

ORIGINAL ARTICLE

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Comparison of different surgical approaches for hysterectomy using the modified Clavien Dindo classification

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Abstract

This study aimed to compare the surgical approaches for hysterectomy performed in benign indications using the modified Clavien Dindo classification. Between January 2017 and December 2020, 1040 patients' clinical records who underwent a total laparoscopic hysterectomy, abdominal hysterectomy, and vaginal hysterectomy for benign causes at Istanbul Kanuni Training and Research Hospital were retrospectively analyzed. Patients were categorized into three groups; Total Laparoscopic Hysterectomy (TLH) (Group 1), total abdominal hysterectomy (TAH) (Group 2), and vaginal hysterectomy (VH) (Group 3). The demographic and clinical characteristics of the patients were classified and evaluated according to the type of surgery. Including; mean age, parity, body mass index, average uterine weight, history of prior abdominal surgery, hysterectomy indications, operation time, complication rates, amount of blood loss, and postoperative hospital stay. Modified Clavien Dindo classification was used to compare the complications. Ethics committee approval was obtained from the ethics committee of Kanuni training and research hospital. Statistical analysis of data was performed using (SPSS Inc, Chicago, Illinois). There weren't any differences among the three groups in terms of mean age, parity, and body mass index. VH group had the lowest complication rate 17 (5.48%), compared to the other TLH 33 (9.42%), and TAH 37 (9.73%), groups $p < 0.001$. The TLH group had the longest operation duration 123 ± 24.35 minutes, compared to the other VH 47 ± 14.57 and TAH 96 ± 27.64 groups. $p < 0.001$. The use of the Clavien Dindo classification system enabled the comparison of clinical and surgical techniques and the correct interpretation of surgical results. Recognizing and treating complications reduces morbidity and mortality.

Keywords: Clavien Dindo classification, complication, comparison, hysterectomy, surgical approach

Introduction

Numerous conditions, including life-threatening illnesses, irregular uterine bleeding, and uterine prolapse, can be treated by hysterectomy [1]. Alternative application choices for the methods used have recently started to rise, even though the indications for hysterectomy have not changed for a long time [2]. Abdominal hysterectomy is inferior to laparoscopic hysterectomy in terms of post-operative pain, blood loss, and resume to daily activities

[3,4,5]. Abdominal and laparoscopic hysterectomy technique for benign indications was shown to be inferior to vaginal hysterectomy and not advised as the first-choice modality [8]. Most surgeons avoid performing a vaginal hysterectomy in cases with a large uterus, previous pelvic surgery, history of pelvic inflammatory disease, severe endometriosis, undescended uterus, adnexal mass, or cyst [9]. A standardized classification system was required to evaluate complications in surgical approaches

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performed in the same or different centers. Clavien a general surgeon proposed a classification of complications. in 1992 and modified it with Dindo in 2004[10,11]. The modified Clavien Dindo classification has been used in the international literature in recent years to compare complications of gynecological operations[12].

Table 1. Modified Clavien Dindo classification

Grade 1 Complications in the postoperative phase that do not require medical treatment, surgical, or radiological intervention

Grade 2 Complications that necessitate the use of medication other than those prescribed in Grade 1

Grade 3A Complications that don't require general anesthesia but call for surgical, endoscopic, or imaging intervention.

Grade 3B Health problems requiring surgery, an endoscopy, or imaging intervention, combined with general anesthesia.

Grade 4A Life-threatening impacts and solitary organ damage

Grade 4B Life-threatening impacts because of numerous organ dysfunction.

Grade 5 Death

This study aimed to compare the surgical approaches for hysterectomy performed in benign indications using the modified Clavien Dindo classification.

Material and Methods

The records of 1040 women (aged 40–80 years) who underwent laparoscopic, abdominal, and vaginal hysterectomies for benign indications were retrospectively reviewed. This descriptive study was conducted at Istanbul, Kanuni Sultan Suleyman Training and Research Hospital between January 2017 and December 2020.

Patients were classified into three groups, Total Laparoscopic Hysterectomy (TLH) (Group 1), total abdominal hysterectomy (TAH) (Group 2), and vaginal hysterectomy (VH) (Group 3).

