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Study of Implementation of Enhanced Recovery After Gynaecological Surgery in Tertiary Care Centre

[1]Dr Shyamali Bondarde, Junior Resident, Dept. of Obstetrics and Gynecology, Dr. VMGMC, Solapur, Maharashtra, India.

[2]Dr Vijay Pawar, Associate Professor, Dept. of Obstetrics and Gynecology, Dr. VMGMC, Solapur, Maharashtra, India.

[3]Dr Vidya Tirankar, Professor and HOD, Dept. of Obstetrics and Gynecology, Dr. VMGMC, Solapur, Maharashtra, India.

[4]Dr Kanchan Bondarde, Assistant Professor, Dept. of Anaesthesiology, Maharashtra, India.

[5]Dr Anusha Shetty, Senior Resident, Dept. of Obstetrics and Gynecology, Dr. VMGMC, Solapur, Maharashtra, India.

Corresponding Author: Dr Shyamali Bondarde, Junior Resident, Dept. of Obstetrics and Gynecology, Dr. VMGMC, Solapur, Maharashtra, India.

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Abstract

Introduction: Enhanced Recovery After Surgery (ERAS) protocols aim to improve perioperative outcomes by minimizing surgical stress and promoting early recovery through standardized, evidence-based practices.

Aim & Objectives: This study evaluates the clinical outcomes of ERAS implementation in elective gynecologic surgeries.

Methods: A prospective observational study was conducted from June 2023 to May 2025 at a tertiary care hospital in India. A total of 163 non-pregnant women undergoing elective gynecologic surgeries were enrolled. ERAS components were uniformly applied, including preadmission counseling, carbohydrate loading, avoidance of bowel prep and overnight fasting, intraoperative measures, and early postoperative mobilization and feeding.

Results: All patients adhered to core ERAS protocols. Opioids, abdominal drains, and nasogastric tubes were avoided. TAP block was used in all major surgeries. Rescue analgesia was required in 15.46% of minor and 13.64% of major surgeries. Postoperative milestones were achieved promptly, with early ambulation and oral intake. Pain scores decreased significantly over time. Mean VAS scores at 1, 3, and 6 hours postoperatively were 4.03, 2.03, and 0.40 in minor surgeries, and 6.57, 4.66, and 3.68 in major surgeries. Complications were minimal; minor surgeries reported one urinary tract infection. In major surgeries, complications included surgical site infections (4.54%), fever (4.54%), and readmissions (7.57%). Mean postoperative day (POD)

for discharge was 1.56±0.79 (minor) and 4.29±0.52 (major), with total hospital stays of 2.52±0.65 and 6.26±1.96 days, respectively.

Conclusion: ERAS implementation in gynecologic surgeries was associated with early recovery, minimal complications, reduced pain, and shorter hospital stays.

Keywords: Enhanced Recovery After Surgery (ERAS); Gynecologic Surgery; Postoperative Outcomes, Multimodal Analgesia, Minimally Invasive Surgery.

Introduction

Enhanced Recovery After Surgery (ERAS) programs, introduced in the 1990s, are key to modern perioperative care, focusing on reducing surgical stress and promoting evidence-based practices to improve outcomes[1]. Core components include preoperative counseling, shortened fasting, multimodal analgesia, early mobilization, and nutritional optimization, all aimed at expediting recovery and reducing hospital stay[2]. In gynecologic surgery, including both oncologic and benign procedures, ERAS protocols enhance recovery through patient-centered, multidisciplinary care[3], incorporating strategies such as avoiding routine bowel preparation, maintaining normovolemia, minimizing drains, and encouraging early ambulation and feeding to reduce complications[2,4,5]. Initially developed for colorectal surgery, ERAS has been successfully adapted to gynecologic procedures, consistently demonstrating reduced length of hospital stay (LOS), fewer complications, and better postoperative recovery[6]. Studies, including single-center cohorts and systematic reviews, support ERAS in gynecologic oncology, highlighting its impact on standardizing and improving perioperative care[7,8]. Overall, ERAS aligns with best practices while helping institutions improve outcomes, quality of care, and resource utilization[3,7,9]. This study evaluates the effect of ERAS implementation in gynecologic surgeries on LOS, opioid use, pain scores, postoperative complications, and 30-day readmission rates.

