Jinekoloji - Obstetrik ve Neonatoloji Tıp Dergisi
The Journal of Gynecology-Obstetrics and Neonatology

ÖZGÜN ARAŞTIRMA / ORIGINAL ARTICLE

DOI: 10.38136/jgon.1496548

Hysterectomy complications: five year long experience of a tertiary health center

Histerektomi komplikasyonları; üçüncü basamak sağlık merkezinin beş yıllık deneyimi

Rıza DUR[1], Şeyma İlayda PALTACI[1], Sudabe GARİBOVA[1], Fatih ÇELİK[1], Mine KANAT PEKTAS[1]

[1]Afyonkarahisar Health Sciences University, School of Medicine, Department of Obstetrics and Gynecology, Afyonkarahisar, Turkey

ABSTRACT

Aim: This study aims to analyze the experience of a tertiary health center about the complications of hysterectomy within a period of five years.

Materials and Methods: This is a retrospective review of 1311 hysterectomies which were performed for both benign and malignant indications between 1 January 2017 and 1 January 2023.

Results: Complications occurred in 218 patients (16.6%) and the mortality rate was 0.5% (n=6). The rate of conversion into laparotomy was 2.8%. Bladder injury, colon injury, ileus and incisional hernia were significantly more frequent in women who underwent laparotomy (p=0.007, p=0.026, p=0.027 and p=0.010 respectively). Logistic regression analysis indicated hysterectomy technique as an independent prognostic factor for its complications (p=0.001). Ureter injury, bladder injury and colon injury were significantly less frequent in patients who had hysterectomy for gynecological malignancy (p=0.001, p=0.001 and p=0.015 respectively). Hospital stay was significantly longer in patients undergoing hysterectomy for laparotomy and gynecological malignancy (p=0.001 for both).

Conclusion: Minimally invasive techniques such as laparoscopy or vaginal approach should be attempted whenever it is possible and feasible. Performing hysterectomy for benign pathologies should not be considered as a distraction from meticulous work during the preoperative preparation and postoperative monitorization periods. Similar attention should be also paid to patients who have chronic diseases.

Keywords: Hysterectomy, laparoscopy, laparotomy, morbidity, mortality

ÖZ

Amaç: Üçüncü basamak sağlık merkezinin histerektomi komplikasyonları konusundaki beş yıllık deneyimini analiz etmeyi amaçlamaktadır.

Gereç ve Yöntemler: Bu yazı 1 Ocak 2017 ile 1 Ocak 2023 tarihleri arasında, hem malign hem de benign endikasyonlarla yapılan, 1311 histerektominin retrospektif incelemesidir.

Bulgular: Komplikasyonlar 218 hastada (%16,6) görüldü ve mortalite oranı %0,5 (n=6) idi. Laparotomiye dönüş oranı %2,8 idi. Laparotomi uygulanan kadınlarda mesane yaralanması, kolon yaralanması, ileus ve insizyonel herni anlamlı olarak daha sık görüldü (sırasıyla p=0,007, p=0,026, p=0,027 ve p=0,010). Lojistik regresyon analizi, histerektomi tekniğinin komplikasyonlar açısından bağımsız bir prognostik faktör olduğunu gösterdi (p=0.001). Jinekolojik malignite nedeniyle histerektomi yapılan hastalarda üreter yaralanması, mesane yaralanması ve kolon yaralanması anlamlı olarak daha az görüldü (sırasıyla p=0,001, p=0,001 ve p=0,015). Laparotomi ve jinekolojik malignite nedeniyle histerektomi yapılan hastaların hastanede kalış süresi daha uzundu (her ikisi için de p=0,001).

Sonuç: Mümkün ve uygulanabilir olduğunda laparoskopi veya vajinal yaklaşım gibi minimal invaziv teknikler denenmelidir. Benign patolojiler nedeniyle histerektomi yapılması, ameliyat öncesi hazırlık ve ameliyat sonrası takip dönemlerinde titiz çalışmaktan uzaklaşmak olarak düşünülmemelidir. Kronik hastalığı olan hastalara da aynı özen gösterilmelidir.

Anahtar Kelimeler: Histerektomi, laparoskopi, morbidite, mortalite

Cite as: Dur R, Paltacı Şİ, Garibova S, Çelik F, Kanat Pektas M. Hysterectomy complications: five year long experience of a tertiary health center. Jinekoloji-Obstetrik ve Neonatoloji Tıp Dergisi 2024;21(3):152–159.

