

DOI: <http://dx.doi.org/10.18203/2320-1770.ijrcog20200911>

Original Research Article

Study of early perinatal outcome in lower segment caesarean section in severe foetal distress at tertiary care centre

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Received: 04 July 2019

Revised: 27 January 2020

Accepted: 01 February 2020

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ABSTRACT

Background: For asphyxia, the fetus reacts with a series of responses. First there is redistribution of blood flow to vital centres to limit the deleterious effects of oxygen limitation in the brain, heart and adrenal glands. A further compensatory response is that overall fetal oxygen consumption declines to values as low as 50% of the control.

Methods: This was a prospective study. Early perinatal outcome of newborns delivered through Caesarean section due to clinical foetal distress in labour was compared with a group of newborns similarly delivered via Caesarean section without a diagnosis of clinical foetal distress. Data collected and analysed using appropriate standard statistical methods i.e. Chi-square (X^2) test and 'Z' - test.

Results: Most common indication for NICU admission in study group was MAS (Meconium Aspiration Syndrome 14%) followed by MAS with perinatal asphyxia (5.33%), MAS with Hypoxic ischaemic encephalopathy (HIE) - stage III (3.33%) perinatal asphyxia (2.66%), severe PNA with HIE - III (0.66%) and TTN (0.66%) meconium gastritis (0.66%) respectively.

Conclusions: Clinical foetal distress (study group) was found to be significantly associated with low 1 min and 5 min. Apgar score. There was no significant difference in immediate NICU admission whether D-D (i.e. detection fetal detection to delivery interval) time interval <30 minutes or >30 minutes. But rate of mortality was high when D-D (i.e. detection fetal detection to delivery interval) was >30 minutes.

Keywords: Apgar score, Foetal distress, Caesarean section, Hypoxic ischaemic encephalopathy, Meconium aspiration syndrome, Perinatal outcome

INTRODUCTION

The fetus depend on the mother for exchange of oxygen and carbon dioxide is reliant on adequate maternal blood gas concentrations, uterine blood supply, placental transfer and fetal gas transport.^{1,2}

For asphyxia, the fetus reacts with a series of responses. First there is redistribution of blood flow to vital centres to limit the deleterious effects of oxygen limitation in the brain, heart and adrenal glands. A further compensatory

response is that overall fetal oxygen consumption declines to values as low as 50% of the control. This level can be maintained for periods up to 45 minutes and is completely reversible on cessation of hypoxia.³ There is accumulation of lactate in the vascular beds with limited oxygen supply due to anaerobic glycolysis leading to gradual development of metabolic acidosis.^{4,5}

The management of the compromised fetus is a challenging task and often prompts performance of an emergency caesarean delivery. Fetal distress is a poorly

defined term and may result in unnecessary emergency caesarean deliveries under general anesthesia.⁴

The goal of fetal intrapartum resuscitation (FIR) is to optimize the fetal condition in utero so that labor may continue safely, or to improve fetal wellbeing prior to emergency delivery. Intrauterine resuscitation encompasses maternal repositioning, reducing uterine activity, oxygen administration, amnioinfusion, optimizing aternal fluid status and correction of hypotension, and modifying maternal expulsive efforts. It helps to “buy time” to optimize the fetal condition while preparing for an impending delivery, or an emergency cesarean section.¹

Meconium aspiration syndrome (MAS)

Meconium staining is, in itself, not evidence that the foetus is suffering from oxygen deprivation in the uterus. There is a suggestion that the foetus passes the meconium because it is under stress however the main concern is related to meconium aspiration syndrome, which is where the baby takes meconium contaminated fluid into its lungs either before or during birth. This is more common in post term babies (over 41 weeks) and is rare before 38 weeks.⁶

MAS causes problems in breathing through two means; there is some evidence that indicates that meconium inhibits, or depletes, the function of the surfactant (a naturally produced soapy substance that stops the walls of the lung buds from sticking to each other) which makes breathing ineffective. The second problem caused is that the meconium can block the lungs thus reducing the amount of oxygen that can be taken in. Meconium also causes irritation in the lungs that can lead to inflammation and infection and potentially death of the affected areas of lung tissue.⁷

