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Research Article

Morbidity of caesarean delivery: a comparative study between early and advanced stages of labour in an Indian tertiary care center

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ABSTRACT

Background: The aim was to compare the maternal and perinatal complications associated with caesarean sections performed in the early and advanced stage of labour.
Methods: A retrospective analysis of 131 women with singleton term pregnancies who underwent emergency caesarean section. The study was done in a tertiary care teaching hospital in India. In this study advanced labour was defined as one with cervical dilatation 8 cm or more at the time of caesarean section. The primary outcome variables were a maternal composite morbidity and a neonatal composite morbidity. Categorical data were compared using chi square test or Fischer's exact test.
Results: 73 women (56%) underwent caesarean delivery in the early labour and 58(44%) in advanced labour. 12/73 (16.4%) patients in early stage of labour had at least one maternal complication (Composite maternal morbidity) compared to 18/58 (31%) women who had caesarean in advanced stage ($p = 0.048$). Seven patients out of 73 in the early labour and 14/58 in the advanced labour ($p = 0.024$) had at least one neonatal complication (Composite neonatal morbidity).
Conclusions: The morbidity of primary caesarean sections done in the advanced stage of labour is associated with increased maternal and neonatal morbidity compared to that done in the early stage. A larger study will be needed to establish the inference.

Keywords: Caesarean section, Advanced labour, Maternal morbidity, Maternal mortality, Perinatal morbidity

INTRODUCTION

Cesarean delivery is associated with an increased risk of postpartum maternal death.[1] There are several studies which conclude that the length of the second stage of labour influences maternal morbidity, but not the neonatal morbidity.[2-6] Cheng et al[7] in a retrospective study 2007 concluded that both neonatal and maternal morbidity were higher when the length of the second stage of labour was more than 3 hours in multiparous women. This is in contrast to an earlier retrospective study by the same authors in 2004[5] which found that neonatal morbidity was not significantly increased when the length of the second stage was prolonged in nulliparous women. Epidural analgesia was given to the patients in the above studies and could be the reason for conflicting results.

Caesarean sections could be delayed due to several reasons. In a developing country like India, the increased patient load, inadequate prenatal care, a dearth of resources like the lack of adequate number of anesthesiologists, the lack of sufficient number of operation theatres, and the failure to identify the slow

progress of labour may be some of the reasons for the delay.[8] This study was prompted by an observation that maternal and neonatal morbidity was probably higher in the patients in whom emergency caesarean section was done at an advanced stage of labour. The purpose of this study was to compare the maternal and perinatal complications associated with caesarean sections performed in the early and advanced stage of labour.

METHODS

This is a retrospective analysis of 131 women with singleton term pregnancies who underwent emergency caesarean section (CS). The study period was from January 2010 to Dec 2010. The study was carried out in a tertiary academic teaching hospital in Kerala, India. An institutional review board approval was obtained for this study. The clinical records of the mother, the neonate, surgical records and the labour room records were studied. There were a total of 12699 deliveries in 2010 at the institution. Of these 3991(31.5%) were delivered by caesarean section. 2417(19%) were primary CS. Among them, 1909 were emergency CS. After applying the inclusion and exclusion criteria 131 consecutive women who underwent CS were recruited for the study. They were divided into two groups- Women in early labour and women in advanced labour. For this study, an advanced labour was defined as the one with cervical dilatation 8 cm or more at the time of caesarean section. Women in the active phase of labour with gestational age 37-41weeks, singleton pregnancy, and cephalic presentation, with intact membranes or duration of rupture of membranes that is less than three hours at the time of admission were included in the study. Women having severe preeclampsia / eclampsia, multiple pregnancy, gestational diabetes mellitus on insulin, intra uterine growth retardation, non vertex presentations, any significant medical disorders, attempted operative vaginal delivery, post dated pregnancy, ante-partum hemorrhage, meconium stained amniotic fluid , prematurity and those in whom PGE1 (Prostaglandin E1) tablets or Foleys catheter were used for induction, were excluded from the study. Though induction of labour with PGE1 and Foley's catheter was excluded, the induction of labour with PGE2 gel was included. PGE1 as compared to PGE2 is known to produce more fetal distress and Foley's catheter induction could introduce sepsis. This was done to exclude other confounding factors likely to affect the morbidity. A comparison of maternal morbidity and neonatal morbidity was done between the group of women who underwent caesarean section in the early and advanced stage of labour. Maternal morbidity was studied in terms of post partum hemorrhage (estimated blood loss more than 1000 ml), requirement for blood transfusion, occurrence of uterine lacerations, puerperal infection / fever, wound complications (more than 38°C on two or more occasions in any 48 hour period, excluding the first 24 hours after delivery), admission to intensive care unit, need for hysterectomy and maternal mortality. Neonatal morbidity was compared in terms of neonatal asphyxia, sepsis, trauma, intensive care admission and neonatal mortality. The primary outcome variables were a maternal composite (composed of at least one of the above mentioned maternal morbidity) and a neonatal composite (composed of at least one of the above mentioned neonatal morbidity). Categorical data were compared using chi square test or Fischer's exact test as appropriate. A p value less than 0.05 was considered as statistically significant. Statistical analysis was performed with SPSS.17 software.