Methodology

A prospective observational study was conducted in the Department of Obstetrics and Gynecology at a tertiary care teaching hospital in India from June 2023 to May 2025. After Institutional Ethics Committee approval and informed consent, 163 non-pregnant women scheduled for elective gynecologic surgeries were enrolled to assess perioperative outcomes following ERAS implementation. Women aged 18–60 years (ASA I–II), undergoing elective minor or major gynecologic procedures under general or regional anesthesia, were included. Exclusion criteria were pregnancy, ASA ≥III, emergency surgery, malignancy receiving neoadjuvant therapy, or deviation from ERAS care. Universal sampling was used to include all eligible patients.

A structured ERAS protocol tailored to gynecologic surgery was adhered to across perioperative phases:

- **Preoperative:** Patient counseling, avoidance of prolonged fasting, clear carbohydrate drinks allowed up to 2 hours pre-surgery, antibiotic prophylaxis within 60 minutes pre-incision, no bowel preparation.
- **Intraoperative:** Goal-directed fluids, normothermia maintenance, minimal tissue handling, avoidance of routine drains/nasogastric tubes, and opioid-free anesthesia with NSAIDs, paracetamol, and regional blocks (e.g., TAP).
- **Postoperative:** Oral intake within 4 hours and ambulation within 6– 8 hours, multimodal analgesia without opioids, early removal of urinary catheter and IV lines. Pain was assessed via VAS at 1, 3, and

6 hours and categorized as mild (1–3), moderate (4–6), or severe (≥7). Patients were monitored for complications and followed for 30-day readmissions.

Data were recorded using a structured proforma (demographics, intra-/post-operative variables, VAS scores, complications, readmissions), entered in Microsoft Excel 2023, and analyzed using SPSS v25. Continuous variables were described as mean ± SD, categorical variables as proportions.

Observations and Result

A total of 163 patients were enrolled, including 97 undergoing minor surgery and 66 major surgery. The mean age was 37.26 ± 9.24 years in the minor group and 49.16 ± 8.31 years in the major group. Most minor cases were aged 26–30 years (31.96%), while almost half (48.48%) of major cases were ≥51 years. Mean BMI was 22.04 ± 1.17 kg/m² in the minor group (all normal BMI) and 22.66 ± 2.99 kg/m² in the major group, where 21.21% were overweight. ASA I was more frequent in minor surgeries (52.58%) and ASA II in major surgeries (54.55%). Rural residence predominated in minor cases (68.04%), whereas most major cases were urban (63.64%). Lower-middle socioeconomic status was common in both groups (79.38% minor, 68.18% major). Middle-school education was the most frequent (34.02% minor, 33.33% major), with illiteracy higher in the major group (10.61%). Housewives constituted the majority in both groups. Open surgery was the predominant approach (65.98% minor, 69.69% major), with the remainder performed laparoscopically (Table 1).

Table 1: Distribution of study participants according to Sociodemographic charecteristics.

Sociodemographic characteristics	Minor Surgery 97(100%)	Major Surgery 66(100%)
Age group in Years		
18-25 Years	05(05.15%)	01(01.51%)
26-30 Years	31(31.96%)	0(0%)
31-35 Years	15(15.46%)	07(10.61%)
36-40 Years	03(03.09%)	03(04.54%)
41-45 Years	16(16.49%)	02(03.03%)
46-50 Years	20(20.62%)	21(31.82%)
≥51Years	07(07.22%)	32(48.48%)
Mean ± SD in Years	37.26±09.24	49.16±08.31
BMI(kg/m2)		
<18.50 kg/m2	00	05(07.58%)
18.50-24.99 kg/m2	97(100%)	47(71.21%)
25.00-29.99 kg/m2	00	14(21.21%)
>30.00 kg/m2	00	00

