

Complications in gynecological surgeries in Ukraine: results a multicenter study

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ABSTRACT

Aim: To analyze the complications during gynecologic surgery procedures and identify possible risk factors associated with this type of surgery in Ukraine.

Materials and Methods: We conducted a multicenter, retrospective cohort study in tertiary care hospitals from 12 regions of Ukraine from January, 2021, to December, 2023. The study included women who underwent gynecologic surgery at these hospitals. Postoperative complications are defined by Clavien–Dindo classification.

Results: A total of 13,937 women were included in our study. The overall prevalence of 30-day complications was 13.9%. The most frequently postoperative complication types were surgical site infections, hemorrhage, urinary tract infection, bowel injury, urinary tract injury, and bladder injury. Age 60 years or older (adjusted odds ratio (aOR) 1.81), BMI ≥ 30 kg/m² (aOR 1.78), diabetes mellitus (aOR 1.45), procedures for gynecologic cancer (aOR 2.58), prior pelvic surgery (aOR 1.61), emergency procedure (aOR 1.83), ASA-physical status class 5 vs. 1 or 2 (aOR 4.31), operative time greater than 3 hours vs. less than 1 hour (aOR 2.92), wound class 4 vs. 1 (aOR 4.28), and open abdominal approach for surgery vs. laparoscopic procedure (aOR 2.65) were significantly associated with postoperative complications.

Conclusions: This study found a high prevalence of complications rate in gynecological surgery varied widely depending on the approach and type of procedure. Risk factors for complications are age, obesity, diabetes, procedures for gynecologic cancer, prior pelvic surgery, emergency procedure, open abdominal surgery, ASA-physical status, duration of surgery, and wound class.

KEY WORDS: gynecological surgery, type of procedure, approach of surgery, endometrioma, complications, risk factors, Ukraine

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INTRODUCTION

Surgical care in gynecology has been an essential component of health care worldwide. Surgery procedure is often the only therapy that can alleviate disabilities and reduce the risk of death from common conditions in gynecology. However, any surgical procedures have certain risks associated with them including complications. Complications in gynecologic surgery result from the proximity of the uterus and ovaries to other critical pelvic structures, including the urinary tract, bowel, nerves, and vasculature [1].

The most common surgeries performed in gynecology are hysterectomy, salpingectomy, and cystectomy [2]. These surgeries can be performed either by the abdominal or vaginal route, by open technique, or by minimally invasive

techniques such as laparoscopy and robotic methods. Each of these routes of surgery carries its own advantages and disadvantages. Complications rates are difficult to determine owing to the natural tendency to report successes but not complications. According to the literature, the risk of complications depends on individual patient characteristics [3, 4] and surgeon-related [5].

Infections and other postoperative complications in gynecology are a serious concern for public health care. Therefore, improving patient safety is an increasing priority for surgeons and hospitals. Currently, patient safety initiatives aimed at creating a safe gynecological surgery are increasingly being adopted, but a reliable means of measuring their impact on hospitals does not exist.

The registration of complications represents an essential component in the quality evaluation of gynecological surgical procedures. Standardised classification systems for recording the surgical morbidity of gynecological surgical interventions provide uniform definitions for the existence of a complication. These helpful in the recording of the surgical complication, in the categorisation of the severity of the observed event and thus improve the comparability of studies on surgical procedures [6, 7].

Postoperative complications in gynecological surgery are increasingly becoming frequent and need up to date and accessible coverage. Currently, in Ukraine still lack a consensus on how to define and to grade surgical complications what substantially hampers the interpretation of surgical performance. A number of attempts have been made to classify of complications in gynecological surgery, but none of them has gained widespread acceptance. There is no previous study conducted in Ukraine for complications in gynecologic surgery.

AIM

The aim this study to analyze the complications during gynecologic surgery procedures and identify possible risk factors associated with this type of surgery in Ukraine.

MATERIALS AND METHODS

DESIGN, SETTING AND PATIENTS

This is a multicenter, retrospective cohort study included women over the age of 18 years who underwent gynecologic surgery in 12 regional (tertiary care) hospitals of Ukraine, from Jan.1st 2021 to Dec. 31st, 2023. A total of 13,937 women were categorized in the dataset as undergoing procedures performed by a gynecologic surgeon. The inclusion criteria were patients, who underwent any type of gynecological surgery in the hospital during the study period. Women were excluded from analysis for the following reasons: patients with incomplete medical records and current pregnancy.