RESULTS

131 women were included in the study. The mean age was 23.2 years (range 18-32 years). 117 (89%) were primi gravida. The maternal characteristics are summarized in Tables 1 and 2. The labor was induced in 79(60%). The major indications for induction of labour premature rapture of membranes (PROM) in 23 women (17.6%), on date induction in 21 women (16.0%). The details of indications for induction is given in Table 3. The labour was augmented with oxytocin infusion in 116 women (88.5%). The details of indication of emergency caesarean section is given in Table 4. Arrest of descent was the commonest indication (62 women, 47.4%). All except one underwent surgery under spinal anesthesia. 73 women (56%) underwent caesarean delivery in early labour and 58(44%) in advanced labour. The mode of delivery was as head first in 123(94%) and breech first in 8(6%). In these 8 cases, though the presentation was vertex, the babies were extracted as breech due to advanced labour. Maternal morbidity is summarized in table 5. Puerperal fever was the commonest, seen in 19 patients (14.5%). The number of patients with at least one maternal morbidity (Composite maternal morbidity) was 30 (22.9%). 12/73 patients in early labour had at least one maternal complication compared to 18/58 women who had caesarean in advanced labour (p value 0.048: Odds Ratio 1.51, 95% CI 1.037 to 2.212). When considered independently, none of the complications were significantly different between the groups. The incidence of puerperal fever morbidity was showing an increased trend in women undergoing caesarean section in advanced labour (p value 0.073). The mean duration of maternal hospital stay was 7.5 days (Range 5 to 27 days). The neonatal morbidity is summarized in Table 6. Twenty neonates required intensive care admission (15.2%), 21 neonates (16%) had any one of the neonatal morbidity (composite neonatal morbidity), 7/73 in t early labour and 14/58 in the advanced labour (p value, 0.024: Odds Ratio 1.66, 95% CI 1.141 to 2.435). When individual neonatal morbidity was studied, only the incidence of neonatal intensive care unit admission was significantly different between the groups (p value 0.043).

Table 1: Maternal characteristics (Continuous variables).

Maternal characteristics	Caesarean section in	
	early labour (mean)	advanced labour (mean)
Age (years)	23.29	23.19
Gestational age at delivery(weeks)	39.32	39.22
Decision to delivery interval (minutes)	110.9	67.98
Duration of first stage (minutes)	425.2	445.18
Maternal hospital stay (days)	7.2	7.9

Table 2: Maternal characteristics (Dichotomous variables).

Maternal characteristics		Caesarean section in		
		Early labour (%)	Advanced labour (%)	p value
Gravidity	Primi	64(87.6)	53(91.3)	0.57
	Multi	9(12.4)	5(8.7)	
Type of labour	Induced	47(64.4)	32(55.1)	0.36
	Spontaneous	26(35.6)	26(44.9)	
Augmentation of labour	Augmented	63(86.3)	53(91.4)	0.41
	Not augmented	10(13.7)	5(8.6)	
Anaesthesia	Spinal	73(100)	57(98.3)	0.44
	General	0(0)	1(1.7)	
Duration	< 90 minutes	70(95.9)	58(100)	0.25
	>90 minutes	3(4.1)	0(0)	

%: Percentage

Table 3: Indications for induction of labour.

