Original Article
DOI: https://doi.org/10.70749/ijbr.v3i5.2606

INDUS JOURNAL OF BIOSCIENCE RESEARCH
https://ijbr.com.pk
ISSN: 2960-2793/ 2960-2807

Post Cesarean Early Puerperal Complications

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ARTICLE INFO

Keywords: Cesarean section, Postpartum complications, Postoperative pain, Hemorrhage, Seizures, Urinary tract infection, Parietal hematoma, Anemia

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Declaration
Authors' Contribution: Both authors equally contributed to the study and approved the final manuscript.

Conflict of Interest: No conflict of interest.

Funding: No funding received by the authors.

Article History
Received: 13-02-2025 Revised: 03-05-2025
Accepted: 17-05-2025 Published: 30-05-2025

ABSTRACT

Background: Cesarean section, although frequently conducted, has an array of early puerperal complications that can affect the recovery of the mother and the outcome of her health. Knowing the complications and the risk factors involved helps to facilitate postoperative care and the safety of the mother. **Objective:** To determine the frequency of early puerperal complications in patients after cesarean section. **Study Design:** Descriptive cross-sectional study. **Duration and Place of Study:** This study was conducted from July 2024 to January 2025 in the Department of Obstetrics and Gynecology at Rawal Institute of Health Sciences, Islamabad. **Methodology:** A total of 400 women aged 18–40 years undergoing cesarean section were included. Demographic and clinical data including age, parity, gestational age, BMI, indication for surgery, type of anesthesia, and procedure duration were recorded. Patients were observed for 24 hours postoperatively for early complications such as postpartum hemorrhage, postoperative pain, fever, anemia, urinary tract infection, parietal hematoma, and seizures. **Results:** Postpartum hemorrhage was observed in 33%, postoperative pain in 31%, fever in 27%, anemia in 21%, urinary tract infection in 18%, parietal hematoma in 12%, and seizures in 6% of patients. Statistically significant associations were found between complications and variables including age, parity, BMI, indication for cesarean section, and duration of surgery. **Conclusion:** Early puerperal complications following cesarean delivery are common and significantly associated with multiple patient-related and procedural factors.

INTRODUCTION

Cesarean section is a frequently executed surgical intervention aimed at the delivery of a baby via incisions in the abdominal and uterine walls.[1] It is usually indicated when vaginal delivery threatens the well-being of the mother or fetus, e.g., in fetal distress, cephalopelvic disproportion, or previous uterine surgery.[2] Although usually safe, cesarean section remains a substantial abdominal surgery and thus poses the risk of some early postpartum complications.[3] These issues can worsen maternal morbidity, complicate recovery, and extend hospital stay and need vigorous postoperative monitoring and prompt intervention.[4]

Postpartum hemorrhage remains the most significant early complication of cesarean section. Postpartum hemorrhage is caused by uterine atony, surgical trauma, or retained placental components.[5] Prompt diagnosis and treatment in the form of uterotonic agent administration, uterine massage, and in the most severe cases surgical intervention in the form of uterine artery ligation or hysterectomy are necessary.[6] Urinary tract infection (UTI) is also a common issue and typically associated with the prolonged use of the catheter and intraoperative manipulation of the bladder.[7] UTIs typically have symptoms of fever, dysuria, and suprapubic pain and would be managed with the correct antibiotic after culture and sensitivity testing of the urine.[8]

Postoperative anemia is common and often found in the scenario of intraoperative blood loss or preoperatively acquired iron deficiency.[9] The symptoms include fatigue, pallor, and late healing of the wound.[9] Management includes iron supplementation and, in the more severe cases, blood transfusions. Postoperative pain is also very pronounced and tends to occur in the first puerperium and can interfere with mobility, lactation, and the well-being of the mother.[10] Effective pain control with the combination of analgesics and ancillary measures is absolutely necessary to allow ambulation sooner and expedite recovery.[10]

Less frequent but important complications include parietal hematoma resulting from hemorrhage into the abdominal wall around the incision.[11] Clinically presents as localized pain and swelling and sometimes ecchymosis.[11] The symptoms of postpartum fever in the initial periods might be a symptom of wound infection, endometritis, or systemic infection and need close evaluation.[12] Seizures as a complication also ensue even though seldom and resulting from eclampsia, disturbances

in the state of metabolism, or issues relating to the anesthesia.[13] All the above need immediate medical intervention to halt progression and also offer safety to the mother during the crucial initial postpartum time.

