

Perinatal and Maternal Outcomes of Caesarean Section Done in Second Stage of Labour: A Prospective Observational Study

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Abstract

Background: Caesarean section (CS) performed in the second stage of labour is technically demanding and is associated with greater maternal and perinatal morbidity than CS performed earlier in labour. Indian data on this subgroup remain limited.

Objectives: To evaluate the maternal and perinatal outcomes of CS performed in the second stage of labour.

Materials and Methods: This hospital-based prospective observational study was conducted in the Department of Obstetrics & Gynaecology, Assam Medical College & Hospital, Dibrugarh, over one year (September 2024–September 2025) on 70 women who underwent CS in the second stage of labour and their newborns. Maternal demographics, indications, operative technique, intra- and post-operative complications, and neonatal outcomes were recorded and analysed using descriptive statistics.

Results: The mean maternal age was 25.76 ± 3.86 years; 55.71% were primigravida and 74.29% were referred cases. Cephalopelvic disproportion (37.14%) was the commonest indication, and the Patwardhan technique (80.0%) was the commonest method used for delivering the impacted head. Uterine incision extension (45.71%) and postpartum haemorrhage (35.71%) were the leading intra-operative complications; paralytic ileus (22.86%) and prolonged catheterisation (21.43%) were the leading post-operative complications. Low 1-minute Apgar score occurred in 68.57% of neonates, 40.0% required NICU admission, and perinatal mortality was 2.86%.

Conclusion: CS in the second stage of labour carries substantial maternal and perinatal morbidity. Early recognition of labour abnormalities, timely decision-making and skilled operative technique are essential to minimise complications.

Keywords: Second Stage of Labour, Caesarean Section, Maternal Outcome, Perinatal Outcome, NICU Admission, Patwardhan Technique.

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Introduction

Caesarean section (CS) is the delivery of the fetus, placenta and membranes through a surgical incision in the abdominal and uterine walls. [1] It is among the oldest surgical procedures known to medicine, with accounts dating back to ancient Greek, Roman, Hindu and Egyptian traditions, although it only evolved into a routine life-saving intervention for both mother and child following the surgical advances of the nineteenth century. In contemporary obstetric practice, the World Health Organization considers a population-level CS rate of 5–15% to be appropriate: rates above this threshold generally reflect unnecessary surgical intervention, while rates below 5% may indicate

inadequate access to emergency obstetric care.[3] Despite this benchmark, CS rates have risen steeply worldwide over the past decade — from a global estimate of roughly 17.6% around 2010, with wide regional variation (about 36% in the Americas, 23% in Europe, 9% in Asia and 4% in Africa) — and CS carries up to eight times the mortality and eight-to-twelve times the morbidity of uncomplicated vaginal birth. [4] In India, national survey data show that the prevalence of caesarean delivery rose from 16.7% in 1998–99 to 21.5% in 2019–21, a trend that has intensified the burden on tertiary obstetric units and renewed calls for closer monitoring of the indications for surgical delivery.

[5] The second stage of labour is defined as the interval between full cervical dilatation and delivery of the fetus, and is considered prolonged when progress stalls for three hours or more in nulliparous women, or two hours or more in multiparous women, with or without regional anaesthesia. [6] Caesarean section performed after full dilatation — second-stage CS — occurs when vaginal or instrumental delivery is no longer feasible or safe despite the mother having reached full dilatation, and it represents one of the more challenging decisions in modern obstetric practice. [1] At this point the fetal head is typically deeply engaged and often impacted in the maternal pelvis, which makes the operation technically more demanding than an earlier CS: it carries a higher risk of uterine angle extension, haemorrhage, bladder injury and prolonged operative time for the mother, and of birth asphyxia, low Apgar scores and a greater need for neonatal intensive care for the baby.