DEFINITIONS

In this study a complication is any undesirable and involuntary outcome derived from the surgery that affects the patient, which would not have occurred if the surgery had been performed following the corresponding procedures. Postoperative complications are defined by Clavien–Dindo (CD) classification [6, 8]. Definition of Surgical Site Infections (SSIs) and Urinary Tract Infection (UTI) were adapted from the ECDC (European Centre for Disease Prevention and Control) [9]. Body weight was categorized as obese (BMI ≥ 30 kg/m²).

DATA COLLECTION

Data were collected from patients' medical records in hospital archive. Outcome variables included any complication reported intraoperatively or within 30 days post-surgery. The study collected demographic and clinical data from medical records, including age, BMI, comorbidities, history of prior pelvic surgery, type of surgical procedure, approach of surgery, duration of surgery, surgical wound class, type

of admission, emergency surgery, ASA-physical status class, and other procedural characteristics.

ETHICS

This study was approved by the Ethics Committee of Shupyk National Healthcare University of Ukraine. Data were anonymized and de-identified before analysis; therefore, informed consent was not required.

STATISTICAL ANALYSIS

Statistical analysis was performed using STATA 11.0 (StataCorp, College Station, TX). Descriptive statistics, Student's t test, χ^2 , Wilcoxon rank sum test, and Fisher's exact test were performed as appropriate. Logistic regression models were conducted to further explore the associations of preoperative predictors with 30-day postoperative complications. The likelihood ratio test statistic was used to compared to the chi-squared distribution of the model and a p-value calculated. Only variables with a p-value of <0.05 based on likelihood ratio testing were included in the final model.

RESULTS

A total of 13,937 gynecologic surgical procedures were performed, 1,930 complications were observed. The overall prevalence of 30-day complication in women who underwent gynecologic surgery was 13.9% (95% CI, 13.6–14.2). Intraoperative and postoperative complications were recorded in 3.4% (468/1,930) and 10.5% (1,462/1,930), respectively. In this study, procedures for gynecologic cancer had the highest prevalence of complications. The complication rate differed significantly between patients with benign and malignant diagnoses (35.2% vs. 12.2%, $p < 0.001$).

The complication types differed significantly by of approach surgery. Laparoscopic procedures had the lowest prevalence of overall complications (6.4%). The prevalence of complication in abdominal and vaginal procedures was 20,8%, and 10,7%, respectively. The most frequently reported complication types were SSIs (47.8%, 922/1,930), hemorrhage (17.3%, 334/1,930), UTI (6.5%, 125/1,930), bowel injury (6,0%, 115/1,930), urinary tract injury (5.6%, 109/1,940), and bladder injury (5.1%, 98/1,930). In addition, there were 44 (2.3%) pelvic abscess, 41 (2.1%) respiratory infection, 39 (2.0%) sepsis or septic shock, 38 (2%) small bowel obstruction, 24 (1.2%) vaginal cuff dehiscence, 23 (1.2%) urinary retention, and 19 (1%) other complications. Complications by procedure type and approach of surgery are showed in Table 1.

Complication rates according to the CD classification varied widely. CD grade I complications were recorded in 1.5%, CD grade II in 2.5%, CD grade IIIa in 0.8%, CD grade IIIb in 4.1%, CD grade IVa complications in 1.1%, and CD grade IVb in 0.007% of patients (Table 2).

The average age of the patients who underwent gynecologic surgery was 38.9 years (standard deviation 11.15 years); 79.8% came from urban areas, 87.4% had at least one birth. The main diagnosis in women for gynecological surgery was Fibroids (26.8%), Prolapse (23.7%), Ovarian cyst

Table 1. Distribution of complications by approach of gynecological surgery in Ukraine, 2021-2023

