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Assessment of Cardiac Risk Index in Gynecological Oncology Surgical Patients

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Abstract

Background: Surgical procedures in gynecological oncology patients carry significant cardiac risks due to the complex nature of the surgeries and the often-compromised health status of the patients. This study aims to assess the cardiac risk index in gynecological oncology patients undergoing surgery. **Objectives:** To assess the cardiac risk index using the Revised Cardiac Risk Index (RCRI) in gynecological oncology patients undergoing surgery. **Methods:** A prospective observational study was conducted at Uttara Crescent Hospital and Lab Aid Cancer hospital and super Specialty Center from August 2022 to December 2023. A total of 154 gynecological oncology patients scheduled for surgery were included in the study. The Revised Cardiac Risk Index (RCRI) was used to evaluate the cardiac risk before surgery. Data on patient demographics, medical history, RCRI scores, intraoperative findings, and postoperative cardiac complications were collected and analyzed. Statistical analyses of the results were be obtained by using window-based Microsoft Excel and Statistical Packages for Social Sciences (SPSS-24).

Results: Of the 154 patients age mean ± SD were 49±12.3, while a little over half of the patients (54.55%) have had no prior abdominal surgery. Postoperative cardiac complications (2%), with the highest incidence among those in the high-risk group (40%). The most common complications were UTI (15%), VTE (Venous thromboembolism) (4.5%), Return to operating room (4%). The length of hospital stays and need for intensive care were significantly higher in patients with elevated RCRI scores. According to medical history hypertension (42.20%) and Chronic Obstructive Pulmonary Disease (COPD) is present in 11.68% of the population. A little over half of the patients (54.55%) have had no prior abdominal surgery. Uterine cancer is the most prevalent, affecting 54.55% of the patients. In cancer stage (FIGO) the majority of cancer cases (72.72%) are in stage I.

Conclusion: The Revised Cardiac Risk Index (RCRI) is a valuable tool for predicting cardiac risk in gynecological oncology surgical patients. Patients with higher RCRI scores are at an increased risk of postoperative cardiac complications and may require more intensive perioperative monitoring and management. Early identification of high-risk patients allows for better preparation and potentially improved outcomes in this vulnerable population. Further research is recommended to refine risk assessment strategies and enhance patient care.

Keywords: Cardiac risk index; Gynecological oncology; Cardiac center

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Introduction

The cost of perioperative complications to the health care system is substantial [1]. Whether justified or not, the frequency of perioperative morbidity and mortality has been proposed as an indicator of surgical and hospital performance [2]. With the passage of the Affordable Care Act and a connection between physician performance and payment, there has been a renewed emphasis on lowering the frequency of surgical complications [3]. In 2016, the United States of America was estimated to have 105.000 new cases of gynecologic malignancies, of which two-thirds will require surgery [4]. Typically, the goal is complete tumor resection. Depending on the patient's condition and diagnosis, these surgeries may be expanded to include upper abdominal procedures like diaphragmatic peritoneal resection, splenectomy, and segmental liver resection [5].

The correlation between a high number of surgical operations and postoperative morbidity and mortality makes it imperative to assess the effectiveness and safety of these treatments [6]. In addition, these difficulties may delay the start of postoperative chemotherapy. For instance, approximately 50% of patients who undergo extensive debulking ovarian cancer surgery to remove any gross residual tumor may experience significant complications [7]. These complications are particularly likely to affect older patients, who face higher risks of death and morbidity [8]. Systems for assessing surgical risk exist; however, their predictive value for patients with gynecologic cancer has not been established in most cases [9,10].

In order to forecast significant complications in ovarian cancer patients who had laparoscopic procedures prior to primary debulking surgery, a risk score model study was conducted. Observed risk and anticipated risk were 17.8% and 16.7%, respectively, in the validation population. This study's primary contribution was the preoperative tool it offered for outcome prediction [3]. A perfect risk assessment model would be straightforward, repeatable, accurate and legitimate, impartial, and available to all patients. It would also be especially capable of performing customized evaluations of patients based on patient-specific attributes [3,6]. It should also be feasible to execute at the bedside and inexpensive [6].

Therefore, as medical professionals, it is our goal to carry out a straightforward and useful risk assessment in order to avert difficulties, guarantee a reduction in perioperative healthcare expenses, and lower postoperative morbidity and mortality. Notably, conservative treatment or neoadjuvant chemotherapy can be administered in lieu of upfront surgery in comparison to other alternatives [7,11]. Numerous studies have demonstrated that the use of perioperative beta-blockers, with metoprolol being the most appropriate medication, lowers mortality in both low- and high-risk cardiac surgeries [12,15]. The purpose of this study was to evaluate the surgical risk for patients with gynecological oncologic conditions, to provide a simple risk assessment model that could be used at the patient's bedside, and to lower the risk of complications following surgery by utilizing the information we collected.

