



Original Article

A Study to Compare the Maternal and Perinatal Outcomes Between Elective and Emergency Cesarean Sections

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ABSTRACT

Background: Cesarean sections (CS) are categorized as elective or emergency based on timing and indication, with potential implications for maternal and perinatal outcomes. This study aims to compare the maternal and perinatal outcomes between elective and emergency cesarean sections.

Methods: A comparative cross-sectional study was conducted involving 90 women who underwent cesarean section at a tertiary care hospital. Participants were divided into elective (n=45) and emergency (n=45) groups. Maternal outcomes assessed included operation time, blood loss, uterine atony, and postoperative complications. Perinatal outcomes included Apgar scores, neonatal admissions, and complications.

Results: The elective CS group demonstrated significantly shorter mean operation time (48.2 ± 8.3 vs 68.5 ± 10.1 minutes, $p < 0.001$) and lower estimated blood loss (585 ± 125 vs 785 ± 165 ml, $p < 0.001$). Postoperative complications were more frequent in the emergency CS group (26.7% vs 8.9%, $p = 0.03$). Neonatally, the elective CS group had better Apgar scores at 1 minute (7.8 ± 0.9 vs 6.9 ± 1.2 , $p < 0.001$) and 5 minutes (8.7 ± 0.5 vs 8.2 ± 0.8 , $p = 0.001$), with higher rates of NICU admissions in the emergency group (31.1% vs 11.1%, $p = 0.02$).

Conclusion: Elective cesarean sections are associated with more favorable maternal and perinatal outcomes compared to emergency procedures. These findings highlight the importance of proper patient selection and timing for elective CS and the need for prompt management of emergency cases to optimize outcomes.

Keywords: Cesarean Section, Elective, Emergency, Maternal Outcomes, Perinatal Outcomes, Apgar Score.

INTRODUCTION

Cesarean section (CS) rates have been rising globally, with current rates significantly exceeding the World Health Organization's recommended 10-15% in many countries, a trend observed in both developed and developing nations.¹ This upward trajectory necessitates a critical evaluation of the associated maternal and perinatal outcomes to optimize healthcare delivery. CS procedures are broadly classified as either elective (planned) or emergency (unplanned), a distinction based on the timing and indication for the procedure that carries profound clinical significance as it directly influences both maternal and perinatal outcomes.²

Elective cesarean sections are typically performed for recognized maternal or fetal indications before the onset of labor. Common indications include previous cesarean sections, breech presentation, placenta previa, and major congenital anomalies.³ This planned nature allows for thorough preoperative preparation, including patient counseling, optimization of medical conditions, fasting, and the scheduling of the procedure during daytime hours with a well-rested, senior surgical team.⁴ In contrast, emergency cesarean sections are performed due to unforeseen, acute complications arising during labor that threaten the life or well-being of the mother, fetus, or both. These include conditions like fetal distress, failure to progress, cord prolapse, or abruptio placentae.⁵ The emergent nature of these procedures often means they are conducted

under time-sensitive circumstances, which may limit preoperative optimization, necessitate general anesthesia, and involve a fatigued team, all of which can contribute to increased technical difficulties and compromised outcomes.⁶

The existing body of literature suggests a clear divergence in outcomes between these two categories of cesarean delivery. Emergency cesarean sections have been consistently associated with increased maternal morbidity, including higher rates of intraoperative hemorrhage, blood transfusion requirements, visceral injury (particularly to the bladder and bowel), surgical site infections, and postpartum endometritis.^{7,8} This increased risk profile is attributed to factors such as the urgency of the procedure, prolonged rupture of membranes, and multiple vaginal examinations during labor.⁹ Similarly, perinatal outcomes may be less favorable in emergency procedures. The very indications for emergency CS, such as fetal distress or chorioamnionitis, often mean the neonate is already compromised at birth, leading to lower Apgar scores, higher rates of neonatal resuscitation, and increased admissions to the Neonatal Intensive Care Unit (NICU).¹⁰ Furthermore, the risk of iatrogenic respiratory morbidity due to transient tachypnea of the newborn is a consideration in elective CS performed before the onset of labor, though this must be weighed against the risks of emergency procedures.¹¹

However, despite this established knowledge, there remains a need for contemporary comparative studies from tertiary care settings, which often manage high-risk pregnancies and complex cases.¹² The profile of patients and the spectrum of indications in such settings can provide valuable, context-specific insights. Elucidating these differences is crucial for patient counseling, resource allocation, and the development of targeted strategies to improve outcomes, particularly for emergency procedures where risk mitigation is most critical.¹³

This study, therefore, aims to compare maternal outcomes (including operative time, intraoperative blood loss, and postoperative complications) and perinatal outcomes (including Apgar scores at 1 and 5 minutes and NICU admissions) between elective and emergency cesarean sections at a tertiary care hospital. We hypothesize that elective cesarean sections will be associated with more favorable outcomes for both mother and neonate compared to emergency procedures.

