

# Preterm Birth: Mode of Delivery and Neonatal Outcome

S Sonkusare, MD (Obst & Gynae)\*, L Rai, MD (Obst & Gynae)\*, P Naik, MD (Paediatrics)\*\*

\*Department of Obstetrics and Gynaecology, \*\*Department of Paediatrics, Kasturba Medical College, Manipal - 576104, Karnataka, India

## SUMMARY

To evaluate the perinatal outcome of premature babies according to the mode of delivery. A total of 113 pregnant women and 124 neonates who delivered from 30 to 35 weeks of gestation were enrolled and outcomes of 70 neonates born vaginally were compared to 54 neonates born by caesarean. Neonatal mortality rate was 20 percent for infants in caesarean group as compared to 10 percent for vaginal group. There was no significant difference in the neonatal morbidity among both the groups. Caesarean delivery cannot be routinely recommended, unless there are obstetric indications.

## KEY WORDS:

*Preterm vaginal delivery, Preterm caesarean delivery, Premature baby, Neonatal complications, Perinatal mortality*

## INTRODUCTION

Preterm birth is the most significant problem in current obstetric practice and according to the World Health Organization, is the direct cause accounting for 24% of neonatal deaths<sup>1</sup>. Rates of preterm birth range between 7-16% and are similar world wide<sup>1</sup>.

The optimal mode of delivery for preterm babies is controversial. Data from prospective randomized studies are very limited due to recruitment difficulties<sup>2,3</sup>. In practice, however, the rate of elective caesarean deliveries in preterm babies has markedly increased over the last decades. This further strengthens the need to try and determine whether this practice of elective caesarean deliveries is justified for a possibly better outcome of the infants, in face of potential serious morbidities among the mothers.

This observational study is specifically aimed to determine the association between the mode of delivery (caesarean versus vaginal) and morbidity in the neonates and the rate of death prior to discharge in premature infants between 30 and 35 weeks of gestation. In order to do this, we also studied the perinatal factors associated with caesarean delivery of these infants.

## MATERIALS AND METHODS

This study is based on an analysis of data prospectively collected after gaining approval from the institute ethical committee, from a database comprising maternal and neonatal information drawn from the medical charts on preterm infants born in Kasturba Hospital, Manipal,

India (level III centre), from 01.05.2002 to 30.09.2003. The database was based on file reviews and collected in a uniform, consistent and reliable manner by trained qualified doctors with the use of standard definitions. Data included information on the maternal pregnancy history, details of the delivery, the infant's status at delivery, diagnoses, procedures and complications during hospital stay and outcome at discharge. Women with conditions potentially affecting the likelihood of an adverse neonatal outcome were noted.

Gestational age (in completed weeks) was determined by the best obstetric estimate of gestational age based on last menstrual period, obstetric history and examination, prenatal ultrasound and postnatal physical examination. Antenatal steroid treatment was considered as given even if delivery occurred in less than 24 hours after the first dose. Intravenous antenatal antibiotic therapy was given in the form of Amoxicillin 500mg 6 hourly and Metronidazole 500 mg 8 hourly after the patient got admitted and was maintained in intravenous form till delivery. Premature rupture of membranes was considered when membranes ruptured more than 6 hours before the onset of regular uterine contractions. Failed induction was considered in the absence of significant change in Bishop scoring with twice prostaglandin E<sub>2</sub> gel instilled intracervically 6 hours apart. Severe preeclampsia was considered as blood pressure above 150/110 mm Hg which remained uncontrolled on antihypertensive drugs, along with proteinuria of  $\geq 2+$ . Oligohydroamnios was defined as amniotic fluid index of  $\leq 5$  as measured by transabdominal ultrasonography. All the ultrasonographies were done by the qualified personnels. Neonatal sepsis was defined as positive septic screen of the neonate and the causative organism was demonstrable in most of the cases. Neonatal hyperbilirubinemia was defined as the serum bilirubin levels of  $>7$  mg/dl for a neonate weighing  $<1500$  grams;  $>10$  mg/dl for the infant weighing 1500 to 2000 grams and  $>13$  mg/dl when the infant weighed  $>2000$  grams. Mortality was defined as death occurring before discharge from the hospital.

The total number of deliveries during this period in this center were 2223, out of which 153 were preterm deliveries (7 percent). The overall caesarean rate was 25 percent (%), which is similar to the rate in other tertiary centers all over India. During this 17 month period, out of 153 deliveries, there were 11 antenatal fetal deaths and 8 babies with congenital malformations, which were excluded. Out of the rest, 22 births were excluded as we

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*Corresponding Author: Shipra Sonkusare, Department of Obstetrics & Gynaecology, Melaka Manipal Medical College, Jalan Batu Hampar, Bukit Baru, 75150, Melaka, Malaysia Email: shipra\_s18@rediffmail.com*

could not get the complete information from their records. Thus, 113 premature deliveries between 30 and 35 weeks of gestation were registered in the database. Only live births were included in the examination of the management of preterm births because an antepartum or intrapartum still birth is likely to have a major effect on delivery management although there were no intrapartum or labour room deaths in this study. Similarly, cases of congenital anomalies were also excluded. No mothers or babies had any complications other than the ones mentioned.