The Royal College of Obstetricians and Gynaecologists reports that nearly 6% of operative deliveries occur at full dilatation, often reflecting insufficient senior supervision or gaps in specialised training; a lack of expertise in managing a difficult delivery at this stage contributes directly to maternal and neonatal morbidity. [2]

Although overall CS rates have risen steadily over the past two decades, the specific burden of second-stage CS has received comparatively little attention. Many such deliveries are unanticipated, occurring after a prolonged and difficult second stage, and are compounded by the absence of uniform national protocols, training deficits, and inadequate supervision of junior staff — factors that together make the decision to proceed to CS at full dilatation one of the more consequential judgements an obstetrician can face.

Given the limited Indian literature specifically addressing this subgroup of deliveries, the present study was undertaken to prospectively evaluate the maternal and perinatal outcomes of CS performed in the second stage of labour at a tertiary-care teaching hospital in Assam. By characterising the indications, operative techniques and complications associated with these deliveries, the study aims to help obstetricians better anticipate risk, refine surgical decision-making, and guide training priorities directed at reducing associated morbidity.

Aims and Objectives

Aim: To study the maternal and perinatal outcomes of caesarean section done in the second stage of labour.

Objectives:

- To evaluate the outcomes of caesarean section done in the second stage of labour in the mother.
- To evaluate the outcomes of caesarean section done in the second stage of labour on the foetus.

Materials and Methods

This hospital-based prospective observational study was carried out in the Department of Obstetrics & Gynaecology, Assam Medical College & Hospital, Dibrugarh, over one year (September 2024 to September 2025) on 70 women who underwent CS in the second stage of labour, together with their newborns. All term pregnant women undergoing CS in the second stage of labour, admitted either through the OPD or as emergencies, were enrolled using continuous sampling.

Assuming a background incidence of 1% for second-stage CS, the sample size was calculated at 70, with 95% confidence and a 2.5% margin of error.

Inclusion Criteria: Prolonged second stage of labour; fetal distress or non-reassuring fetal heart rate; arrest of descent; persistent occiput-posterior position; shoulder dystocia; singleton gestation; fetal macrosomia; and failed instrumental delivery.

Exclusion Criteria: Women with medical disorders (hypertension, cardiac disease, hypothyroidism, gestational diabetes, etc.); prior uterine surgery (previous CS, myomectomy, exploratory surgery); multiple gestation; and those declining participation.

Written informed consent was obtained from all participants and institutional ethical clearance was secured before enrolment. Detailed obstetric history, examination findings, indication for CS, anaesthesia and skin-incision type, intra-operative and post-operative complications, and neonatal condition were recorded on a structured proforma; mother–baby pairs were followed until hospital discharge. Quantitative data are presented as mean $\pm$ SD and categorical data as frequency (%). The Chi-square/Fisher's exact test was used for categorical variables and the t-test (or Mann–Whitney test for non-normal data) for continuous variables; $p < 0.05$ was considered statistically significant.

Results

Among the 70 women studied, most (77.14%) were aged 20–30 years (mean 25.76 ± 3.86 years, range 19–35 years); 55.71% were primigravida and 74.29% were referred, unbooked cases. The largest gestational-age group was 41–42 weeks (40.0%).

Table 1: Baseline characteristics (n = 70)

Characteristic	Category	n	%
Age (years)	<20	6	8.57
	20–30	54	77.14
	>30	10	14.29
Parity	Primigravida	39	55.71
	Multigravida	31	44.29
Booking status	Booked (AMCH)	18	25.71
	Referred	52	74.29
Gestational age	37–38 wks	21	30.00
	39–40 wks	21	30.00
	41–42 wks	28	40.00

Cephalopelvic disproportion was the commonest indication for second-stage CS (37.14%), followed by arrest in the second stage (32.86%), prolonged second stage (25.71%) and failed instrumental delivery (4.29%). A low-transverse uterine incision was used in 58.57% of cases and a higher

curvilinear incision in 35.71%; J-shaped and inverted-T incisions were each required in 2.86%. The Patwardhan technique was the commonest method for delivering the deeply impacted fetal head (80.0%), followed by the push method (18.57%) and pull method (1.43%).