Type of complications	Approach of surgery procedure			All approaches (n=13,937)
	Vaginal (n=2,604)	Laparoscopy (n=3,745)	Abdominal (n=7,688)	
All complications, n (%)	206 (10.7)	124 (6.4)	1,600 (20.8)	1,930 (13.9)
Intraoperative complications, n (%)	63 (2.4)	46 (1.23)	359 (4.67)	468 (3.4)
Hemorrhage	29 (1.11)	29 (0.77)	204 (2.65)	262 (1.88)
Bladder injury	13 (0.50)	13 (0.34)	72 (0.93)	98 (0.70)
Bowel injury	13 (0.50)	1 (0.03)	42 (0.54)	56 (0.40)
Urinary tract injury	8 (0.31)	3 (0.08)	41 (0.53)	52 (0.37)
Postoperative complications, n (%)	143 (5.5)	78 (2.08)	1,241 (16.1)	1,462 (10.5)
Surgical site infections	34 (1.31)	9 (0.24)	879 (11.43)	922 (6.62)
Urinary tract infection	14 (0.54)	13 (0.9)	98 (1.27)	125 (0.90)
Hemorrhage	13 (0.50)	0 (0.0)	59 (0.77)	72 (0.52)
Bowel injury (not recognized intraoperatively)	12 (0.46)	10 (0.27)	37 (0.48)	59 (0.42)
Urinary tract injury (not recognized intraoperatively)	12 (0.46)	14 (0.37)	30 (0.39)	56 (0.40)
Pelvic abscess	11 (0.42)	4 (0.11)	29 (0.38)	44 (0.32)
Respiratory infection	11 (0.42)	3 (0.08)	27 (0.35)	41 (0.29)
Sepsis or septic shock	10 (0.38)	8 (0.21)	21 (0.27)	39 (0.28)
Small bowel obstruction	9 (0.35)	6 (0.16)	23 (0.30)	38 (0.27)
Vaginal cuff dehiscence	8 (0.31)	6 (0.16)	10 (0.13)	24 (0.17)
Urinary retention	7 (0.27)	2 (0.05)	14 (0.18)	23 (0.17)
Other	2 (0.08)	3 (0.08)	14 (0.18)	19 (0.14)

Table 2. Distribution of complications by Clavien Dindo Classification in gynecological surgery (n=13,937) in Ukraine, 2021-2023

Complications	Total	
	n	%
All complications	1,930	13.9
Intraoperative complications	468	3.43
Postoperative complications	1462	10.52
Type of complication by Clavien Dindo Classification (CD)		
CD grade IIIb	578	4.14
CD grade II	347	2.48
CD grade I	211	1.51
CD grade IVa	155	1.11
CD grade IIIa	113	0.81
CD grade V	67	0.48
CD grade IVb	1	0.007

(11.7%), Family planning (10.6%), Stress urinary incontinence (6.4%), Endometriosis (5.3%), and other (15.6%). The 'other' diagnosis group includes adenomyosis, abnormal bleeding (without concurrent diagnosis, fibroids or adenomyosis), chronic pelvic pain and history of gynecologic cancer. The most rates of complications were by procedure: open adnexal surgery (30.0%), vaginal hysterectomy without prolapse indication (25.0%), abdominal myomectomy (14.3%), abdominal hysterectomy (12.5%), laparoscopic

hysterectomy (9.7%), and resection of endometrioma (5.1%). In this study, women could have more than one complication, however they were counted only once in the composite morbidity category (data in table not shown). Characteristics of patients who underwent gynecologic surgery in Ukraine are presented in Table 3.

In this study, multiple logistic regression analyses showed that age \geq 60 years (adjusted odds ratio (aOR)=1.81(95% Confidence Interval (CI) 1.26, 2.59)), BMI \geq 30 kg/m² (aOR=1.78

Table 3. Characteristics of patients who underwent gynecologic surgery in Ukraine, 2021-2023

Variable	All patients (n=13,937)	Complications			p-value	
		Yes (n=1,930)	No (n=12,007)			
Age category					<0.001	
<60 years	13,589	1,839	95.3	11,750	97.9	
≥60 years	348	91	4.7	257	2.1	
Body mass index					< 0.01	
<30 kg/m ²	1,895	586	30.4	1,309	10.9	
≥30 kg/m ²	12,042	1,344	69.6	10,698	89.1	
Diabetes mellitus	1,084	257	13.3	827	6.9	<0.001
Hypertension	4,192	703	36.4	3,489	29.1	0.02
Existence of endometrioma	4,456	913	47.3	3,543	29.5	0.012
Steroid use for chronic condition	162	38	2.0	124	1.0	0.01
History of peripheral vascular disease	87	16	0.8	71	0.6	0.2
Prior pelvic surgery	2,424	437	22.6	1,987	16.5	0.003
Procedure for gynecologic cancer	981	345	17.9	636	5.3	<0.001
Emergency procedure	293	112	5.8	181	1.5	<0.001
Surgical approach					<0.0012	
Laparoscopic	3,745	124	6.4	3,621	30.2	
Vaginal	2,604	206	10.7	2,398	20.0	
Abdominal	7,588	1,600	82.9	5,988	49.8	
ASA-Physical Status Class					<0.001	
I or II	10,907	1,173	60.8	9,734	81.1	
III	2,859	689	35.7	2,170	18.1	
IV	159	62	3.2	97	0.8	
V	12	6	0.3	6	0.04	
Duration of surgery					<0.001	
<1 hour	1,411	22	1.1	1,389	11.6	
1-2 hours	4,815	431	22.3	4,384	36.5	
2-3 hours	5,284	924	47.9	4,360	36.3	
≥3 hours	2,427	553	28.7	1,874	15.6	
Surgical wound class					<0.001	
I	230	22	1.1	208	1.7	
II	13,396	1,805	93.6	11,591	96.5	
III	145	41	2.1	104	0.9	
IV	166	62	3.2	104	0.9	

