

RESEARCH ARTICLE

Maternal and Fetal Outcome in Second Stage Caesarean Section

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Abstract

Background: Second-stage CS is riskier than first-stage CS due to complications like a deeply engaged fetal head, limited amniotic fluid, and a thin uterine segment, making fetal extraction difficult. Maternal risks include uterine tears, hemorrhage, and bladder injuries, while neonatal risks include asphyxia and NICU admissions.

Aim of the study: The study aims to evaluate obstetric outcomes in women undergoing second-stage cesarean sections, focusing on maternal and fetal.

Methods: This cross-sectional study, conducted in the Department of Obstetrics and Gynecology, 250 Bed Gaibandha District Hospital, Gaibandha, Bangladesh., examined obstetric outcomes in 60 women undergoing second-stage cesarean sections (CS) from January 2023 to June 2023. Ethical approval was obtained from the hospital's Ethical Review Committee. Women aged 18-39 years without medical comorbidities or fetal abnormalities were included. The study assessed labor characteristics, intraoperative complications, fetal outcomes, and postoperative complications. Data were recorded in Excel and analyzed using IBM SPSS Statistics (version 26.0).

Result: The mean age was 28.34 years (SD=4.8). Primigravida women made up 70%, and 30% were multigravida. Delivery gestational age was distributed as 45% at 37-38 weeks, 53.33% at 39-40 weeks, and 1.67% at 41 weeks. Labor was spontaneous in 66.67% and induced in 33.33%. Labor duration varied, with 46.67% experiencing 1-12 hours. The most common delivery mode was Modified Patwardhan (35%), followed by Vertex (28.33%). The most frequent cesarean indication was non-reassuring fetal status (35%). The most common intra-operative complication was uterine angle extension (20%), and the most frequent postoperative complication was postpartum hemorrhage (6.67%). Hospital stays ranged mostly from 3-5 days (86.67%).

Conclusion: The study underscores the significant maternal and fetal risks of second-stage cesarean sections, with non-reassuring fetal status and labor progression issues being the primary indications. Uterine angle extension was the most common intraoperative complication, while postpartum hemorrhage and infections were frequent challenges. Fetal outcomes included low APGAR scores, respiratory distress, and NICU admissions.

Keywords: Second Stage Caesarean Section, Maternal and Fetal Outcome.

1. Introduction

Cesarean section (CS), defined as the surgical delivery of a fetus through incisions made in the abdominal and uterine walls, has long been an alternative to

vaginal delivery, especially when complications arise during labor [1]. The frequency of CS procedures, particularly those performed in the second stage of labor, has seen a notable increase in recent years [2].

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The second stage of labor, marked by full cervical dilation at 10 cm and concluding with the birth of the baby, is crucial as it presents unique risks and technical challenges when a CS is required [3]. Second-stage CS is distinct from CS performed earlier in labor, due to its additional risks to both the mother and fetus. Unlike first-stage CS, second-stage procedures are often complicated by the fetus's deeply engaged head in the pelvis, limited amniotic fluid, and the thin, edematous lower uterine segment, all of which make fetal extraction technically difficult [4]. According to recent reports, 6% of primary CS procedures occur at full dilation, often without prior attempts at assisted vaginal delivery [5]. This lack of instrumental delivery attempts and the technically challenging nature of second-stage CS underscore the importance of skilled obstetric decision-making [6]. From a maternal health perspective, the complications associated with second-stage CS are significant. Commonly observed maternal morbidities include uterine tears, postpartum hemorrhage, and broad ligament hematomas. Additional complications such as bladder injuries, infections, and the need for prolonged hospitalization also increase the burden on both patients and healthcare providers [7]. Such risks not only affect immediate recovery but may also lead to long-term health implications, particularly if emergency surgical interventions are necessary [2]. Additionally, technical challenges in delivering a deeply impacted fetal head further elevate these risks, adding complexity to the surgical process [8]. Neonatal outcomes in second-stage CS also reflect heightened risk factors. Birth asphyxia, NICU admissions, fetal acidemia, and hypoxemia are prevalent complications, and, in severe cases, the procedure may lead to prolonged NICU stays or even neonatal death. The increased morbidity associated with second-stage CS, particularly in neonates, underscores the need for prompt and skilled intervention to minimize adverse effects on the fetus [9]. One factor contributing to the rise in second-stage CS rates is the absence of clear guidelines and protocols for managing labor at full cervical dilation. Currently, there are no universally accepted guidelines to assist obstetricians in deciding whether to attempt a vaginal delivery or proceed with a CS in the second stage. This lack of guidance often results in junior staff making decisions without adequate supervision or support, leading to suboptimal outcomes [10,11]. As a result, many CS procedures in the second stage could potentially be avoided with the involvement of senior obstetricians and the appropriate use of instrumental delivery

techniques [2]. Globally, medical professionals and organizations are recognizing the urgent need for training programs and structured protocols to enhance second-stage labor management. The Royal College of Obstetricians and Gynecologists (RCOG) and the American College of Obstetricians and Gynecologists (ACOG) have extended the recommended duration of the second stage to allow more time for natural delivery attempts, aiming to reduce unnecessary CS rates [12]. The aim of the present study was to evaluate obstetric outcomes in women undergoing second-stage cesarean sections, focusing on maternal and fetal results to better understand the associated risks and complications of this procedure.

