Risk Factors and Post-Surgical Complications in Ovarian Cancer: A Comprehensive Outcome Analysis

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ABSTRACT

Background: Ovarian cancer (OC) is a prevalent and deadly cancer in women worldwide, ranking as the seventh most frequent. Aggressive surgery can improve survival but increases postoperative risks. High-grade serous EOC has an average survival of less than five years, though early diagnosis and successful surgery improve outcomes.

Aim of the study: This study aims to identify possible risk factors and complications associated with poor outcomes after surgery in ovarian cancer patients.

Methods: The cross-sectional study was conducted at the Department of Obstetrics and Gynaecology, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh. It analyzed fifty patients who underwent ovarian cancer surgery from July 2005 to December 2006. Informed consent and ethical approval were obtained. Variables examined were demographics, FIGO stage, and surgery duration, assessing complications like wound dehiscence, thromboembolic events, sepsis, and more. Data were collected using a proforma and analyzed with SPSS, with significance set at $P<0.05$.

Result: The study enrolled 106 women undergoing surgery for ovarian cancer. The majority were aged 21-30 years (34%) and 41-50 years (28%). Most patients were diagnosed at advanced stages: 58% at FIGO Stage III and 20% at Stage IV. Surgeries lasted less than 5.5 hours for 62% of patients. The most common procedure was total abdominal hysterectomy with bilateral salpingo-oophorectomy (40%). Postoperative complications were frequent, with pleural effusions occurring in 30% of cases. FIGO stage, age, and surgery duration were significant risk factors for complications, with advanced cancer strongly increasing the risk (odds ratio of 9.15, $p < 0.001$).

Conclusion: The study identifies the advanced FIGO stage, prolonged surgery duration, and older age as significant risk factors for postoperative complications in ovarian cancer surgery. Common complications were pleural effusions (30%) and urinary tract infections (14%). Early diagnosis, optimized surgical procedures, and tailored perioperative care can improve patient outcomes.

Keywords: Risk Factors, Post-Surgical Complications and Ovarian Cancer.

I. INTRODUCTION

Ovarian cancer (OC) is one of the most common and deadliest cancers affecting women worldwide [1]. It is the seventh most frequent cancer in women globally [2]. OC begins with abnormal cells growing in the ovary that multiply uncontrollably, forming a tumor that can spread to nearby tissues and become malignant [3,4]. The ovaries contain three types of cells, each of which can give rise to different types of tumors. About 90% of ovarian cancers come from the epithelial cells, including high- and low-grade serous carcinomas, as well as clear cell, endometrioid, and mucinous carcinomas. Only 7% of OCs are stromal, and cancers from germ cell tumors are very rare [3,5]. Epithelial ovarian cancer (EOC) is the second most common type of gynecological

cancer [6]. Although aggressive surgery can improve survival for many women, it also increases the chances of postoperative complications and risks during surgery [7]. For those with high-grade serous EOC, the average survival is less than five years, but about 15% of patients may live for 7 to 10 years or more. Research shows that younger patients, those diagnosed at an early stage, with low-grade or non-serous tumor types, no ascites, and successful removal of the tumor through surgery, tend to have better survival outcomes [8]. While OC often presents warning signs, early symptoms can be unclear and are easy to mistake for common conditions affecting the digestive, urinary, or reproductive systems, making early detection difficult [9]. In 2020, the American Cancer Society estimated that 21,750 new cases of OC would be diagnosed in the United States, with 13,940 deaths. Globally, GLOBOCAN 2020 reported 313,959 new cases and 207,252 deaths, making OC responsible for 6.6% of cancer diagnoses and 4.2% of cancer deaths in women. In Bangladesh, ovarian cancer is a growing health problem, with 3,122 new cases and 2,096 deaths reported in 2020, representing 3.9% of cancer cases and 2.9% of cancer-related deaths [10]. There are several challenges in treating ovarian cancer effectively [11,12]. While initial chemotherapy and surgery lead to good responses in about 70% of patients, many relapse, and long-term survival remains poorly understood. Most patients experience disease progression within 12 to 18 months [13]. Additionally, chemotherapy for OC can severely affect a patient's quality of life, causing side effects like fatigue, joint pain, and nerve damage [14,15]. Understanding the complex biology of ovarian cancer is crucial for better treatment strategies [9]. This study aims to identify possible risk factors and complications associated with poor outcomes after surgery in ovarian cancer patients.