Intrapartum fetal resuscitation¹

The goal of fetal intrapartum resuscitation (FIR) is to optimize the fetal condition in utero so that labor may continue safely, or to improve fetal wellbeing prior to emergency delivery.¹

Maternal oxygenation

Maternal oxygen administration has been used in an attempt to reduce fetal distress by increasing the available oxygen from the mother. Even though healthy women in labor have high blood oxygen saturation (SpO₂), it has been suggested that increasing inspired O₂ increases blood O₂ tension and results in more O₂ delivered to the fetus.⁸

Improving blood supply to the uterus

Maternal body position can influence fetal well-being without uterine contractions; results of non-stress tests

(NST) are most unfavourable when mothers lie on their back.⁹⁻¹¹ ‘Aortocaval compression’ describes compression of the inferior vena cava and the aorta by the gravid uterus in women at term.^{12,13} Acute fetal distress can be caused by either hypoperfusion of the uteroplacental unit secondary to maternal hypotension, or occult aortic compression causing a reduction in iliac arterial flow. The compression of the aorta by the pregnant uterus decreases the blood pressure and especially, pulse pressure distal to the affected level (supine hypotensive syndrome). Maternal cardiovascular compromise and fetal stress in maternal supine position and their relief in the full lateral position, are well recognized.¹⁴⁻¹⁶ Inferior vena cava compression is demonstrable up to 12.5⁰-15⁰ of lateral tilt and aortic compression up to 30⁰. The use of 15⁰ of tilt at cesarean section and 30⁰ during labor reduces the effects considerably. This amount of tilt, if applied correctly, reduces inferior vena cava compression.¹⁷

Intravenous fluids

Animal studies have shown that boluses of intravenous crystalloids increased maternal arterial blood pressure and placental site blood flow and decreased vascular resistance, however, there was no rise in fetal PO₂.¹⁸ In hypovolemic or hypotensive women, blood volume shifts away from the uterus affecting oxygen delivery to the fetus. A bolus of 500 ml of lactated Ringer’s solution over 20 minutes significantly increases fetal oxygen saturation.

Improving placental perfusion

Uterine contractions cause a cessation of maternal intervillous placental blood flow resulting in relative fetal hypoxia with recovery taking 60-90 seconds.¹⁹ If this intermittent interruption of blood flow becomes too frequent the fetus is at risk for hypoxemia and acidosis.

Briozzo et al, conducted a prospective randomized study to determine whether FIR using tocolysis and delayed delivery was better for the fetus than emergency delivery when fetal hypoxia was suspected because of a non-reassuring FHR pattern using conventional heart rate monitoring.²⁰ They concluded that tocolysis and delayed delivery rendered better immediate neonatal results than emergency delivery when fetal distress was suspected because of a non-reassuring fetal heart pattern. In addition, it may decrease the need for emergency delivery without increasing maternal and fetal adverse side-effects.

Improving funic blood flow

Amnioinfusion prevents or relieves umbilical cord compression usually caused by oligohydramnios. Amnioinfusion has been shown to reduce the incidence of variable fetal heart decelerations, but not late decelerations or reduced variability.²¹⁻²³

METHODS

This was a prospective study. Early perinatal outcome of newborns delivered through caesarean section due to clinical foetal distress (on the bases of abnormal foetal heart rate and rhythm by intermittent auscultation, together with meconium staining of amniotic fluid) in labour was compared with a group of newborns similarly delivered via caesarean section without a diagnosis of clinical foetal distress (The non - exposed group of mothers comprises of mothers who underwent caesarean section for indications other than clinical diagnosis of foetal distress). Data collected and analysed using appropriate standard statistical methods i.e. Chi-square (X^2) test and 'Z' - test.

Inclusion criteria

- Term gestation (at 37 weeks or above)
- Cephalic presentation
- Singleton pregnancies.

Exclusion criteria

- All patients with diagnosis of intra- uterine fetal death (IUFD)
- Multiple gestations
- Low birth weight (less than 1.8 kg)
- Malpresentation.

