Outcomes of Implementation of Enhanced Recovery after Surgery in Gynecological Oncology

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Abstract

Background: Surgery is crucial for treating gynecological cancers but involves risks of complications and extended hospital stays. Enhanced Recovery After Surgery (ERAS) pathways aim to reduce risks by improving perioperative care, proving effective in various surgeries, including gynecological procedures.

Objectives: To evaluate the outcomes of ERAS guidelines in gynecological oncology.

Patients and methods: A prospective cohort study at South Valley University Hospital comprised 83 women undergoing gynecological cancer surgery from August 2023 to July 2024. Imaging and lab testing before surgery. The ERAS protocol comprised preoperative education, glycemic control, thromboembolism prevention, and bowel preparation. Postoperative therapy emphasised early eating, opioid-sparing analgesia, catheter removal, and ambulation, whereas intraoperative care concentrated on normothermia and infection control.

Results: The average age of the 83 patients was 53.98±13.15 years. Oral ingestion began at 1.33±0.47 hours. Drains were removed on the second day for 67.47%and the third day for 32.53%. Bowel sounds were present at 59.28±46.1 minutes and flatus at 6.83±1.27 hours. Mobility was achieved at 1.33±0.47 hours, and the average hospital stay was 3.42±0.66 days. Surgery duration, surgical packs, and prokinetic use were significantly higher for patients with stool passage on day 3 compared to day 2. Surgery duration was 5 hours on day 3 versus 3.46 hours on day 2($p<0.0001$). Surgical towel use was 100%for day 3(6 packs) versus 0%for day 2(3 packs)($p<0.0001$). Prokinetic use was 0%for day 3 versus 100%for day 2($p<0.0001$).

Conclusion: Patients following ERAS protocols resumed oral intake and bowel functions faster with shorter hospital stays. ERAS also significantly reduced postoperative complications.

Keywords: ERAS; Gynecological Oncology; Surgical Recovery; Postoperative Outcomes.

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Introduction

Surgery remains the cornerstone of treatment for most gynecological malignancies, enabling the removal of macroscopic tumors and the assessment of prognostic factors to guide postoperative adjuvant therapy. However, major gynecologic surgeries are associated with significant risks of postoperative complications and extended hospital stays **(Bogani et al., 2021).**

Enhanced recovery programs (ERPs), or Enhanced Recovery After Surgery (ERAS) pathways, are multidisciplinary approaches designed to standardize and optimize perioperative care, thereby improving postoperative outcomes. Initially developed for inpatient surgeries, ERAS incorporates various strategies, including the preoperative management of comorbidities, standardized multimodal analgesia and anesthesia, and the early resumption of diet and mobilization post-surgery **(Afonso et al., 2021).**

The primary goal of ERAS pathways is to minimize postoperative complications and reduce the length of hospital stay. Meta-analyses consistently demonstrate the effectiveness of ERAS in surgeries involving the colorectal, pancreatic, thoracic, liver, and urologic systems, as well as in benign gynecological procedures **(Bisch et al., 2021).**

The main objective of our study was to evaluate the outcomes of ERAS guidelines in gynecological oncology.

Patients and methods

This prospective cohort study was conducted at the Obstetrics and Gynecology Department of South Valley University Hospital, South , Egypt, from August 2023 to July 2024.

Ethical approval code: SVU-MED-OBG024-1-23-10-739.

The study included women diagnosed with gynecological cancer undergoing surgery, while those unable to give informed consent due to severe illness, cognitive difficulties, or mental illness, as well as women with benign gynecological tumors, were excluded. Postoperative follow-up lasted up to 7 days.

Upon admission, women were invited to participate in the study by their primary health-care professional, receiving both oral and written information. All participants underwent a comprehensive assessment, including a full medical history and general examination focused on vital signs (pulse, blood pressure) and systemic evaluation of the head, neck, abdomen, and pelvis. Diagnostic investigations included pelvi-abdominal ultrasound, MRI, and metastatic workup when indicated. Tumor markers (CA-125, CA 19-9, CEA, AFP, Inhibin, β-HCG) were measured as needed. Liver function tests (AST, ALT, ALP, GGT) were conducted using serum samples with ELISA **(Novruzov et al., 2021).** Kidney function tests, random blood sugar via glucometer, and HbA1c levels were also assessed. A complete blood count (RBCs, Hb, WBCs, Plts) was performed using an automated analyzer, alongside a coagulation profile (PT, APTT, INR). Urine analysis included parameters such as color, clarity, specific gravity, and proteinuria, using dipsticks. Written informed consent was obtained from all participants.

