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CLINICAL ARTICLE

Hysterectomy trends over a 9-year period in an endoscopic teaching center

Thoralf Schollmeyer^{a,1}, Mohamed Ellessawy^{a,*}, Babis Chastamouratidhs^a, Ibrahim Alkatout^a, Ivo Meinhold-Heerlein^b, Liselotte Mettler^a, Walter Jonat^a, Marion T. Weigel^a

^a Department of Obstetrics and Gynecology, Kiel School of Gynecological Endoscopy, University Hospitals Schleswig-Holstein, Kiel, Germany

^b Department of Obstetrics and Gynecology, RWTH Aachen University, Aachen, Germany

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ABSTRACT

Objective: To investigate trends in the performance of hysterectomy at a single certified endoscopic teaching center. **Methods:** Data were collected retrospectively from 953 patients who underwent hysterectomy between 2002 and 2010 for benign indications at UKSH, Germany. Preoperative risk scores were assigned to patients. **Results:** The most frequent indications for hysterectomy were uterine myoma, adenomyosis, prolapse, endometrial hyperplasia, menstrual disorders, and endometriosis. The shortest operating time was recorded for vaginal hysterectomy (VH) and the longest for laparoscopically assisted VH (LAVH). The average uterine weight was highest for abdominal hysterectomy (AH) and lowest for VH. The major postoperative complication rate was 11.8% for laparoscopic supracervical hysterectomy (LSH) and 23.5% for AH. The highest intraoperative complication rate occurred with AH (46.4%) and the lowest with total laparoscopic hysterectomy (TLH; 3.6%). The minor postoperative complication rate was 5.9%. The mean preoperative score was 1.09 ± 1.51 for AH, 0.75 ± 0.96 for VH, 1.04 ± 1.30 for LSH, 1.0 ± 1.40 for LAVH, and 1.38 ± 1.52 for TLH. **Conclusion:** Laparoscopic hysterectomies have become more common and were associated with decreased complication rates, despite the higher preoperative risk score of these patients.

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1. Introduction

Hysterectomy is the most frequently performed major gynecologic surgical procedure [1,2]. The overall rate of hysterectomy in Germany in 2005–2006 was 362.9 (295.0 for benign diseases of the genital tract and 44.0 for primary malignant tumors of the genital tract) per 100 000 women per year [3]. The Centers for Disease Control and Prevention reported that the US hysterectomy rate in 2000–2004 was 5.4 per 1000 women per year [4]. The art of surgery has developed and changed with the advancement of technology so that hysterectomy is now performed primarily as a minimally invasive operation.

Benign indications for hysterectomy are symptomatic or growing uterine myomas, adenomyosis, abnormal uterine bleeding, endometriosis, and prolapse of the uterus [5]. The choice of route for hysterectomy is dependent on many factors: size and mobility of uterus; body mass index (BMI, calculated as weight in kilograms divided by the square of height in meters); preoperative history; anatomic variation; level of experience of surgeon; and patient preference.

Laparoscopic hysterectomy (LH) is the method of choice whenever vaginal hysterectomy (VH) is not possible [6,7]. A well-trained

operative team is needed to achieve safe surgery with a lower complication rate and a shorter operation time [8,9]. When choosing the laparoscopic technique, the advantages and disadvantages of laparoscopic supracervical hysterectomy (LSH) and total laparoscopic hysterectomy (TLH) have to be considered for each patient.

The aim of the present study was to describe trends in the performance of hysterectomy between 2002 and 2010 in a single university hospital (a certified teaching center) in Germany.

2. Materials and methods

The present study was a retrospective analysis of hysterectomy performed for benign disease at the Department of Obstetrics and Gynecology, University Hospital Schleswig-Holstein, Campus Kiel, Germany. Data were retrospectively collected from patient records and analyzed. The operation information lists were collected from the operation recording archive data backup for the period January 1, 2002, to October 31, 2010. Before treatment at the study center, patients sign an informed consent form allowing the use of their specimen and clinical data for research purposes. Institutional review board or ethics committee approval is not required in such cases.

