

# MINIMALLY INVASIVE SURGICAL TECHNIQUES IN ONCOGYNECOLOGY: IMPACT ON SURVIVAL AND QUALITY OF LIFE

Gulomova Sanobar Akmalovna

Bukhara State Medical Institute named after Abu Ali ibn Sina

sanobar\_gulomova@bsmi.uz

## Abstract

Minimally invasive surgery (MIS) has revolutionized the field of oncogynecology by offering effective tumor control with reduced perioperative morbidity. This review evaluates the role of laparoscopic and robotic-assisted techniques in the treatment of gynecological malignancies, including endometrial, cervical, and ovarian cancers. We analyze current evidence regarding oncologic safety, survival outcomes, and the impact on patients' quality of life. The integration of MIS into standard oncological care represents a paradigm shift that emphasizes patient-centered, individualized treatment.

**Keywords:** minimally invasive surgery, oncogynecology, laparoscopy, robotics, survival, quality of life, cervical cancer, endometrial cancer.

## Introduction

Gynecologic cancers, including cervical, endometrial, and ovarian malignancies, are among the leading causes of cancer-related morbidity and mortality in women worldwide [1-3]. Surgical intervention remains a cornerstone of treatment for most of these cancers, especially in early stages. Traditionally, open surgery (laparotomy) was the standard approach, providing wide exposure and allowing for comprehensive staging and tumor resection [4-7]. However, this approach is associated with significant morbidity, prolonged recovery, and a negative impact on postoperative quality of life [8-10].

The development of minimally invasive surgical (MIS) techniques, such as conventional laparoscopy and robot-assisted surgery, has transformed the surgical landscape of oncogynecology [11-14]. MIS offers several advantages over open surgery, including reduced blood loss, shorter hospital stay, faster recovery, lower postoperative pain, and improved cosmetic outcomes. These benefits have contributed to increased patient satisfaction and enhanced quality of life after surgery [15-19].

Over the past two decades, minimally invasive approaches have become increasingly common in the management of endometrial cancer and selected cases of cervical and ovarian cancers [20-25]. However, concerns remain regarding their oncologic safety, particularly in cervical cancer, following the publication of studies suggesting a possible compromise in survival outcomes with MIS. These findings have sparked renewed discussions about patient selection, surgical technique, and the need for high-quality evidence to guide clinical practice [26-29].





This review aims to provide a comprehensive overview of the role of minimally invasive surgery in the treatment of gynecologic malignancies. We discuss the latest evidence regarding survival outcomes and quality of life, highlight controversies and limitations, and explore future directions in this rapidly evolving field of oncologic surgery [30-32].

### Materials and Methods

This retrospective observational study was conducted at the Bukhara Regional Oncology Hospital between January 2020 and December 2023. The study included 104 female patients diagnosed with early-stage gynecologic cancers, including cervical, endometrial, and ovarian malignancies. Patients were selected based on the availability of complete medical records and a confirmed histopathological diagnosis of FIGO stage I or II disease. All patients were aged between 18 and 75 years and had not received any prior chemotherapy or radiotherapy. Surgical treatment was performed either using minimally invasive techniques (laparoscopy or robotic-assisted surgery) or through conventional open laparotomy, depending on clinical indications, tumor characteristics, and surgeon discretion.

Minimally invasive procedures were performed using standard laparoscopic equipment or the da Vinci robotic platform, adhering to oncological principles such as pelvic lymph node dissection and total hysterectomy when indicated. Open surgeries followed traditional midline laparotomy approaches. All operations were conducted by experienced gynecologic oncologists trained in both open and minimally invasive techniques. Postoperative care and follow-up protocols were standardized across both groups.

Primary outcomes assessed in the study included overall survival and disease-free survival. Secondary parameters such as intraoperative blood loss, duration of surgery, length of hospital stay, postoperative complications, and time to return to normal activity were also evaluated. Patient-reported quality of life was measured using validated instruments (EORTC QLQ-C30 and disease-specific modules), administered before surgery and at 3- and 12-month follow-up visits. Statistical analysis was performed using SPSS software (version 25). Continuous variables were compared using the Student's t-test, while categorical variables were analyzed using Chi-square or Fisher's exact test. Survival curves were plotted using the Kaplan–Meier method and compared via the log-rank test. A p-value of less than 0.05 was considered statistically significant throughout the analysis.

### Results

A total of 104 patients were analyzed in this study, with 56 undergoing minimally invasive surgery (MIS group) and 48 treated with open surgery (laparotomy group). The mean age of patients in the MIS group was  $52.3 \pm 8.7$  years, while in the open group it was  $54.1 \pm 9.2$  years, with no statistically significant difference between the groups ( $p > 0.05$ ). The distribution of cancer types included 49 cases of endometrial cancer, 37 cases of cervical cancer, and 18 cases of early-stage ovarian cancer, with comparable staging and histological features between both groups.

Intraoperative blood loss was significantly lower in the MIS group, averaging  $140 \pm 45$  ml, compared to  $310 \pm 85$  ml in the open group ( $p < 0.001$ ). The mean duration of surgery was slightly longer in the MIS group ( $168 \pm 22$  minutes) than in the open group ( $151 \pm 19$  minutes), although





this difference did not reach statistical significance ( $p = 0.07$ ). Postoperative hospital stay was markedly shorter in the MIS group, with a median duration of 3.2 days, compared to 6.4 days in the open group ( $p < 0.001$ ).

Complication rates, assessed within 30 days post-surgery, were lower in the MIS group (12.5%) compared to the open group (25%), with most complications classified as grade I–II according to the Clavien-Dindo system. No perioperative mortality was recorded in either group.

Regarding oncological outcomes, the median follow-up period was 30 months. The 2-year overall survival rate was 94.6% in the MIS group and 91.7% in the open group ( $p = 0.48$ ), while the disease-free survival rate was 90.2% and 88.4%, respectively ( $p = 0.61$ ), indicating no statistically significant difference in survival outcomes between the two surgical approaches.

Patient-reported quality of life scores, measured using the EORTC QLQ-C30 questionnaire, showed significantly better physical functioning, emotional well-being, and global health status in the MIS group at 3 months postoperatively ( $p < 0.01$ ). By the 12-month follow-up, QoL differences between groups diminished and were no longer statistically significant.

These findings suggest that minimally invasive surgery in gynecologic oncology provides equivalent oncologic outcomes to open surgery while offering better perioperative recovery and short-term quality of life benefits.

## Conclusion

Minimally invasive surgery has significantly influenced the management of gynecologic cancers, offering improved quality of life and comparable survival outcomes in selected cases. While endometrial cancer has benefited the most, the role of MIS in cervical and ovarian cancers requires individualized consideration. Future research should focus on refining patient selection, surgeon training, and long-term follow-up to ensure oncologic safety alongside functional benefits.

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