Geliş/Received: 05.06.2024 • **Kabul/Accepted:** 30.06.2024

Sorumlu Yazar/Corresponding Author: Rıza DUR, Zafer Sağlık Külliyesi Dörtyol Mahallesi 2078 Sokak No: 3, Afyonkarahisar, Turkey
E-mail: durriza@hotmail.com

Çevrimiçi Erişim/Available online at: https://dergipark.org.tr/tr/pub/jgon

INTRODUCTION

Hysterectomy refers to the surgical removal of the uterus and cervix (1). Since it is the most frequently performed operative procedure by gynecological surgeons, more than 600000 hysterectomies are conducted each year in the United States (2). The majority of hysterectomies are performed for benign indications (1, 3).

As a surgical procedure, hysterectomy has both benefits and risks which affect the hormonal balance and overall health (4). Accordingly, hysterectomy might lead to complications which differ with respect to the route and technique of surgery (5). The most commonly encountered complications of hysterectomy include hemorrhage, infections, venous thromboembolism, gastrointestinal injury, genitourinary damage, nerve injury, and vaginal cuff dehiscence (1, 2). Therefore, hysterectomy is recommended as the last choice of treatment for women in whom pharmacological agents and/or other interventions have failed (6).

Hysterectomy can be carried out by laparotomy, laparoscopy or by means of vaginal route (7). Despite the advance in surgical techniques, laparotomy remains the most commonly adopted route for hysterectomy. However, laparotomy is associated with significantly longer hospitalization, more severe postoperative pain, higher rate of infectious complications, and slower return to daily routine (8, 9). Vaginal route has been addressed as the most feasible approach for hysterectomy because it is the least invasive technique which leads to significantly faster recovery (8, 10). Laparoscopy requires minimal access and, thus, laparoscopic hysterectomy resembles vaginal hysterectomy in aspect of complications. On the other hand, laparoscopic hysterectomy is performed within a longer period of time and demands specialized instruments and training. Therefore, laparoscopy is more expensive than laparotomy and maintains the risks associated with abdominal incisions (11, 12).

The present study aims to analyze the experience of a tertiary health center about the complications of hysterectomy within a period of five years.

MATERIALS AND METHODS

The present study is approved by ethical committee of Afyonkarahisar Health Sciences University Hospital where it was undertaken (10.10.2023-2023/432). Written informed consent was obtained from each participant. This study was conducted in accordance with the principles revealed by the Declaration of Helsinki.

This is a retrospective review of 1311 hysterectomies which were performed for both benign and malignant indications at the study center between 1 January 2017 and 1 January 2023. Data related with hysterectomy time, hysterectomy route, hysterectomy indication and adnexal surgery were acquired form medical records.

According to 9th revision of International Classification of Diseases-Clinical Modification (ICD-9-CM), hysterectomy techniques were classified as laparoscopy, laparotomy, and vaginal route. Laparoscopy assisted vaginal hysterectomy was identified as laparoscopic hysterectomy whereas postpartum hysterectomy was designated as laparotomic hysterectomy.

Primary outcomes were the occurrence of complications, need for conversion to laparotomy, and length of hospitalization. The Clavien–Dindo classification was adopted to categorize the complications of hysterectomy. This system defines a complication as any deviation from the optimal progression which is not related to surgery, and which cannot be regarded as an obstacle for the success of the operation. The grades in Clavien–Dindo classification are based on the degree of severity and the need for treatment (13).

Grade I describes any deviation from the normal postoperative course which does not require any pharmacological treatment, radiological imaging, endoscopy and/or surgery. Grade I complications involves the use of drugs as antiemetics, antipyretics, analgesics, diuretics, and electrolytes as well as physiotherapy. Grade II complications need pharmacological agents other than those allowed for grade I complications. These pharmacological agents include blood transfusions and total parenteral nutrition.

Grade III complications are those which should be treated by surgical, endoscopic, or radiological intervention. Grade IV complications are life-threatening problems which should be managed at an intensive care unit and Grade V refers to mortality (13).

A chronic disease is a health condition which persists, appears with time, or has long-lasting effects. Chronic diseases included this study consist of hypertensive disorders (n=94), diabetes mellitus (n=81), functional gastrointestinal disorders (n=63), arthritis (n=59), asthma (n=72), chronic obstructive pulmonary disease (n=63), autoimmune diseases (n=55), genetic disorders (n=64) and viral diseases such as hepatitis B and C (n=71).

