COMPARISON OF OPEN VS. MINIMALLY INVASIVE SURGICAL STAGING IN EARLY-STAGE OVARIAN CANCER

Original Research

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ABSTRACT

Background: Early-stage ovarian cancer is a critical area of study, where accurate staging plays a vital role in determining prognosis and treatment strategies. Surgical staging is considered the gold standard in managing early-stage ovarian cancer, yet the comparative impact on quality of life (QOL) between surgical and clinical staging remains underexplored.

Objective: This study aimed to evaluate the effectiveness and impact of surgical staging procedures on the quality of life in patients with presumed early-stage ovarian cancer.

Methods: A quasi-experimental study was conducted over one year at Lahore General Hospital, involving 56 participants. Patients were randomly assigned to two groups: the control group (clinical staging) and the experimental group (surgical staging). Inclusion criteria were women aged 18 years or older with early-stage ovarian or uterine abdominal masses, elevated tumor markers (β-HCG, α-FP, CA 125), and the ability to provide informed consent. Exclusion criteria included metastasis, prior chemotherapy or radiotherapy, pregnancy, or uncontrolled medical conditions. The quality of life was measured using the FACT-O scale, assessing physical, social, emotional, and functional well-being, as well as concerns related to ovarian cancer.

Results: Data from 50 participants were analyzed. The average age of patients was 45.64 ± 14.95 years. Most participants were diagnosed with Stage 1 ovarian cancer (62%). The surgical staging group reported significantly higher quality of life scores across all domains—Physical Well-Being (PWB), Social Well-Being (SWB), Emotional Well-Being (EWB), Functional Well-Being (FWB), and Additional Concerns (ACO)—with p-values of 0.000 for all comparisons.

Conclusion: Surgical staging significantly improves the quality of life in patients with early-stage ovarian cancer, particularly in physical, emotional, and social well-being, when compared to clinical staging. This highlights the superior impact of surgical staging on patient outcomes and quality of life.

Keywords: Clinical Staging, Early-Stage Ovarian Cancer, Functional Well-Being, Ovarian Cancer Staging, Physical Well-Being, Quality of Life, Social Well-Being.

INTRODUCTION

Surgical staging is a crucial aspect of managing early-stage ovarian cancer, playing a vital role in both the diagnosis and treatment planning process. The procedure is especially important as it addresses the significant risk—ranging from 16% to 42%—of undetected residual disease in patients (1). Ovarian cancer, the leading cause of death among gynecologic cancers, affects over 19,000 women annually in the United States alone and results in more than 14,000 deaths (2). Surgery serves as the cornerstone of management, not only in confirming the diagnosis but also in identifying prognostic factors, relieving symptoms, and improving survival rates (3). Despite these advancements, research shows that some patients do not receive optimal surgical debulking or staging during their initial surgery. This oversight leads to worse survival outcomes and higher morbidity, often necessitating further abdominal surgeries (3). Comprehensive surgical staging remains the standard procedure for early-stage ovarian cancer, influencing both treatment decisions and prognosis (4). The concept of surgical staging emerged in the 1970s, driven by an enhanced understanding of ovarian cancer progression. Studies have shown that para-aortic lymph node involvement occurs in 5–24% of early-stage ovarian cancer cases, while iliac pelvic node involvement is seen in 8–15% of patients. Historically, inadequate surgical staging was common, with reports indicating that 32–72% of patients did not receive comprehensive staging, although these figures have improved over time (4). The required procedure typically involves a lower midline incision extending to the upper abdomen, allowing access to the para-aortic region for lymph node removal (1). Surgical methods vary in effectiveness, and the upstaging rates following surgery for early-stage epithelial ovarian cancer further emphasize the need for accurate staging. This is critical, as the failure to detect intra-peritoneal or retroperitoneal spread could lead to improper treatment and poorer survival outcomes (5).

Minimally invasive techniques, such as laparoscopic surgery, have been explored as alternatives to traditional open surgery, offering less morbidity and quicker recovery. A study found that laparoscopic staging surgery for early-stage ovarian cancer showed improved long-term survival outcomes, especially when performed by experienced gynecologic oncologists (5). These findings suggest that minimally invasive methods can be a viable option, offering the benefits of reduced invasiveness while maintaining effective staging. Nevertheless, comprehensive surgical staging is still regarded as essential for determining the treatment approach, accurately forecasting the disease's progression, and guiding the decision for adjuvant therapy (6). Despite these advancements, many patients with clinically early-stage ovarian cancer do not undergo the recommended surgical staging, leading to missed opportunities for proper treatment. Identifying factors such as age, histological type, and FIGO sub-stage that may contribute to tumor recurrence is crucial in predicting outcomes (6). The EORTC-ACTION trial data also highlighted the importance of complete surgical staging, showing improved survival and recurrence-free survival rates for patients who underwent complete staging surgery (7). Preoperative imaging remains essential for accurate assessment, contributing to higher five-year survival rates of 80% to 90% (5).

