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Original Research Article

The study of fetomaternal outcome in second stage caesarean section

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ABSTRACT

Background: Caesarean section is commonly perceived as a simple alternative to difficult vaginal birth and in the recent years its prevalence during the second stage is increasing. Caesarean section in second stage of labor has additional associated risks for the mother such as obstetric hemorrhage, extended uterine tear, bladder injury and longer hospital stay. It is also associated with increased neonatal morbidity in terms of NICU admissions, fetal acidemia, hypoxemia and prolonged NICU stay. This study was conducted to know the indications of second stage caesarean section and to assess maternal and neonatal outcomes in second stage caesarean section.

Methods: We conducted a prospective observational study conducted at a tertiary perinatal care center from August 2021 to August 2022. All second stage caesarean sections performed during this period were analyzed in terms of indication for caesarean section, intraoperative, postoperative complications and fetal outcomes.

Results: During the study period there were a total of 10433 deliveries. Out of this, 5392 deliveries done by caesarean section, in which 67 were second stage caesarean section. Deep transverse arrest was the most common indication for caesarean section in second stage of labor. Most common intra operative complication was uterine atony, seen in 32.5% cases. 16 (24%) NICU admission were noted with respiratory distress being the most common indication. 15 (23%) had post operative complications like febrile illness.

Conclusions: Second stage caesarean section is associated with significant maternal and neonatal morbidity. A skilled obstetrician and proper training are required to take appropriate decisions for caesarean section at full dilatation of cervix.

Keywords: Second stage caesarean section, Maternal outcome, Perinatal outcome

INTRODUCTION

Caesarean section is commonly perceived as a simple alternative to difficult vaginal birth and in the recent years its prevalence during the second stage is increasing.¹ Second stage of labour begins with full dilatation of the cervix and culminates with the birth of the baby.² Caesarean section in second stage of labour has additional associated risks for both the mother and fetus.³ It is associated with obstetric haemorrhage, extended uterine tear, broad ligament haematoma, bladder injury, infection and longer hospital stay.^{4,5} The delay in delivery during the second stage of labor may increase neonatal morbidity in terms of NICU admissions, fetal acidemia, hypoxemia

and prolonged NICU stay.⁶ Our study was conducted to know the indications of second stage caesarean section and to assess maternal and neonatal outcomes in second stage caesarean section. The purpose of this study was to analyse various methods that were used to deliver the head in second stage section. The study also deals with complications of second stage caesarean section and their management.

METHODS

We conducted a prospective observational study at a South Indian tertiary care center from August 2021 to August 2022. All second stage caesarean sections performed

during this period were included irrespective of parity. We excluded pregnancies with intrauterine fetal demise, medical comorbidities such as cardiac disease, major fetal abnormalities, preterm labour and multiple pregnancies. The primary objective was to study the maternal and neonatal outcomes. The indications of second stage cesarean section and the methods used to deliver the fetal head were amongst the secondary variables studied.

Sample size

Sample size was calculated assuming the proportion of neonatal death in second stage Caesarean deliveries as 12% as per the study by Anusha et al.¹³ The other parameters consider for sample size calculation were 8% absolute precision and 95% confidence level. The required sample size as per the above-mentioned calculation was 64. To account for a non-participation rate of a about 5%, another 3 subjects were added to the sample size making it 67.

Data collection and analysis

Data was collected from the electronic medical records and operative notes in a preset proforma. The same was compiled in excel sheet after completion of the sample size. The qualitative data was expressed in proportions and the quantitative data was expressed in means and standard deviation. Descriptive analysis was carried out by mean and standard deviation for quantitative variables, frequency and proportion for categorical variables. The association between these two variables was assessed by comparing the mean values along with their 95% CI. Independent sample t-test/ANOVA was used to assess statistical significance, $p < 0.05$ was considered statistically significant. Data was analysed by using coGuide software, V.1.01.

RESULTS

The total number of deliveries in the study period of 1 year was 10433. Of these, 5392 were caesarean sections. In our study total of 67 caesarean sections were performed in second stage of labour. Out of which 53 were primigravida and 14 were multigravida pregnancies. 57% of them were in the age group of 26-30 years, 22% were between 31-35 years and only three were above 35 years. The gestational age was between 37-39 weeks in 31 mothers and rest of mothers above 39 weeks. The demographic data is presented in (Table 1).

The most common indication for the second stage section was cephalopelvic disproportion seen in 63.24 % cases. Of these eight cases were deep transverse arrest (11.94%). The second most common indication of second stage caesarean section was presumed fetal compromise which was not amenable for assisted vaginal birth. Figure 1 shows the proportion of all the indications.

Table 1: Maternal demographic details and labor characteristics age distribution (n=67).

