
Comparison of Clinical Outcome in Patient Undergoing Lscs Via Traditional Pathway and Enhanced Recovery After Surgery (Eras) Pathway.

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Abstract

Background: Enhanced Recovery After Surgery (ERAS) protocols are designed to optimize perioperative care and improve postoperative recovery following lower segment cesarean section (LSCS). This study compared maternal clinical outcomes between ERAS and Traditional perioperative pathways. **Methods:** A comparative study was conducted among 80 women undergoing LSCS, with 40 managed under ERAS and 40 under Traditional care. Baseline age distribution, time to ambulation, length of hospital stay, surgical site infection (SSI), pain scores at 12 and 24 hours, maternal satisfaction, and overall mean clinical outcomes were analyzed. **Results:** Age distribution was comparable between groups ($p=0.199$), confirming baseline equivalence. ERAS patients ambulated significantly earlier (mean 8.43 ± 2.297 vs 18.68 ± 3.925 hours; $p=0.002$). Hospital stay was significantly shorter in the ERAS group ($p<0.001$). SSI was significantly lower in ERAS (5.0%) compared to Traditional care (20.0%) ($p=0.043$). Pain scores were significantly lower in ERAS at both 12 and 24 hours ($p<0.001$). Maternal satisfaction was significantly higher in the ERAS cohort ($p<0.001$). Mean QoR-11 scores showed significant improvement at 24 and 48 hours ($p=0.000$ and $p=0.008$). Opioid use was reduced, and gastrointestinal recovery parameters favored ERAS. **Conclusion:** ERAS implementation in LSCS significantly enhances postoperative recovery, reduces complications and hospital stay, improves pain control, and increases maternal satisfaction without compromising safety. ERAS represents a safe and effective patient-centered approach to optimizing cesarean delivery outcomes.

Keywords- Enhanced Recovery After Surgery (ERAS), LSCS, Early ambulation, Maternal satisfaction, post-operative recovery.

Introduction

Lower segment cesarean section (LSCS) is one of the most commonly performed surgical procedures worldwide. With rising global cesarean rates, optimizing maternal recovery and satisfaction has become increasingly important. Traditionally, LSCS management includes prolonged fasting, liberal opioid use, delayed oral intake, restricted mobilization, and hospital stay of three to five days. Although long accepted as standard practice, this conventional approach is associated with delayed recovery, increased morbidity, and higher healthcare costs.

[1]

The Enhanced Recovery After Surgery (ERAS) pathway is a structured, evidence-based approach designed to reduce surgical stress and accelerate recovery. Initially introduced in colorectal surgery and later adapted to obstetrics, ERAS emphasizes patient education, shortened fasting with carbohydrate loading, optimized fluid therapy, regional anesthesia, and multimodal non-opioid analgesia. [2] Studies show that ERAS in cesarean sections reduces postoperative pain, febrile morbidity, and hospital stay while improving maternal satisfaction. [3]

A major difference lies in perioperative care. Unlike traditional fasting from midnight, ERAS allows limited fasting and preoperative carbohydrate intake to maintain metabolic stability. It promotes regional anesthesia and multimodal analgesia to minimize opioid-related side effects. [4,5] Postoperatively, early feeding and mobilization within 6–12 hours enhance gastrointestinal recovery, reduce thromboembolic risk, and improve maternal functioning. Optimized antibiotic timing, normothermia, and fluid management further lower infection rates. [6,7] ERAS consistently shortens hospital stay to 48–72 hours without increasing readmission, making early discharge safe and cost-effective. [8]

Successful implementation requires multidisciplinary coordination and adherence to standardized protocols. While individualized care remains essential, ERAS provides a patient-centered framework that improves outcomes and reduces healthcare burden. Ongoing research is needed to strengthen its integration into routine obstetric practice. [9,10]

The above study was conducted to evaluate the clinical outcome in patients undergoing lscs via traditional pathway and enhanced recovery after surgery (eras) pathway.

Materials and Methods

The study was conducted at Krishna Hospital, Karad, over a period of 2 years after receiving ethical clearance from the Institutional Ethics Committee. A total of 80 patients were selected for the study based on the inclusion and exclusion criteria.