Mean ± SD in kg/m2	22.04±01.17	22.66±02.99
ASA status		
ASA I	51(52.58%)	30(45.45%)
ASA II	46(47.42%)	36(54.55%)
Residence		
Urban	31(31.96%)	42(63.64%)
Rural	66(68.04%)	24(36.36%)
Socioeconomic status		
Upper	00	00
Upper Middle	04(04.12%)	02(03.03%)
Lower Middle	77(79.38%)	45(68.18%)
Upper Lower	07(07.22%)	12(18.18%)
Lower	09(09.28%)	07(10.60%)
Education		
Professional degree	00	00
Graduate	05(05.15%)	01(01.52%)
Intermediate/diploma	05(05.15%)	04(06.06%)
High school	27(27.84%)	14(21.21%)
Middle school	33(34.02%)	22(33.33%)
Primary school	24(24.74%)	18(27.27%)
Illeterate	03(03.09%)	07(10.61%)
Occupation		
Professional	00	00
Semi professional	00	00
Clerical/shop/Farm	05(05.15%)	00
Skilled worker	08(08.25%)	07(10.61%)
Semiskilled worker	18(18.56%)	09(13.64%)
Unskilled worker	19(19.59%)	16(24.24%)
Unemployed/Housewife	47(48.45%)	34(51.52%)
Surgical Approach		
Open	64(65.98%)	46(69.69%)
Laparoscopic	33(34.02%)	20(30.31%)

In the minor surgery group, laparoscopic tubal ligation (30.93%) and dilatation & curettage (29.90%) were most common, followed by abdominal tubal ligation (17.53%). Other procedures (≤4%) included D&C with cervical

polypectomy, diagnostic/operative procedures, and scar endometrioma excision (1.03%). Among major surgeries, total abdominal hysterectomy (19.69%) and total laparoscopic hysterectomy (18.18%) were most frequent, followed by vaginal hysterectomy with cystocele repair (15.15%). Staging laparotomy, vaginal hysterectomy, and laparoscopic cystectomy each accounted for 12.12%, while non-descent vaginal hysterectomy (5.97%), myomectomy (2.99%), and abdominal sling surgery (1.49%) were less common.

Table 2: Distribution of study participants according to Pre-operative, Peri-operative Post-Operative Intervention in ERAS Protocol.

Intervention in ERAS Protocol	Minor Surgery n (%)		Major Surgery n (%)	
Pre-operative	Yes	No	Yes	No
Preadmission Counseling	97(100%)	00	66(100%)	00
Overnight fasting	00	97(100%)	00	66(100%)
Mechanical bowel preparation	00	97(100%)	00	66(100%)
Carbohydrate loading	97(100%)	00	66(100%)	00
Antibiotic prophylaxis	97(100%)	00	66(100%)	00
Peri-operative				
Hypothermia Prevention	97(100%)	00	66(100%)	00
Fluid Therapy	97(100%)	00	66(100%)	00
Minimal tissue handling	97(100%)	00	66(100%)	00
TAP Block	00	97(100%)	66(100%)	00
Use of abdominal drain/ nasogastric tube	00	97(100%)	00	66(100%)
2nd Dose of Antibiotics given	00	97(100%)	03(04.55%)	63(95.45%)
Need of rescue analgesia	15(15.46%)	82(84.56%)	09(13.64%)	57(86.36%)
Use of Opioids	00	97(100%)	00	66(100%)
PONV Prophylaxis	97(100%)	00	666(100%)	00
Operative time in mins (Mean ± SD)	20.77±07.40 mins		91.90±17.87 mins	
Post-operative				
Time to first ambulation in Hr Range	04.14 ± 01.04 3 to 6 Hrs		06.15 ±0.58 6 to 10 Hrs	
Time to first oral intake in Hr Range	04.83 ± 01.17 3 to 6 Hrs		>6 Hr	
Time of removal of Urinary catheter Range	05.42 ± 0.73 3 to 6 Hrs		18.73± 23.90 6 to 80 Hrs	
Time of passing stools in Hrs Range	28.00 ± 05.66 15 to 42 Hrs		36.80 ±03.31 25 to 42 Hrs	