METHODOLOGY

Study design, setting and population

A hospital-based, comparative cross-sectional study design was employed. This design was selected to compare maternal and perinatal outcomes between two distinct groups (elective and emergency cesarean sections) at a single point in time, allowing for the assessment of associations between the type of CS and various outcome measures. The study was conducted over a six-month period at the Department of Obstetrics and Gynecology. The target population consisted of all pregnant women admitted for delivery via cesarean section at the study hospital during the data collection period.

Inclusion Criteria:

- Singleton pregnancy.
- Gestational age of 37 weeks or more confirmed by first-trimester ultrasound.
- Women undergoing either elective or emergency cesarean section.

Exclusion Criteria:

- Multiple gestations (twins, triplets, etc.).
- Preterm delivery (less than 37 weeks of gestation).
- Known placenta previa, placenta accreta spectrum, or morbidly adherent placenta.
- Women with severe pre-existing medical disorders (e.g., severe cardiac disease, chronic kidney disease, active collagen vascular disorders).
- Intrauterine fetal death.

Sample Size Calculation

The sample size was calculated using the formula for comparing two means, with the primary outcome being operative time. Based on previous studies showing a mean difference of 15 minutes in operative time between elective and emergency cesarean sections, with a standard deviation of 12 minutes, and setting the significance level (α) at 0.05 and power ($1-\beta$) at 90%, the calculation yielded a minimum requirement of 21 participants per group. To enhance the study's robustness, account for potential attrition, and ensure adequate power for analyzing multiple secondary outcomes including blood loss and Apgar scores, the sample size was increased to 45 per group, resulting in a total sample of 90 participants. This larger sample size provides greater statistical power and improves the generalizability of our findings while maintaining feasible recruitment within the study timeframe.

Procedure for Data Collection

1. **Identification and Recruitment:** Potential participants were identified daily from the labor room and antenatal ward registers. Women who had undergone a cesarean section and met the eligibility criteria were approached for participation.
2. **Informed Consent:** The nature and purpose of the study were explained to eligible women postpartum, and written informed consent was obtained.

3. **Data Extraction:** Data were collected using a pre-designed, structured proforma. Maternal data, including demographic details, obstetric history, and intraoperative details (operation time, estimated blood loss, complications), were extracted from patient files, anesthesia records, and operation theater notes.
4. **Neonatal Assessment:** Perinatal data, including Apgar scores assigned by the attending pediatrician or neonatologist (who was blinded to the study groups for objective assessment) and NICU admission details, were recorded from the neonatal charts.

Statistical analysis

All collected data were entered into a Microsoft Excel spreadsheet. A double-data-entry method was used to ensure accuracy. The cleaned dataset was then exported to the Statistical Package for the Social Sciences (SPSS) version 26.0 for statistical analysis.

Table 1: Baseline Characteristics of the Study Participants

Characteristic	Elective CS (n=45)	Emergency CS (n=45)	p-value
Maternal Age (years)	28.1 ± 4.5	27.6 ± 5.1	0.62
Gestational Age (weeks)	38.5 ± 0.7	38.7 ± 0.9	0.25
Primigravida	18 (40.0%)	22 (48.9%)	0.40
Previous Cesarean Section	15 (33.3%)	11 (24.4%)	0.35
Indication for CS (Top 3)			
• Previous CS	15 (33.3%)	-	-
• Breech Presentation	12 (26.7%)	-	-
• Cephalopelvic Disproportion	8 (17.8%)	-	-
• Fetal Distress	-	20 (44.4%)	-
• Failure to Progress	-	18 (40.0%)	-
• Abruptio Placentae	-	4 (8.9%)	-

The two study groups were comparable in terms of key baseline characteristics such as maternal age, gestational age, and proportion of first-time mothers (primigravida). This similarity between the groups strengthens the validity of the comparison, suggesting that the differences observed in outcomes are more likely attributable to the type of cesarean section (elective vs. emergency) rather than to underlying differences in the patient populations.

Table 2: Comparison of Maternal Outcomes between Elective and Emergency Cesarean Section Groups

Maternal Outcome	Elective CS (n=45)	Emergency CS (n=45)	p-value
Operation Time (minutes)	48.2 ± 8.3	68.5 ± 10.1	<0.001
Estimated Blood Loss (ml)	585 ± 125	785 ± 165	<0.001
Postoperative Complications	4 (8.9%)	12 (26.7%)	0.03

The analysis of maternal outcomes demonstrated a clear advantage for the elective cesarean section group. The mean operation time was significantly shorter in the elective group compared to the emergency group (48.2 minutes vs. 68.5 minutes). Similarly, the estimated intraoperative blood loss was considerably lower in elective procedures (585 ml vs. 785 ml). Furthermore, the overall rate of postoperative complications was more than three times higher in the emergency CS group (26.7%) than in the elective group (8.9%).