Given the conflicting findings in current research regarding the optimal approach for staging early-stage ovarian cancer, this study aims to evaluate the surgical outcomes of different staging methods. The research will focus on a small sample size, spanning one year, to provide further insights into the effectiveness of open versus minimally invasive surgical staging methods. The objective of this study is to compare the clinical and survival outcomes of these two surgical approaches, helping to refine treatment protocols for early-stage ovarian cancer (8).

METHODS

A quasi-experimental study was conducted over one year at Lahore General Hospital and its associated research center to compare clinical and surgical staging methods in patients diagnosed with early-stage ovarian cancer. The sample size was determined using the OpenEpi tool, resulting in an initial sample of 50 participants, which was adjusted to 56 to account for a 10% anticipated dropout rate. Participants were randomly assigned to one of two groups: the control group, which underwent clinical staging, and the experimental group, which received surgical staging (9). Inclusion criteria for the study comprised adult women aged 18 years or older who presented with early-stage ovarian or uterine abdominal masses, elevated tumor markers such as β-HCG, α-FP, and CA 125, and who were capable of understanding and providing informed consent. Exclusion criteria included patients with evidence of early-stage metastasis, those who had received prior chemotherapy or radiotherapy, pregnant women, and those with severe uncontrolled medical conditions that could interfere with the study protocol (10).

The control group underwent clinical staging, a non-invasive approach that utilized diagnostic tools such as CT scans, X-rays, MRIs, and blood tests to assess cancer spread and tumor characteristics. This method relied on imaging techniques and physical examinations to estimate the extent of the disease. In contrast, the experimental group underwent surgical staging, which involved either laparotomy or laparoscopy to directly visualize the abdominal and pelvic regions. This invasive procedure allowed for accurate tissue sampling, enabling histological confirmation of the cancer's extent and facilitating precise staging (11). To assess the quality of life (QOL) of the participants, both groups were evaluated using the FACT-O scoring system, which measures physical, social, emotional, and functional

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well-being, along with ovarian cancer-specific concerns. Cancer staging for all participants was classified using the FIGO system, ranging from Stage I (confined to the ovaries) to Stage IV (indicating distant metastasis) (12).

Data analysis was carried out using SPSS version 26. Descriptive statistics, including means and standard deviations, were employed to summarize the demographic data. Frequencies and percentages were used for categorical variables. The normality of the data was tested using the Kolmogorov-Smirnov and Shapiro-Wilk tests. To compare the control and experimental groups, parametric (independent t-tests) and non-parametric (Mann-Whitney U tests) analyses were conducted, depending on the distribution of the data. Ethical approval for the study was obtained from the Institutional Review Board (IRB), and all participants provided informed consent before participation. Confidentiality was strictly maintained throughout the research process (13).