Mascarello KC et al. reported that among patients undergoing cesarean section, the frequency of postpartum hemorrhage was 47.8%, urinary tract infection 54.7%, anemia 33.3%, and postoperative pain 58.5%.[14] Similarly, a study conducted by Ahmed Khan NB et al. found that parietal hematoma occurred in 7.4% of cases, fever in 18.52%, and seizures in 3.7% of post-cesarean patients.[15]

Despite improvements in surgical practices and postoperative care, the first few days after cesarean section still carry considerable risk for the health of the mother. Knowing the incidence and character of the problems is critical to enhancing clinical results and informing preventive measures. This study will be useful in establishing common problems of the first few days after operation in the population studied, assessing existing practices of management and highlighting areas of the need for strengthened intervention or revision of protocol.

METHODOLOGY

This descriptive cross-sectional study was conducted in the Department of Obstetrics and Gynecology at Rawal Institute of Health Sciences, Islamabad, from July to January 2025. A total of 400 women undergoing cesarean delivery were enrolled. The sample size was calculated using WHO software, based on a 95% confidence level, 1.85% margin of error, and an expected frequency of seizures in post-cesarean patients of 3.7%.[15]

Eligible participants included women aged 18 to 40 years with a singleton pregnancy beyond 37 weeks of gestation, confirmed by last menstrual period. Both elective and emergency cesarean sections were included if performed for fetal distress, failure to progress, or breech presentation. Women with diabetes mellitus, chronic hypertension, placental abruption, known fetal anomalies, liver or renal disease, or those with a history of more than two previous cesarean sections were excluded. Demographic details such as age, parity, gestational age, BMI, place of residence, anesthesia type, and indication for cesarean section were recorded prior to the procedure.

All surgical procedures were performed using a Pfannenstiel incision. A transverse incision of 6–7 inches was made on the lower abdomen, followed by a 1–2 cm uterine incision at the lower uterine segment, which was extended bluntly. Uterine closure was performed without exteriorization. Hemostasis was ensured and the abdominal wall closed in layers, leaving the peritoneum unsutured. Skin was closed using 3-0 Vicryl sutures. All operations were supervised by a consultant gynecologist with at least three years of post-fellowship clinical experience. Duration of surgery, measured from skin incision to completion of skin closure, was documented.

Patients were monitored for 24 hours postoperatively to detect early complications. Blood loss was estimated using the weight of soaked surgical materials and clots, with one gram equivalent to one milliliter of blood. Any blood loss equal to or exceeding 1000 ml within the first 24 hours was considered significant. Pain assessment was carried out using a visual analog scale ranging from 0 (no pain) to 10 (worst pain). A score above 3 indicated the presence of moderate to severe postoperative pain. Body temperature was measured using a clinical thermometer; values above 100°F were classified as febrile. Urinary tract infection was diagnosed when midstream urine culture demonstrated bacterial growth exceeding 10^5 colony-forming units per milliliter, specifically identifying organisms such as *E. coli*, *Klebsiella*, or *Pseudomonas*. Hemoglobin was measured through a blood test, and values below 10 g/dL were labeled as anemic. Parietal hematoma was diagnosed by ultrasound showing a homogenous, hypoechoic fluid collection between the abdominal musculature and parietal peritoneum. Seizures were identified by the occurrence of unconsciousness along with involuntary bilateral limb movements lasting more than one minute. All findings were documented in a structured proforma designed for the study.

Data analysis was conducted using SPSS version 26. Means and standard deviations were calculated for continuous variables. Categorical variables including anesthesia type, cesarean indications, and presence or absence of complications were presented as frequencies and percentages. Stratification was applied based on age, BMI, parity, gestational age, indication, type of anesthesia, procedure duration, and residential status. Chi-square test was used post-stratification to evaluate significance, with a p-value ≤ 0.05 considered statistically significant.

RESULTS

The study included 400 patients with a mean age of 29.28±6.43 years and mean gestational age of 38.89±1.21 weeks. The average parity was 1.81±1.53, mean BMI was 24.88±3.99 kg/m^2, and mean procedure duration was 34.11±7.74 minutes. Regarding residential status, 192 patients (48.0%) were from rural areas while 208 (52.0%) were from urban areas. The most common indication for cesarean section was fetal distress in 180 patients (45.0%), followed by failure to progress in labor in 124 patients (31.0%), and breech presentation in 96 patients (24.0%). Spinal anesthesia was used in 360 patients (90.0%) while general anesthesia was administered to 40 patients (10.0%) (as shown in Table 1).