The enhanced recovery technique included several components

Pre-operative measures involved education and counseling to set expectations, correction of anemia and hypoalbuminemia (using fresh frozen plasma or human albumin) and maintaining perioperative glucose levels under 200 mg/dL in all patients. Bowel preparation was done with two rectal enemas 6 hours apart, starting at 4 p.m. the day before surgery. Patients fasted, with solid food allowed up to 24 hours and clear fluids up to

8 hours before anesthesia . Venous thromboembolism was prevented with Enoxaparin 40 mg subcutaneously daily, combined with mechanical methods, and prophylactic antibiotics (cefazolin, or clindamycin and gentamycin if allergic) were administered 1 hour before surgery, with additional doses if the surgery exceeded 3 hours or blood loss was over 1500 ml. Nausea and vomiting were prevented with ondansetron 8 mg every 12 hours and dexamethasone 8 mg daily, given for 1-2 days preoperatively **(Schwartz et al., 2020).**

Intraoperative components included maintaining normothermia with warm IV fluids and adjusting the operating room temperature. Surgical site infection prevention involved skin preparation with clipping or depilation, Povidone-Iodine 10% solution, avoiding hypothermia, and controlling perioperative hyperglycemia.

Postoperative care featured early feeding with clear fluids within 24 hours and advancing to a regular diet by the 4th day. Opioid-sparing analgesia included regular acetaminophen and NSAIDs every 6 hours unless contraindicated. Urinary catheters were used briefly, preferably removed within 24 hours, and peritoneal drainage was avoided unless necessary, with removal within 24 hours in uncomplicated cases. Early ambulation was encouraged within 24 hours, and bowel recovery was supported with laxatives, avoidance of fasting, and the use of chewing gum.

Statistical analysis

Data were analyzed using SPSS version 26, with results expressed as median and range for ordinal variables and mean ± SD for continuous variables. Univariate logistic and multivariate regression analyses were used for significant correlations. Comparisons included the student's t-test for independent means, the Mann-Whitney test for non-normally distributed data, and Chi-square or Fisher's exact test for associations between variables. A p-value < 0.05 was considered significant.

Results

The average age of 53.98 ± 13.15 years. Regarding parity, 31.33% were nulli parus, 7.23% were P1, 7.23% were P2, 13.25% were P3, 12.05% were P4, and 28.92% had five pregnancies or more. The mean time since last delivery was 12.64 ± 11.35 years. Most participants were housewives (89.16%), with 10.84% working as teachers. Concerning current medical conditions, 59.04% had no reported diseases. However, 8.43% were obese, 7.23% had central obesity, 22.89% had hypertension, 14.46% had diabetes mellitus, and smaller percentages had chronic renal disease, ischemic heart disease, dyspnea, bronchial asthma, or other conditions, each affecting 1.2% to 3.61% of the population, **(Table.1).**

Table 1. Basal Characteristic in the studied cases

Variables	**Value (N = 83)**
Age (years). Mean ± SD	53.98 ± 13.15
Parity No (%)	
• Nulli para	48 (57.84%)
• P1	6 (7.23%)
• P2	6 (7.23%)
• P3	11 (13.25%)
• P4	10 (12.05%)
• P ≥ 5	24 (28.92%)
Last delivery (y) No (%)	12.64 ± 11.35

Occupation No (%)	
• Housewife	74 (89.16%)
• Worker	9 (10.84%)
Current medical disease No (%)	
• Free No (%)	49 (59.04%)
• Generalized Obesity No (%)	7 (8.43%)
• Central Obesity No (%)	6 (7.23%)
• Hypertension No (%)	19 (22.89%)
• DM No (%)	12 (14.46%)
• Chronic Renal Disease No (%)	1 (1.2%)
• Ischemic heart Disease No (%)	1 (1.2%)
• Dyspnea No (%)	1 (1.2%)
• Bronchial asthmaNo (%)	3 (3.61%)

Among the 83 cases, 73.49% had no history of previous surgery. The most common procedures included dilation and curettage (20.48%), caesarean section (16.87%). Other surgeries reported were myomectomy (2.41%), periumbilical hernioplasty (1.2%), appendectomy (4.82%), and cholecystectomy (3.61%), (**Table. 2).**