RESULTS

Fifty patients diagnosed with presumed early-stage ovarian cancer were analyzed in this study. The mean age of participants was 45.64 ± 14.95 years. The Shapiro-Wilk test for normality indicated that the data for Physical Well-Being (PWB) and Functional Well-Being (FWB) were normally distributed ($p > 0.05$), while Social Well-Being (SWB), Emotional Well-Being (EWB), and Ovarian Cancer-Related Quality of Life (ACO) data did not follow a normal distribution ($p < 0.05$). Regarding cancer staging, 62% of participants were diagnosed with Stage 1 ovarian cancer, 22% with Stage 2, 16% with Stage 3, and none with Stage 4, indicating that the majority of participants had early-stage ovarian cancer. To compare the quality of life between the surgical staging group (Group 1) and the clinical staging group (Group 2), independent t-tests and Mann-Whitney U tests were conducted based on the data distribution. In Physical Well-Being (PWB), Group 1 (surgical staging) had a mean score of 85.71 ± 12.54, while Group 2 (clinical staging) had a mean score of 55.28 ± 14.25. The mean difference was 30.43 ± 1.71, with a p-value of 0.000, indicating a significant improvement for the surgical staging group.
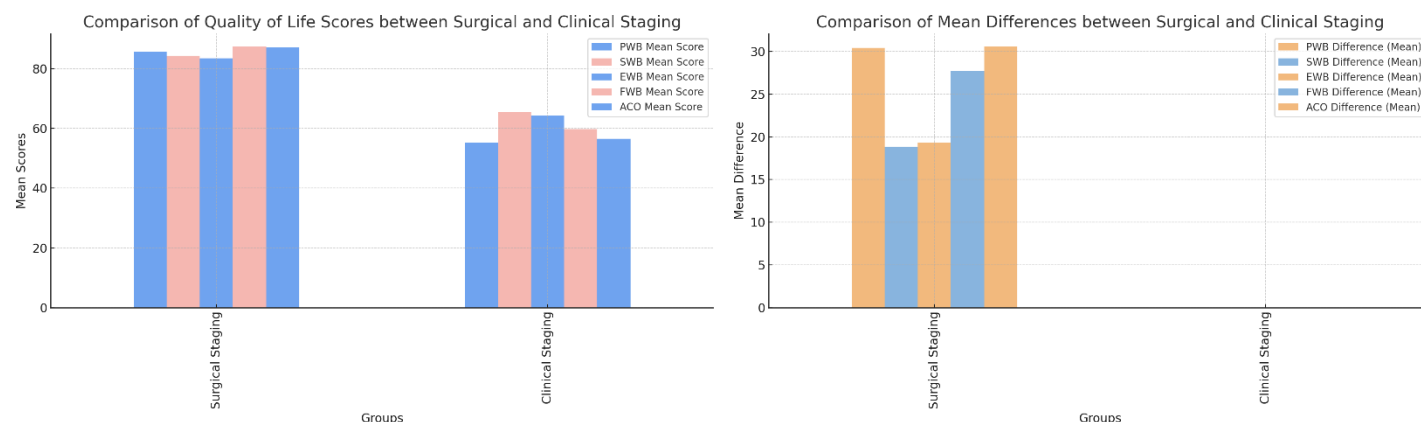
In Social Well-Being (SWB), Group 1 had a mean score of 84.28 ± 12.50, compared to 65.42 ± 17.24 in Group 2. The mean difference was 18.86 ± 4.74, with a p-value of 0.000, showing a significant improvement in the surgical staging group. For Emotional Well-Being (EWB), Group 1 had a mean score of 83.50 ± 9.88, while Group 2 had a mean score of 64.16 ± 15.30. The mean difference was 19.34 ± 5.42, and the p-value was 0.000, indicating a significant improvement in EWB for the surgical staging group. In Functional Well-Being (FWB), Group 1 had a mean score of 87.42 ± 11.43, compared to 59.71 ± 11.95 in Group 2. The mean difference was 27.71 ± 0.52, with a p-value of 0.000, showing a substantial difference in FWB. Regarding Additional Concerns of Ovarian Cancer (ACO), Group 1 had a mean score of 87.08 ± 10.36, compared to 56.50 ± 18.10 in Group 2. The mean difference was 30.58 ± 7.74, with a p-value of 0.000, further supporting the benefits of surgical staging. Overall, the results demonstrated that patients who underwent surgical staging had significantly better quality-of-life outcomes across all domains of the FACT-O scale compared to those who underwent clinical staging. These findings suggest that surgical staging significantly improves the quality of life for patients with early-stage ovarian cancer in comparison to clinical staging.

Table: Comparison of Mean Scores for Quality-of-Life Domains between Surgical and Clinical Staging Groups

Group	PWB Mean Score	SWB Mean Score	EWB Mean Score	FWB Mean Score	ACO Mean Score
Surgical Staging	85.71	84.28	83.5	87.42	87.08
Clinical Staging	55.28	65.42	64.16	59.71	56.5

Table: Comparison of Quality-of-Life Measures (Mean, SD, Median, and Interquartile Range) between Surgical and Clinical Staging Groups

Measure	Group 1 (Surgical Staging)		Group 2 (Clinical Staging)		P Value
	Mean ± SD	Median (Q1-Q3)	Mean ± SD	Median (Q1-Q3)	
Physical Well-Being (PWB)	85.71 ± 12.54	89.28 (75.0-96.42)	55.28 ± 14.25	57.14 (42.85-64.28)	.000
Social Well-Being (SWB)	84.28 ± 12.50	85.71 (75.0-92.8)	65.42 ± 17.24	71.42 (57.14-78.57)	.000
Emotional Well-Being (EWB)	83.50 ± 9.88	83.33 (75.0-91.66)	64.16 ± 15.30	70.83 (50.0-75.0)	.000
Functional Well-Being (FWB)	87.42 ± 11.43	89.28 (82.14-96.42)	59.71 ± 11.95	60.71 (51.78-71.42)	.000
Additional Concerns (ACO)	87.08 ± 10.36	85.41 (80.20-96.87)	56.50 ± 18.10	58.33 (40.62-73.95)	.000

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Comparison of Quality of Life Scores between Surgical and Clinical Staging