Table 1

Patient Demographics

Demographics		Mean ± SD
Age (years)		29.28±6.43
Gestational Age (weeks)		38.89±1.21
Parity		1.81±1.53
BMI (Kg/m^2)		24.88±3.99
Duration (min)		34.11±7.74
Residential Status	Rural n (%)	192 (48.0%)
	Urban n (%)	208 (52.0%)
C-section Indication	Fetal distress n (%)	180 (45.0%)
	Failure to progress in labor n (%)	124 (31.0%)
	Breech presentation n (%)	96 (24.0%)
Type of Anesthesia	Spinal n (%)	360 (90.0%)
	General n (%)	40 (10.0%)

The frequency of post-cesarean early puerperal complications revealed that postpartum hemorrhage occurred in 132 patients (33.0%), postoperative pain in

124 patients (31.0%), fever in 108 patients (27.0%), anemia in 84 patients (21.0%), urinary tract infection in 72 patients (18.0%), parietal hematoma in 48 patients (12.0%), and seizures in 24 patients (6.0%) (as shown in Table 2).

Table 2

Frequency of Post-Cesarean Early Puerperal Complications

Complications		Frequency	% age
Postpartum Hemorrhage	Yes	132	33.00%
	No	268	67.00%
Postoperative Pain	Yes	124	31.00%
	No	276	69.00%
Anemia	Yes	84	21.00%
	No	316	79.00%
Urinary Tract Infection	Yes	72	18.00%
	No	328	82.00%
Parietal Hematoma	Yes	48	12.00%
	No	352	88.00%
Fever	Yes	108	27.00%
	No	292	73.00%
Seizures	Yes	24	6.00%
	No	376	94.00%

When examining associations between demographic factors and complications, significant differences were observed across multiple variables. Age stratification showed that postoperative pain was significantly higher in patients ≤30 years (38.2%) compared to those >30 years (22.2%) with p<0.001, while fever was more common in older patients >30 years (33.3%) versus younger patients ≤30 years (21.8%) with p=0.010, and seizures were also more frequent in the >30 years group (8.9%) compared to ≤30 years group (3.6%) with p=0.028. Parity analysis revealed that postoperative pain was significantly more common in patients with parity ≤3 (33.7%) compared to those with parity >3 (14.3%) with p=0.004, while seizures showed the opposite trend being higher in the >3 parity group (7.1%) versus ≤3 group (5.8%) with p=0.760. BMI stratification demonstrated that postoperative pain was significantly higher in patients with BMI ≤25 kg/m^2 (38.9%) compared to those with BMI >25 kg/m^2 (21.7%) with p<0.001, parietal hematoma was more frequent in the ≤25 BMI group (16.7%) versus >25 group (6.5%) with p=0.002, fever was higher in the >25 BMI group (32.6%) compared to ≤25 group (22.2%) with p=0.020, and seizures were more common in the >25 BMI group (8.7%) versus ≤25 group (3.7%) with p=0.036.

C-section indication analysis showed significant associations with postpartum hemorrhage being highest in breech presentation cases (45.8%) compared to fetal distress (35.6%) and failure to progress (19.4%) with p<0.001, postoperative pain was most frequent in breech presentation (45.8%) followed by fetal distress (26.7%) and failure to progress (25.8%) with p=0.001, fever was highest in failure to progress cases (32.3%) compared to fetal distress (28.9%) and breech presentation (16.7%) with p=0.026, and seizures were only observed in fetal distress (11.1%) and breech presentation (4.2%) cases with no seizures in failure to progress cases (p<0.001). Duration analysis revealed that postoperative pain was significantly higher in procedures >30 minutes (37.3%) compared to ≤30 minutes (18.2%) with p<0.001, urinary tract infection was more common in longer procedures >30 minutes (20.9%) versus shorter procedures ≤30 minutes (12.1%) with p=0.032, and fever was significantly higher in procedures >30 minutes (32.8%) compared to ≤30 minutes (15.2%) with p<0.001 (as shown in Table 3).