ASA, American Society of Anesthesiologist.

(95% CI 1.46, 2.18)), diabetes mellitus (aOR=1.45 (95% CI 1.16, 1.78)), procedures for gynecologic cancer (aOR=2.58 (95% CI 1.65, 4.04)), prior pelvic surgery (aOR=1.61, 95% CI 1.26, 2.01), emergency procedure (aOR=1.83, 95% CI 1.19, 2.78), ASA-physical status class 5 vs. 1 or 2 (aOR= 4.31, 95% CI 1.92, 10.81), operative time greater than 3 hours vs. less than 1 hour (aOR = 2.92, 95% CI 2.17,3.85), wound class 4 vs. 1 (aOR= 4.28, 95% CI 1.82,10.1), and abdominal approach for surgery vs. laparoscopic procedure (aOR= 2.65, 95% CI 1.22, 5.77) were significantly associated with postoperative complications (Table 4).

DISCUSSION

This retrospective multicentre cohort study is the largest published study that we are aware of which reports on the complications associated with gynecological surgery undertaken in Ukrainian hospitals. In this study the overall prevalence of 30-day complication was 13.9%. Intraoperative and postoperative complications were recorded in 3.4% and 10.5%, respectively. We defined postoperative complications by CD classification. CD grade I complications were recorded in 1.5%, CD grade II in 2.5%, CD grade IIIa in 0.8%, CD grade IIIb in 4.1%, CD grade IVa complications in 1.1%, and CD

Table 4. The logistic regression analysis of factors associated with the occurrence of complications following gynecological surgery (n = 13,937) in Ukraine, 2021-2023

Predictor	Adjusted OR (95% CI)
Age category	
<60 years	1 (reference)
≥60 years	1.81 (1.26, 2.59)
Body mass index	
<30 kg/m ²	1 (reference)
≥30 kg/m ²	1.78 (1.46, 2.18)
Diabetes mellitus	1.45 (1.16, 1.78)
Procedures for gynecologic cancer	2.58 (1.65, 4.04)
Prior pelvic surgery	1.61 (1.26, 2.01)
Emergency procedure	1.83 (1.19, 2.78)
Surgical approach	
Laparoscopic	1 (reference)
Vaginal	1.89 (1.19, 3.00)
Abdominal	2.65 (1.22, 5.77)
Operative time	
<1 hour	1 (reference)
1-2 hours	1.74 (1.38, 2.23)
2-3 hours	2.19 (1.67, 2.89)
>3 hours	2.92 (2.17, 3.88)
Wound Class	
1-Clean	1 (reference)
2-Clean/contaminated	1.98 (0.99, 3.97)
3-Contaminated	2.28 (0.93, 5.54)
4-Dirty/infected	4.29 (1.81, 10.2)
ASA-Physical Status Class	
Grade I or II	1 (reference)
Grade III	1.06 (0.70, 1.59)
Grade IV	1.77 (1.05, 2.96)
Grade V	4.31 (1.92, 10.81)

OR, Odds Ratio

CI, Confidence interval

grade IVb in 0.007% of patients. In our study, the more common complications from gynecologic surgery relate to injuries to these viscera and occur during resections for the treatment of cancer or due to infection or endometriosis (endometrioma). The most frequently complication types were SSI, hemorrhage, UTI, bowel injury, urinary tract injury, and bladder injury. This study showed that the risk of complications in gynecologic surgery depends upon the extent and approach to surgery and patient characteristics. Age >60 years, BMI ≥30 kg/m², diabetes mellitus, procedures for gynecologic cancer, prior pelvic surgery, emergency surgical procedure, ASA-physical status class 5 vs. 1 or 2, operative time greater than 3 hours vs. less than 1-hour, wound class 4 vs. 1, and abdominal approach for surgery vs. laparoscopic procedure were significantly associated with postoperative

complications. Complication cases were significantly more likely to have previous pelvic surgery and have preoperative diagnosis of endometriosis (endometrioma).