2. Methodology and Materials

This cross-sectional study was conducted within the Department of Obstetrics and Gynecology, 250 Bed Gaibandha District Hospital, Gaibandha, Bangladesh. It aimed to examine obstetric outcomes in women who underwent cesarean section (CS) during the second stage of labor. The study spanned from January 2023 to June 2023 and involved 60 postnatal women who experienced second-stage CS. The ethical approval for the study was obtained from the hospital's Ethical Review Committee.

2.1 Inclusion Criteria

- Women aged ≥ 18 to 39 years.
- Pregnant women who underwent second-stage cesarean section.

2.2 Exclusion Criteria

- Pregnancies with intrauterine fetal demise, medical comorbidities such as cardiac disease, major fetal abnormalities, preterm labor and multiple pregnancies.

Women were assessed based on several labor characteristics, such as whether labor was spontaneous or induced, labor duration, and findings from per speculum and per vaginal examinations at the time of the CS decision. These findings included the presence of cervicovaginal infection, characteristics of the amniotic fluid (liquor), fetal head station, molding, caput, and head rotation. The study also reviewed any attempts at instrumental delivery prior to CS, reasons for opting for CS, anesthesia type, abdominal and uterine incisions, and method of fetal head removal.

The study assessed various intraoperative complications, including uterine angle extensions, broad ligament hematoma, bladder injury, tears in

the lower uterine segment and adjacent structures, bowel injury, and significant blood loss. Fetal outcomes included the APGAR scores at 1 and 5 minutes, birth weight, NICU admissions, reasons for admission, birth asphyxia, birth injuries, sepsis, hospitalization duration, and neonatal mortality. Postoperative complications analyzed in the study comprised postpartum hemorrhage, postpartum fever, infections, wound complications, and the duration of catheterization and hospitalization.

3. Data Analysis

Data were systematically recorded in Microsoft Excel to organize and maintain accurate records for each participant. All the data was presented in tables and graphs. Subsequently, statistical analysis was conducted using IBM SPSS Statistics for Windows (version 26.0). Continuous variables were expressed as the mean \pm standard deviation (SD). Categorical variables were summarized using frequencies (n) and percentages.

4. Results

In this study, we enrolled 60 pregnant women who underwent second-stage cesarean section. Table 1 shows the baseline characteristics of the study women. The mean age of the participants is 28.34 years, with a standard deviation of 4.8. Regarding parity distribution, 42(70%) were primigravida, and 18(30%) were multigravida. The gestational age distribution shows that 45% delivered between 37-38 weeks, 53.33% between 39-40 weeks, and 1.67% at 41 weeks. Labor was spontaneous in 40(66.67%) cases and induced in 20(33.33%) cases. The duration of labor varied, with 46.67% of women experiencing

1-12 hours of labor, 36.67% experiencing 13-18 hours, 13.33% experiencing 19-24 hours, and 3.33% enduring more than 24 hours. According to the modes of delivery in table 2, Modified Patwardhan is the most common mode, accounting for 21(35.00%) cases of deliveries. This is followed by Vertex deliveries, which account for 17(28.33%) cases. Patwardhan mode is noted in 12(20.00%), and the Push mode of delivery is the least frequent (16.67%). Figure 1 presents data on the indications for cesarean deliveries. The most common indication was non-reassuring fetal status, occurring in 21 cases, which constitutes 35.00% of the total. This was followed by non-progress of labor with 12 cases (20.00%) and cephalopelvic disproportion (CPD) with 11 cases (18.33%). The least frequent indication was the occipital-posterior position, which was seen in 3 cases (5.00%). Among intra-operative complications, extension of the uterine angle occurred most frequently with 12 (20%) cases, followed by blood transfusion with 10 cases (16.67%), and atonic postpartum hemorrhage (PPH) with 8 cases (13.33%). Blood-stained urine was noted in 7 cases (11.67%), respectively. Post-operative complications included postpartum hemorrhage, affecting four patients (6.67%), febrile illness, and wound infection, each affecting three patients (5%) (Table 3). The complications listed include 1-minute APGAR scores below 5 (10%), 5-minute APGAR scores below 5(13.33%), respiratory distress (16.67%), birth injuries (3.33%), NICU admissions (30%), septicemia (10%), and fresh stillbirths (1.67%). Regarding hospital stays, 13.33% of patients stayed for 6-10 days, while a significant majority of 86.67% stayed for 3-5 days (Table 4).