All patients showed 100% adherence to pre-operative ERAS elements including counseling, carbohydrate

loading, antibiotic prophylaxis, and avoidance of overnight fasting and bowel preparation. Intra-operative measures—thermal control, goal-directed fluids, minimal tissue handling, and PONV prophylaxis—were applied uniformly. TAP blocks were given for all major surgeries, with complete avoidance of abdominal drains, nasogastric tubes, and opioid use. Rescue analgesia was required in 15.46% of minor and 13.64% of major surgeries, while a second antibiotic dose was needed in 4.55% of major cases due to prolonged duration. Mean operative time was 20.77 ± 7.40 min (minor) versus 91.90 ± 17.87 min (major). ERAS recovery targets were met, with ambulation at 4.14 ± 1.04 h and 6.15 ± 0.58 h, oral intake at 4.83 ± 1.17 h and >6 h, catheter removal at 5.42 ± 0.73 h and 18.73 ± 23.90 h, and first stool passage at 28.00 ± 5.66 h and 36.80 ± 3.31 h in minor and major surgeries respectively, indicating successful protocol implementation and timely recovery (Table 2).

Table 3: Distribution of study participants according to Visual analogue score at 1, 3 and 6 hr after ERAS Protocol.

Visual analogue score at 1, 3 and 6 hr	Minor Surgery 97(100%)	Major Surgery 66(100%)
At 1 hour Post-operative Intervention		
No Pain (0)	0	0
Minimal Pain (1-3)	0	0
Moderate Pain (4-6)	97(100%)	28(42.42%)
Severe sore Pain (7-10)	00	38(57.58%)
Mean±SD	4.03±0.22	6.57±0.70
At 3 hour Post-operative Intervention		
No Pain (0)	0	0
Minimal Pain (1-3)	96(98.97%)	17(25.76%)
Moderate Pain (4-6)	01(01.03%)	49(74.24%)
Severe sore Pain (7-10)	0	0
Mean±SD	2.03±0.22	4.66±1.15
At 6 hour Post-operative Intervention		
No Pain (0)	59(60.82%)	0
Minimal Pain (1-3)	38((39.18%)	17(25.76%)
Moderate Pain (4-6)	0	49(74.24%)
Severe sore Pain (7-10)	0	0
Mean±SD	0.40±0.51	3.68±1.31

At 1 hour postoperatively, mean VAS scores indicated moderate pain in minor surgeries (4.03 ± 0.22) and severe pain in major surgeries (6.57 ± 0.70). Pain decreased steadily over time, with 3-hour VAS scores of 2.03 ± 0.22 (minor) and 4.66 ± 1.15 (major). By 6 hours, minor surgery patients reported minimal pain (0.40 ± 0.51), while major surgery patients had moderate residual discomfort (3.68 ± 1.31) (Table 3). Postoperative complications were minimal in the minor surgery group (n = 97), with only one urinary tract

infection (1.03%) and no other adverse events or readmissions (Figure 3). In the major surgery group (n = 66), complications were mainly associated with open procedures, including surgical site infection (4.54%), fever (4.54%), urinary tract infection (6.06%), and readmission (7.57%), with isolated cases of paralytic ileus and abdominal distension (1.51% each); abdominal distension was also seen in 4.54% of laparoscopic cases (Figure 3).

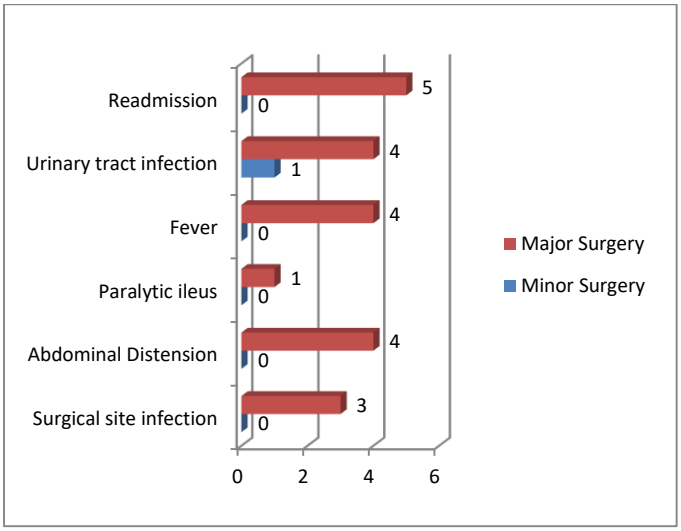

Figure 3: Distribution of study participants according to the Complication.