Methodology

This prospective observational study was conducted at Uttara Crescent Hospital and Lab Aid Cancer and Super Specialty Center from August 2022 to December 2023, involving 154 gynecological oncology patients scheduled for surgery. Preoperative assessments included a detailed medical history, physical examination, and calculation of the Revised Cardiac Risk Index (RCRI) for each patient. Based on their RCRI scores, patients were categorized into low-to-moderate risk (RCRI score 0-2) and high-risk (RCRI score 3 or more) groups. Standard intraoperative monitoring and tailored anesthesia management were provided, with postoperative cardiac complications such as arrhythmias, myocardial infarction, and congestive heart failure closely monitored. Data on patient demographics, comorbidities, surgical details, and postoperative outcomes were systematically collected. Statistical analysis was performed using SPSS software, with comparisons made between the risk groups to identify significant predictors of postoperative cardiac complications, and a p-value <0.05 was considered statistically significant.

Results

Table 1 shows that the study population presents a mean age of 49 years, indicating a middle-aged group, with a standard deviation of 12.3 years. The mean height of the participants is 60.2 inches with a relatively low standard deviation of 1.9 inches. The mean weight is 177 pounds, but with a high standard deviation of 59.7 pounds. The mean Body Mass Index (BMI) is 30 kg/m². The average hospital stay is 2.9 days, with a wide standard deviation of 5.6 days, the mean blood loss during surgery was 170 mL, with a large standard deviation of 370 ml.

Table 1: Patient demographic characteristics.

Demographic	Mean± SD
Age, (year)	49±12.3
Height, (inch)	60.2±1.9
Weight, lb	177±59.7
BMI, Kg/m²	30±10
Hospital stays, (Day)	2.9±5.6
Blood loss, (mL)	170±370

Table 2 shows that data provides Hypertension is the most common condition, affecting 42.20% of the participants, highlighting it as a significant comorbidity within this group. Chronic Obstructive Pulmonary Disease (COPD) is present in 11.68% of the population. Ascites, which affects 8.44% of the participants, and disseminated cancer, present in 6.49%

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of the cases. Diabetes is also common, with 5.85% of the patients managing their condition with oral medications and 5.19% requiring insulin.

Less common conditions include prior cardiac events (7.79%), steroid use (3.24%), and dyspnea (3.24%). A small percentage of patients are dependent on ventilators (0.64%) or have sepsis (0.64%) or acute renal failure (0.64%). The low percentage of emergency surgeries (1.29%). Overall, the data highlights a population with significant cardiovascular, respiratory, and metabolic comorbidities.

Table 3 shows that the distribution of prior abdominal surgeries among 154 patients. A little over half of the patients (54.55%) have had no prior abdominal surgery, indicating that the majority of patients did not have a surgical history that could potentially complicate further procedures. Among those who had previous surgeries, 9.74% had undergone laparoscopic procedures, which are typically less invasive. Minor open abdominal surgeries were performed on 19.48% of the patients, while 16.23% had undergone major open abdominal surgeries (Figure 1).

Table 2: Medical history of the patients.

Medical History	n =154	(%)
Ascites	13	8.44
Emergency surgery	2	1.29
Sepsis	1	0.64
Ventilator dependent	1	0.64
Disseminated cancer	10	6.49
Diabetes (oral medications)	9	5.85
Diabetes(insulin)	8	5.19
Hypertension	65	42.2
Steroid use	5	3.24
Prior cardiac event	12	7.79
Congestive heart failure	4	2.59
Dyspnea	5	3.24
COPD	18	11.68
Acute renal failure	1	0.64

Table 3: Prior abdominal surgery of the patient.

Prior abdominal Surgery	n=154	(%)
None	84	54.55
Laparoscopic only	15	9.74
Minor open abdominal	30	19.48
Major open abdominal	25	16.23

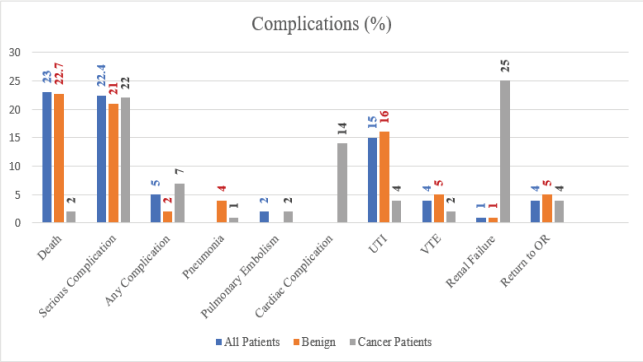

Figure 1: The Brier score approaches the threshold for death in cancer patients, pneumonia in all patients, cardiac complications in noncancer patients, UTI in cancer patients, VTE in all patients and renal failure in noncancer patients.

Table 4 shows that Uterine cancer is the most prevalent, affecting 54.55% of the patients, indicating it as the most common cancer in this group, Ovarian cancer is the second most common, present in 27.27% of the patients, Cervical cancer accounts for 10.39%, followed by less common cancers such as vulvar (4.54%) and vaginal cancer (0.64%), a small proportion of patients (2.59%) had non-gynecologic cancers. In cancer stage (FIGO) the majority of cancer cases (72.72%) are in stage I, suggesting early detection in a substantial portion of the patients, Stage III cancers account for 20.78% of the cases, representing more advanced disease, while stage II is less common, with 6.49% of the cases.