Collected data were analyzed by Statistical Package for Social Sciences version 22.0 (SPSS, SPSS IBM., Armonk, NY, USA). Continuous data were expressed as mean ± standard deviation whereas categorical data were denoted as numbers and percentages. Student t test, one way analysis of variance, chi square test and Kruskal-Wallis test were used for the comparisons. Logistic regression analysis was done to specify the prognostic factors for the occurrence of hysterectomy

complications. Two-tailed p values <0.05 were accepted as statistically significant.

RESULTS

Complications occurred in 218 patients (16.6%) and the mortality rate was 0.5% (n=6).

Table 1 shows complications in aspect of hysterectomy technique. Bladder injury, colon injury, ileus and incisional hernia were significantly more frequent in women who underwent laparotomy (p=0.007, p=0.026, p=0.027 and p=0.010 respectively). Dysrhythmia, massive bleeding, intraabdominal abscess, and cuff prolapse were significantly more common in patients who had vaginal hysterectomy (p=0.016, p=0.007, p=0.002 and p=0.005 respectively). Wound infection and the need for transfusion were also significantly more common in the laparotomy group (p=0.001 for both). Hospital stay was significantly longer in patients undergoing laparotomic hysterectomy (p=0.001).

Laparoscopy was converted into laparotomy in 18 patients and the rate of conversion to laparotomy was 2.8%. Twenty-three patients in the laparotomy group had postpartum hysterectomy and vaginal hysterectomy was laparoscopy assisted in 10 patients (Table 2).

Table 3 summarizes complications with respect to malignancy. Ureter injury, bladder injury and colon injury were significantly less frequent in patients who had hysterectomy for gynecological malignancy (p=0.001, p=0.001 and p=0.015 respectively). Vocal cord palsy, incisional hernia and neurological injury were significantly less common in patients who underwent hysterectomy

Table 1. Hysterectomy complications by technique

	Total (n=1311)	Laparoscopy (n=625)	Laparotomy (n=571)	Vaginal (n=133)	p
Grade I					
Hypertension	19 (1.4%)	6 (1.0%)	12 (2.1%)	1 (0.9%)	0.221
Dysrhythmia	16 (1.2%)	3 (0.5%)	9 (1.6%)	4 (3.5%)	0.016*
Delirium	8 (0.6%)	3 (0.5%)	5 (0.9%)	0 (0.0%)	0.462
Vocal cord palsy	3 (0.2%)	1 (0.2%)	2 (0.4%)	0 (0.0%)	0.683
Neurological injury	10 (0.8%)	6 (1.0%)	3 (0.5%)	1 (0.9%)	0.683
Wound infection	29 (2.2%)	2 (0.3%)	25 (4.4%)	2 (1.7%)	0.001*
Grade II					
Ileus	11 (0.8%)	1 (0.2%)	9 (1.6%)	1 (0.9%)	0.027*
Massive bleeding	19 (1.4%)	4 (0.6%)	10 (1.8%)	5 (4.3%)	0.007*
Need for transfusion	317 (24.2%)	112 (17.9%)	175 (30.6%)	22 (19.1%)	0.001*
Venous thromboembolism	4 (0.3%)	1 (0.2%)	3 (0.5%)	0 (0.0%)	0.428
Thrombophlebitis	1 (0.1%)	1 (0.2%)	0 (0.0%)	0 (0.0%)	0.577
Cuff cellulitis	2 (0.2%)	1 (0.25)	1 (0.2%)	0 (0.0%)	0.906
Grade III					
Ureter injury	11 (0.8%)	4 (0.6%)	6 (1.1%)	1 (0.9%)	0.738
Bladder injury	40 (3.1%)	12 (1.9%)	27 (4.7%)	1 (0.9%)	0.007*
Colon injury	14 (1.1%)	3 (0.5%)	11 (1.9%)	0 (0.0%)	0.026*
Vesicovaginal fistula	5 (0.4%)	3 (0.5%)	2 (0.4%)	0 (0.0%)	0.735
Rectovaginal fistula	1 (0.1%)	1 (0.2%)	0 (0.0%)	0 (0.0%)	0.577
Incisional hernia	23 (1.8%)	6 (1.0%)	17 (3.0%)	0 (0.0%)	0.010*
Intestinal eventration	1 (0.1%)	0 (0.0%)	1 (0.2%)	0 (0.0%)	0.523
Port site metastasis	1 (0.1%)	1 (0.2%)	0 (0.0%)	0 (0.0%)	0.577
Ovary torsion	1 (0.1%)	1 (0.2%)	0 (0.0%)	0 (0.0%)	0.577
Intraabdominal abscess	6 (0.5%)	2 (0.3%)	1 (0.2%)	3 (2.6%)	0.002*
Cuff prolapse	1 (0.1%)	0 (0.0%)	1 (0.2%)	0 (0.0%)	0.005*
Cuff dehiscence	1 (0.1%)	1 (0.2%)	0 (0.0%)	1 (0.9%)	0.093
Grade IV					
Atelectasis	6 (0.5%)	2 (0.3%)	4 (0.7%)	0 (0.0%)	0.466
Pleural effusion	2 (0.2%)	0 (0.0%)	2 (0.4%)	0 (0.0%)	0.273
Trachea rupture	2 (0.2%)	2 (0.3%)	0 (0.0%)	0 (0.0%)	0.333
Diabetic ketoacidosis	2 (0.2%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0.273
Grade V					
Mortality	6 (0.5%)	1 (0.2%)	5 (0.9%)	0 (0.0%)	0.140
Hospital stay (days)	3.37+2.7	2.79+0.05	4.05±0.71	3.09±1.23	0.001*