Comparison of Mean Differences between Surgical and Clinical Staging

DISCUSSION

Previous studies have confirmed that laparoscopic surgical staging is a viable procedure for early-stage ovarian cancer, demonstrating comparable survival rates to traditional laparotomy methods. While concerns about recurrence and survival persist, particularly in minimally invasive procedures, most retrospective studies report survival rates of approximately 90% following laparoscopic staging, which aligns closely with those seen in patients who underwent laparotomy (14,15). In the present study, surgical staging was found to be effective in treating early-stage ovarian cancer when patients were carefully selected, with no evidence of recurrence or survival issues post-surgery. These findings support the notion that laparoscopic staging can be a safe and efficient approach, provided patients meet the criteria for this minimally invasive technique (16). While previous research has demonstrated promising long-term outcomes with minimally invasive surgery, there is a consensus that further validation through randomized controlled trials is necessary. One such study concluded that patients undergoing minimally invasive surgery for early-stage epithelial ovarian cancer had favorable long-term follow-up results, yet it emphasized the need for more robust evidence (16). In light of this, the current quasi-experimental study aimed to evaluate the impact of surgical staging on early-stage ovarian cancer. Although the results were positive, they were not as definitive as those from larger, randomized studies. Nonetheless, they still provide substantial evidence supporting the effectiveness of surgical staging in treating early-stage ovarian cancer, particularly in improving the quality of life for patients (17,18).

Long-term data from the ACTION trial have reinforced the importance of complete surgical staging as an independent prognostic factor for both recurrence-free survival and overall survival in early-stage ovarian cancer. This benefit is particularly noticeable when adjuvant chemotherapy is administered to patients with suboptimal staging, who are at a higher risk for residual disease (17). In this context, the present study highlights that surgical staging is effective for treating early-stage ovarian cancer and significantly enhances the quality of life of patients, especially when performed without the need for subsequent chemotherapy (19,20). A study involving over 3,000 patients who underwent laparoscopy for early-stage ovarian cancer found that the survival outcomes were comparable to those of laparotomy (18). Despite the promising findings, the evidence remains limited, and further randomized trials are needed to confirm these results. In this study, surgical staging without laparotomy was shown to be effective for treating early-stage ovarian cancer, offering patients the benefits of a minimally invasive approach without compromising their overall quality of life. However, as with many studies, the lack of long-term data remains a limitation, and further research with extended follow-up periods would be beneficial (21).

In another study, a smaller cohort of 42 patients emphasized the significance of pre- and post-surgical assessments to evaluate the effects of surgery and chemotherapy on quality of life. This research also noted that some patients used complementary alternative medicine to manage symptoms during chemotherapy, highlighting the importance of addressing quality of life concerns during treatment (19). In contrast, the present study found that surgical staging alone, without additional pre- or post-assessments, was still effective in improving the quality of life for patients with early-stage ovarian cancer. This underscores the potential of surgical staging to enhance overall well-being even without the implementation of supplementary interventions during or after treatment (12). The strength of this study lies in its focus on comparing the outcomes of surgical versus clinical staging, providing valuable insights into the benefits of surgical staging in improving the quality of life for patients. However, several limitations must be acknowledged. The study's quasi-experimental design, with a relatively small sample size, restricts the generalizability of the findings. Additionally, the lack of a control group receiving no staging, or only chemotherapy, limits the ability to fully evaluate the effectiveness of surgical staging in isolation. Future studies should include larger, randomized controlled trials with longer follow-up periods to confirm the findings and explore additional factors such as recurrence rates, survival outcomes, and the potential role of complementary therapies (11,19).

This study supports the effectiveness of surgical staging in treating early-stage ovarian cancer and improving patients' quality of life. While further research is necessary to validate these findings, particularly through randomized controlled trials, the current evidence

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highlights the importance of careful patient selection and the potential advantages of minimally invasive surgical approaches for early-stage ovarian cancer management.

CONCLUSION

In conclusion, this study demonstrates that surgical staging significantly enhances the quality of life for patients with early-stage ovarian cancer when compared to clinical staging. Patients who underwent surgical staging reported improvements across various aspects of well-being, including physical, social, emotional, and functional domains. These findings underscore the importance of surgical staging as a beneficial approach in the management of early-stage ovarian cancer, offering a clear advantage in improving overall patient outcomes. This research highlights the practical implications of adopting surgical staging to optimize quality of life in this patient group.

AUTHOR CONTRIBUTIONS

Author	Contribution
Hafiz Mouzam Ali	Conceptualization, Methodology, Formal Analysis, Writing - Original Draft, Validation, Supervision
Mehwish Ilyas	Methodology, Investigation, Data Curation, Writing - Review & Editing
Usman Iftikhar	Investigation, Data Curation, Formal Analysis, Software
Zobia Asghar ch.	Software, Validation, Writing - Original Draft
Kinza Khalid	Formal Analysis, Writing - Review & Editing
Rabia Kanwal	Writing - Review & Editing, Assistance with Data Curation
Zohaib Shahid	Validation, Writing

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