Demographic and clinical characteristics of the patients were classified and defined in each procedure according to the type of surgical approach, including mean age, parity, body mass index (BMI), uterine weight, estimated blood loss, current medical diseases, previous surgeries, indications for hysterectomy, complications, duration of surgery and length of hospital stay. We used the modified Clavien Dindo classification to compare the complications. The preoperative and postoperative hemoglobin difference was calculated. Uterus weight was measured using a precision scale at the pathology laboratory immediately after the procedure. Duration of surgery was evaluated as the time from the incision on the skin to the complete closure of the skin sutures. The length of hospital stay was determined as the time between the day of the procedure and the day of discharge from the hospital. Patients who had postoperative spontaneous micturition and defecation were discharged. The data obtained from the study were collected in 6 months. Follow-up visits were

made on the first and second postoperative days and one month after surgery. In addition, patients who developed complications were followed up until they recovered. Pelvic examinations, cervical-vaginal smears, and endometrial sampling were performed before the procedure. We included patients who were aged 40–80 years, underwent hysterectomy for benign indications, and had no missing records. We excluded patients who had malignancy, underwent a hysterectomy after a cesarean section due to postpartum bleeding, underwent a supracervical hysterectomy, or had missing records.

The management protocol (preparation and operative technique) was the same for all groups.

The hysterectomy technique that would help the patients the most was chosen after considering the presence of extra extrauterine pelvic adhesion, uterine size, and a descensus uterus. The night before the surgery, the patients underwent mechanical bowel preparation with a rectal enema. single dose of one gram cefazolin sodium was administered intravenously to all patients one hour preoperatively and six hours postoperatively. For thromboembolism prophylaxis, enoxaparin at a dose of 0.4 ml was administered subcutaneously 8 hours before the procedure and continued at 24-hour intervals throughout the hospitalization.

SPSS (SPSS Inc., Chicago, IL, USA) for Windows 24.0 was used to statistically analyze the data. Mean, standard deviation, and variance were used to present numerical data having a normal distribution. The one-way ANOVA test was used to parametrically compare three groups. Mann-Whitney U test and the Bonferroni correction were used to compare the paired groups, and the non-parametric Kruskal-Wallis test was employed to assess the significance of the difference. Fischer's precision test was used to determine whether there was a difference between the groups. Categorical data were expressed as numbers and percentages. P 0.05 was regarded as meaningful.

Results

22 patients had missing records, excluded from the study. Eight were in the total laparoscopic hysterectomy group, nine were in the total abdominal hysterectomy group, and five were in the vaginal hysterectomy group. After excluding those patients, a total of 1040 female patients were included in the study, who had undergone hysterectomies for benign indications. The modified Clavien Dindo classification is shown in table I.

Table II shows the demographic and clinical characteristics of the patients in each group. The patients in the total laparoscopic hysterectomy group had a mean age of $49,29 \pm 6,02$ years and a mean parity (number of children delivered) of $3,01 \pm 1,04$. The body mass index was $25,40 \pm 1,84$. The patients in the total abdominal hysterectomy group had a mean age of $47,51 \pm 5,96$ years and a mean parity of $2,51 \pm 1,13$ years. The body mass index was $28.01 \pm 1,82$. The average age of the Vaginal hysterectomy group was $51,82 \pm 4.69$ years, and the average parity was $3,17 \pm 6,39$. The body mass index was $26.92 \pm 1,16$. In terms of mean age, parity, body mass index, uterine size, and uterine weight,

there was no significant difference between the three groups of participants in the study. Salpingectomy was the most common concurrent procedure in groups one and two. Colporrhaphy anterior was the most common concurrent procedure in group three. Table II shows the operational indications for the various procedures. The most common operation indication in the TLH and TAH groups was uterine myoma, while uterine prolapse was the most main indication in the VH group. A comparison of clinical outcomes of hysterectomy procedures is shown in table III.

Table 1. Demographic characteristics of Hysterectomy

	TLH n=350	TAH n=380	VH n= 310(%)	P
Demographic characteristics	Mean±SD	Mean±SD		
age (year)	49 (41-63) ³	47 (42-62)	51 (48-80)	0.432 ¹
Parity(number)	3 (1-9) ³	2 (1-8)	3 (1-11)	0.369
BMI (kg/m2)	25.4±2.3 ⁴	28.2±2.7 ⁴	26.3±2.6 ⁴	0.571 ²
Uterine size(week)	12(8-14) ³	12(10-16) ³	12(6-14) ³	0.589
Uterine weight(gr)	150 (110-160) ³	155 (130-270) ³	145 (70-190) ³	
Previous surgery	70	80	47	0.262
Simultaneous operations	277	281	283	0.324
Salpingectomy	250	255	18	
Colporrhaphy anterior	14	15	218	
Colporrhaphy posterior	10	9	34	
Vaginal vault suspension	3	2	13	