II.   METHODOLOGY & MATERIALS

A cross-sectional study was conducted at the Department of Obstetrics and Gynecology in Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh, involving fifty consecutive patients who underwent surgery for ovarian cancer from July 2005 to December 2006. Informed consent was obtained from each participant, and ethical approval was secured from the institution's ethics committee.

Inclusion Criteria
- Patients aged 10 to 70 years.
- Pelvic mass, finally diagnosed as ovarian neoplasm.
- Patients who underwent surgery for ovarian cancer.

Exclusion Criteria
- Patients with ovarian cysts are not diagnosed with ovarian neoplasm.
- Patients who did not consent to the study.

Data Collection

The study examined various variables, including patient demographics (age, gender), FIGO stage, and surgery duration, to assess risk factors and post-surgical complications in ovarian cancer patients. Complications considered included wound dehiscence, anastomotic insufficiency, thromboembolic events, ileus, organ failure, sepsis, peritonitis, fistula, intestinal perforation, delirium, neurological disorders, postoperative pleural effusions, pneumonia, pneumothorax, and urinary tract infections. Data were collected using a preformed proforma by the investigator shortly after patient admission.

Statistical Analysis

All data were systematically recorded in the preformed data collection form. Quantitative data were expressed as means, while qualitative data were presented as frequency distributions and percentages. Statistical analysis was performed using SPSS for Windows version 12.0, with significance determined by a 95.0% confidence interval and a P-value of <0.05.

III.   RESULT

A total of 106 women undergoing surgery for ovarian cancer were enrolled in the study. The majority of patients (34%) were between 21-30 years old, followed by 28% in the 41-50 years age group. Conversely, the lowest frequencies were observed in the age groups of 10-20 years and 61-70 years, each comprising 8% of the total population (Table 1). Regarding the FIGO stage at diagnosis, the majority of patients (58%) were in Stage III, indicating advanced disease at presentation. Additionally, 20% were in Stage IV, further reflecting the severity of ovarian cancer in this cohort. However, only 14% of patients were diagnosed at Stage I, while 8% were at Stage II, suggesting that most cases were identified at later stages (Table 2). Furthermore, the duration of surgery varied among the patients, with 62% undergoing surgery that lasted less than 5.5 hours and 38% experiencing procedures longer than 5.5 hours (Figure 1). The types of surgeries performed were diverse, with the most common being total abdominal hysterectomy with bilateral salpingo-oophorectomy, accounting for

40% of the cases. Additionally, 20% of the patients underwent left-sided salpingo-oophorectomy, and 14% had right-sided salpingo-oophorectomy. Other procedures, such as cystectomies and omentectomy, were performed at lower frequencies, including palliative surgery, which was done in 2% of the cases (Table 3). Postoperative complications were noted in a significant number of patients, with postoperative pleural effusions being the most common, occurring in 30% of the population. Moreover, 14% of patients developed urinary tract infections, while other complications, such as thromboembolic events, wound dehiscence, and sepsis, were each observed in 4% of cases. Other less frequent but critical complications included ileus, organ failure, peritonitis, fistula, and neurological disorders, which were each seen in approximately 2% of the patients (Table 4). Finally, multivariate analysis revealed that the FIGO stage of cancer was strongly associated with the likelihood of developing postoperative complications, with an odds ratio of 9.15 (95% CI 2.252-31.847, p < 0.001). Finally, a multivariate analysis identified significant risk factors associated with postoperative complications (Table 5). FIGO stage was found to have a strong association with postoperative outcomes, with an odds ratio of 9.15 (95% CI: 2.252-31.847, P < 0.001), indicating that advanced-stage cancer significantly increases the risk of complications. Age also showed statistical significance (p = 0.048), indicating a potential correlation with increased risk. Additionally, prolonged surgery duration also showed a significant correlation with complications, with a P-value of <0.001.