Table 3

Association of Obstetric Complications with Demographic Factors

Demographic Factors		Postpartum Hemorrhage	Postoperative Pain	Anemia	Urinary Tract Infection	Parietal Hematoma	Fever	Seizures
Age (years)	≤30	80 (36.4%)	84 (38.2%)	48 (21.8%)	40 (18.2%)	32 (14.5%)	48 (21.8%)	8 (3.6%)
	>30	52 (28.9%)	40 (22.2%)	36 (20.0%)	32 (17.8%)	16 (8.9%)	60 (33.3%)	16 (8.9%)
p-value		0.114	<0.001*	0.657	0.917	0.083	0.010*	0.028*
Parity	≤3	108 (31.4%)	116 (33.7%)	68 (19.8%)	64 (18.6%)	44 (12.8%)	92 (26.7%)	20 (5.8%)
	>3	24 (42.9%)	8 (14.3%)	16 (28.6%)	8 (14.3%)	4 (7.1%)	16 (28.6%)	4 (7.1%)
p-value		0.091	0.004*	0.134	0.435	0.274*	0.775	0.760*
Residential Status	Rural	56 (29.2%)	68 (35.4%)	40 (20.8%)	36 (18.8%)	28 (14.6%)	48 (25.0%)	8 (4.2%)
	Urban	76 (36.5%)	56 (26.9%)	44 (21.2%)	36 (17.3%)	20 (9.6%)	60 (28.8%)	16 (7.7%)
p-value		0.117	0.067	0.937	0.708	0.127	0.387	0.138
BMI (Kg/m^2)	≤25	76 (35.2%)	84 (38.9%)	44 (20.4%)	40 (18.5%)	36 (16.7%)	48 (22.2%)	8 (3.7%)
	>25	56 (30.4%)	40 (21.7%)	40 (21.7%)	32 (17.4%)	12 (6.5%)	60 (32.6%)	16 (8.7%)
p-value		0.314	<0.001*	0.738	0.77	0.002*	0.020*	0.036*
C-section Indication	Fetal distress	64 (35.6%)	48 (26.7%)	36 (20.0%)	28 (15.6%)	24 (13.3%)	52 (28.9%)	20 (11.1%)
	Failure to progress	24 (19.4%)	32 (25.8%)	20 (16.1%)	28 (22.6%)	12 (9.7%)	40 (32.3%)	0 (0.0%)
	Breech presentation	44 (45.8%)	44 (45.8%)	28 (29.2%)	16 (16.7%)	12 (12.5%)	16 (16.7%)	4 (4.2%)
p-value		<0.001*	0.001*	0.057	0.272	0.619	0.026*	<0.001*
Type of Anesthesia	Spinal	116 (32.2%)	116 (32.2%)	76 (21.1%)	64 (17.8%)	48 (13.3%)	92 (25.6%)	20 (5.6%)
	General	16 (40.0%)	8 (20.0%)	8 (20.0%)	8 (20.0%)	0 (0.0%)	16 (40.0%)	4 (10.0%)
p-value		0.321	0.113	0.87	0.729	0.017*	0.051	0.283*
Duration Group (min)	≤30	52 (39.4%)	24 (18.2%)	32 (24.2%)	16 (12.1%)	20 (15.2%)	20 (15.2%)	8 (6.1%)
	>30	80 (29.9%)	100 (37.3%)	52 (19.4%)	56 (20.9%)	28 (10.4%)	88 (32.8%)	16 (6.0%)
p-value		0.056	<0.001*	0.264	0.032*	0.173	<0.001*	0.971

*Fischer Exact Test

DISCUSSION

The present study demonstrates a significant burden of early puerperal complications following cesarean delivery, with postpartum hemorrhage (33.0%), postoperative pain

(31.0%), and fever (27.0%) being the most prevalent complications. The high incidence of postpartum hemorrhage can be attributed to the inherent surgical trauma associated with cesarean section, which involves uterine incision and manipulation, leading to increased blood loss compared to vaginal delivery. Additionally, the surgical procedure may compromise uterine contractility due to anesthesia effects and tissue handling, further predisposing to hemorrhage.

The substantial occurrence of postoperative pain (31.0%) is expected given the nature of cesarean section as a major abdominal surgery involving incision through multiple tissue layers including skin, fascia, muscle, and uterus. The surgical trauma activates nociceptors and inflammatory pathways, resulting in acute postoperative pain that typically persists for several days. The 27.0% incidence of fever likely reflects the body's inflammatory response to surgical trauma, potential subclinical infections, or tissue necrosis at the surgical site. Fever may also result from atelectasis due to reduced respiratory effort following abdominal surgery or from the resorption of blood and fluid collections.

When comparing our findings with existing literature, several notable similarities and differences emerge. Our postpartum hemorrhage rate of 33.0% was substantially higher than the 2.9-4.5% range reported by Burke C et al. [14] in their US literature review, and considerably exceeded the 8.8% and 7.0% rates found by Swarna SS et al. [15] in primigravida and multigravida patients respectively. This significant discrepancy may be attributed to differences in healthcare infrastructure, patient populations, and possibly varying definitions of postpartum hemorrhage across studies. Our higher rates might reflect challenges in resource-limited settings or different thresholds for diagnosing hemorrhage compared to developed healthcare systems.