¹ Kruskal -Wallis test
² One way anova (ANOVA) test
³mean, Minumum-Maximum
⁴ Mean, Standard deviation
BMI:body mass index;TLH:Total laparoscopic hysterectomy

Table 2. Operation indications of hysterectomy

Indication	TLH n=350 (%)	TAH n=380 (%)	VH n=310 %	P
Myoma uteri	116 33 .14 123	32.36 40	12.90	p<0.05
Abnormal uterine bleeding	92 26.28 98	25.78 36	11.61	p<0.05
Endometrial hyperplasia without atypia	36 10.28 39	10.26 6	1.94	p>0.05
Cervical Intraepithelial neoplasia	14 4.00 15	3.94 5	1.61	p>0.05
Adnexal mass	14 4.00 15	3.94 6	1.94	p>0.05
Descensus Uteri	4 1.14 6	1.59 201	65.80	p>0.05
Endometrial Polyp	14 4.00 17	4.47 4	1.29	p>0.05
Adenomyosis	34 9.71 38	10.00 12	3.87	p>0.05
Chronic pelvic pain	26 7.42 29	7.63	-	p>0.05

Table 3. Comparison of clinical results of hysterectomy

	TLH Mean±SD	TAH Mean±SD	VH Mean±SD	p
Operating time (Minute)	123±24.35	96±27.64	47±14.57	0.001
Mean Preoperative hemoglobin (gr/dl)	10.7.1±1.5	11±1.5	10.9±1.5	0.322
Mean Postoperative hemoglobin (gr/dl)	9.4.3±1.6	9.2±1.4	10.3±1.5	0.01
Duration of hospital stay(hour)	45(24-72) ³	48(30-84) ³	28 (18-48) ³	0.01
Uterine weight(gr)	150(110-160) ³	155(130-70) ³	145(70-190) ³	0.411

Table 4. Evaluation of complications in each type of hysterectomy using the modified Clavien Dindo classification

Clavien Dindo clasification	TLH n=350	TAH n=380	VH n=310
Decree 1			
Subcutaneous emphysema	2		
Preperitoneal emphysema	1		
Mild hematuria	2	4	1
Decree 2			
Port site infection	1		
High fever	1	3	1
Urine infection	4	5	4
Bleeding requiring a blood transfusion	4	8	2
Mild ileus	1	2	1
Decree 4			
Pulmonary embolism	0	0	0
My cart infarction	0	0	0
Decree 5			
Death	0	0	0

Compared with TLH and TAH groups VH group had the shortest hospital stay 55±8.22(34-82 hours), 58±11.64 (32-90 hours), and 38±8.4 (28-58 hours) p<0.001 respectively. The mean operative time was 123±24.35 minutes (55-180 minutes) in the TLH group, 96±27.64(64-145 minutes) in the TAH group, and 47±1,4.57 (25-82minutes) in the VH group. Compared to the other VH and TAH groups, the TLH group had the longest operation time. 47±1,4.57 (25-82minutes) , 96±27.64(64-145 minutes), 123±24.35 (90-190minutes, p<0.001) respectively. The decrease in hemoglobin value on the first postoperative day was the lowest t in the VH group. Mean Postoperative hemoglobin (gr/dl) was 9.4.3±1.6gr/dl in TLH, 9.2±1.4gr/dl in TAH, and 10.3±1.5gr/dl in VH. Data on complications are given in table IV. Complication rates were the lowest in the VH group. It was 33 (9.42%), in the TLH group, 37 (9.73%) in the TAH group, group, and 17 (5.48%) in the VH group. Bladder damage occurred in a total of 8(0.77%) patients. We repaired the bladder injuries by suturing with a double layer of polyglactin without conversing to laparotomy. After cystography, we removed the catheter when there was no leakage and the bladder was intact. Ureteral damage

occurred in 4 (0.38%) patients. one was in TLH, 2 were in TAH, and One was in the VH group. We repaired the ureteral damage by conversion to laparotomy. After intravenous pyelography, we removed the ureteral stent when there was no leakage and the ureteral was intact. A total of 14 (1.35%) patients had bleeding requiring blood transfusion due to excessive bleeding. We noticed, 2 (0.19%) bowel injuries during the operations, one was in TAH and one was in the VH group called a general surgeon to the operating room and repaired the injury without converting to laparotomy. intra-abdominal hematoma/ abscess was detected in 4 (0.38%) patients. 1(0.28%) was in TLH, 3(0.79%) were in TLH group.