Out of 113 preterm births which were analyzed, 58 women either went into preterm labour or had preterm premature rupture of membranes. Five of these had failed induction after rupture of membranes and underwent caesarean delivery.

Twenty eight women were planned for elective vaginal delivery, the indication being severe pre-eclampsia in 24 and abruptio placenta in 4, but only 12 delivered vaginally and rest 16 had caesarean delivery. Twenty seven women were planned for caesarean, the main indications being severe oligohydramnios, placenta previa and malpresentation. Out of these, one delivered vaginally.

Thus, a total of 66 mothers delivered vaginally and 47 mothers had caesarean delivery. To these 113 mothers, 124 babies were born, 70 vaginally and 54 by caesarean.

For analysis, the mothers and the neonates were classified into two groups (1) those who delivered by caesarean and (2) those who delivered vaginally. The following antenatal, perinatal and neonatal variables were included in the analyses: mother's age, parity, pregnancy complications including premature rupture of membranes, antepartum hemorrhage, severe preeclampsia, malpresentation, multiple gestation, antenatal steroid treatment, antenatal antibiotic treatment, presence of oligohydramnios, delivery mode,

gestational age at delivery in weeks, birth weight, gender, apgar score, presence of neonatal complications like intraventricular haemorrhage, sepsis, respiratory distress syndrome, neonatal hyperbilirubinemia and intensive care unit admission days. All neonatal diagnoses were made at the time of the baby's discharge by an experienced neonatologist who was not blinded for preterm babies.

The significant differences in the antenatal and intrapartum factors between both the groups were standardized using analysis of covariance (ANCOVA) and the adjusted means were finally analyzed. The Odds ratio (OR) and 95% confidence interval (CI) were calculated to compare the proportion in the two groups using the Confidence Interval Analysis. Testing for relationships between the variables in the two groups was done using the Chi-square test, and Fisher Exact test was used for cell values of less than 5. P value of less than 0.05 was regarded as significant.

## RESULTS

The overall caesarean rate was 42%. And it was directly associated with maternal hypertension and oligohydroamnios. Conversely caesarean rate was much lower among mothers with premature rupture of membranes. Important indications for caesarean delivery were: severe preeclampsia (34%), placenta previa (13%), malpresentation (13%), preterm premature rupture of membranes with failed induction (11%), oligohydramnios (17%) and multiple gestation (11%). Among 124 neonates recruited, there were 35 male infants in the vaginal delivery group and 26 in the caesarean delivery group.

There was no significant difference in the basic antenatal profile except that larger number of women in caesarean group had received antenatal steroid as well as antibiotics (Table I).

**Table I: Antenatal profile of the mothers among caesarean and vaginal delivery group**

Antenatal profile	Caesarean group [n(%)]	Vaginal delivery group [n(%)]	Odds ratio (95% CI)	p value
<b>Mother's Age (Years)</b>				
18-25	16 (34)	26(39)	0.794 (0.36-1.73)	0.56(NS)
26-34	25 (53)	33(50)	1.13 (0.53-2.40)	0.73(NS)
≥35	6 (13)	7(11)	1.23 (0.38-3.93)	0.72(NS)
<b>Primipara</b>	33 (70)	37(56)	1.746 (0.83.4.07)	0.12(NS)
<b>Gestational age (weeks) at delivery</b>				
<32	17 (36)	28(42)	0.302 (0.35-1.66)	0.50(NS)
≥32	30 (63)	38(58)	0.51 (0.60-2.80)	0.50(NS)
<b>Received antenatal Steroid therapy</b>	47(100)	61(92)		0.05(S)
<b>Received antenatal Antibiotic therapy</b>	47(100)	61(92)		0.05(S)

NS: Not significant S: Significant

Table II: Antenatal risk factors among caesarean and vaginal delivery group

Risk Factor	Caesarean group [n(%)]	Vaginal delivery group [n(%)]	Odds ratio (95% CI)	p value
Preterm premature Rupture of membranes Severe preeclampsia	5(11)	29(44)	0.15 (0.05-0.43)	< 0.0001(S)
Oligohydroamnios	16(34)	8(12)	3.74 (1.44-9.71)	0.004(S)
Antepartum Haemorrhage Malpresentation	8(17)	1 (2)	13.33 (1.60-110.6)	0.003(S)
Multiple gestation	6(12)	4 (6)	2.26 (0.60-8.53)	0.31(NS)
	7(14)	3 (5)	2.64 (0.89-15.04)	0.09(NS)
	5(10)	4 (6)	1.84 (0.46-7.27)	0.48(NS)