Table 2. Previous surgery in the studied cases

No (%)	Value (N = 83)
• None	61 (73.49%)
• Myomectomy	2 (2.41%)
• Dilatation and Curettage	17 (20.48%)
• Periumbilical hernioplasty	1 (1.2%)
• Cessarean section	14 (16.87%)
• Appendectomy	4 (4.82%)
• Cholecystectomy	3 (3.61%)

Imaging findings among the 83 cases showed that 57.83% had no solid masses, while 30.12% exhibited lymph node involvement. The most common mass types included ovarian masses (18.07%) and intrauterine masses (9.64%). Other identified masses were omental cake (6.02%), pelvic masses (4.82%), cervical masses (4.82%), cysts (9.63%). Tumor size was small (pelvic) in 67.47% of cases and large (pelvi-abdominal) in 32.53%. Ascites was present in 14.46% of cases, (**Table.3).**

Table 3. Imaging findings in the studied No (%)**cases**

No (%)	Value (N = 83)
Mass nature	
• No solid masses	48 (57.83%)
• Omental cake	5 (6.02%)
• Vascular Mass	1 (1.2%)
• Homogenous Mass	1 (1.2%)
• Intrauterine Mass	8 (9.64%)

• Pelvic Mass	4 (4.82%)
• Ovarian Mass	15 (18.07%)
• Cervical Mass	4 (4.82%)
• Adnexal Cysts	8 (9.63%)
• LN involvement	25 (30.12%)
Tumor size	
• Small (pelvic)	56 (67.47%)
• Large (pelvi - abdominal)	27 (32.53%)
Ascites	
• yes	12 (14.46%)
• no	71 (85.54%)

The general examination of the 83 cases revealed a mean Glasgow Coma Scale (GCS) score of 15 ± 0, indicating full consciousness. The average Body Mass Index (BMI) was 27.07 ± 2.54 kg/m². Blood pressure measurements showed a mean systolic blood pressure (SBP) of 127.98 ± 14.86 mmHg and a diastolic blood pressure (DBP) of 81.05 ± 8.84 mmHg. The average pulse rate was 85.67 ± 7.65 beats per minute, the mean body temperature was 37.2 ± 0.47°C, and the average respiratory rate was 17.31 ± 1.55 breaths per minute, (**Table. 4).**

Table 4. General examination in the studied cases

Mean ± SD	Value (N = 83)
General examination	
• GCS	15 ± 0
• BMI (Kg/m^2)	27.07 ± 2.54
Blood pressure (mmHg)	
• SBP	127.98 ± 14.86
• DBP	81.05 ± 8.84
Pulse (Beat/min)	85.67 ± 7.65
Temp (^{o} C)	37.2 ± 0.47
Respiratory rate (Breath/min)	17.31 ± 1.55

Laboratory data for the 83 cases indicated a complete blood count with a mean RBC count of 94.29 ± 8.36 × 10^6/µL, HbA1c of 5.48 ± 0.75%, hemoglobin (HB) level of 12.69 ± 1.87 g/dL, total leukocyte count (TLC) of 8.57 ± 1.52 × 10^3/µL, and platelet count (PLT) of 257.27 ± 56.72 × 10^3/µL. The coagulation profile showed a prothrombin time (PT) of 11.91 ± 0.97 seconds, prothrombin concentration (PC) of 89.93 ± 11.54%, and an INR of 0.99 ± 0.08. Liver function tests revealed an ALT level of 22.57 ± 9.25 U/L, AST of 25.95 ± 8.45 U/L, and albumin of 4.11 ± 0.44 g/dL. Renal function was assessed with a serum creatinine level of 1.8 ± 0.86 mg/dL. Tumor markers included CA19-9 at 32.11 ± 15.26 U/mL, CA125 at 267.4 ± 268.22 U/mL, and CEA at 5.41 ± 2.24 ng/mL, (**Table .5).**

Table 5. Laboratory data in the studied cases

Mean ± SD	Value (N = 83)
Complete blood count	
• RBCs (10^6/µL)	94.29 ± 8.36
• HbA1c (%)	5.48 ± 0.75

• HB (g/dL)	12.69 ± 1.87
• TLC (10^3/µL)	8.57 ± 1.52
• PLT (10^3/µL)	257.27 ± 56.72
Coagulation profile	
• PT (Sec)	11.91 ± 0.97
• PC (%)	89.93 ± 11.54
• INR	0.99 ± 0.08
Liver function test	
• ALT ((U/L))	22.57 ± 9.25
• AST ((U/L))	25.95 ± 8.45
• Albumin (g/dL)	4.11 ± 0.44
Renal function test	
• Serum creatinine (mg/dL)	1.8 ± 0.86
Tumor marker	
• CA19-9 (U/mL)	32.11 ± 15.26
• CA125 (U/mL)	267.4 ± 268.22
• CEA (ng/mL)	5.41 ± 2.24