Variables	N	%
Age distribution (years)	19-25	11 16.42
	26-30	38 56.72
	31-35	15 22.39
	>35	3 4.48
Parity distribution	Primigravida	53 79.10
	Multigravida	14 20.90
Gestational age (weeks)	37-39	31 46.27
	>39	36 53.73
Indication of surgery	PFC	27 40.29
	Failed instruments	2 2.9
	Prolonged second stage	2 2.98
	Occipitoposterior	1 1.49
	CPD	35 63.24

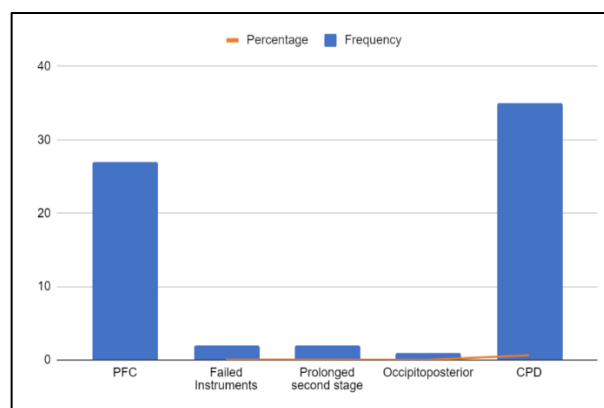


Figure 1: Indications for second stage cesarean section.

When we looked into the methods for delivery of the fetal head, 59 (87%) were delivered as vertex, 7 (10.5%) by the push method and 1 was delivered using the Patwardhan technique. The (Table 2) shows the different methods used for delivery of fetal head.

Maternal outcomes

Second stage caesarean sections are associated with technically difficulty and hence operative complications are expected to be more. In our study, the most common intra-operative complication was atonic post-partum haemorrhage seen in 33.3% cases. All the cases were treated with medical management and none needed any blood transfusion.

Table 2: Methods used for delivery of fetal head during Cesarean.

Additional method	N	%
Vertex	59	87.06
Patwardhan	1	1.49
Push method	7	10.45

Table 3: Maternal complications (n=67).

Complications	N	%
PPH	13	32.5
Blood transfusion	0	0
Uterine angle extension	4	10
Bladder edematous	11	27.5
Bowel injury	0	0
Post op wound infection	0	0
Post op fever	15	22.38
Post op urinary problem	0	0

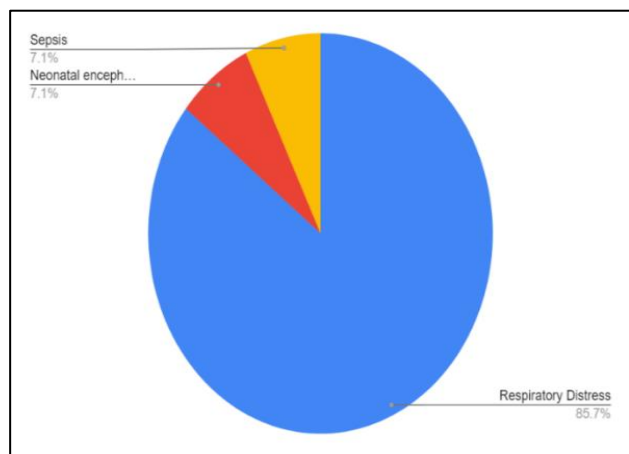


Figure 2: Neonatal Intensive care unit admissions.

The other complications included ballooned out lower uterine segment (5%), oedematous bladder in 11 cases (27.5%) and angle extension in 4 cases (10%). We did not encounter any incidence of bowel and bladder injury. The post operative morbidity observed was post operative fever in 15 cases (22.38%). We did not report any cases of wound infection, readmission, re-laparotomy or maternal death. Table 3 shows the proportion of intraoperative and post-operative complications seen in our study.

Table 4: Neonatal complications (n=67).

Complications	N	%
APGAR score <3 at 5 min	0	0
Respiratory distress	12	87.5
Need for NICU admission	16	23.88
Neonatal death	0	0

Neonatal outcomes

Neonates outcomes in terms of APGAR score, NICU admission, Respiratory distress and neonatal death were analyzed. The mean birth weight was 3.19 kg, mean cord arterial pH was 7.22 and venous pH was 7.27. There were no low APGAR scores at 5 minutes of birth. In our study sixteen babies (23.88%) required NICU admission (Figure 2). Respiratory distress was the main indication for admission seen in 12 out of 67 cases. There was no neonatal death noted in our study. The average duration of

NICU admission was 2 days. The (Table 4) summarizes the neonatal complications.