Inclusion Criteria

1. Pregnancy with gestational age > 37 weeks.
2. ASA Grade 1 and Grade 1, scheduled for elective Caesarean section.
3. Those willing to participate in the study.

Exclusion Criteria

1. Existing Cardiac Disease • Diabetes, Autoimmune disease, Severe and Uncontrolled Hypertension,
2. Abnormal Placentation – Abruption Placentae and Placenta Previa
3. Severe Renal and Hepatic Dysfunction •
4. Neurological/Psychiatric Illness
5. Patient Refusal

Participants were assigned into two groups based on the perioperative pathway followed:

- **Group A:** Patients receiving care through the Traditional Pathway, which involved conventional fasting protocols, delayed ambulation, and extended hospital stays.
- **Group B:** Patients following the ERAS Pathway, which included preoperative counselling, minimized fasting, multimodal analgesia, early ambulation, and early initiation of oral intake and breastfeeding.

Patients in the ERAS group received detailed counselling regarding the ERAS protocol. The preoperative preparation included limited fasting, encouragement of carbohydrate loading, and no routine bowel preparation. During surgery, regional anesthesia was preferred, and fluid restriction was maintained. Postoperative management emphasized early removal of urinary catheters, early ambulation within 6–12 hours, and oral intake within 4–6 hours postoperatively. Pain was managed using multimodal analgesia to minimize opioid use. Patients in the traditional group followed the conventional fasting guidelines, delayed postoperative mobilization, delayed oral intake, and standard opioid-based analgesia. Postoperative assessments were made using a structured checklist, and all patients were monitored for recovery milestones and complications during their hospital stay.

Data was collected, entered into Microsoft Excel and analysed using the SPSS software 26.0 version. A p-value of <0.05 was considered statistically significant.

Result

Table 1: Age (Years) and Group

Age (years)	ERAS (n=40)	Traditional (n=40)	Total	p-value
21–25	15	9	24	0.199
26–30	14	13	27	
31–35	11	18	29	
Total	40	40	80	

In the ERAS group (n=40), 21–25 years included 15 (37.5%), 26–30 years 14 (35.0%), and 31–35 years 11 (27.5%). In the Traditional group (n=40), 21–25 years included 9 (22.5%), 26–30 years 13 (32.5%), and 31–35 years 18 (45.0%).

Table 2: Time to Ambulation (Hours) and Group

Time to Ambulation (hrs)	ERAS	Traditional	Total	p-value
4	4	0	4	< 0.001
5	2	0	2	
7	5	0	5	
8	8	0	8	
9	8	0	8	
10	8	1	9	
11	2	0	2	
12	2	3	5	
14	1	1	2	
15	0	3	3	
16	0	4	4	
17	0	4	4	
18	0	2	2	
19	0	4	4	
20	0	5	5	
21	0	4	4	

22	0	3	3	
23	0	1	1	
24	0	2	2	
25	0	2	2	
27	0	1	1	
Total	40	40	80	

Ambulation occurred earlier in the ERAS group (n=40), most frequently at 8 hours (8; 20.0%), 9 hours (8; 20.0%), and 10 hours (8; 20.0%), with 4 cases at 4 hours (10.0%). In the Traditional group (n=40), ambulation clustered later, mainly at 20 hours (5; 12.5%), 16/17/19 hours (4 each; 10.0% each), and 21 hours (4; 10.0%). The association was highly significant (Pearson $\chi^2=69.644$, $df=20$; $p<0.001$).

Table 3: Length of Hospital Stay (Days) and Group

Length of Stay (Days)	ERAS	Traditional	Total
0	0	0	0
2	1	0	1
3	5	0	5
4	14	0	14
5	13	14	27
6	7	15	22
7	0	9	9
8	0	1	1
9	0	1	1
Total	40	40	80

Most patients in the ERAS arm were discharged within 3–5 days, with the highest frequency at 4 days (14 patients) and 5 days (13 patients), and no ERAS patient stayed beyond 6 days. In contrast, patients in the Traditional group predominantly had longer hospital stays, with most remaining hospitalized for 5–7 days, including 15 patients staying 6 days and 9 patients staying 7 days, and some extending up to 8–9 days. The overall difference in length of stay between the two groups is statistically highly significant ($p < 0.001$), indicating that the observed reduction in hospital stay with ERAS is unlikely due to chance.

