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A prospective comparative study of cosmetic satisfaction for three different surgical approaches

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ABSTRACT

Objectives: To compare gynecologic patients' cosmetic satisfaction with surgical wounds after different approaches: laparoendoscopic single-site surgery (LESS), conventional laparoscopic surgery (CLS) and open surgery (OS).
Study design: This was a prospective study. The primary outcome was the cosmetic satisfaction after LESS, CLS, or OS, measured at 1 and 6 months post-surgery using the well-validated Cosmetic Scale. Multiple linear regression analysis was used to determine whether the surgical approach was independently associated with cosmetic satisfaction or not.
Results: Of 294 patients enrolled, 84 (28.6%), 129 (43.9%), and 81 patients (27.3%) underwent LESS, CLS, and OS, respectively. Cosmetic Scale scores in the LESS group at 1 month post-surgery was about 7 higher than in the CLS group and 9 higher than in the OS group ($P < 0.001$). This difference was maintained also at 6 months post-surgery ($P < 0.001$). On multiple linear regression analysis, the surgical approach was independently associated with postoperative cosmetic satisfaction ($P < 0.001$).
Conclusion: Our study found that cosmetic satisfaction after LESS was highest, followed by CLS, then OS. Therefore, physicians should more assertively discuss and consider LESS for gynecologic diseases.

Introduction

Laparoscopy has been used widely over the past three decades for treatment of gynecologic disease. The advantages of laparoscopic surgery include faster recovery, less pain, decreased analgesic requirements, improved cosmesis, shorter hospitalization, and lower perioperative complications compared with open surgery (OS) [1]. Because trocars have an inherent risk of hemorrhage, infection, organ damage, hernia formation and decreased cosmesis, the logical and natural goal of gynecologic surgery is to reduce the number of trocars used in laparoscopic surgery [1]. Recent technological advances such as single-port multi-channel systems, articulating instruments, and high-definition visualization have enabled the development of a less invasive alternative to conventional laparoscopic surgery (CLS) called laparoendoscopic single-site surgery (LESS).

LESS is feasible for gynecology [2–4] and has perioperative outcomes that are comparable to CLS [5]. A fundamental advantage of LESS over CLS or OS is that LESS requires fewer skin incisions, with resultant improved cosmesis. However, data on cosmetic satisfaction with these surgical approaches are lacking [6,7]. Furthermore, no study has compared cosmetic outcomes after LESS versus CLS versus OS. The aim of this study was to compare cosmetic satisfaction with postoperative wounds for patients who underwent three different surgical approaches (LESS, CLS and OS) for gynecologic disease.

Methods

Study design and participants

Between January 2011 and March 2013, we performed a prospective cohort study at Samsung Medical Center (Seoul, Republic of Korea). Inclusion criteria were an indication for gynecologic surgery and appropriate medical status for general

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endotracheal anesthesia (American Society of Anesthesiologists Physical Status Classification 1 or 2). Participants were excluded if they were age <18 years or ≥70 years old; were pregnant at time of surgery; were taking chemotherapeutic agents or other medications such as steroids and immunosuppressive drugs that would affect wound healing; had comorbidities such as uncontrolled diabetes, contractive skin disorders (e.g., scleroderma), or active dermatologic conditions at abdomen; or were likely to receive post-surgical chemotherapy or radiation treatment. After giving informed consent to participate in the study, participants were asked to complete baseline questionnaires to obtain demographic data. All data were collected prospectively. The study was approved by the Institutional Review Board of Samsung Medical Center.

Treatment

Before surgery, all patients underwent the same standard preparation, which included administration of prophylactic antibiotic therapy 30 min before the procedure. Our LESS technique used has been previously reported [4]. A vertical incision 2.0–2.5 cm was made using an open Hasson technique within the umbilicus. A single multi-channel port was inserted through the umbilicus and the abdomen was insufflated to 12 mmHg with carbon dioxide gas. A laparoscope was introduced through one of the channels and the intended surgical procedure was performed. In the CLS group, a single 12-mm trocar was inserted in the umbilicus and 2 or 3 ancillary 5-mm trocars were inserted in the lower abdomen. In the OS group, a Pfannenstiel or midline incision at least 12 cm long was made. Patients were discharged from the hospital when bowel activity was restored, they were ambulatory, and had no postoperative fever or need of narcotic analgesic therapy. All patients were followed up at 1 week, 1 month and 6 months for routine postoperative checkup.