After the extraction of baby (by LSCS) we studied following things

- Relationship between clinical fetal distress and one-minute Apgar score
- Relationship between clinical fetal distress and five-minute Apgar score
- Clinical foetal distress and foetal outcome during the first 24 hours post-partum
- Distribution of reasons for admission to new-born unit for more than 24 hours to 48 hours

- Relationship between clinical foetal distress and morbidity and mortality
- Perinatal outcome at 48 hours
- Take home baby rate.

This study was performed in 150 pregnant women who had completed 37 weeks of gestation and underwent lower segment caesarean section for clinical foetal distress in labour (study group) was compared with another 150 pregnant women who had completed 37 weeks of gestation who underwent lower segment caesarean section for indication other than clinical foetal distress (control group).

RESULTS

Majority of the patients were in the age group of 21-25 years in both study (54%) and control group (57.33%).

Table 1: Age distribution.

Age (years)	Study group (150)	Control group (150)
18-20	45 (30%)	28 (18.66%)
21-25	81 (54%)	86 (57.33%)
26-30	17 (11.33%)	32 (21.33%)
>30	7 (04.6%)	4 (02.66%)
Mean±SD	23.05±3.63	23.91±3.43

'p' value - $p > 0.05$ (insignificant).

Table 2: Gravidity distribution.

Gravidity	Study group (150)	Control group (150)
Gravida 1	80 (53.33%)	42 (28%)
Gravida 2	42 (28%)	62 (41.33%)
Gravida 3	23 (15.33%)	33 (22%)
Gravida 4	4 (2.6%)	11 (7.33%)
Gravida 5	0 (0%)	2 (1.33%)
Gravida 6	1 (0.66%)	0 (0%)

Table 3: Antenatal complications (risk factors).

Complications	Study group	Control group
Pregnancy induced hypertension	25 (16.66%)	25 (16.66%)
Anemia	38 (25.33%)	25 (16.66%)
Anemia with PIH	3 (2%)	2 (1.33%)
Post maturity (41 weeks and above)	38 (25.33%)	10 (6.66%)
Oligohydramnios	3 (2%)	1 (0.66%)
Abruptio placentae	2 (1.33%)	0 (0%)
Central placenta previa	1 (0.66%)	2 (1.33%)
Antepartum eclampsia	0 (0%)	2 (1.33%)
PROM	8 (5.33%)	15 (10%)
Mother on anti-convulsant/ anti-psychotic drug	2 (1.33%)	0 (0%)
Total	120 (80%)	82 (54.66%)

$p < 0.01$ (more significant).

Table 4: Distribution of 1 min Apgar score in study and control group.

	0-3 (Very poor)	4-6 (Moderate poor)	7-10 (Good)	Mean±SD	'p' value - p < 0.001 (highly significant)
Study group (150)	27 (18%)	90 (60%)	33(22%)	5.21±1.6	
Control group (150)	3 (2%)	46 (30.66%)	101 (67.33%)	7.09±1.11	

Table 5: Distribution of 5 min Apgar score in study group and control group.

	0-3 (Very poor)	4-6 (Moderate poor)	7-10 (Good)	Mean±SD	'p' value - p < 0.001 (highly significant)
Study group (150)	11 (7.33%)	26 (17.33%)	113 (75.33%)	6.99±1.75	
Control group (150)	0 (0%)	03 (2%)	147 (98%)	8.19±0.81	

Table 6: Distribution of liquor state Apgar score and fetal outcome in study group.

Liquor state	No. of cases	Low Apgar score (0-6)		Admission to NICU in first 48 hours	Discharge rate	Mortality (death)
		1 min	5 min			
Thin meconium	61 (40.66%)	39 (26%)	5 (3.33%)	6 (4%)	6 (4%)	0 (0%)
Thick meconium	79 (52.66%)	70 (46.6%)	29 (19.33%)	32 (21.33%)	19 (12.66%)	13+2 still birth = 15 (10%)
Clear	9 (6%)	7 (4.66%)	2 (1.33%)	2 (1.33%)	1 (0.66%)	1 (0.66%)
Blood tinged	1 (0.66%)	1 (0.66%)	1 (0.66%)	1 (0.66%)	1 (0.66%)	0 (0%)
Total	150	117	37	41	27	16

Table 7: Distribution of fetal outcome in study group.