*p<0.05 was accepted as statistically significant.

Table 2. Hysterectomy complications by alternative techniques

	Laparoscopy to laparotomy (n=18)	Postpartum hysterectomy (n=23)	Laparoscopy assisted vaginal hysterectomy (n=10)
Atelectasis	1 (5.6%)	1 (4.3%)	0 (0.0%)
Ureter injury	0 (0.0%)	2 (8.7%)	0 (0.0%)
Bladder injury	3 (16.7%)	3 (13.0%)	0 (0.0%)
Intestinal evisceration	1 (5.6%)	0 (0.0%)	0 (0.0%)
Massive bleeding	3 (16.7%)	0 (0.0%)	0 (0.0%)
Ileus	1 (5.6%)	2 (8.7%)	0 (0.0%)
Hypertension	1 (5.6%)	1 (4.3%)	1 (10.0%)
Dysrhythmia	1 (5.6%)	0 (0.0%)	0 (0.0%)
Delirium	0 (0.0%)	1 (4.3%)	0 (0.0%9
Wound infection	0 (0.0%)	0 (0.0%)	1 (10.0%)
Mortality	0 (0.0%)	1 (4.3%9	0 (0.0%)

Table 3. Hysterectomy complications by malignancy

	Total (n=1311)	No malignancy (n=369)	Malignancy (n=942)	p
Grade I				
Hypertension	19 (1.4%)	12 (3.3%)	7 (0.7%)	0.001*
Dysrhythmia	16 (1.2%)	8 (2.2%)	8 (0.8%)	0.050
Delirium	8 (0.6%)	5 (1.4%)	3 (0.3%)	0.030*
Vocal cord palsy	3 (0.2%)	3 (0.8%)	0 (0.0%)	0.006*
Neurological injury	10 (0.8%)	9 (2.4%)	1 (0.1%)	0.001*
Wound infection	29 (2.2%)	24 (6.5%)	5 (0.5%)	0.001*
Grade II				
Ileus	11 (0.8%)	7 (1.9%)	4 (0.4%)	0.009*
Massive bleeding	19 (1.4%)	16 (4.3%)	3 (0.3%)	0.001*
Need for transfusion	317 (24.2%)	221 (59.9%)	96 (10.2%)	0.001*
Venous thromboembolism	4 (0.3%)	2 (0.5%)	2 (0.2%)	0.330
Thrombophlebitis	1 (0.1%)	1 (0.3%)	0 (0.0%)	0.110
Cuff cellulitis	2 (0.2%)	2 (0.5%)	0 (0.0%)	0.024*
Grade III				
Ureter injury	11 (0.8%)	8 (2.2%)	3 (0.3%)	0.001*
Bladder injury	40 (3.1%)	30 (8.1%)	10 (1.1%)	0.001*
Colon injury	14 (1.1%)	8 (2.2%)	6 (0.6%)	0.015*
Vesicovaginal fistula	5 (0.4%)	3 (0.8%)	2 (0.2%)	0.113
Rectovaginal fistula	1 (0.1%)	1 (0.3%)	0 (0.0%)	0.110
Incisional hernia	23 (1.8%)	15 (4.1%)	8 (0.8%)	0.001*
Intestinal eventration	1 (0.1%)	0 (0.0%)	1 (0.1%)	0.531
Port site metastasis	1 (0.1%)	0 (0.0%)	1 (0.1%)	0.531
Ovary torsion	1 (0.1%)	1 (0.3%)	0 (0.0%)	0.110
Intraabdominal abscess	6 (0.5%)	4 (1.1%)	2 (0.2%)	0.035*
Cuff prolapse	1 (0.1%)	1 (0.3%)	0 (0.0%)	0.110
Cuff dehiscence	1 (0.1%)	1 (0.3%)	0 (0.0%)	0.110
Grade IV				
Atelectasis	6 (0.5%)	2 (0.5%)	3 (0.3%)	0.555
Pleural effusion	2 (0.2%)	0 (0.0%)	2 (0.2%)	0.376
Trachea rupture	2 (0.2%)	0 (0.0%)	2 (0.2%)	0.376
Diabetic ketoacidosis	2 (0.2%)	0 (0.0%)	2 (0.2%)	0.376
Grade V				
Mortality	6 (0.5%)	2 (0.5%)	4 (0.4%)	0.777
Hospital stay (days)	3.37+2.7	3.10±1.94	3.76±1.60	0.001*