DISCUSSION

The background rate of second-stage caesarean sections has been estimated at around 2% of all deliveries.³ Second-stage caesarean section is technically demanding and carries an increased risk of maternal and neonatal morbidity. Over a period of one year, we had a total of 10433 deliveries out of which 5392 were caesarean sections. Of these, 67 sections were performed in the second stage of labor, that is 6% of all deliveries. 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 study done by Feinstein, et al 2.21% Caesarean sections were performed at full dilatation, the incidence more among in primigravida (74%) than in multigravida (26%) due to mild to moderate cephalopelvic disproportion, rigid perineum, lack of experience of previous labour in primigravida women.⁷

The incidence of second stage caesarean sections was more in primigravida (74%) than multigravida (26%) in our study. This observation was similar to study by Babre et al where 2760 were delivered by caesarean section out of which, 61 caesarean sections were performed in second stage of labour.⁷ Majority of the women were in the age group 20- 25 yrs. In a study by Malathi et al 61% of women were in the age group 21-30 years and primigravida contributed to 79% of patients undergoing second-stage caesarean section.¹⁴ Baloch et al also found that second-stage interventions were more frequent among primigravida (45%).¹³ Al Kadri et al reported that nulliparous women have more chances of failed instrumental delivery necessitating a second stage caesarean section.⁴ The increased frequency of second-stage caesarean section in primigravida could be because of cephalopelvic disproportion. This corroborated with our finding of Cephalo-pelvic disproportion being the most common indication for the cesarean section. Sameer et al also reported the same findings.¹⁵⁻²⁷ A retrospective study from Canada has shown that women delivered by caesarean sections at full dilatation of the cervix were 2.6 times more likely to have intraoperative trauma.¹⁰ These difficulties were due to the edematous lower segment, overstretched and thinned-out lower segment, and impaction of presenting part in the pelvis as the duration for the second stage increases. The morbidities can be due to the difficulty in handling the fetus impacted in the maternal pelvis. Estimated blood loss, PPH, and need for blood transfusion all were greater in the second-stage caesarean group. There was no difference in maternal or neonatal morbidity when the duration of the second stage

of labor was prolonged or when assisted vaginal delivery had failed.²⁵

In our study, women who were birthed by the second stage of caesarean section experienced PPH in 32.5%. All were managed medically and none needed blood transfusion. Uterine angle extension was noted in 10.3% of such mothers. Post-operative fever was seen in 22.38% cases. There were no incidences of wound infection and no prolonged hospital stay was needed. Landon et al showed that second stage caesarean section is associated with obstetric haemorrhage, bladder injury, extended uterine tear which may lead to broad ligament hematoma, infection and a longer hospital stay of more than 6 days.¹⁰ Rabiou et al also found that women who had caesarean deliveries performed in the second stage had longer operative time, greater blood loss, more cases of intraoperative trauma, blood transfusion, re-look laparotomy, hysterectomy, post-partum pyrexia wound infection and a longer hospital stay.²⁶ Padma, Sameer et al in 2017 studied 200 cases of second stage cesarean sections. They reported maternal complications like atonic postpartum haemorrhage uterine incision extension, postoperative fever, wound infection.¹⁷ The mechanism of difficult delivery of the fetal head during caesarean section is not entirely clear. Intraoperative disengagement of the fetal head continues to pose a challenge to obstetricians. The difficulty in delivering the fetal head arises because of the lack of space between the bony pelvis, pelvic soft tissues and the fetal head, and the degree that the head has moulded into the pelvis. Several techniques have been reported in the literature and the method to be chosen depends on the skill and experience of the surgeon. The incidence of uterine incision extension in second-stage caesarean sections may be as high as 30%.¹⁹ In our study majority of the babies were delivered as vertex (87.1%), 10.5% by the push method and 1 delivered using Patwardhan technique (pull method). The results of our study were similar to those of a study done by Khosla et al (done 5.3% second stage cesarean section and complications were noted in 38.44% mothers.⁹ We had a lower rate of uterine extensions, 10% as compared to what is reported in literature. We regularly follow measures such as lowering the head end of operating table, operating using a footstool for appropriate height, waiting for relaxation of uterus and administering a tocolytic just before delivery, (either Terbutaline 250 mcg subcutaneous or Nitroglycerine intravenous). We also give a higher incision on the uterus. A standard incision may risk incising the bladder or the vagina, or may affect the integrity of the cervix. Lower-segment incisions may also be at increased risk of vertical extensions and be more difficult to repair.