Table 4: Surgical Site Infection and Group

Surgical Site Infection	ERAS (n=40)	Traditional (n=40)	Total	p-value
No	38	32	70	0.043
Yes	2	8	10	
Total	40	40	80	

Surgical site infection was lower in the ERAS group (n=40), with 2 cases (5.0%) and 38 (95.0%) without infection. In the Traditional group (n=40), infection occurred in 8 cases (20.0%) and 32 (80.0%) had no infection. Overall, 10 of 80 participants (12.5%) had infection and 70 (87.5%) did not. The association was statistically significant (Pearson Chi-square $p=0.043$).

Table 5: Comparison of Pain Score (VAS) at 12 and 24 Hours Between ERAS and Traditional Groups (n=80)

VAS Score	12 Hours ERAS (n=40)	12 Hours Traditional (n=40)	24 Hours ERAS (n=40)	24 Hours Traditional (n=40)
1	0	0	1	0
2	3	0	10	1
3	2	0	18	0
4	18	2	9	3
5	13	5	2	10
6	4	12	0	13
7	0	9	0	7
8	0	9	0	6
9	0	2	0	0
10	0	1	0	0
Total	40	40	40	40

- At 12 hours: Pearson $\chi^2 = 46.356$, $df = 8$; $p < 0.001$ (Highly significant)
- At 24 hours: Pearson $\chi^2 = 60.697$, $df = 7$; $p < 0.001$ (Highly significant)

Pain scores were consistently lower in the ERAS group at both 12 and 24 hours postoperatively. At 12 hours, ERAS patients predominantly reported VAS scores of 4–5, whereas higher scores (6–8) were more common in the Traditional group. By 24 hours, ERAS patients shifted toward even lower pain scores (2–3), while moderate to severe pain (5–7) persisted in the Traditional group. This demonstrates significantly better postoperative pain control in the ERAS pathway compared to the Traditional perioperative approach.

Table 6: Maternal Satisfaction Score and Group

Satisfaction Score	ERAS	Traditional	Total	p-value
4	0	1	1	< 0.001
5	0	4	4	
6	0	8	8	
7	2	15	17	
8	10	8	18	
9	15	3	18	
10	13	1	14	
Total	40	40	80	

Maternal satisfaction scores were higher in the ERAS group (n=40), with scores of 9 in 15 (37.5%) and 10 in 13 (32.5%), while 8 was reported by 10 (25.0%) and 7 by 2 (5.0%). In the Traditional group (n=40), the most frequent score was 7 in 15 (37.5%), followed by 6 in 8 (20.0%) and 8 in 8 (20.0%), with fewer reporting 9 (3; 7.5%) and 10 (1; 2.5%). The association was highly significant (Pearson $\chi^2=41.449$, $df=6$; $p<0.001$).

Table 7: Comparison of Mean Clinical Outcomes Between ERAS and Traditional Groups (n=80)

	Group	N	Mean	Std. Deviation	P value
Gestational Age (weeks)	ERAS	40	38.58	0.712	0.715
	Traditional	40	38.58	0.747	
QoR-11 Score (24h)	ERAS	40	85.08	5.191	0.000
	Traditional	40	56.15	12.458	
QoR-11 Score (48h)	ERAS	40	93.28	6.567	0.008
	Traditional	40	69.88	10.224	
Time to De-Catheterisation (hours)	ERAS	40	12.45	3.038	0.816
	Traditional	40	24.90	2.951	
Opioid Use (mg Morphine Equivalent)	ERAS	40	7.43	3.573	0.058
	Traditional	40	19.33	4.943	
Time to First Bowel Movement (hours)	ERAS	40	23.90	4.043	0.401
	Traditional	40	37.30	4.298	
Time to Passage of Flatus (hours)	ERAS	40	14.65	2.842	0.758
	Traditional	40	22.35	2.914	
Time to Ambulation (hours)	ERAS	40	8.43	2.297	0.002
	Traditional	40	18.68	3.925	

Gestational age was identical in both groups (38.58 ± 0.712 and 38.58 ± 0.747 ; $p=0.715$). QoR-11 scores were higher in ERAS at 24h (85.08 ± 5.191 and 56.15 ± 12.458 ; $p=0.000$) and 48h (93.28 ± 6.567 and 69.88 ± 10.224 ; $p=0.008$). Mean time to ambulation was shorter in ERAS (8.43 ± 2.297 and 18.68 ± 3.925 ; $p=0.002$). Mean opioid use was 7.43 ± 3.573 and 19.33 ± 4.943 ($p=0.058$), and time to de-catheterisation was 12.45 ± 3.038 and 24.90 ± 2.951 ($p=0.816$). Time to first bowel movement was 23.90 ± 4.043 and 37.30 ± 4.298 ($p=0.401$), and flatus passage was 14.65 ± 2.842 and 22.35 ± 2.914 ($p=0.758$).