Patient data—including age, BMI, parity, previous operations, indications for operation, duration of hospital stay, operation time, weight of uterus, histopathologic report for removed specimen, hemoglobin decrease, and intra- and postoperative complications—were organized in

* Corresponding author at: Department of Obstetrics and Gynecology, Kiel School of Gynecological Endoscopy, UKSH, Arnold-Heller-Strasse 3, House 24, 24105 Kiel, Germany. Tel.: +49 431 5972086; fax: +49 431 5972149.

E-mail addresses: kiel.school@uksh.de, ellessawy@gmail.com (M. Ellessawy).

¹ Authors contributed equally.

Excel version 12.2 (Microsoft, Redmond, WA, USA). Operating time was calculated from the first incision to the final stitches. Hemoglobin level was measured 1 day preoperatively and 1 day postoperatively, with the difference recorded. Uterus weight was recorded from pathology reports. Of the 953 patients who underwent hysterectomy for benign disease during the study period, 766 met the inclusion criteria. Thirty women were excluded from the comparison criteria because of malignant histopathologic reports, 97 were excluded because of improper or incomplete recording of their data, and 60 patients did not sign an informed consent form allowing the use of their clinical data for research.

Indications for surgery included fibroids, abnormal uterine bleeding, adenomyotic formations, endometriosis, and precancerous lesions of the uterus or the cervix. In the majority of cases, the operations were performed by consultants; LH procedures were performed by doctors holding the MIC I, II, or III qualification, which is awarded by the Arbeitsgruppe Gynaekologische Endoskopie (task force for gynecologic endoscopy). The department has established the Kiel School of Gynecological Endoscopy, where laparoscopic techniques are taught and have been highly standardized to reduce complications [10].

The operative techniques compared were VH, abdominal hysterectomy (AH), TLH, LSH, and laparoscopically assisted VH (LAVH). In order to have clear comparison parameters, it was decided that a preoperative risk score should be assigned to patients and that postoperative complications should be classified as major or minor. For the preoperative score, patients who had undergone a previous laparoscopy were assigned 1 point; those who had undergone a previous laparotomy were assigned 2 points; those who had undergone 1 cesarean delivery were assigned 3 points; those who had undergone 2 cesarean deliveries were assigned 4 points; those who had undergone 3 cesarean deliveries were assigned 5 points; and those with no previous operations were assigned 0 points. The preoperative score was recorded for 785 patients. Injury to blood vessels requiring a blood transfusion and injury to the intestines, rectum, and urinary tract (including ureter and urinary bladder) were classified as intraoperative complications. Major postoperative complications included postoperative bleeding and reoperations; minor postoperative complications included hematomas, vaginal bleeding, wound infections, dysuria, urinary tract infections, and fever.

SPSS version 20 (IBM, Armonk, NY, USA) was used to log and analyze the data. The χ^2 test was used to analyze the difference between 2 proportions; the *t* test was used to determine the significance of the difference between 2 proportions or percentages; the Mann–Whitney *U* test was used to compare a quantitative value between 2 groups of patients. Demographic and surgical data were analyzed via analysis of variance, Kruskal–Wallis test, χ^2 test, or Fisher exact test. For age, BMI, hospital stay, operating time, uterus weight, and hemoglobin decrease, a mean \pm SD value was calculated. *P* < 0.05 was considered to be statistically significant.

3. Results

In total, 766 patients fulfilled the inclusion criteria of the study. The most frequently performed operative technique was VH (291 patients

[38.0%]), followed by AH (203 patients [26.5%]), LSH (163 patients [21.3%]), TLH (66 patients [8.6%]), and LAVH (43 patients [5.6%]) (Table 1).

The majority of patients in the AH cohort had delivered 0 or 1–2 children (42.6% and 46.5%, respectively). By contrast, 59.1% of patients who underwent VH had 1–2 previous deliveries, 35.4% had delivered 3 or more children, and 5.5% were nulliparous. The percentage of nulliparous women who underwent LAVH was slightly higher (16.3%). The majority of patients who underwent LSH or TLH had delivered 1–2 children (46.6% and 57.6%, respectively). In these patient cohorts, 11.7% and 16.7%, respectively, had delivered 3 or more children.