Table 4: Distribution of study participants according to the Stay in the hospital.

Stay in the hospital	Minor Surgery 97 (100%)	Major Surgery 66 (100%)
Readiness for discharge POD in days Mean ± SD (Days)	Range 1 to 3 Days 01.56±0.79	Range 3 to 6 Days 04.29±0.52
Total length of Hospital stay Mean ± SD (Days)	Range 1 to 4 Days 02.52±0.65	Range 4 to 15 Days 06.26±1.96

The mean postoperative day (POD) readiness for discharge was 1.56 ± 0.79 days in minor surgeries and 4.29 ± 0.52 days in major surgeries, with mean hospital stays of 2.52 ± 0.65 days and 6.26 ± 1.96 days, respectively (Table 4).

Discussion

This prospective observational study highlights the feasibility and clinical value of ERAS implementation in routine gynecologic surgeries at a tertiary care centre. The findings corroborate international literature demonstrating that ERAS pathways enhance recovery, shorten hospitalization, and do not compromise patient safety. The mean hospital stay in our study was 2.52 ± 0.65 days for minor and 6.26 ± 1.96 days for major surgeries, comparable to the reductions reported by O'Neill et al.[8] and Bisch et al.[10], who observed shortened LOS by 1.22 and 1.6 days, respectively. Similarly, Fernandez et al.[11] and Miralpeix et al.[12] documented a 2-day reduction in hospitalization, particularly in endometrial cancer patients treated with ERAS and prehabilitation. These consistent outcomes support the role of ERAS in enabling early yet safe discharge.

Pain was effectively managed with opioid-free multimodal analgesia, incorporating TAP blocks for major surgeries. A rapid decline in pain scores within 6 hours postoperatively reflects the effectiveness of this strategy, also emphasized in previous ERAS reports[1,2]. Adequate pain control, combined with early mobilization and oral intake, likely contributed to improved patient comfort and satisfaction, as previously observed by Thangavel et al.[13]. The overall complication rate was low, especially in minor procedures. Higher rates of surgical site infections, urinary infections, and readmissions were noted among major open surgeries. Lindemann et al.[14] similarly reported greater complications with high-complexity surgeries despite ERAS compliance. However, our acceptable readmission rates align with those of Bisch et al.[10] and

Reuter et al.[15], who showed that ERAS reduces complications and ICU admissions without increasing unplanned readmissions.

A key strength of this study was high compliance (> 95%) to essential ERAS elements including preoperative carbohydrate loading, avoidance of mechanical bowel preparation and prolonged fasting, timely initiation of oral diet, and early ambulation. This mirrors findings by Lindemann et al.[14] and Miralpeix et al.[12], who emphasize that strict adherence is pivotal in achieving optimal outcomes. Minimally invasive (laparoscopic) surgeries performed within the ERAS framework demonstrated fewer complications and faster recovery than open procedures, supporting similar evidence from Fernandez et al.[11] advocating for minimally invasive approaches within ERAS. In our study, ERAS protocols in gynecologic surgery significantly improve postoperative recovery timelines, reduce opioid use and pain, lower complication rates, and shorten hospital stay without increasing readmissions. These results strengthen the growing body of evidence endorsing ERAS as a safe, efficient, and patient-centered perioperative care pathway in gynecologic surgery.

Conclusions

The implementation of ERAS protocols in gynecologic surgeries in present study resulted in shorter hospital stays, effective pain control through opioid-free multimodal analgesia, and minimal postoperative complications, with readmission rates remaining within acceptable limits. Pain scores improved rapidly postoperatively, and adherence to key ERAS principles—such as avoidance of drains, early mobilization, and minimal tissue handling—contributed to faster recovery and better outcomes. Laparoscopic approaches were associated with fewer complications compared to open surgeries, highlighting the advantage of minimally invasive techniques within ERAS pathways.

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