Table 1: Age distribution of the study population (N=50).

Age group (in year)	Frequency (n)	Percentage (%)
10-20	4	8.00
21-30	17	34.00
31-40	6	12.00
41-50	14	28.00
51-60	5	10.00
61-70	4	8.00
Total	50	100.00

Table 2: Distribution of FIGO stage (N=50).

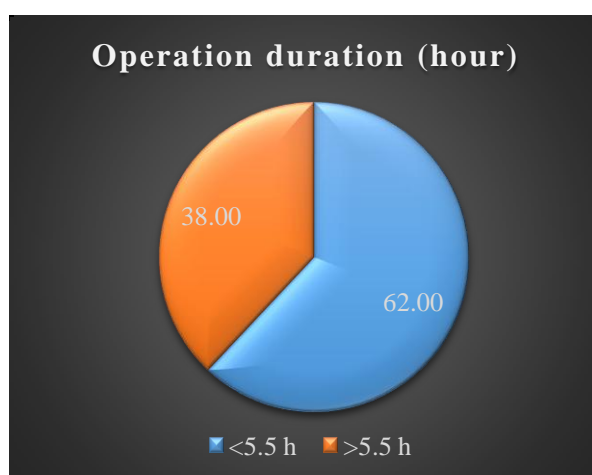| FIGO stage	Frequency (n)	Percentage (%)
I	7	14.00
II	4	8.00
III	29	58.00
IV	10	20.00

Figure 1: Operation duration of the study.

Table 3: Surgery procedure performed in the study.

Surgery procedure	Frequency (n)	Percentage (%)
Right sided cystectomy	2	4.00
Left-sided cystectomy	1	2.00
Right sided salpingooophoreetomy	7	14.00
Left sided salpingo-oophorectomy	10	20.00
Total abdominal hysterectomy with bilateral	20	40.00

salpingooophoretomy		
Total abdominal hysterectomy with bilateral saipingo-oohporectomy with omentectomy	4	8.00
Total abdominal hysterectomy with left-sided salpingo- oophorectomy	2	4.00
Right-sided salpingo-oophorectomy with omentectomy	1	2.00
Left -sided salpingooopherectomy with right-sided cystectomy	2	4.00
Palliative surgery	1	2.00

Table 4: Post-operative complication of the study population.

Type of complication	Frequency (n)	Percentage (%)
Wound dehiscence	2	4.00
Anastomotic insufficiency	4	8.00
Thromboembolic events	2	4.00
Ileus	1	2.00
Organ failure	1	2.00
Sepsis	2	4.00
Peritonitis	2	4.00
Fistula	1	2.00
Intestinal perforation	1	2.00
Delir	2	4.00
Neurological disorder	2	4.00
Postoperative pleural effusions	15	30.00
Pneumonia	2	4.00
Pneumothorax	1	2.00
Urinary tract infections	7	14.00

Table 5: Multivariate analyses of risk factors associated with postoperative complications.

Risk factor	Odds ratio	95%CI	P-value
Age	1.16	(0.382-4.156)	0.048
FIGO stage	9.15	(2.252-31.847)	<0.001
Duration of surgery	1.2	(0.21-11.421)	<0.001