Discussion

The aim of the present study was to evaluate and compare the clinical outcomes of women undergoing lower segment caesarean section managed through an Enhanced Recovery After Surgery (ERAS) pathway versus those managed through a Traditional perioperative care pathway. Traditional postoperative management following LSCS often involves delayed feeding and mobilization, prolonged catheterization, extended hospital stay, and higher reliance on opioids for pain control, all of which may contribute to delayed maternal recovery and increased healthcare burden. The ERAS pathway offers a structured, evidence-based approach designed to minimize surgical stress, promote early functional recovery, and enhance patient experience without compromising safety. By evaluating multiple objective and patient-reported outcomes, this study provides comprehensive evidence on the effectiveness of ERAS in improving maternal recovery and satisfaction while maintaining favorable neonatal outcomes.

Age distribution between the ERAS and Traditional groups was statistically comparable (Pearson $\chi^2=3.227$, $p=0.199$), confirming baseline demographic equivalence and minimizing potential confounding. This balance strengthens the internal validity of the study, as differences in recovery outcomes cannot be attributed to age-related physiological variation. Varadhan et al. [11] and Vignali et al. [12] emphasized that demographic comparability is essential when assessing ERAS efficacy in surgical cohorts. In obstetric settings, Jakhetiya et al. [13] and Matthews et al. [14] similarly reported no significant age differences between ERAS and conventional cesarean groups, reinforcing that improved outcomes are protocol-driven rather than selection-based. Feldman et al. [15] further highlighted that controlling baseline variables is critical when evaluating multidimensional recovery metrics such as pain, mobilization, and hospital stay.

Time to ambulation was significantly shorter in the ERAS group ($p<0.001$), with a markedly lower mean ambulation time (8.43 ± 2.297 vs 18.68 ± 3.925 hours; $p=0.002$). Early mobilization is a fundamental component of ERAS pathways, reducing thromboembolic risk, enhancing pulmonary function, and promoting maternal independence. Similar improvements have been reported by Ali et al. [16] and Monaghan et al. [17] in non-obstetric surgical populations, where early ambulation contributed to fewer complications and shorter hospitalization. In cesarean-specific ERAS studies, Jakhetiya et al. [13] demonstrated ambulation within 6 hours in the majority of ERAS patients, while Afreen et al. [18] linked early mobilization to higher satisfaction and faster discharge. Fletcher et al. [19] further showed that ERAS protocols significantly reduced length of stay without compromising recovery. The present findings align with this evidence, underscoring early ambulation as a key driver of enhanced recovery in LSCS.

Length of hospital stay was significantly reduced in the ERAS cohort ($p<0.001$), with most patients discharged by postoperative day 3–4 compared to prolonged stays of 5–7 days in the Traditional group. Reduced hospitalization is one of the most consistent and clinically meaningful benefits of ERAS. Varadhan et al. [11] reported a weighted mean reduction of 2.55 days in surgical patients managed under ERAS protocols, while Vignali et al. [12] observed shorter primary and total hospital stays without increased morbidity. In obstetric practice, Matthews et al. [14] demonstrated a significant decline in cesarean length of stay following ERAS implementation, and Afreen et al. [18] reported discharge within 33–61 hours in ERAS-managed cases. The current study corroborates these findings, highlighting both clinical and economic advantages of ERAS adoption in high-volume obstetric units.