Indication	Number of patients	Percent
Post dates	13	9.9
PROM	23	17.6
On date	21	16.0
Big baby	3	2.3
BOH	2	1.5
Maternal request	1	0.8
GDM on diet	3	2.3
Abnormal GCT	21	16.0
Gestational Hypertension	21	16.0
Decreased foetal movement	13	9.9
Data not available	10	7.6

PROM: Premature Rupture of Membranes
BOH: Bad Obstetric History
GDM: Gestational Diabetes Mellitus
GCT: Glucose Challenge Test

Table 4: Indication for emergency LSCS.

Indication	Number of patients	Percent
First degree CPD, arrest of dilatation	4	3.1
Arrest of descent	62	47.4
Failure to progress	23	17.5
Arrest of dilatation	30	22.9
First degree CPD, failed trial	11	8.4
Others	1	0.8

LSCS: Lower Segment Caesarean Section
CPD: Cephalo Pelvic Disproportion

Table 5: Univariate analysis for maternal morbidity, LSCS at early labour vs. advanced labour.

Variable	Number of patients	Percentage	Early labour	Advanced labour	p value
Blood loss >500 ml	5	3.8	1	4	0.17
Blood transfusion	3	2.3	1	2	0.584
Maternal ICU admission	6	4.6	2	4	0.405

Hysterectomy	1	0.8	1	0	1.000
Intra operative complication	8	6.1	3	5	0.465
Maternal Infection	22	16.8	9	13	0.125
Wound Complication	16	12.2	9	7	0.964
Puerperal fever	19	14.5	7	12	0.073
Maternal mortality	0	0			
Readmission to hospital	0	0			

LSCS: Lower Segment Caesarean Section
ICU: Intensive Care Unit

Table 6: Univariate analysis for neonatal morbidity, LSCS at early labour vs. advanced labour.

Variable	Number of patients	Percentage	Early labour	Advanced labour	p value
Birth asphyxia	5	3.8	2	3	0.655
Sepsis	9	6.8	4	5	0.508
ICU admission	20	15.2	7	13	0.043
Neonatal mortality	1	0.8	1	0	1.000

ICU: Intensive Care Unit

LSCS: Lower Segment Caesarean Section

DISCUSSION

The optimal management of second stage of labour should maximize the probability of vaginal delivery and minimize the risks of maternal and neonatal morbidity as well as death. Maternal morbidity associated with spontaneous vaginal delivery is lower than that of operative delivery in the second stage of labour.[2,3] But there are few studies comparing the maternal and neonatal morbidities of caesarean sections done in early stages of labour with advanced labour. Certain published reports suggest that caesarean section in the second stage of labour has a higher risk of maternal but not perinatal morbidity.[3-6]

In our study, caesarean delivery in advanced labour was associated with a raised maternal and neonatal morbidity composites when compared to caesarean section in the earlier phase. Certain other studies have similar outcomes.[2,9] The length of labour is affected by epidural analgesia,[10,11] maternal age and ethnic differences.[12,13] The American College of Obstetricians and gynecologists (ACOG)[14] has defined a prolonged second stage of labour in nulliparous women as the lack of continuing progress for 3 hours with regional anesthesia or 2 hours without regional anesthesia and prolonged second stage of labour in multiparous women was defined as lack of progress for 2 hours with or 1 hour without regional anesthesia. Allen et al in a study from Canada reported that the risks of both maternal and perinatal adverse outcomes rise with increased duration of the second stage, longer than 3 hours in nullipara and longer than 2 hours in multipara.[15] A systematic review reported that the variable definitions of prolonged second stage of labour, diverse study population characteristics, lack of control of confounding variables increase the difficulty in addressing the duration of second stage to obstetric outcomes.[16]

Caesarean deliveries in developing countries is associated with increased morbidity.[17-19] There are different reasons for a delay in performing Caesarean sections. In developing countries, increased patient load and lack of resources are important reasons. The present study compares the outcome in a tertiary teaching hospital. This study has the advantage that none of the patients were under epidural analgesia during labour. Epidural analgesia is not routinely performed in our institution. Also a deliberate attempt was made to exclude patients with possible confounding factors likely to affect maternal and neonatal morbidity. The study is limited by its retrospective nature and small sample size.

CONCLUSIONS

Our study has shown that, the morbidity of primary caesarean sections done in the advanced labour is associated with increased maternal and neonatal morbidity compared to that done in the early labour. This result is evident only when individual morbidity components are grouped together to calculate a composite maternal and neonatal morbidity. Individual components showed no statistically significant difference. A study with larger number of patients will be needed to establish the impact of time of caesarean section on the individual causes of maternal and perinatal morbidity.

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