	No. of admission to NICU	Reason for admission to NICU	Discharge	Mortality	Cause of deaths
0-24 hours	41 (27.33%)	MAS → 21 (14%) MAS with PNA → 8 (5.33%) Perinatal Asphyxia → 4 (2.66%) Severe PNA with HIE-III → 1 (0.66%) MAS with HIE-III → 5 (3.33%) TTN → 1 (0.66%) Meconium gastritis → 1 (0.66%)		3+2 SB = 5 (3.33%)	MAS with pulmonary hemorrhage with RF with RD MAS with severe PNA MAS with severe PNA
25-48 hours	-	-	2 (1.33%)	3 (2%)	MAS with HIE-III severe PNA MAS with HIE-III Severe PNA with HIE-III
49-72 hours	2 (1.33%)	Aspiration pneumonitis with RD → 1 Hypoglycemic convulsion → 1	2 (1.33%)	2 (1.33%)	MAS with HIE-III with severe PNA MAS with HIE-III with severe PNA
73 hours to 7 days	3 (2%)	Jaundice (Hyperbilirubinemia) (on PND4) → 2 Hypoglycemic convulsion (on PND 4) → 1	4 (2.66%) (PND4)	3 (2%) (PND4)	MAS with HIE-III with severe PNA with RF with cardiorespiratory arrest (CRA) MAS with HIE-III with RF with CRA MAS with pulmonary hemorrhage with severe perinatal asphyxia
			PND 5-7 (4.66%)	2 (1.33%)	Aspiration pneumonitis with RD with RF with CRA MAS with HIE stage III
			PND 6-2 (1.33%)	1 (0.66%)	MAS with severe PNA
			PND 7-2 (1.33%)	0	0
> 7 days			12 (8%)	1 (0.66%) (on PND8)	MAS with RF with CRA

Association of primigravida in study group was statistically highly significant ($p < 0.001$) when compared with control group.

Anemia (25.33%) and post-maturity (41 weeks and above) (25.33%) was most common antenatal complications in study group. 2nd common complication in study group was pregnancy induced hypertension (16.66%).

Incidence of low 1 min Apgar score i.e. very poor (18%) and moderately poor (60%) was higher in study group when compared with control group in which incidence of low 1 min Apgar score was very poor (2%) and moderately poor (30.66%).

Incidence of low 5 min Apgar score i.e. very poor (7.33%) and moderately poor (17.33%) was higher in study group when compared with control group in which incidence of low 5 min Apgar score was very poor (0%), moderately poor (2%).

In control group incidence of good Apgar score at 5 min was higher (98%) when compared with study group (75.33%).

Association of low 5 min. Apgar score in study group was statistically highly significant ($p < 0.001$).

Rate of NICU admission in first 48 hrs. was higher in thick meconium stained liquor group i.e. 21.33% followed by thin meconium (4%), clear liquor (1.33%), Blood tinged liquor (0.66%) respectively.

Most common indication for NICU admission in study group was MAS (meconium aspiration syndrome 14%) followed by MAS with perinatal asphyxia (5.33%), MAS with hypoxic ischaemic encephalopathy (HIE) - stage III (3.33%) perinatal asphyxia (2.66%), severe PNA with HIE - III (0.66%) and TTN (0.66%) meconium gastritis (0.66%) respectively.

Table 8: Distribution of fetal outcome in control group.

	No. of admission to NICU	Reason for admission	Discharge	Mortality	Cause of deaths	
0-24 hours	6 (4%)	Cleft lip and cleft palate	1 (0.66%)			
		Anal atresia	1 (0.66%)			
		MgSO ₄ depression	2 (1.33%)	-	-	-
		Moderate PNA	1 (0.66%)			
		Severe PNA? Heart disease	1 (0.66%)			
25-48 hours	-	-	-	-	-	
49-72 hours	1 (0.66%)	Jaundice	1 (0.66%)	2 (1.33%)	-	
> 7 days	-	-	-	5 (3.33%)		

Table 9: Fetal outcome in first 48 hours in study group and control group.