Mean BMI was 25.85 ± 5.40 in the different treatment cohorts. The mean preoperative score was 1.09 ± 1.51 for AH, 0.75 ± 0.96 for VH, 1.04 ± 1.30 for LSH, 1.0 ± 1.40 for LAVH, and 1.38 ± 1.52 for TLH. Most patients had a preoperative score of 0 or 1 (332 and 344, respectively) (Table 2). A preoperative score of 0 or 1 was most common among patients who underwent VH. Preoperative scores of 3 or higher were more common among patients who underwent AH.

The predominant indication for hysterectomy was uterine myoma (58.6%), followed by uterine prolapse (17.9%) and abnormal bleeding (11.7%) (Table 3). Vaginal hysterectomy was the technique most frequently performed in cases of uterine prolapse; for abnormal bleeding, LSH was the most common operative technique. Most patients with endometriosis underwent a laparoscopic operation. The preferred techniques for treating adenomyosis were TLH and LAVH.

Mean operation time was shortest for VH (76.03 ± 34.63 minutes). The longest operation times were associated with TLH (130.24 ± 38.27 minutes) and LAVH (137 ± 53.80 minutes) (Table 4).

Mean uterine weight varied among the different operative techniques. The lightest uteri were extracted via VH (127.77 ± 78.35 g), whereas the average uterine weight in cases of AH was 518.58 ± 425.0 g (Fig. 1). Although the cervix is left in situ during LSH, the average uterine weight for this technique was higher (244.92 ± 185.82 g) than for TLH and LAVH (205.11 ± 149.33 and 159.24 ± 91.05 g, respectively).

The mean decrease in hemoglobin was largest during LAVH (1.83 ± 1.08 g/dL) and AH (1.63 ± 1.08 g/dL). By contrast, LSH and TLH were associated with the smallest hemoglobin decrease (0.7 ± 0.84 and 0.82 ± 0.94 g/dL, respectively).

During the study period, there were no mortalities recorded in association with hysterectomy for benign indications. From a total of 953 hysterectomies, complications were recorded in 52 (5.5%) cases (Table 4). The 2 entirely laparoscopic techniques (LSH and TLH) had a lower rate of complications than the other techniques. Intraoperative complications were recorded in 28 of 953 (2.9%) cases: 10 (35.7%) cases of VH; 13 (46.4%) cases of AH; 3 (10.7%) cases of LSH; 1 (3.6%) case of LAVH; and 1 (3.6%) case of TLH. The most common intraoperative complications were urinary bladder lesions (8 cases). They occurred in 3 cases of VH, 2 cases of AH, and 3 cases of LSH. Major postoperative complications occurred in 17 of 953 (1.8%) cases. The largest number was seen among patients who underwent VH (*n* = 7 [41.2%]) but a high percentage was among women who underwent LAVH (*n* = 3

Table 1
Patient characteristics.^a

Parameter	AH	VH	LAVH	LSH	TLH	Total
No. of operations	203 (26.5)	291 (38.0)	43 (5.6)	163 (21.3)	66 (8.6)	766 (100.0)
Age, y	44.8 \pm 6.73	52.9 \pm 13.77	44.5 \pm 7.67	44.4 \pm 6.32	44.1 \pm 5.40	47.9 \pm 10.87
Parity						
0	86 (42.6)	16 (5.5)	7 (16.3)	68 (41.7)	17 (25.8)	194
1–2	95 (46.5)	172 (59.1)	19 (44.2)	76 (46.6)	38 (57.6)	400
≥ 3	22 (10.9)	103 (35.4)	17 (39.5)	19 (11.7)	11 (16.7)	172
BMI ^b	26.5 \pm 5.52	26.2 \pm 5.61	25.7 \pm 6.35	24.3 \pm 4.18	25.4 \pm 4.83	25.8 \pm 5.40

Abbreviations: AH, abdominal hysterectomy; LAVH, laparoscopically assisted vaginal hysterectomy; LSH, laparoscopic supracervical hysterectomy; TLH, total laparoscopic hysterectomy; VH, vaginal hysterectomy.

^a Values are given as number (percentage) or mean \pm SD.

^b Calculated as weight in kilograms divided by the square of height in meters.

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