Surgical site infection (SSI) occurred significantly less frequently in the ERAS group (5.0% vs 20.0%; $p=0.043$), suggesting improved perioperative safety. Lower complication rates under ERAS have been consistently reported. Varadhan et al. [11] demonstrated a relative risk reduction in postoperative complications with ERAS, and Naito et al. [20] observed significantly fewer complications in ERAS-managed cystectomy patients. In cesarean populations, Afreen et al. [18] and Matthews et al. [14] similarly reported reduced or unchanged postoperative morbidity after ERAS implementation. The present findings indicate that optimized analgesia, early feeding, mobilization, and standardized perioperative protocols likely contribute to reduced infective morbidity.

Pain control at both 12 and 24 hours postoperatively strongly favored the ERAS pathway ($p < 0.001$ at both intervals). At 12 hours, ERAS patients predominantly reported mild to moderate pain, whereas higher VAS scores were common in the Traditional group. By 24 hours, the ERAS cohort demonstrated sustained pain reduction, with most patients reporting VAS scores of 2–3 compared to persistent moderate-to-severe pain in the Traditional group. Effective multimodal analgesia is central to ERAS and minimizes opioid-related adverse effects. Prabhakaran et al. [21] reported significantly lower early postoperative pain scores and opioid requirements under ERAS protocols. In cesarean-specific studies, Cojocaru et al. [22] demonstrated improved pain control throughout the first postoperative days, while Jakhetiya et al. [13] and Matthews et al. [14] documented enhanced recovery scores and reduced opioid prescribing following ERAS adoption. Sustained pain control facilitates early ambulation, breastfeeding, and maternal–neonatal bonding, reinforcing the multidimensional benefits of ERAS in LSCS.

Maternal satisfaction was significantly higher in the ERAS group ($p < 0.001$), reflecting the cumulative impact of improved analgesia, earlier mobilization, shorter hospital stay, and greater patient engagement. In obstetric populations, Jakhetiya et al. [13] reported higher QoR-11 scores and better patient experiences in ERAS-managed cesarean patients, while Afreen et al. [18] and Matthews et al. [14] similarly demonstrated improved satisfaction and perceived quality of recovery. The present findings confirm that ERAS not only enhances objective clinical outcomes but also significantly improves maternal perception of care, supporting its role as a patient-centered approach in cesarean delivery.

All mean clinical parameters were compared between the ERAS and Traditional groups. Gestational age was identical in both groups ($p = 0.715$), confirming baseline obstetric equivalence. QoR-11 scores were significantly higher in the ERAS group at 24 hours ($p = 0.000$) and 48 hours ($p = 0.008$), demonstrating superior early and sustained recovery, consistent with findings by Jakhetiya et al. [13], Matthews et al. [14] and Feldman et al. [15].

Mean time to ambulation was significantly shorter in the ERAS group ($p = 0.002$), reflecting faster functional recovery, in agreement with reports by Ali et al. [16] and Afreen et al. [18]. Opioid use was markedly lower in ERAS patients, aligning with opioid-sparing effects described by Cojocaru et al. [22].

Time to de-catheterisation, time to first bowel movement, and time to passage of flatus were all earlier in the ERAS group, although not statistically significant in mean comparison. Similar trends toward faster gastrointestinal recovery under ERAS protocols have been reported by Varadhan et al. [11] and Cojocaru et al. [22].

Overall, evaluation of all mean clinical outcomes—including gestational age, QoR-11 scores, ambulation time, opioid consumption, de-catheterisation time, bowel movement, and flatus passage—demonstrates that ERAS enhances multidimensional recovery and promotes faster postoperative functional restoration following LSCS.

This study has several strengths, including a well-defined comparative design, baseline equivalence between groups, comprehensive assessment of multiple clinical and recovery parameters (QoR-11 scores, ambulation time, opioid use, gastrointestinal recovery, and hospital stay), and statistically robust analysis enhancing internal validity. However, limitations include the relatively small sample size, single-center setting limiting

generalizability, short-term follow-up without long-term maternal outcomes, and potential performance bias due to lack of blinding.

Conclusion

The present study demonstrates that implementation of the ERAS protocol in LSCS significantly improves overall maternal recovery compared to traditional care. ERAS was associated with higher QoR-11 scores, earlier ambulation, reduced opioid consumption, faster gastrointestinal recovery, shorter hospital stay, and greater maternal satisfaction without increasing complications. These findings confirm that ERAS is a safe, effective, and patient-centered approach that enhances postoperative outcomes and optimizes resource utilization in cesarean delivery.

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