Table 4: Cancer type and stage of the patients.

Cancer type	n= 154	(%)
Ovarian	42	27.27
Uterine	84	54.55
Cervix	16	10.39
Vulvar	7	4.54
Vaginal	1	0.64
Non gynecologic	4	2.59
Total cancer	123	79.88
Benign	31	20.12
Cancer stage (FIGO)		
1	112	72.72
11	10	6.49
111	32	20.78

Discussion

Similar to previous studies, the most common type of gynecologic cancer was uterine cancer, followed by ovarian and cervical cancer in this study [3]. In gynecologic cancers, prediction of postoperative complications is important because the incidence of these diseases is progressively increasing [6,8]. As a consequence, postoperative morbidity,

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mortality, and healthcare costs can be reduced through the prevention of postoperative complications. Previous studies have depicted that several parameters such as age, advanced stage, poor performance, ascites ≥1000, hypoalbuminemia, extended surgical time, and extensive surgery were associated with a higher risk of postoperative complications [6-8,16-20].

There are several studies about surgical risk assessment. Although some studies have been evaluated for gynecological cancers [4], generally they are non-specific in terms of gynecologic cancers or validated only for ovarian cancer [18-21]. On the other hand, several studies have shown that peri-operative beta-blockers use (metoprolol being more suitable and beneficial) was associated with reduced mortality among patients with high and low cardiac risk [12-15].

In our study, we evaluated the effect of metoprolol use on postoperative mortality and morbidity and it was significantly correlated with the prediction of complications ($p<0.0001$). Some studies investigated the role of extended surgery on postoperative mortality and morbidity. Patankar et al. [19] reported that extended cytoreductive procedures were the strongest risk factor for complications in ovarian cancers. Conversely, Phillips et al. [20] found that the number of surgical procedures was significantly correlated with an increased risk of major morbidity, and was a better predictor of major postoperative morbidity than the high-risk performance alone.

Also, in the prediction of major complications, they found that ultra-radical surgery was less useful than any solitary gastrointestinal resection. They identified standard surgery as "total abdominal hysterectomy, bilateral salpingo-oophorectomy, omentectomy, pelvic and/ or para-aortic lymphadenectomy, and bowel surgery outside the definition of 'ultra-radical' (localized colonic resection, non-multiple bowel resection)" and ultra-radical surgery as "diaphragmatic stripping, extensive peritoneal stripping, multiple resections of the bowel (excluding localized colonic resection), liver resection, partial gastrectomy, cholecystectomy, splenectomy" [20].

In this study, upper abdominal surgery was found as a risk factor for postoperative complications. Other parameters that showed significance in our scoring system were the stage, ECOG, ascites, major pelvic surgery, total surgical time, and diabetes. Preoperative albumin levels, CA-125 levels, COPD, and heart and renal disease were parameters that were assessed in prior studies [6,8,9]. These parameters have been found to be correlated significantly with postoperative complictions. According to a study designed by Ataseven et al. [17] preoperative hypoalbuminemia had been found as an independent predictive parameter for severe postoperative complications in epithelial ovarian cancer. Conversely, in our study, no significant correlation was found between hypoalbuminemia and postoperative complications in gynecologic cancers.

CA 125 levels had no significant correlation with postoperative complications, which was probably influenced by our study design with the inclusion of all gynecologic cancers. Also, there were not many patients with COPD, renal disease, and heart disease in the study population, and thus these parameters were not found eligible for predicting complications. In our study, after estimating the risk assessment with ROC analysis, we found the AUC as 0.60 for the presence of complications and 0.70 for the number of complications, respectively. We have arranged a simple, practical and convenient model for preoperative risk assessment in patients with gynecological cancer.

Limitations of the study

The present study was conducted in a very short period due to time constraints and funding limitations. The small sample size was also a limitation of the present study.

Conclusion

Patients identified as high-risk based on the Revised Cardiac Risk Index (RCRI) exhibited a significantly higher incidence of postoperative complications, particularly cardiovascular events. These results suggest that careful evaluation and management of cardiac risk factors are essential to improving surgical outcomes in this population. Enhanced perioperative monitoring and tailored interventions should be considered for patients at increased cardiac risk to minimize adverse outcomes.

Recommendation

To improve surgical outcomes in gynecological oncology patients, it is recommended to implement comprehensive preoperative cardiac risk assessments using the Revised Cardiac Risk Index (RCRI) for all patients. High-risk patients should receive tailored perioperative management, including multidisciplinary involvement, enhanced monitoring, and cardioprotective strategies. Educating patients about managing pre-existing cardiac conditions and ensuring robust postoperative follow-up are crucial for minimizing complications. Additionally, ongoing research should be encouraged to refine risk assessment tools and develop targeted interventions for this population.

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