 subject and a cancer diagnosis with postoperative chemotherapy administration in 2 subjects. When these subjects deemed "high risk" for incisional disruption were excluded from the analysis, the umbilical hernia rate was 0.5% (1/207). On univariable analysis, obesity was the only factor associated with complications ($p = .04$).
**Conclusion:** When performed by advanced laparoscopic surgeons, laparoendoscopic single-site gynecologic surgery is associated with a low risk of major adverse events. Additionally, the overall umbilical hernia rate was 2.4% and was lower (0.5%) in subjects without significant comorbidities. Journal of Minimally Invasive Gynecology (2012) 19, 40–45 © 2012 AAGL. All rights reserved.

*Keywords:* Laparoendoscopic single-site surgery; Umbilical hernia; Surgical complications

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Laparoendoscopic single-site surgery (LESS) is a novel, rapidly evolving minimally invasive technique that has recently been adopted in gynecology. This surgical approach involves performing a surgical procedure through a single,

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small umbilical incision (1.5 to 2.5 cm) with specialized multichannel, single-port technology. Published reports in the general surgery, urologic, and gynecologic literature demonstrate safe and reproducible results, with LESS used for a variety of procedures including cholecystectomy, nephrectomy, splenectomy, hysterectomy, and adnexal surgery, among others [1–5]. Specifically, initial reports in the gynecologic literature have demonstrated the feasibility of LESS for the performance of a variety of benign and oncologic procedures with excellent clinical outcomes and overall low rates of major perioperative morbidity (1%–3%) [1,6–12].

Recent prospective reports in gynecology, including a randomized, controlled trial, further suggest the potential for improved cosmesis and decreased pain and analgesia requirements in women who undergo LESS procedures when compared with those who undergo conventional minimally invasive procedures [13]. Additionally, because LESS is performed exclusively through the base of the umbilicus, surgeons avoid multiple rectus-muscle–splitting incisions and the associated pain and potential complications affiliated with extraumbilical trocar sites [14–16].

Recently, our group reported on clinical outcomes and rates of major perioperative complications in a series of 74 gynecologic patients who underwent LESS [1]. A low rate of major adverse events was observed (2%). However, little is known about the potential latent or umbilical morbidity associated with LESS, particularly with regard to risk of incisional hernia. A theoretical limitation of LESS is that a more sizable umbilical incision is required than with conventional laparoscopy, which may increase the risk of umbilical hernia and other events at the navel. Previous studies have demonstrated a correlation between trocar incision size and risk of subsequent incisional hernia [16–19]. Therefore the aim of this study is to estimate the risk of incisional hernia and other latent complications in a large cohort of women who underwent LESS for a gynecologic indication.

## Materials and Methods

### *Study Design and Patient Selection*

This was a retrospective cohort study of women treated with LESS on 4 gynecologic services at urban teaching hospital centers (Greater Baltimore Medical Center, Baltimore, MD; University Hospitals, Case Medical Center, Cleveland, OH; Cleveland Clinic, Cleveland, OH; and Wheeling Hospital, Wheeling, WV). The study period was April 2009 through January 2011. Study approval was obtained from the respective Institutional Review Boards at each center. Eligible subjects were women with either a benign or malignant gynecologic condition who were deemed appropriate candidates for a minimally invasive surgery and underwent a LESS procedure. Subjects required at least 6 months of follow-up after undergoing LESS to identify latent complications.

Demographic, intraoperative, and postoperative data were collected and entered into a deidentified database. Data included age, body mass index (BMI), previous abdominal surgeries, relevant co-morbidities, indication for surgery, type of single port procedure, operative time, estimated blood loss (EBL), hospital stay, and perioperative and remote complications. All attending surgeons were either gynecologists or gynecologic oncologists with advanced laparoscopic training.

### *Operative Technique*

Each case was performed jointly by a 2-surgeon team. All women undergoing myomectomy or hysterectomy received preoperative antibiotics. When necessary, a V-Care uterine manipulator (Conmed Endosurgery, Utica, New York) was used. All subjects underwent LESS via a single 1.5- to 2.0-cm incision at the base of the umbilicus with a "Hasson" open-entry technique [20]. On the basis of surgeon preference, 1 of several multichannel ports was used, including the SILS Multiple Instrument Access Port (Covidien, Mansfield, MA), Gelpoint (Applied Medical, Rancho Santa Margarita, CA) and the Ethicon SSL port (Ethicon Endosurgery, Cincinnati, OH). Of note, investigators at Wheeling Hospital primarily used the SILS port, but port type was more heterogeneous at other institutions. At the conclusion of the each case, the fascia and underlying peritoneum were isolated and closed with delayed absorbable suture in a running fashion with 0-Vicryl suture (Ethicon, Somerville, NJ). The umbilical stalk was identified and reattached to the fascia with an anchoring stitch by use of 0-Vicryl suture, and the skin was closed with interrupted absorbable sutures with 4-0 monocryl. In a select few women at Wheeling Hospital, the fascia was closed with interrupted, "figure-of-8" delayed absorbable sutures (n = 15). All subjects underwent at least 1 postoperative visit 4 to 12 weeks after surgery, and at least 1 additional visit between 6 to 20 months after surgery. Incidence of preoperative umbilical hernias and postoperative umbilical complications including hernia formation and incisional cellulitis were recorded. Timing of hernia development in relation to surgery was recorded; additionally, port-site hernias were classified as "early-onset" type (developing within 2 months after surgery) or "late-onset" (developing greater than 2 months after surgery) as previously described [21]. Additionally, other perioperative and latent complications were also recorded.

### *Statistics*

The primary objective was estimation of umbilical hernia and other latent adverse events. A secondary objective was to report on the rate of perioperative complications. Descriptive statistics were utilized, and univariable analysis was employed to determine possible risk factors for complications. Variables included in the analyses were age, BMI, history of previous abdominal surgery, procedure type, operative time,