*p<0.05 was accepted as statistically significant.

Table 4. Hysterectomy complications by chronic disease

	Total (n=1311)	No chronic disease (n=689)	Chronic disease (n=622)	p
Grade I				
Hypertension	19 (1.4%)	8 (1.2%)	11 (1.8%)	0.358
Dysrhythmia	16 (1.2%)	6 (0.9%)	10 (1.6%)	0.225
Delirium	8 (0.6%)	1 (0.1%)	7 (1.1%)	0.023*
Vocal cord palsy	3 (0.2%)	3 (0.4%)	0 (0.0%)	0.099
Neurological injury	10 (0.8%)	4 (0.6%)	6 (1.0%)	0.425
Wound infection	29 (2.2%)	14 (2.0%)	15 (2.4%)	0.641
Grade II				
Ileus	11 (0.8%)	7 (1.0%)	4 (0.6%)	0.460
Massive bleeding	19 (1.4%)	12 (1.7%)	7 (1.1%)	0.351
Need for transfusion	317 (24.2%)	174 (25.3%)	143 (23.0%)	0.339
Venous thromboembolism	4 (0.3%)	1 (0.1%)	3 (0.5%)	0.269
Thrombophlebitis	1 (0.1%)	1 (0.1%)	0 (0.0%)	0.342
Cuff cellulitis	2 (0.2%)	1 (0.1%)	1 (0.2%)	0.942
Grade III				
Ureter injury	11 (0.8%)	8 (1.2%)	3 (0.5%)	0.178
Bladder injury	40 (3.1%)	27 (3.9%)	13 (2.1%)	0.055
Colon injury	14 (1.1%)	11 (1.6%)	3 (0.5%)	0.050
Vesicovaginal fistula	5 (0.4%)	1 (0.1%)	4 (0.6%)	0.144
Rectovaginal fistula	1 (0.1%)	0 (0.0%)	1 (0.2%)	0.292
Incisional hernia	23 (1.8%)	12 (1.7%)	11 (1.8%)	0.971
Intestinal evisceration	1 (0.1%)	0 (0.0%)	1 (0.2%)	0.292
Port site metastasis	1 (0.1%)	0 (0.0%)	1 (0.2%)	0.292
Ovary torsion	1 (0.1%)	1 (0.1%)	0 (0.0%)	0.342
Neurological injury	10 (0.8%)	4 (0.6%)	6 (1.0%)	0.425
Intraabdominal abscess	6 (0.5%)	2 (0.3%)	4 (0.6%)	0.345
Cuff prolapse	1 (0.1%)	1 (0.1%)	0 (0.0%)	0.342
Cuff dehiscence	1 (0.1%)	1 (0.1%)	0 (0.0%)	0.342
Grade IV				
Atelectasis	6 (0.5%)	4 (0.6%)	2 (0.3%)	0.488
Pleural effusion	2 (0.2%)	0 (0.0%)	2 (0.3%)	0.136
Trachea rupture	2 (0.2%)	1 (0.1%)	1 (0.2%)	0.942
Diabetic ketoacidosis	2 (0.2%)	0 (0.0%)	2 (0.3%)	0.136
Grade V				
Mortality	6 (0.5%)	1 (0.1%)	5 (0.8%)	0.078
Hospital stay (days)	3.37+2.7	3.14±1.70	3.63±1.47	0.001*

*p<0.05 was accepted as statistically significant.