Outcome measures

The primary outcome was cosmetic satisfaction after LESS, CLS, or OS. At 1 and 6 months after surgery, cosmetic satisfaction was determined via the validated self-reported Cosmetic Scale, as previously described [7,8], at each visit before seeing the clinician. When hospital visits were not available, telephone interviews were performed by an independent assessor who was blinded to treatment conditions. The questionnaire for the Cosmetic Scale consist of 3 questions: On a scale of 1 (very unsatisfied) to 7 (very satisfied), how satisfied are you with your scar?; On a scale of 1 (very unsatisfied) to 7 (very satisfied), how would you describe your scar?; On a scale of 1 (worst) to 10 (best), score your scar. The maximum score for the Cosmetic Scale is 24, with higher scores indicating greater cosmetic satisfaction. We also collected information about age, body mass index (BMI), residence, marital status, employment status, surgical scar on the abdomen, and disease entity, which can affect cosmetic outcomes.

Statistical analysis

Statistical analyses were performed using commercially available software (SPSS version 20.0; SPSS Inc., IL, USA). Normality of data was checked by the Shapiro–Wilk test. Mean ± standard deviation was used to describe normal distributions and median (interquartile range) was used for non-normal distributions. Frequency distributions among categorical variables for the three surgical approach groups were compared using a chi-square test or Fisher's exact test. Comparisons of quantitative variables were performed using one-way ANOVA as a parametric test or the Kruskal–Wallis test as a nonparametric test and adjusted by Bonferroni's correction for multiple comparisons. Multiple linear regression analysis was used to determine whether the surgical approach was independently associated with postoperative cosmetic satisfaction or not, including variables with P-value <0.200 in simple regression analysis. A P-value was considered significant if it reached 0.05 in a two-sided test.

Results

Enrollment was between January 2011 and December 2012 and 6-month follow-up was concluded in July 2013. Of the 361 patients who participated, we excluded 67 who received postoperative chemotherapy and/or radiotherapy based on their pathologic findings, received reoperation due to operative complications, had additional abdominal surgery within the 6-month follow-up period, or were lost to follow-up and did not complete the questionnaire. Thus, 294 patients were included in the final analysis, with 84 (28.6%) undergoing LESS, 129 (43.9%) undergoing CLS, and 81 (27.3%) receiving OS.

Demographic characteristics of the study population are in Table 1. Mean ages by group were 40.7 ± 10.1 years for LESS, 43.1 ± 10.3 years for CLS, and 42.9 ± 9.5 years for OS, which were not significantly different. Residence and employment status did not differ significantly between three surgery groups. Of 294 total patients, 75 (25.5%) underwent surgery for malignant gynecologic disease including early cervical, endometrial or ovarian cancer; 219 (74.5%) underwent surgery for benign disease. Fewer patients in the LESS group had malignant disease compared to the other two groups ($P < 0.001$). The three surgery groups differed in marital status ($P = 0.038$) and surgical scar on the abdomen ($P = 0.043$).

Cosmetic Scale scores for each group are in Fig. 1. Scores at 1 month after surgery by group were 24 (20–24) for LESS, 17 (13–21) for CLS and 15 (13–18) for OS group ($P < 0.001$). Cosmetic Scale scores at 6 months after surgery were 24 (19–24) for LESS, 18 (14–21) for CLS and 14 (12–17) for OS group ($P < 0.001$). The Cosmetic Scale scores in the LESS group at 1 month post-surgery was about 7 higher than in the CS group and 9 higher than in the OS group ($P < 0.001$). This difference was maintained at 6 months post-surgery ($P < 0.001$). Subgroup analysis was performed on only patients with malignant (or benign) disease and the results were unchanged. On simple linear regression analyses of Cosmetic Scale scores, surgical approach (LESS versus CLS versus OS) and disease entity (benign versus malignant) correlated with cosmetic satisfaction after surgery; other variables of age, BMI, marital status, and surgical scar on the abdomen were not associated with cosmetic satisfaction (Table 2). On multiple linear regression analysis, surgical approach was independently associated with postoperative cosmetic satisfaction ($P < 0.001$), after adjusting for other variables.

Comments

In this prospective cohort study, we found that patients who underwent LESS for gynecologic diseases had higher cosmetic satisfaction than patients who underwent CLS or OS at 1 and 6 months after surgery. These findings applied to patients with both malignant and benign gynecologic diseases. To the best of our knowledge, this is the first study to compare LESS, CLS, and OS for cosmetic satisfaction of patients as a primary outcome and to include both benign and malignant gynecologic disease.

Based on previous reports on the advantages of laparoscopy over laparotomy, surgeons have tried to reduce the number of laparoscopic incisions [9–11]. These efforts to reduce incisional scars in CLS gave rise to LESS. Many studies demonstrated that LESS is feasible and safe for benign gynecologic disease [2,12–14]. However, although LESS is assumed to be superior for postoperative cosmesis compared to OS or CLS based on surgeons' assumptions, no