Table 1. Baseline characteristics of the study population (n=60).

Variables	Frequency (n)	Percentage (%)
Age (years)		
Mean \pm SD	28.34 \pm 4.8	
Parity distribution		
Primigravida	42	70
Multigravida	18	30
Gestational age (weeks)		
37-38	27	45
39-40	32	53.33
41	1	1.67
Indication of labour		
Spontaneous	40	66.67
Induced	20	33.33
Duration of labour (Hours)		
1-12	28	46.67
13-18	22	36.67
19-24	8	13.33
>24	2	3.33

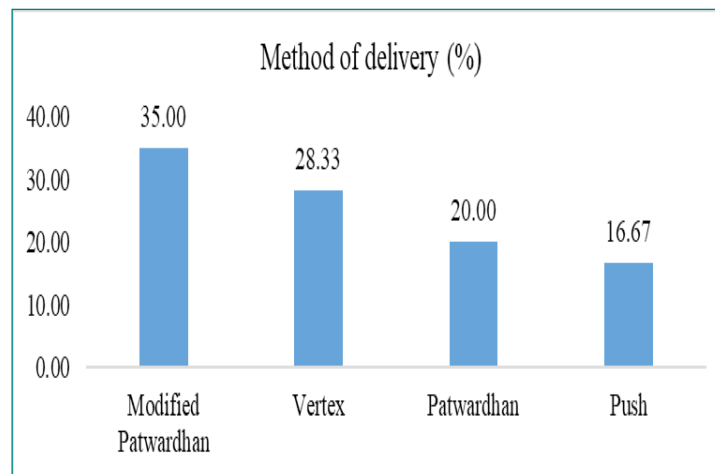


Figure 1. Distribution according to the method of delivery of the deeply impacted head (n=60)

Table 2. Distribution of patients according to indications of second-stage CS (n=60)

Indications	Frequency (n)	Percentage (%)
Non-reassuring fetal status	21	35.00
Non-progress of labor	12	20.00
Cephalopelvic disproportion (CPD)	11	18.33
Deep transverse arrest (DTA)	8	13.33
Failed operative vaginal delivery	5	8.33
Occipito-posterior	3	5.00

Table 3. Intra- and post-operative maternal complications (n=60)

Variables	Frequency (n)	Percentage (%)
Intra-operative complications		
Atonic PPH	8	13.33
Extension of uterine angle	12	20.00
Injury to uterine vessels	3	5.00
Blood transfusion	10	16.67
Bladder injury	1	1.67
Blood-stained urine	7	11.67
Post-operative complications		
Febrile illness	3	5.00
Wound infection	3	5.00
Postpartum hemorrhage	4	6.67

Table 4. Neonatal outcomes of the study (n=60)

Complications	Frequency (n)	Percentage (%)
1 Min APGAR <5	6	10
5 Min APGAR <5	8	13.33
Respiratory distress	10	16.67
Birth injuries	2	3.33
NICU admission	18	30
Septicemia	6	10
Fresh Stillbirth	1	1.67
Hospital stays (Days)		
6-10	8	13.33
3-5	52	86.67

5. Discussion

The background rate of second-stage caesarean sections has been estimated at around 2% of all deliveries [2]. There is a recent trend to go to caesarean section in the second stage without due consideration of operative vaginal delivery, a combination of lack of training and supervision for junior staff in second stage decision-making, a loss of technique associated with difficult-assisted delivery and concerns relating to maternal and neonatal morbidity with associated litigious issues might have contributed to this disturbing trend. The findings of this study provide valuable insights into the maternal and fetal outcomes associated with second-stage CS. The mean age of the study participants was 28.34 years (± 4.8), which is consistent with the typical reproductive age range and with other similar studies [13,14]. A significant proportion of the participants were primigravida (70%), which suggests that first-time mothers may be more likely to undergo second-stage caesarean section, possibly due to mild to moderate cephalopelvic disproportion, rigid perineum, and lack of experience of previous labour in primigravida women. This is aligned with findings from other studies [15,16]. Gestational age distribution showed that most patients were between 37 and 40 weeks of gestation (98.33%), with a very small percentage (1.67%) delivering at 41 weeks. This is in line with standard obstetric practices, where caesarean sections are generally recommended for complications arising during or after 37 weeks. Similarly, the study of Anusha on 40 deliveries revealed that the gestational age predominantly ranged from 37 to 39 weeks, with only three cases extending beyond 40 weeks [17]. The findings of this study show that a majority of the labors were spontaneous (66.67%), which may be indicative of normal progression. The duration of labor was varied, with most of the patients experiencing labor lasting between 1 to 12 hours. The results of our study are comparable with the study of Unterscheider et al [18]. In our study deeply engaged head delivered by motified patwardhan method were 35.0%, vertex method was 28.33%, patwardhan were 20.0% and by push method 16.67%. This result was comparable with Goswami et al. [19]. The most common indications for second-stage caesarean section were non-reassuring fetal status (35%), followed by non-progress of labor (20%) and CPD (18.33%). Non-reassuring fetal status is a frequent indication for emergency caesarean delivery and is commonly associated with fetal heart rate abnormalities, suggesting fetal distress during labor. CPD, where the baby's head is too large to