Discussion

Considering the presence of extrauterine pelvic adhesions, uterine size, and, descensus uteri the hysterectomy technique that would be most helpful to the patients was selected. Early recognition and management of complications are vital. To compare data from various institutions and analyze the risks associated with different surgical preservation procedures, standardized complication reporting is essential for future preservation surgery outcome analyses. Complications can be evaluated objectively and compared across various outcome studies using a uniform and trustworthy classification-grading system. The use of the Clavien Dindo classification system enabled the comparison of clinical and surgical techniques and the correct interpretation of surgical results

In the VH group we observed the least amount of blood loss, the shortest hospital stay, the shortest operation time, and the lowest complication rates compared to the other TAH and TLH groups. The TLH group had the longest operation time compared to the other VH and TAH groups.

Gendy et al. [13] Compared to the other VH and TAH groups, the TLH group had the longest operation time Leung[14].et al and Härkki-Sirén P et al. [15].reported that TLH requires a longer surgical time than other abdominal and vaginal hysterectomy techniques. Seracchioli et al. [16] compared TLH with TAH and couldn't find any difference in terms of operation time. In this study, compared to the other VH and TAH groups, the TLH group had the longest operation time. Aarts et al. [17]. reported the longest operative time and more urinary system complications in laparoscopic hysterectomy in their Cochrane review comparing total laparoscopic hysterectomy, abdominal hysterectomy, and vaginal hysterectomy. The best results were reported in vaginal hysterectomy. However, serious surgical complications were found to occur in 1.8% of abdominal hysterectomies and 5.1% of vaginal hysterectomies respectively. Olsson et al. [18]. compared 143 cases and found no statistical difference between TLH and TAH complication rates. Lee SH et al. [19] didnot discover any difference in complication rates in the meta-analysis outcomes comparing VH and TLH. Allam et al. [20]reported fewer complications in the TLH group using the electrosurgical bipolar vessel sealing technique than in the TAH and VH groups.

In this study. The VH group had the lowest complication rates compared to the other TLH and TAH groups. Early detection and management of intraoperative problems are crucial.

Candiani et al. [21] reported the hospital stay as 2.7 days and Morelli et al. [22]as 2.9 days in laparoscopic hysterectomy. Philips et al. [23] said that the length of hospital stay is shorter in TLH than in TAH. Garry R et al. [24] reported that the length of hospital stay was shorter in TLH than in TAH, but they could not find any difference compared to VH group . In our study among the TAH, TLH, and VH groups, the shortest hospital stay was in VH. Uterine myoma constitutes the largest indication group in TLH and TAH [25] In a vaginal hysterectomy, uterine prolapse is the largest indication group [26]. In our study, similar to the literature, uterine myoma constituted the largest indication group in TLH and TAH groups, and uterine prolapse was in the VH group. Harkki et al [27] reported the complication rate of urinary tract injury in laparoscopic hysterectomy (2.2%) and vaginal hysterectomy (0.04).In our study urinary tract injury was in the TLH group (1.43%)and (0.32%)in the VH group. In the literature, conversion rates from laparoscopy to laparotomy vary between 0.03% and 6.6% [28- 31]. TLH and vaginal hysterectomy complications have been reported to be similar for a uterus weighing up to 300 g [32] In our study conversion rate from laparoscopy to laparotomy was 0.86%

Data collected from patient files is sufficient for sample size estimation. The effects of surgical experience, which may affect each parameter, were determined in this study.

The study was descriptive and retrospective, conducted in a single tertiary hospital; These factors may have limited the generalizability of the study.

Conclusion

Our study revealed the importance of early recognition and management of complications.Early recognition and treatment complications reduce morbidity, mortality, and post-operative reoperation rates. Compared to the other TAH and TLH groups, the VH group had the least blood loss, the shortest hospital stays, the shortest operation time, and the lowest complication rates.

The hysterectomy technique that will be most beneficial to the patients should be selected.The use of the Clavien Dindo classification system enabled the comparison of clinical and surgical techniques and the correct interpretation of surgical results.

Conflict of interests

The authors declare that there is no conflict of interest in the study.

Financial Disclosure

The authors declare that they have received no financial support for the study.

Ethical approval

Commitee of Ethics Istanbul Kanuni Sultan Suleyman Training and Research Hospital number: 2021.11.291

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