The postoperative pain frequency of 31.0% in our study showed interesting parallels with Mostafayi M et al. [16] who reported significantly higher pain scores in emergency cesarean sections compared to elective procedures. Similarly, Mascarello KC et al. [17] found a 2.40-fold higher risk of pain following cesarean delivery compared to vaginal delivery. Our finding that postoperative pain was significantly more common in younger patients (≤30 years, 38.2% vs >30 years, 22.2%, p<0.001), patients with lower parity (≤3, 33.7% vs >3, 14.3%, p=0.004), and those with lower BMI (≤25 kg/m^2, 38.9% vs >25 kg/m^2, 21.7%, p<0.001) suggests that younger, primiparous women with normal BMI may experience heightened pain sensitivity or have different pain management needs.

Our urinary tract infection rate of 18.0% was notably higher than the findings of Mascarello KC et al. [17] who reported a 79% increased risk of urinary infection following cesarean section compared to vaginal delivery. The elevated rate in our study, particularly in procedures lasting >30 minutes (20.9% vs ≤30 minutes, 12.1%, p=0.032), may reflect prolonged catheterization, increased tissue manipulation, or potentially different prophylactic protocols compared to the Brazilian cohort studied by Mascarello KC et al. [17]

The surgical site infection patterns, while not directly comparable due to different outcome measures, showed some consistency with existing literature. Although our study focused on broader complications rather than specific surgical site infections, Bizuayew H et al. [18] reported a 12.4% overall surgical site infection rate within 30 days post-cesarean, with rural residence, prolonged membrane rupture, extended labor, and anemia as significant risk factors. Our findings of higher complication rates with longer procedure duration align with their observation that operative factors influence post-surgical morbidity.

Demographic factors played crucial roles in complication patterns across studies. Our mean patient age of 29.28±6.43 years was comparable to Mostafayi M et al. [16] (28.1±5.1 vs 28.7±4.5 years) but higher than Swarna SS et al. [15] (22.9±4.1 vs 26.2±5.3 years). The age-related complication patterns in our study, with fever and seizures being more common in patients >30 years, may reflect underlying comorbidities or physiological changes associated with advanced maternal age.

The indication-specific complication rates revealed important clinical patterns. Our finding that postpartum hemorrhage was highest in breech presentation cases (45.8%) compared to fetal distress (35.6%) and failure to progress (19.4%) suggests that certain obstetric conditions may predispose to specific complications. This pattern contrasts with Swarna SS et al. [15] who found failed induction and post-dated pregnancy as common emergency indications but did not stratify complications by indication type.

The procedure duration analysis in our study, showing increased complications with operations >30 minutes, aligns with Burke C et al. [14] who identified operative time >47 minutes as a risk factor for surgical site infection. Our threshold of 30 minutes may reflect different surgical techniques or complexity, but the underlying principle that prolonged surgery increases morbidity remains consistent across studies.

These significant correlations between patient demographics and specific complications then suggest that risk stratification based on age, BMI, parity, and surgical time could help for individualized preventive actions. The providers need to take individualized pain management steps in the young and the thin and be on the lookout for the febrile and the seizure activity in the elderly and the obese. The variability in the complications based on the indication for the cesarean suggests the need for indication-specific care protocols, particularly for the condition of the breech presentation that was found to have higher incidence of hemorrhage and pain. Future research needs to focus on the establishment of predictive models that incorporate these demographic variables so as to identify the high-risk patients and introduce intervention accordingly in order to provide better outcome for the mothers.

This study also has several limitations that must be taken into account during the interpretation of results. Since this is a single-center trial conducted on a single university teaching hospital, the generality of findings to other health care settings with varying patient populations, resources, and clinical practices may be compromised. The research design also did not account for potential confounding variables such as surgical technique variation between

different surgeons, specific anesthetic techniques used, and preoperative patient condition potentially influencing complication rates. The relatively short follow-up period covering only the early puerperal complications also may have missed delayed complications possibly occurring outside the immediate postoperative period. The study also did not capture subtle information on severity grading of complications and specific management intervention used that otherwise would provide useful information on clinical decisions and resource allocation.

CONCLUSION

Our research identified that the post-cesarean early puerperal complications represent a significant clinical burden and the most frequent observed complications were postpartum hemorrhage, postoperative pain, and infection/fever. The research determines linkages between the patient demographic characteristics and the occurrence of certain complications and therefore implies that the patient's age, BMI, parity, operation time, and indication for the performance of the cesarean section emerge as the main predicting variables for postoperative morbidity. The patients who belonged to the younger ages and the lowest values of the BMI appeared more susceptible to the postoperative pain, while the aged and higher-value-BMI patients appeared more susceptible to the occurrence of the fever and the seizures.

Acknowledgments

Gratitude is extended to the dedicated staff of the department; whose meticulous record-keeping and careful handling of patient information played a crucial role throughout this work.

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