Table 5. Logistic regression analysis for hysterectomy complications

	Odd ratio (95% Confidence interval)	p
Technique	0.262 (0.068-0.475)	0.001*
Malignancy	0.171 (0.163-0.182)	0.263
Chronic disease	0.138 (0.119-0.156)	0.444

*p<0.05 was accepted as statistically significant

for malignant pathologies (p=0.006, p=0.001 and p=0.001 respectively). Massive bleeding and need for transfusion were also significantly less frequent in patients who were hysterectomized for gynecological malignancy (p=0.001 for both). Ileus, hypertension, and delirium were significantly less common in patients who had hysterectomy for malignant conditions (p=0.009, p=0.001 and p=0.030 respectively). Wound infection, intraabdominal abscess and cuff cellulitis were significantly less frequent in patients who underwent hysterectomy for malignant pathologies (p=0.001, p=0.035 and p=0.024 respectively). Hospital stay was significantly longer in patients undergoing hysterectomy for gynecological malignancy (p=0.001). Thirteen patients with gynecological malignancy (1.4) had a IV/V complication based on Clavien-Dindo classification.

Table 4 indicates that delirium was significantly more frequent and hospital stay was significantly longer in hysterectomized patients with chronic disease (p=0.023 and p=0.001 respectively). Logistic

regression analysis indicated hysterectomy technique as an independent prognostic factor for its complications (p=0.001).

DISCUSSION

Hysterectomy has been described as the ultimate treatment for uterine pathologies. Accordingly, leiomyomas, abnormal bleeding and gynecological tumors have been enlisted as the main indications for hysterectomy (14). Since hysterectomy is the most commonly performed gynecological surgery, it would be prudent to expect that this operation would be associated with complications (1, 2). Therefore, this study has been designed to analyze the five-year long experience of a tertiary health center about the complications of hysterectomy.

The decision for the route of hysterectomy should be made according to the indication, surgeon's experience, and existence of any concurrent pathology and/or chronic disease. It has

been recommended that less invasive techniques should be used for hysterectomy and, thus,

laparoscopy should be preferred in case vaginal hysterectomy cannot be performed (6, 7).

Laparoscopy provides certain advantages over laparotomy, and technological improvements have allowed the implementation of laparoscopic techniques in gynecological surgery. The advantages of laparoscopy include less postoperative pain, shorter hospital stays, and less blood loss (15-17). Two meta-analyses have verified that postoperative pain and blood loss were significantly lower in patients who undergo laparoscopic hysterectomy than those who undergo hysterectomy by laparotomy. The length of hospitalization and recovery were also found to be significantly shorter in patients who have laparoscopy than patients who have laparotomy. On the contrary, the risk of urinary tract injury was significantly higher in patients undergoing laparoscopic hysterectomy (7, 18).

In this study, bladder injury, colon injury, ileus, wound infection, and need for transfusion were significantly more frequent in women who underwent hysterectomy by laparotomy. Moreover, hospital stay was significantly longer in patients undergoing laparotomy. These findings comply with literature. Yet, in this study, the rate of bladder injury was significantly lower in women undergoing laparoscopic hysterectomy. This significantly lower rate of bladder injury might be due to the selection criteria for patients. That is, the patients who had previous abdominal and/or pelvic surgery might have been recruited for laparotomy. A body of evidence for this hypothesis is the increase in the risk of hysterectomy related complications for the patients who have delivered by cesarean section previously (15-17). Another underlying factor might be the conductance of laparoscopic hysterectomy by experienced surgeons. A retrospective review has concluded that laparoscopy is not associated with anatomical complications for experienced surgeons. Thus, supporting the surgeons until the completion of learning curve for laparoscopy might decrease the complication rates (19).

Laparoscopy can be switched to laparotomy in up to 19% hysterectomies (20). A Turkish study reported the rate of conversion to laparotomy as 7% (21). The lower conversion rate of 7% in this study might be attributed to the experience of surgeons about laparoscopy.

The RISC-Gyn trial has been held to determine the role of predictive markers for severe postoperative complications in women undergoing surgery for gynecological malignancies. This trial revealed that 17.7% of the gynecological oncology patients (n=226) experienced a grade ≥IIIb complication according to Clavien-Dindo system and the mortality rate was 3.8% (22). A retrospective analysis of Dutch Gynecological Oncology Audit detected Clavien grade ≥IIIb complications in 10.3% of 1027 patients who had primary debulking and 9% of 1355 patients who underwent interval debulking for ovarian cancer (23). In contrast, an examination of 6551 patients with gynecological malignancy indicated Clavien grade IV/V complications in 2.9% of the patients. Additionally, this examination also addressed non-laparoscopic approach as a risk factor for severe postoperative complications (24).