Nia et al has done a prospective observational study in women who underwent second stage caesarean birth in the UK where a dis-impaction technique was used for deeply impacted fetal head like push and Patwardhan techniques to reduce neonatal complication.²⁴ In this study no extensions occurred while Patwardhan technique was

used. Mukhopadhyay et al. concluded that extension of the uterine incision and injury to the surrounding structures during LSCS is common in obstructed labour, when the hand is forcibly introduced into the pelvis to deliver the head which is impacted and jammed in the pelvis and this was also seen in our study. They also showed that neonates who delivered by Patwardhan's method had outcome similar to delivered by vertex and breech.¹⁵ In our study the mean length of hospital stay was 3 days. This was not significantly increased compared to other cases of caesarean section. In various studies it has been quoted that duration of hospital stay for patients in second stage caesarean section is increased. In the study by Seal et al the mean length of stay in the hospital after delivery was higher after a second stage caesarean section i.e. average of 6.4 days.²³ We reported 29.9% cases of post-operative fever. However, there were no cases of wound infection following the cesarean section. Cebekulu and Buchmann from Johannesburg, South Africa, reporting on 39 cases and 39 controls, found that second-stage caesarean section was associated with more postoperative fever.¹¹ In the study by Shahla Baloch et al wound infection was present in 8.33% cases. We had no cases of maternal death.^{13,28} Studies have reported pelvic floor trauma, particularly bladder and bowel problems, in 50% of women at the five-year follow-up after Caesarean sections late in labour, even without attempted vaginal delivery.¹⁶ We did not encounter any bowel or bladder injury incident during our study. However, we did not address long term maternal morbidity in terms of vaginal prolapse and urinary and fecal incontinence as our study was conducted over a short period of time. In our study, second stage caesarean done after failed instrumental delivery was noted in 2.98%. McDonnell et al did an observational study over a 5-year period and found overall failed instrumental delivery rate to be 5.1%. A failed operative vaginal birth was associated with increased maternal and fetal morbidity.¹⁸

Neonatal morbidity in terms of NICU admissions, fetal acidemia, hypoxemia, prolonged NICU stay is reportedly higher in second stage caesarean sections. This is likely to be a result of increasing fetal compromise with prolonged duration of maternal bearing down and hypoxia, and not a result of the procedure. In our study, 16 neonates required NICU admission, of which 12 were for respiratory distress. The most common reason for the distress was meconium-stained liquor. A recent study by Das et al demonstrated a statistically significant increase in admission to NICU, septicaemia and low 5 min APGAR.²² Padma et al also found fetal complications such as meconium stained amniotic fluid, neonatal hyperbilirubinemia, increased NICU admission and increased perinatal mortality.^{12,27} In a study by Young et al on the effect of the duration of the second stage of labour on the acid base state of the fetus, they showed a significant rise in umbilical cord lactate concentration and cord arterial and venous blood value changes when the second stage lasted longer than 30 mins.¹ Mayberry & Wood et al showed that a time dependent correlation exists between the duration of second stage labor and the indices of a fetal acidosis such

as low pH, high base deficit & lactate concentrations.⁸ Our study did not show any significant change in cord ABG and VBG, lactate concentration and low APGARs at 5 minutes of birth. Neonatal mortality and morbidity rates were not related to the length of the second stage. We did not report any neonatal deaths. Manisha et al have done a study NICU admissions and neonatal deaths were significantly high due to birth asphyxia.²¹

Table 5: Proposed measures to reduce complications during second stage caesarean section.

S. No.	Measures
1.	Operation should ideally be performed or supervised by a senior obstetrician
2.	Attendance of workshops and hand-on-training for assisted vaginal births.
3.	Training and performance of intrapartum ultrasound to judge the fetal position and descent.
4.	Paediatrician to be informed before any second stage caesarean section so that they can be ready for neonatal resuscitation
5.	Steps for difficult delivery of the fetal head at second stage caesarean section:
	Stand on a step or lower the operating table, Ensure the table is tilted with the woman's head down,
	Wait for contraction to cease,
	Attempt to turn to the occiput transverse position and deliver,
	Call for senior help,
	Delivery with the opposite hand,
	Administer 250 mcg of subcutaneous terbutaline or a general anaesthetic, Apply pressure to the fetal head,
Push the fetal head upwards vaginally and Evaluate the incision (extend to a J or T shape) and deliver the breech.	
6.	If the fetal head is disimpacted and subsequently displaced superiorly; Maintain longitudinal lie of the fetus, apply firm pressure from above, Delivery of the fetal head with forceps, Deliver the breech.

Table 5 enlists the measures that can be taken to reduce maternal and fetal complications in such cases.

CONCLUSION

Second stage caesarean section is associated with significant maternal and neonatal morbidity. A skilled obstetrician and proper training is required to take appropriate decisions for caesarean section at full dilatation of cervix. The increasing rate of second stage caesarean sections can also be attributed to the loss of the skill of instrumental deliveries and manual rotation. Obstetricians need to work on these essential skills in order

to improve their confidence and limit the need for second stage caesarean sections. Resorting to alternate positioning during labor such as left lateral position with peanut ball, apple shake method and cow girl positions help with malposition's such as occiput posterior and occiput transverse, enabling rotation to occiput anterior. These positions are advocated as part of midwifery teachings and hence midwifery support in labor also reduces the incidences of cesarean sections in such cases. If a second stage section is indeed indicated, then proper technique and delivery of the fetus will further reduce complications.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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