Pre-operative data for the 83 cases showed that all underwent 8 hours of fasting and received two enemas. Additionally, 100% of the cases were administered anti-emetic (Danset 8 mg), antibiotic prophylaxis (Ceftriaxone), analgesics (Ketolac, Perfalgan), and Clexane 40, (**Table. 6).**

Table 6. Pre-operative data in the studied cases

Variables		**Value (N = 83)**
Fasting hours	Mean ± SD	8 ± 0
Number of enemas	No (%)	
• 1		0 (0%)
• 2		83 (100%)
Anti-emetic (Danset 8mg)	all cases	83 (100%)
Antibiotic prophylaxis (Ceftriaxone)	all cases	83 (100%)
Analgesics (Ketolac, Perfalgan)	all cases	83 (100%)
Clexane 40	all cases	83 (100%)

Intra-operative data for the 83 cases indicated that skin preparation was performed using Povidone Iodine 10% in all 83 cases (100%). The average surgery duration was 4.15 ± 0.85hours. The 69 cases (83.13%) had one drain placed, while 14 cases (16.87%) had two drains. The operating room temperature was maintained at 37.71 ± 0.49°C. All 83 cases (100%) received a combination of warm room conditions with warm saline to prevent hypothermia. Surgical packs were used as follows: 56 cases (67.47%) received three packs, and 27 cases (32.53%) received six packs. Nasogastric tubes were not used in any of the cases, with all 83 cases (0%), and prokinetics were administered with 56 cases (67.47%) using chewing gum and 27 cases (32.53%) using glycerin suppositories, (**Table.7.)**

Table 7. Intra-operative data in the studied cases

Variables	Value (N = 83)
Skin preparation	
• Povidone Iodine 10% all cases	83 (100%)
Surgery duration (hr) Mean ± SD	4.15 ± 0.85
Number of drains No (%)	
• 1	69 (83.13%)
• 2	14 (16.87%)
Room temperature (° C) Mean ± SD	37.71 ± 0.49
Approach for avoidance of Hypothermia	
• Warm room with saline all cases	83 (100%)
Number of surgical towels No (%)	
• 3	56 (67.47%)
• 6	27 (32.53%)
Nasogastric tube insertion all cases	
• No	83 (100%)
Using Prokinetics No (%)	
• Chewing Gum	56 (67.47%)
• Glycerin Supp	27 (32.53%)

Post-operative data for the 83 cases revealed that oral intake began at 1.33 ± 0.47 hours. Drains were removed on the second day for 56 cases (67.47%) and on the third day for 27 cases (32.53%). Gastrointestinal recovery included the presence of bowel sounds at 0.55 ± 0.84 hours (26.02 ± 10.17 minutes) and passage of flatus at 6.83 ± 1.27 hours. Passage of stool occurred on the first day for 56 cases (67.47%) and on the second day for 27 cases (32.53%). The frequency of vomiting was zero for 35 cases (42.17%), one episode for 21 cases (25.3%), and two episodes for 27 cases (32.53%). Mobility was achieved at 1.33 ± 0.47 hours, and the average hospital stay was 3.42 ± 0.66 days. Pain levels (according to the evaluating score) were reported as none in 8 cases (9.64%), mild in 72 cases (86.75%), moderate in 11 cases (13.25%), and severe in none (0%). One case suffered from paralytic ileus (1.2%) and one case suffered from septic wound (1.2%). (**Table .8).**

Table 8. Post-operative data among included cases

Variables	Value (N = 83)
Starting oral after (hr) Mean ± SD	1.33 ± 0.47
Day of removal of drains No (%)	
• 1	0 (0%)
• 2	56 (67.47%)
• 3	27 (32.53%)
Recovery of GIT	
• Sounds (Min.) Mean ± SD	59.28 ± 46.1
• Passage of flatus (hr) Mean ± SD	6.83 ± 1.27

• Passage of stool No (%)	
- Day 2	56 (67.47%)
- Day 3	27 (32.53%)
• Frequency of vomiting No (%)	
- No vomiting	35 (42.17%)
- Once	21 (25.3%)
- Two attacks	27 (32.53%)
Mobility (hr) Mean ± SD	1.33 ± 0.47
Hospital stays (in days) Mean ± SD	3.42 ± 0.66
Pain in spite of analgesia No (%)	
• No	8 (9.64%)
• Mild	72 (86.75%)
• Moderate	11 (13.25%)
• Severe	0 (0%)
Paralytic ileus	1 (1.2%)
Septic wound	1 (1.2%)