As for the present study, only 1.4% of the patients who were hysterectomized for gynecological tumors had Clavien grade IV/V complication and mortality rate corresponded to 0.4%. The significantly lower rate of severe morbidity and mortality in this study might be the result of carefully handled preoperative preparation and postoperative monitorization processes for the patients with gynecological malignancy. Such discrepancy might also be attributed to the relatively lower number of the patients with early-stage malignancy. Therefore, the lack of data related with the severity of gynecological tumors might be regarded as a power-limiting factor for this study.

An interesting finding of this study is that patients with chronic disease experience delirium significantly more frequent after hysterectomy. Delirium has been identified as the acute depression in cognitive and behavioral potential of the hospitalized individuals (25). This depression especially emerges as a significant problem for patients who have had surgery (25, 26). A population-based study has determined the Odds ratio for delirium as 5.99 in women

undergoing hysterectomy due to gynecological malignancy. The same study also highlighted higher comorbidity index as a risk factor for postoperative delirium (27). It has been well established that delirium further increases morbidity and prolongs hospitalization (26, 28). This might be the reason for the significantly longer hospital stay of the hysterectomized patients with chronic disease in this study.

CONCLUSION

Minimally invasive techniques such as laparoscopy or vaginal approach should be attempted whenever it is possible and feasible. The results of the present study also suggest that performing hysterectomy for benign pathologies should not be considered as a distraction from meticulous work during the preoperative preparation and postoperative monitorization periods. Similar attention should be also paid to patients who have been already diagnosed with chronic diseases as these patients are prone to cognitive impairment and prolongation in hospital stay. However, these conclusions should be interpreted cautiously as their power is limited by the retrospective design, relatively small and heterogenous cohort of the present study. The lack of data with age, body mass index, obstetric history, and previous surgeries might also be specified as power-limiting factors.

Further research has been warranted to identify the complications associated with hysterectomy in various patient populations.

Author Contributions

R Dur: Protocol/project development, Manuscript writing; Sİ Paltacı: Data collection or management, Acquisition; S Garibova: Data collection or management; F Çelik: Manuscript editing; MK Pektaş: Protocol/project development, analysis, Manuscript writing and editing

Conflict of Interest

The authors declare that no funds, grants, or other support were received during the preparation of this manuscript.

The authors have no relevant financial or non-financial interests to disclose.