pass through the pelvis, remains a significant cause of caesarean delivery, particularly in nulliparous women. Other indications such as deep transverse arrest (DTA) and failed operative vaginal delivery (OVD) further highlight the role of second-stage caesarean sections in managing obstetric emergencies when vaginal delivery is not feasible or safe. According to Babre et al., the most frequent signs were non-descending head, deflexed head, DTA, failed vacuum, and occipito-posterior [15]. In research presented by Belay et al., CPD (48.5%) was the most prevalent indication [20]. Intra-operative complications included atonic postpartum hemorrhage (PPH) (13.33%), extension of the uterine angle (20%), and blood transfusion requirements (16.67%). Atonic PPH is a well-known risk factor in caesarean deliveries, as the uterus may fail to contract effectively after delivery, leading to significant blood loss. Post-operative complications such as febrile illness and wound infection were relatively low, with only 5% of patients affected by each. However, postpartum hemorrhage (6.67%) remained a concern. In a study conducted by Khaniya et al., 20/36 patients experienced intraoperative complications. Blood-stained urine was the most common, occurring in 14 patients (33.88%), followed by uterine incision extension in five patients (13.88%), and B lynch compression suture was encountered in only one woman (2.77%) with atonic PPH [10]. Furthermore, in a study given by Moodley et al., the postoperative complication involved early PPH that involved three patients, and four patients were there for post-operative fever [21]. In terms of neonatal outcomes, the study found that 10% of neonates had a 1-minute APGAR score of less than 5, and 13.33% had a 5-minute APGAR score of less than 5, which are indicative of immediate neonatal distress requiring resuscitation. The incidence of respiratory distress (16.67%) and neonatal intensive care unit (NICU) admissions (30%) further highlights the vulnerability of neonates born via second-stage caesarean section, which may be associated with factors like prematurity, labor complications, or intrauterine distress. Birth injuries were rare, occurring in only 3.33% of cases, while neonatal septicemia and fresh stillbirth were observed in 10% and 1.67% of cases, respectively. Study of Gurung et al. demonstrated fetal and newborn complications with Meconium stained liquor consisting of 49 (34.2%) neonates, admission to nursery consisting of 22 (15.3%), NICU admission involving five (3.4%), neonatal jaundice in 14 (9.7%), Cephalhematoma in two (1.3%), Apgar score < 7 at 5 min including 13 (9%), and fresh stillbirth involving

one (0.6%) [22]. Khaniya et al. showed perinatal outcomes in their study and reported that baby weight between 2.5 and 2.9 involved 5.5% neonates, 3-3.5 involved 11.11%, between 3.6 and 4.0 consisting of 83.33% neonates, meconium stain liquor with 27.77%, Apgar score <5 at 5 min including 13.88%, NICU admission with 5.55% neonates, and fresh stillbirth consisting of 2.77% neonates [10]. Most patients (86.67%) had a hospital stay of 11 to 14 days, which is consistent with the typical recovery period for cesarean deliveries. Longer stays may be due to complications such as infections, hemorrhage, or the need for extended neonatal care in the NICU. Gurung et al. and Markandu et al. reported the mean hospital stay of 5.59 days and 2.28 days, respectively [22,23].

5.1 Limitations of the study

- Maternal and neonatal outcomes were assessed only in the immediate postoperative period, excluding long-term effects.
- The study did not compare outcomes with those who delivered vaginally or underwent first-stage CS, which could have provided deeper insights.

6. Conclusion

The study underscores the critical nature of second-stage CS as a life-saving intervention for both mothers and neonates when complications arise during labor. It highlights that second-stage CS is most frequently performed in primigravida women, with non-reassuring fetal status and non-progress of labor being the primary indications. The procedure, however, is associated with significant maternal complications such as uterine angle extensions and atonic postpartum hemorrhage, as well as neonatal complications like respiratory distress and NICU admissions. These findings emphasize the need for improved obstetric decision-making, enhanced training programs for junior staff, and the appropriate use of instrumental delivery techniques to minimize unnecessary CS. Ultimately, second-stage CS remains a vital intervention to ensure safe delivery outcomes in cases where vaginal delivery is not feasible, despite its associated risks.

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