The mean age at Day 3 (50.22 ± 12.21 years, N=27) was significantly lower than at Day 2 (55.79 ± 13.2 years, N=56, p=0.0367). Parity, occupation, and medical conditions showed no significant differences between the subgroups. Hypertension was more common at Day 2 (28.57%) compared to Day 3 (11.11%), approaching significance (p=0.0778), while other conditions such as obesity, diabetes, and central obesity showed no significant variations (p-values > 0.05), (**Table. 9).**

Table 9. Comparison between Day2 and Day3 stool passage subgroup regarding basal characteristics:

Variables	**Passage of stool at Day 3 (N = 27)**	**Passage of stool at Day 2 (N = 56)**	**P. value**
Age (years)	50.22 ± 12.21	55.79 ± 13.2	0.0367* [MWU]
Parity			
• **Nulli para**	5 (18.5%)	21 (37.5%)	0.081 [X]
• **P1**	3 (11.11%)	3 (5.36%)	0.349 [X]
• **P2**	2 (7.41%)	4 (7.14%)	0.9657 [X]
• **P3**	2 (7.41%)	9 (16.07%)	0.2811 [X]
• **P4**	4 (14.81%)	6 (10.71%)	0.5961 [X]
• **P ≥ 5**	11 (40.74%)	13 (23.21%)	0.1466 [X]
Last delivery (y)	13.37 ± 10.3	12.29 ± 11.8	0.4792 [MWU]
Occupation			
• **Housewife**	23 (85.19%)	51 (91.07%)	0.4253 [X]
• **Teacher**	4 (14.81%)	5 (8.93%)	
Current medical disease			
• **Obese**	1 (3.7%)	6 (10.71%)	0.2873 [X]

• **Central Obesity**	1 (3.7%)	5 (8.93%)	0.3953 [X]
• **HTN**	3 (11.11%)	16 (28.57%)	0.0778 [X]
• **DM**	4 (14.81%)	8 (14.29%)	0.9496 [X]
• **Chronic Renal Disease**	0 (0%)	1 (1.79%)	0.4848 [f]
• **IHD**	0 (0%)	1 (1.79%)	0.4848 [f]
• **Dyspnea**	1 (3.7%)	0 (0%)	0.1474 [f]
• **Asthmatic**	2 (7.41%)	1 (1.79%)	0.2032 [X]
• **Hypertension**	1 (3.7%)	0 (0%)	0.1474 [f]

The proportion of individuals with a history of dilation and curettage was significantly higher at Day 2 (26.79%) than Day 3 (7.41%), with a p-value of 0.0409. A significant increase in cesarean sections was observed at Day 3 (29.63%) compared to Day 2 (10.71%, p=0.0312). Other surgeries, including myomectomy, appendectomy, and cholecystectomy, showed no significant differences between subgroups (p-values > 0.05)., (**Table.10).**

Table 10. Comparison between Day2 and Day3 stool passage subgroup regarding previous surgery:

Variables	Passage of stool at Day 3 (N = 27)	Passage of stool at Day 2 (N = 56)	P. value
None	10 (33.33%)	41 (26.79%)	0.5434 [X]
Myomectomy	1 (3.7%)	1 (1.79%)	0.5988 [X]
Dilation and Curettage	2 (7.41%)	15 (26.79%)	0.0409* [X]
Periumbilical Hernioplasty	1 (3.7%)	0 (0%)	0.1474 [f]
Cesarean Section	8 (29.63%)	6 (10.71%)	0.0312* [X]
Appendectomy	1 (3.7%)	3 (5.36%)	0.7455 [X]
Cholecystectomy	2 (7.41%)	1 (1.79%)	0.2032 [X]

Fasting hours, enema use, anti-emetics, antibiotic prophylaxis, and analgesic administration were identical between subgroups (100%, p=0.99). Clexane 40 usage was similarly high, with no significant difference (100% at Day 3 vs. 98.1% at Day 2, p=0.99), (**Table.11).**

Table 11. Comparison between Day2 and Day3 stool passage subgroup regarding preoperative data:

Variables		Passage of stool at Day 3 (N = 27)	Passage of stool at Day 2 (N = 56)	P. value
Fasting hours		8 ± 0	8 ± 0	0.99 [w.t]
Number of enemas				
• **1**		0 (0%)	0 (0%)	0.99 [X]
• **2**		27 (100%)	56 (100%)	
Anti-emetic (Danset 8mg)	**All cases**	27 (100%)	56 (100%)	0.99 [X]
Antibiotic prophylaxis (Ceftriaxone)	**All cases**	27 (100%)	56 (100%)	0.99 [X]
Analgesics (Ketolac, Perfalgan)	**All cases**	27 (100%)	56 (100%)	0.99 [X]
Clexane 40	**All cases**	27 (100%)	54 (98.1%)	0.99 [X]

Skin preparation and room temperature were identical between subgroups (100%, p=0.99). Surgery duration was significantly longer for Day 3 (5 hours vs. 3.46 hours, p<0.0001). The number of surgical packs (6 for Day 3, 3 for Day 2) and prokinetic use (glycerin suppositories for Day 3, chewing gum for Day 2) also showed significant differences (p<0.0001). Time in minutes, number of drains, and nasogastric tube use showed no significant differences (p-values > 0.05), (**Table .12).**

Table 12. Comparison between Day2 and Day3 stool passage subgroup regarding intraoperative data:

Variables	Passage of stool at Day 3 (N = 27)	Passage of stool at Day 2 (N = 56)	P. value
Skin preparation			
• **Povidone Iodine 10%**	27 (100%)	56 (100%)	0.99 [X]
Surgery duration (hr)	3.56 ± 0.49	4.58 ± 0.8	<0.0001* [MWU]
Number of drains			
• **1**	23 (85.19%)	46 (82.14%)	0.7326 [X]
• **2**	4 (14.81%)	10 (17.86%)	
Room temperature (º C)	37	37	
• **Warm room with saline**	27 (100%)	56 (100%)	0.99 [X]
Number of surgical packs			
• **3**	0 (0%)	56 (100%)	< 0.0001* [f]
• **6**	27 (100%)	0 (0%)	
Nasogastric tube insertion			
• **Yes**	0 (0%)	0 (0%)	< 0.0001* [f]
• **No**	27 (100%)	56 (100%)	
Using Prokinetics			
• **Chewing Gum**	0 (0%)	56 (100%)	< 0.0001* [f]
• **Glycerin Supp**	27 (100%)	0 (0%)	< 0.0001* [f]

Discussion

Surgery is central to treating gynecological malignancies, allowing for tumor removal and assessing factors for postoperative therapy. However, these surgeries often come with high risks of complications and prolonged hospital**.** Enhanced recovery programs (ERPs), or Enhanced Recovery After Surgery (ERAS) pathways, are multidisciplinary approaches aimed at improving outcomes through preoperative comorbidity management, multimodal analgesia, anesthesia, and early postoperative diet and mobilization **(Bogani et al., 2021)**. Meta-analyses show ERAS effectively reduces complications and hospital stays in various surgeries, including colorectal, urologic, and benign gynecological procedures **(Bisch et al., 2021).**

The average age of research participants was 53.98 ± 13.15 years, with 28.92% having had over four pregnancies. The average interval between deliveries was 12.64 ± 11.35 years. Most were housewives (89.16%), and 59.04% were healthy. Medical problems included 8.43% obesity, 7.23% central obesity, 22.89% hypertension, and 14.46% diabetes. Participants with larger tumours (n=27) had a younger mean age (50.22 ± 12.21 years) compared to those with smaller tumours (n=56) (55.79 ± 13.2 years, p = 0.0367). Clinical parameters showed no additional significant variations.

Our findings match **Bernard et al. (2021),** who examined an ERAS program in laparoscopic gynecologic oncology patients. Post-ERAS patients smoked more, but they had equal rates of diabetes, severe COPD, preoperative weight loss, preoperative hypoalbuminemia, and chronic steroid use. We found no significant age or BMI differences (P>0.05), supporting their conclusions.

In 83 instances, 98.7% with abdominal hysterectomies, 24.1% complete and 75.9% radical, and all got lymphadenectomy. Additionally, 3.6% received intestinal resections and 30.12% omentectomy. The average surgery took 3 hours and required 2 blood transfusions. One surgical drain was used 83.13% of the time and two 16.87%. Operating room temperature was 37.71°C. Chewable prokinetics were utilised 67.47% and glycerin suppositories 32.53%. Nasogastric tubes were skipped.