REFERENCES

1. Ramdhan RC, Loukas M, Tubbs RS. Anatomical complications of hysterectomy: A review. Clin Anat 2017; 30(7): 946-52.
2. Clarke-Pearson DL, Geller EJ. Complications of hysterectomy. Obstet Gynecol 2013; 121(3): 654-73.
3. Stang A, Merrill RM, Kuss O. Prevalence-corrected hysterectomy rates by age and indication in Germany 2005-2006. Arch Gynecol Obstet 2012; 286(5): 1193-200.
4. Madueke-Laveaux OS, Elsharoud A, Al-Hendy A. What We Know about the Long-Term Risks of Hysterectomy for Benign Indication-A Systematic Review. J Clin Med 2021; 10(22): 5335.
5. Danilyants N, MacKoul P, Baxi R, van der Does LQ, Haworth LR. Value-based assessment of hysterectomy approaches. J Obstet Gynaecol Res 2019; 45(2): 389-98.
6. Lefebvre G, Allaire C, Jeffrey J, Vilos G. No. 109-Hysterectomy. J Obstet Gynaecol Can 2018; 40(7): e567-e579.
7. Pickett CM, Seeratan DD, Mol BWJ, Nieboer TE, Johnson N, Bonestroo T, Aarts JW. Surgical approach to hysterectomy for benign gynaecological disease. Cochrane Database Syst Rev 2023; 8(8): CD003677.
8. Barker MA. Current Issues with Hysterectomy. Obstet Gynecol Clin North Am. 2016 Sep;43(3):591-601.
9. Chevrot A, Margueritte F, Fritel X, Serfaty A, Huchon C, Fauconnier A. Hystérectomie : évolution des pratiques entre 2009 et 2019 en France [Hysterectomy: Practices evolution between 2009 and 2019 in France]. Gynecol Obstet Fertil Senol 2021; 49(11): 816-22.
10. Geller EJ. Vaginal hysterectomy: the original minimally invasive surgery. Minerva Ginecol 2014; 66(1): 23-33.
11. Sandberg EM, Twijnstra ARH, Driessen SRC, Jansen FW. Total Laparoscopic Hysterectomy Versus Vaginal Hysterectomy: A Systematic Review and Meta-Analysis. J Minim Invasive Gynecol 2017; 24(2): 206-217.e22.
12. Lee SH, Oh SR, Cho YJ, Han M, Park JW, Kim SJ, Yun JH, Choe SY, Choi JS, Bae JW. Comparison of vaginal hysterectomy and laparoscopic hysterectomy: a systematic review and meta-analysis. BMC Womens Health 2019; 19(1): 83.
13. Dindo D, Demartines N, Clavien PA. Classification of surgical complications: a new proposal with evaluation in a cohort of 6336 patients and results of a survey. Ann Surg 2004; 240(2): 205-13.
14. Solnik MJ, Munro MG. Indications and alternatives to hysterectomy. Clin Obstet Gynecol 2014; 57(1): 14-42.
15. Driessen SR, Baden NL, van Zwet EW, Twijnstra AR, Jansen FW. Trends in the implementation of advanced minimally invasive gynecologic surgical procedures in the Netherlands. J Minim Invasive Gynecol 2015; 22(4): 642-7.
16. Schollmeyer T, Elessawy M, Chastamouratidhs B, Alkatout I, Meinhold-Heerlein I, Mettler L, Jonat W, Weigel MT. Hysterectomy trends over a 9-year period in an endoscopic teaching center. Int J Gynaecol Obstet 2014; 126(1): 45-9.
17. Lee J, Jennings K, Borahay MA, Rodriguez AM, Kilic GS, Snyder RR, Patel PR. Trends in the national distribution of laparoscopic hysterectomies from 2003 to 2010. J Minim Invasive Gynecol 2014; 21(4): 656-61.
18. Aarts JW, Nieboer TE, Johnson N, Tavender E, Garry R, Mol BW, Kluivers KB. Surgical approach to hysterectomy for benign gynaecological disease. Cochrane Database Syst Rev 2015 Aug 12; 2015(8): CD003677.
19. Naveiro-Fuentes M, Rodríguez-Oliver A, Fernández-Parra J, González-Paredes A, Aguilar-Romero T, Mozas-Moreno J. Effect of surgeon's experience on complications from laparoscopic hysterectomy. J Gynecol Obstet Hum Reprod 2018; 47(2): 63-7.
20. Twijnstra AR, Blikkendaal MD, van Zwet EW, Jansen FW. Clinical relevance of conversion rate and its evaluation in laparoscopic hysterectomy. J Minim Invasive Gynecol 2013; 20(1): 64-72.
21. Mat E, Yildiz P, Yilmaz TG, Ozer EB, Basol G, Kurt D, Gundogdu EC. Total Laparoscopic Hysterectomy Experience: Retrospective Results of a Tertiary Center. South Clin Ist Euras 2021; 32(3): 311-5.
22. Inci MG, Richter R, Woopen H, Rasch J, Heise K, Anders L, Mueller K, Nasser S, Siepmann T, Sehouli J. Role of predictive markers for severe postoperative complications in gynecological cancer surgery: a prospective study (RISC-Gyn Trial). Int J Gynecol Cancer 2020; 30(12): 1975-82.
23. Baldewpersad Tewarie NMS, van Driel WJ, van Ham M, Wouters MW, Kruitwagen R; participants of the Dutch Gynecological Oncology Collaborator Group. Postoperative outcomes of primary and interval cytoreductive surgery for advanced ovarian cancer registered in the Dutch Gynecological Oncology Audit (DGOA). Gynecol Oncol 2021; 162(2): 331-8.
24. Uppal S, Igwe E, Rice LW, Spencer RJ, Rose SL. Frailty index predicts severe complications in gynecologic oncology patients. Gynecol Oncol 2015; 137(1): 98-101.

25. Mattison MLP. Delirium. Ann Intern Med 2020; 173(7): ITC49-ITC64.

26. Xiao MZ, Liu CX, Zhou LG, Yang Y, Wang Y. Postoperative delirium, neuroinflammation, and influencing factors of postoperative delirium: A review. Medicine (Baltimore) 2023; 102(8): e32991.

27. Bandini M, Marchioni M, Preisser F, Nazzani S, Tian Z, Graefen M, Montorsi F, Saad F, Shariat SF, Schips L, Briganti A, Karakiewicz PI. Comprehensive analysis of in-hospital delirium after major surgical oncology procedures: A population-based study. Can Urol Assoc J 2020; 14(3): E84-E93.

28. Raats JW, van Eijsden WA, Crolla RM, Steyerberg EW, van der Laan L. Risk Factors and Outcomes for Postoperative Delirium after Major Surgery in Elderly Patients. PLoS One 2015; 10(8): e0136071.