IV.   DISCUSSION

Ovarian cancer remains one of the leading causes of gynecologic cancer-related mortality globally, primarily due to late-stage diagnoses and the complexity of surgical treatment [16-17]. Post-surgical complications can significantly impact patient outcomes, necessitating a thorough analysis of risk factors to improve clinical decision-making and patient management. Therefore, we aimed to evaluate the risk factors contributing to post-surgical complications in ovarian cancer patients and identify the most common complications encountered. In our study, the age distribution indicated that the highest proportion of patients belonged to the 21–30 age group (34%), followed by the 41–50 age group (28%). The lowest frequencies were seen in the 10–20 and 61–70 age groups, each representing 8% of the total sample (Table 1). Age has long been recognized as a key risk factor for surgical complications, as highlighted by Wright et al. (2011) in their study on ovarian cancer surgery, where complication rates increased from 17.1% in women under 50 to 29.7% in those aged 70–79, and 31.5% in those 80 years or older. These findings differ from our study, which showed a different age-related complication trend [18]. The distribution of FIGO stages (Table 2) revealed a significant predominance of advanced-stage ovarian cancer at diagnosis, with stage III accounting for 58% of cases and stage IV for 20%. This aligns with the well-established observation that ovarian cancer is often diagnosed at later stages [19]. Our analysis further highlights FIGO stage as a pivotal risk factor for postoperative complications. Patients presenting with advanced-stage disease demonstrated an odds ratio of 9.15 (p < 0.001), signifying a markedly elevated risk of adverse outcomes (Table 5). This finding is consistent with prior research, which similarly identified higher complication rates in patients with advanced-stage ovarian cancer [20]. Our study highlights the importance of surgery duration as a significant factor in postoperative outcomes. The mean operative time was divided into two groups: surgeries lasting less than 5.5 hours and those exceeding this duration. Notably, extended surgery times were linked to a greater incidence of postoperative complications, aligning with previous research showing that prolonged operations can increase the risk of infections,

thromboembolic events, and other adverse outcomes [21]. Data from the Tennessee Surgical Quality Collaborative further reinforce this, indicating that the risk of secondary surgical events escalates markedly after 2.1 hours of surgery, with the risk of deep surgical site infections rising after just 42 minutes. Moreover, every additional hour of surgery heightens the likelihood of postoperative sepsis [22]. Even in minimally invasive procedures such as laparoscopy, extended surgery time remains a critical risk factor for complications [23]. Surgeons with advanced training can effectively shorten operative durations, contributing to a significant 69% reduction in mortality rates [24]. In terms of surgical procedures, total abdominal hysterectomy with bilateral salpingo-oophorectomy was the most commonly performed surgery (Table 3), consistent with standard treatment protocols for advanced ovarian cancer [25].Post-operative complications observed in our study were varied, with postoperative pleural effusions being the most prevalent, affecting 30% of patients. This aligns with existing literature, which suggests that pleural effusions are common in the postoperative setting, particularly following extensive abdominal surgeries [26]. Additionally, urinary tract infections (14%) and pneumonia (4%) were notable complications, reflecting the multifaceted nature of postoperative care in these patients. These findings align with earlier research, which also reported a similar prevalence of urinary tract injuries [27]. Notably, our findings also highlighted less common complications such as fistula formation and neurological disorders, which, although rare, significantly impact patient recovery and quality of life.

Limitations of the study:The study's cross-sectional design also restricts the ability to establish causality between identified risk factors and postoperative complications. Furthermore, potential confounding variables such as comorbidities, nutritional status, and variations in surgical techniques were not thoroughly controlled or examined, which could influence the study's outcomes and interpretations.

V. CONCLUSION AND RECOMMENDATIONS

In conclusion, our study identifies significant risk factors and postoperative complications in ovarian cancer surgery. Advanced FIGO stage was the strongest predictor of complications, with Stage III and IV patients experiencing the highest risk. Prolonged surgery duration and older age were also significant risk factors. The most common complications included postoperative pleural effusions (30%) and urinary tract infections (14%). These findings underscore the importance of early diagnosis and optimizing surgical procedures to minimize operative time. Enhanced perioperative care and tailored interventions for high-risk patients may improve outcomes and reduce the burden of postoperative complications in ovarian cancer treatment.

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