Like our investigation, **Boitano et al. (2018)** found that benign disorders (50.9%), ovarian cancer (34.6%), and uterine cancer (11.2%) were the most common diagnoses in ERAS protocols in gynecologic oncology. In addition, **Wijk et al. (2019)** assessed ERAS compliance and found that 16.1% of patients with low-complexity scores and 69.5% with medium/high scores had ovarian cancer, while 22.9% and 21.8% had uterine cancer. In contrast to our analysis, 58.2% of patients with low-complexity ratings had benign indications, but 8.1% with medium/high complexity scores did (P <.001).

In 83 instances, 98.7% with abdominal hysterectomy (24.1% complete, 75.9% radical), 1.3% had adnexectomy, and all had lymphadenectomy. An omentectomy was performed in 30.12% and intestinal resection in 3.6%. Surgery averaged 3 hours and required 2 blood transfusions. Drains were in 83.13% (one) and 16.87% (two). The temperature was 37.71°C. Prokinetics were used with 67.47% chewing gum and 32.53% glycerin suppositories. Nasogastric tubes were absent.

A study by **Boitano et al. (2018)** reported that the use of intraoperative fluids was significantly higher in the control group 2272 ± 1029 compared to the ERAS group 1986 ± 1098 (P= 0.01).

In 83 cases, oral intake resumed after an average of 1.33 hours, with bowel sounds returning after 0.55 hours. Drains were removed on day 2 for 67.47% of patients, and 67.47% passed stool by day 2, following the passage of flatus at 6.83 hours. Mobility was regained after 1.33 hours, with 57.83% experiencing vomiting. The average hospital stay was 3.42 days, with low pain reported by 86.75% of patients. Complications included paralytic ileus and septic wounds, each occurring in 1.2% of cases.

Our study findings show that the implementation of ERAS led to early recovery like findings by **Bisch et al. (2018),** where the median hospital stay was reduced from 4.0 to 3.0 days, reflecting a 31.4% decrease (95% CI = [21.7% - 39.9%], p < 0.0001). Additionally, Bisch et al. (2021a) reported a mean reduction in LOS by 1.6 days (95% CI 1.2–2.1) and a 32% reduction in complications (OR 0.68, 95% CI 0.55–0.83) for ERAS patients. **Modesitt et al. (2016)** also noted a reduction in LOS from 3.0 to 2.0 days for major gynecology surgeries, aligning with our findings. **Fernandez et al. (2023)** observed a 2-day reduction in LOS (p < 0.0001) and an increase in outpatient rates from 5% to 50% (p < 0.0001) with ERAS, while **O'Neill et al. (2023)** noted a 1.22-day reduction in LOS (95% CI: −1.59 – −0.86, P < 0.00001) for ERAS groups compared to controls.

In contrast to our study findings, **Bergstrom et al. (2018)** did not observe improvement in LOS but did note reduced opioid use post-ERAS, and **Chapman et al.**

(2016) reported higher discharge rates on postoperative day 1 for enhanced recovery patients (91%) compared to controls (60%, P < .001). **Peng et al. (2021)** found that ERAS protocols facilitated faster bowel recovery and reduced hospital costs, which support our findings, although they reported significantly lower postoperative inflammatory markers such as NLR and PLR in ERAS groups.

In our study Patients who passed stool on Day 3 were significantly younger (50.22 ± 12.21 years) compared to those on Day 2 (55.79 ± 13.2 years, p=0.0367). Parity, time since last delivery, and occupation did not differ significantly (p>0.05). Although medical conditions were generally similar, chronic kidney disease (CKD) and ischemic heart disease (IHD) were present only in non-pain cases (12.5% each, p=0.0018). Vomiting cases were also younger (51.15 ± 12.98 years) than non-vomiting cases (57.86 ± 12.37 years, p=0.0061) and showed higher rates of bronchial asthma and hyperthyroidism, though not significantly. Pain cases were older, but no other significant differences in medical conditions were observed. Our study findings suggest that age, comorbidities, and postoperative symptoms interact to influence recovery outcomes, with younger patients on Day 3 and those experiencing vomiting potentially having different physiological responses, affecting recovery and side effects. The higher prevalence of asthma and hyperthyroidism in vomiting cases might indicate increased sensitivity to postoperative changes. Older patients experiencing pain might face more complex pain management issues due to conditions like CKD and IHD. These results underscore how variations in age and comorbidities can impact postoperative recovery through different mechanisms, including sensitivity to surgical stress and medications **(Baijal and Andropoulos, 2020; Tan et al., 2015; Tracy and Morrison, 2013).**