Table 2: Maternal complications (n = 70)

Complication	n	%
Intra-operative		
Uterine incision extension	32	45.71
Postpartum haemorrhage	25	35.71
Angle haematoma	7	10.00
Haematuria	5	7.14
Bladder injury	1	1.43
Post-operative		
Paralytic ileus	16	22.86
Prolonged catheterisation	15	21.43
Need for higher antibiotics	13	18.57
Prolonged hospitalisation	13	18.57
Wound infection	4	5.71
Postoperative fever	4	5.71
Need for blood transfusion	4	5.71
Maternal sepsis	1	1.43

No cases of bowel or ureteric injury occurred. On the neonatal side, 97.14% of babies were born alive and 2.86% were stillborn; 60.0% weighed 3.0–3.5 kg. A low Apgar score at 1 minute was seen in 68.57% of neonates, falling to 40.0% by 5 minutes. Overall, 57.14% of neonates remained stable, 40.0% required NICU admission, and 2.86% were stillborn.

Table 3: Perinatal outcomes (n = 70)

Outcome	n	%
Low Apgar score at 1 min	48	68.57
Low Apgar score at 5 min	28	40.00
NICU admission	28	40.00
Birth asphyxia	15	21.43
Neonatal respiratory distress	12	17.14
Neonatal sepsis	3	4.29
Birth trauma	1	1.43
Perinatal mortality (incl. stillbirth)	2	2.86

Discussion

This prospective study of 70 women confirms that CS performed in the second stage of labour is technically demanding and carries a substantial burden of maternal and perinatal morbidity,

consistent with the wider literature. The predominance of women aged 20–30 years mirrors the findings of Khadbade et al., [7] and the high proportion of unbooked, referred cases reflects the pattern reported by Yadav et al., [8] who attributed

it to delayed referral and prolonged labour management at peripheral centres. The preponderance of post-dated pregnancies (41–42 weeks) in the present cohort suggests that prolonged gestation and labour are important contributors to second-stage operative intervention.

Cephalopelvic disproportion was the leading indication in this study, in keeping with Kumaresan et al. [9] (47.2%), while arrest of descent and fetal distress predominated in other series; [10–12] together these indications account for the great majority of second-stage CS across studies. The Patwardhan technique, used in 80.0% of the present cohort for delivering the impacted head, was likewise the preferred method in comparable studies, albeit at lower frequencies (23–28%), [13,14] underscoring the value of surgical expertise in reducing complications during a difficult extraction.

Uterine incision extension and postpartum haemorrhage were the leading intra-operative complications here, a pattern echoed by Goswami et al., [15] Bhatia et al. [16] and others, [10] though reported rates vary (16–28% for incision extension; 8–25% for haemorrhage) depending on operator experience and case-mix. Post-operatively, paralytic ileus and prolonged catheterisation predominated in the present series, differing somewhat from other reports where febrile morbidity was more prominent; [15,16,18] this may reflect greater bowel handling and surgical duration during difficult extractions in the present cohort.

Perinatal morbidity was considerable: low Apgar scores, a 40% NICU admission rate, and a 2.86% perinatal mortality are broadly consistent with published ranges (NICU admission 14–50%; mortality up to 18% in some series). [7,10,11,18,19] Birth asphyxia and respiratory distress were the leading perinatal complications, mirroring the findings of Dahiya et al. [10] and Gurashi et al.,¹¹ and likely reflect sustained uterine contraction, prolonged head compression and impaired perfusion associated with a difficult second-stage delivery. Collectively, these findings reinforce the case for early recognition of labour abnormalities, timely decision-making, structured training in techniques for delivering the impacted head, and adequate senior supervision to reduce both maternal and neonatal morbidity.

Conclusion

Caesarean section in the second stage of labour is a technically demanding procedure associated with significant maternal and perinatal morbidity, including uterine incision extension, postpartum haemorrhage, paralytic ileus, low Apgar scores and increased NICU admission. While it may remain the safest option for mother and baby in some

situations, it also carries appreciable risk for both. Sound clinical judgement, adequately trained and supervised obstetric staff, standardised institutional protocols, and skilled use of techniques such as the Patwardhan method are essential to minimise complications and improve maternal and neonatal outcomes.

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