The prevalence of surgical complications in gynecological surgery varies depending on the population and methods to define and grade adverse postoperative events. According to the literature, complications in surgical gynecological procedures, Japan found 3.1% [10], in USA 3.7% [4], in Brazil 8.9% [11], in Colombia 3.8% [2] and 12.5% [12], in Germany 12.1% [13], in Sweden 31.8% [14], and in Egypt 35.6% [15], respectively. Our relatively high prevalence of complications in gynecologic surgery do not strongly differ from the findings of published reports.

Our study showed that incidence rate of complications varied widely depending on the approach and type of procedure.

This is in agreement with other study. Brummer et al. reported a higher complication rate related to laparoscopic, abdominal and vaginal hysterectomy overall complication rate of 15.4%, 19.2% and 11.7%, respectively [16]. However, the results of research on surgical complications vary widely and depend on the type of route used [2]. Watrowski et al. and Behbehani et al. reported that in comparison to an abdominal approach, the minimally invasive access offers several advantages. However, laparoscopy can be associated with a number of approach-specific complications who ranging from 0.2% to 18.0% [17, 18]. In our study, laparoscopic procedures had the lowest prevalence of overall complications (6.4%).

According to the literature, the main postoperative complications in gynecological surgery are urinary tract injury (0.3-1%), bowel injury (0.4%), ureteral injury (0.25%), fever (0.47%), bleeding (0.06%) and rectal perforation (0.09%) [11, 12]. The most common complication in surgical gynecological procedure is surgical site infections, which occur between 2.2% and 16% [1, 11, 19-21], followed by transfusion (4%), pelvic abscesses (1.5%), reoperation (2 %) and wound dehiscence (1.5%) [1, 12]. This is in agreement with our study.

In our study, postoperative complications in gynecological surgery, age, BMI, ASA-physical status, diabetes, gynecologic cancer, prior pelvic surgery, emergency procedure, open abdominal surgery, duration of surgery, wound class, and final diagnosis were significant in both univariable and multivariable regression. Our results are partially consistent with previous studies. Previous reports have shown that the assessment of the impact of concomitant gynecologic malignancies on postoperative complications lacks uniformity. Lee et al. reported that gynecological malignancy and prior open abdominal surgery emerged as significant risk factors for 30-day readmission [22]. However, in a meta-analysis conducted by Radosa et al., the presence of gynecological malignant pathology did not prove to be an independent risk factor for the occurrence of complications [6].

STRENGTH AND LIMITATIONS

This is the first study to publish the prevalence and the frequency of complications, and to estimate for its degree of severity, and identify the risk factors of complications from gynecologic surgery in Ukraine. The results this study could provide more information to identify those with higher risk and further minimize the risk of complications. We believe that this study constitutes a unique addition to the currently available literature on gynecological surgical complications since it has included and analysed different type surgical procedure and surgical approach complications. A major limitation of this study is that we included data from only 10 Ukrainian hospitals, which cannot be generalised to the general population women who underwent gynecologic surgery at other hospitals. Secondly, being a retrospective study, there is a possibility of selection bias or information bias affecting the findings. Thirdly, there may be additional parameters in this study not considered in the analysis that could have acted as confounding factors influencing the results our study.

CONCLUSIONS

This study found a high prevalence of complications rate in gynecological surgery in Ukraine who varied widely depending on the approach and type of procedure. The most frequently complication types were SSIs, hemorrhage, UTI, bowel injury, urinary tract injury, and bladder injury. There was a significant association between the presence of complications and parameters like age, obesity, diabetes mellitus, procedures for gynecologic cancer, emergency procedure, prior pelvic surgery, open abdominal surgery, ASA-physical status, duration of surgery, and wound class. Further research needs to be conducted on surgical procedure to design necessary strategies to decrease the burden on patients who underwent gynecologic surgery facing these complications.

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CONFLICT OF INTEREST

The Authors declare no conflict of interest

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