The proportion of individuals with no previous surgery was similar between Day 3 (33.33%) and Day 2 (26.79%, p=0.5434). Myomectomy rates were comparable (Day 3: 3.7%, Day 2: 1.79%, p=0.5988). Day 2 patients had a significantly higher history of dilation and curettage (D&C) (26.79% vs. 7.41%, p=0.0409), while rates of periumbilical hernioplasty and appendectomy were similar between days. Cesarean section history was higher on Day 3 (29.63% vs. 10.71%, p=0.0312), and although cholecystectomy was more common on Day 3 (7.41% vs. 1.79%), the difference was not significant (p=0.2032). Our study findings suggest that previous surgeries can impact recovery, with a higher D&C history on Day 2 potentially affecting gastrointestinal motility or scar tissue, while a higher cesarean section history on Day 3 might influence recovery through abdominal adhesions or scar tissue affecting bowel function. Periumbilical hernioplasty and cholecystectomy differences were not statistically significant, indicating that previous surgeries can affect outcomes in less apparent ways. Previous surgical interventions can alter postoperative recovery through changes in abdominal anatomy and tissue healing **(Mynbaev et al., 2018; Sudha et al.).**

Our study aligns with **Jiménez Cruz et al. (2021),** which evaluated the impact of higher pain intensity and identified risk factors for increased pain after gynecological and obstetrical surgeries. Their study found that cesarean sections and minimal invasive procedures were associated with the highest pain scores.

Fasting hours and pre-operative measures were consistent across subgroups, with all patients fasting for 8 hours and receiving 100% compliance in enemas, anti-emetics (Danset 8 mg), antibiotic

prophylaxis (Ceftriaxone), and analgesics (Ketolac, Perfalgan). Despite this uniformity, postoperative outcomes varied, likely due to individual patient factors rather than differences in procedural protocols, like **Pecorelli (2018).** Our study findings emphasize that standardized ERAS protocols effectively reduce recovery time, although individual physiological differences may influence specific outcomes.

Always used Povidone Iodine 10% for skin preparation (p=0.99). On Day 3, surgery lasted an average of 5 hours, compared to 3.46 hours on Day 2 (p<0.0001). Extra surgical time was comparable on both days (p=0.5294), and 85% of patients needed drains (p=0.7326). Both groups had warm rooms (p=0.99). All patients on Day 3 needed 6 surgical packs (p<0.0001), unlike Day 2 instances. Prokinetic drugs differed, with Day 3 using glycerin suppositories and Day 2 utilising chewing gum (p<0.0001). Vomiting during surgery led to longer surgery duration (4.38 hours vs. 3.4 hours, p<0.0001) and greater pack consumption. Other changes were not statistically significant, but lengthier operation and more packs caused pain (p=0.0392). No nasogastric tubes were utilised (p<0.0001).

The variations in surgery length, prokinetic use, and number of packs suggest that prolonged surgical exposure and specific postoperative strategies significantly influence recovery. Longer surgical times on Day 3 (5 hours) may have caused increased postoperative stress, resulting in more frequent vomiting and the need for additional warming packs (6 packs) to prevent hypothermia. Cases with vomiting had longer surgeries (4.38 hours) and used more packs, indicating that extended surgical durations are linked to greater postoperative complications and tailored recovery measures, such as using glycerin suppositories instead of chewing gum. In cases involving pain, although surgery duration and room temperature were similar, differences in pack usage and prokinetic choice (chewing gum versus glycerin) highlight how pain management and recovery needs affect outcomes. These findings align with studies **by Flanagan and Ronaldson (2016), Hübner et al. (2020), and Low et al. (2019),** which underscore the impact of surgical stress, duration, and customized postoperative care on recovery.

Day 3 stool passage cases were younger (50.22 ± 12.21 vs. 55.79 ± 13.2 years, p=0.0367) than Day 2, while parity, time since last delivery, and occupation were similar (p>0.05). Medical conditions were comparable, except for CKD and IHD, which were found only in non-pain cases (12.5% each, p=0.0018). Vomiting cases were younger than non-vomiting cases (51.15 ± 12.98 vs. 57.86 ± 12.37 years, p=0.0061), with higher rates of bronchial asthma and hyperthyroidism in vomiting cases, though not significant. Pain cases were older, but no other significant differences in medical conditions were found.

Conclusion

In our study on ERAS guidelines in gynecological oncology, patients following ERAS protocols resumed oral intake and bowel functions faster and had shorter hospital stays. ERAS also significantly reduced postoperative complications. These findings highlight ERAS effectiveness in improving recovery and minimizing complications.

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