Table 3: Comparison of Perinatal Outcomes between Elective and Emergency Cesarean Section Groups

Perinatal Outcome	Elective CS (n=45)	Emergency CS (n=45)	p-value
Apgar Score at 1 minute	7.8 ± 0.9	6.9 ± 1.2	<0.001
Apgar Score at 5 minutes	8.7 ± 0.5	8.2 ± 0.8	0.001
NICU Admission	5 (11.1%)	14 (31.1%)	0.02

Perinatal outcomes were consistently more favorable in the elective CS group. Neonates delivered by elective CS had significantly higher Apgar scores at both 1 minute (7.8 vs. 6.9) and 5 minutes (8.7 vs. 8.2) after birth, indicating better immediate physiological condition. This clinical advantage was further reflected in the need for neonatal intensive care, as the rate of NICU admissions was nearly three times higher for babies born via emergency CS (31.1%) compared to those born via elective CS (11.1%).

DISCUSSION

This comparative cross-sectional study aimed to evaluate the differences in maternal and perinatal outcomes between elective and emergency cesarean sections at a tertiary care hospital. Our findings robustly demonstrate that elective cesarean sections are associated with significantly more favorable outcomes for both the mother and the neonate compared to emergency procedures, thereby confirming our initial hypothesis.

The superior maternal outcomes observed in the elective CS group align consistently with the existing body of literature.^{7,8,14} The significantly shorter mean operative time (48.2 vs. 68.5 minutes) and reduced estimated blood loss (585 ml vs. 785 ml) in planned surgeries can be attributed to the controlled conditions under which they are performed. Unlike emergency scenarios, elective procedures allow for meticulous preoperative planning, including the involvement of a senior, well-rested surgical team, optimal anesthetic preparation, and the absence of the physiological stresses of prolonged labor.^{4,6} This controlled environment likely contributes to greater surgical ease and efficiency. Furthermore, the significantly higher rate of postoperative complications in the emergency CS group (26.7% vs. 8.9%) underscores the increased maternal morbidity associated with unplanned operations. This elevated risk profile is a well-documented consequence of factors unique to emergency settings, such as prolonged rupture of membranes, multiple vaginal examinations, and the urgency of the procedure itself, which collectively heighten the susceptibility to infections like endometritis and surgical site complications.⁹

Similarly, our analysis of perinatal outcomes revealed a distinct advantage for neonates delivered via elective CS. The significantly higher Apgar scores at both 1 and 5 minutes in the elective group indicate a better immediate physiological transition at birth.^{10,15} This finding is intrinsically linked to the very indications for emergency CS, such as fetal distress or failure to progress, which often mean the fetus is already compromised by the time delivery is initiated. In contrast, elective sections are performed on generally stable fetuses, avoiding the hypoxic stress of a complicated labor. This is further corroborated by the nearly three-fold higher rate of NICU admissions in the emergency group (31.1% vs. 11.1%), reflecting a greater need for neonatal resuscitation and management of conditions like birth asphyxia and suspected sepsis.^{10,16} While the risk of iatrogenic respiratory morbidity like transient tachypnea of the newborn is a recognized consideration in elective CS performed before 39 weeks, our study, which included only term pregnancies (≥ 37 weeks), still demonstrated a clear net benefit for elective procedures in terms of overall neonatal well-being.^{11,17}

The strengths of this study include its robust design, the use of blinded assessment for Apgar scores to minimize bias, and the comparability of baseline characteristics between the two groups, which strengthens the internal validity of our conclusions. However, certain limitations must be acknowledged. As a single-center study, the generalizability of our findings may be limited. The cross-sectional design can establish associations but not causality.

CONCLUSION

In conclusion, this study provides contemporary evidence from a tertiary care setting that elective cesarean sections are associated with significantly better maternal and perinatal outcomes compared to emergency procedures. The findings underscore the critical importance of diligent antenatal care and timely decision-making to facilitate planned surgeries wherever clinically indicated, thereby avoiding the heightened risks of emergency interventions. For situations where emergency CS is unavoidable, our results highlight the imperative for optimized hospital protocols, including ready availability of senior obstetricians, anesthesiologists, and neonatal resuscitation teams, to mitigate associated risks. Future research should focus on multi-center longitudinal studies to further validate these findings and explore targeted strategies for improving outcomes in emergency cesarean deliveries.

Declaration:

Conflicts of interests: The authors declare no conflicts of interest.

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