NS: Not significant S: Significant

Table III: Comparison of neonatal outcome among caesarean and vaginal delivery group

Infant data	Caesarean Group [n(%)]	Vaginal delivery group [n(%)]	Odds ratio (95% CI)	Adjusted p value
Birth weight (grams)				
<1500	15(28)	23(33)	0.78 (0.36-1.70)	0.54(NS)
1501-2500	39(72)	47(67)	1.27 (0.58-2.76)	0.59(NS)
Apgar <5 at 5 minutes	11(20)	8(11)	1.98 (0.73-5.33)	0.17(NS)
NICU admission days				
<5	13(24)	15(21)	1.16 (0.49-2.70)	0.72(NS)
<5-10	18(33)	26(37)	0.84 (0.40-1.78)	0.66(NS)
>10	23(42)	29(41)	1.04 (0.51-2.15)	0.89(NS)
Intraventricular Haemorrhage	2 (3)	1(1.4)		0.41(NS)
Respiratory distress Syndrome	12(22)	13(19)		0.92(NS)
Sepsis	16(29)	13(19)		0.29(NS)
Neonatal Hyperbilirubinemia	23(43)	40(57)		0.10(NS)
Neonatal mortality	11(20)	7(10)		0.33(NS)

But there were more high risk factors like oligoamnios and severe preeclampsia in the mothers who had caesarean (Table II).

Neonatal morbidity due to intraventricular hemorrhage and sepsis as well as the mortality was apparently higher in the caesarean delivered newborns (Table III), but was not significant statistically.

The overall neonatal mortality rate until discharge was 14.5% and important factors associated were, sepsis with coagulase negative Staphylococci and Pseudomonas, severe prematurity and intraventricular hemorrhage grade III. The mortality rates decreased significantly with increasing gestational age for infants delivered by caesarean section.

## DISCUSSION

The main finding in this study is that caesarean delivery did not enhance the neonatal survival of preterm infants nor did it decrease the morbidity in these infants. This is further supported by the work of Malloy *et al.*<sup>4</sup> and others<sup>5-8</sup>.

Though the issue of how best to deliver is of importance, there is little evidence from randomized studies on which to base the management of preterm birth. Data in the literature are so far inconclusive and associated with problems of randomization, selection criteria and the effects of multiple confounding variables<sup>4,5,9</sup>. The largest

metaanalysis of six trials too involves only a total of 122 babies<sup>2</sup>. Conducting an appropriately controlled study designed to answer this important clinical issue should be the ultimate goal.

In the light of lack of direct evidence to support the management of preterm birth, we took a multivariate analysis using analysis of covariance of the observational data based on a significant population of all preterm infants born in Kasturba Hospital, Manipal, which catered to other states of southern India too. During the study period, recent technologies and treatments were widely used. The multivariate analysis attempted to control for confounding variables, such as the fact that the mode of delivery may be influenced by the indication, such as hypertension or decreased liquor.

We also have studied the incidence of morbidity along with the mortality rate in the preterm fetuses, to study the effect of mode of delivery. We have taken into account the specific circumstances influencing the obstetric decision-making process for the individual deliveries, and factors that might have led the obstetrician to perform a caesarean. Thus, the caesarean group had more number of high risk mothers with compromised fetal status which mandated caesarean delivery.

The neonatologist was not blinded for the preterm babies though it does not affect all the variables of the outcome like mortality and development of complications, it will

definitely affect the initial admission days in the intensive care unit. Hence, the initial admission days in the neonatal intensive care unit might have been influenced by the knowledge of exposure, and probably does not correlate with the seriousness of the morbidity, though, persistent stay in the intensive care unit is a better indicator of morbidity. The malpresenting infants were also included in the analysis. Also, we have analyzed singletons, twins or triplets together. Furthermore, data collection, as much as we tried to avoid it, might still have been misclassified or subject to temporal changes in data input. Despite these reservations, in the absence of a prospective randomized control study, which may not be feasible, we believe that these are the reasonably fair available data. This study would have been more informative if the follow up of the infants was studied at least for two years.

### CONCLUSION

Based on our findings, we disagree with the assumption that caesarean delivery may improve the outcome in preterm babies. Our data is consistent with the hypothesis that mode of delivery does not influence mortality and morbidity in preterm infants, if there are no obstetric indications favoring a particular mode. We believe that caesarean section cannot be recommended as the routine mode of delivery for preterm babies unless there are other recognized maternal or fetal indications. However, these conclusions are guarded due to the limits of the methodology employed.

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