	Baby with mother	Admitted in NICU	Mortality
Study group	109 (72.66%)	41 (27.33%)	6+2 SB (still birth) = 8 (5.33%)
Control group	144 (96%)	6 (4%)	0 (0%)

'p' value - $p < 0.001$ (highly significant).

Table 10: Fetal outcome in relation to detection of fetal distress to delivery interval in study group.

detection of fetal distress to delivery interval	No. of LSCS	NICU admission	Mortality
≤ 30 min	60 (40%) (n = 150)	16 (60) (26.66%)	3+2 still births = 5 (60) (8.33%)
>30 min	90(60%) (n = 150)	25 (90) (27.77%)	11 (90) (12.22%)

And most common cause for perinatal deaths in study group was MAS with HIE stage III with severe PNA (2.66%), 2nd common cause for perinatal death was MAS with severe PNA (2%) and MAS with HIE stage III (2%) followed by MAS with pulmonary haemorrhage with RD with RF (0.66%), severe PNA with HIE stage III

(0.66%), MAS with pulmonary haemorrhage with severe perinatal asphyxia (0.66%), Aspiration pneumonitis with RD with RF with cardiorespiratory arrest (0.66%) and MAS with RF with cardiorespiratory arrest (0.66%) respectively.

Incidence of NICU admission rate (27.33%), and mortality (5.33%) was higher in study group in first 48 hours, when compared to control group NICU admission rate was (4%) but no mortality.

In control group incidence of baby with mother was higher (96%) when compared with study group (72.66%).

Admission to NICU, mortality rate was statistically highly significant in study group when compared to control group ($p < 0.001$) in first 48 hours.

Incidence of NICU admission rate (27.33%), and mortality (5.33%) was higher in study group in first 48 hours., when compared to control group NICU admission rate was (4%) but no mortality.

In control group incidence of Baby with mother was higher (96%) when compared with study group (72.66%).

Admission to NICU, mortality rate was statistically highly significant in study group when compared to control group ($p < 0.001$) in first 48 hours.

Incidence of NICU admission (27.77%), and mortality (12.22%) was more when lower segment caesarean section was done after 30 min of detection of fetal distress.

DISCUSSION

The outcomes of various studies were comparable.

Majority of the patient in both present study (95%) and A. Geidam study (85%) were in age group 20-35 years.

This age group represents the reproductive active age group in general.

Table 11: Age distribution: comparison of present study with A. Geidam, B. Bako, S. Ibbrahim, M. Ashir.²⁴

Age distribution	Age (years)	Study group	Control group
Geidam A study (n = 120)	< 20 years	11 (9.1%)	11 (9.1%)
	20-35	102 (85%)	100 (83.33%)
	> 35	7 (5.83%)	9 (7.5%)
Present study (n = 150)	< 20	6 (4%)	6 (4%)
	20-35	143 (95%)	143 (95%)
	> 35	1 (0.66%)	1 (0.66%)

Table 12: Gravidity distribution: comparison of present study with A. Geidam, B. Bako, S. Ibbrahim, M. Ashir study in terms of gravidity.²⁴

Gravidity Distribution	Gravidity	Study group	Control group
Geidam A. study (n=120)	Primigravida	57 (47.5%)	56 (46.66%)
	2 nd to 5 th gravida	55 (45.83%)	56 (46.66%)
	Gravida 6th and above	8 (6.66%)	8 (6.66%)
Present study (n= 150)	Primigravida	80 (53.33%)	42 (28%)
	2 nd to 5 th gravida	69 (46%)	108 (72%)
	Gravida 6th and above	1 (0.66%)	0 (0.00%)

Table 13: Antenatal complications (risk factor), comparison of present study with A. Geidam, B. Bako, S. Ibbrahim, M. Ashir study.²⁴

	Antenatal complication	Study group	Control group
Geidam A. study (n = 120)	Eclampsia /PIH	7 (5.83%)	11 (9%)
	Placenta previa	0 (0.0%)	4 (3.33%)
	Abruptio placentae	2 (1.66%)	0 (0.0%)
Present study (n = 150)	Eclampsia/PIH	25 (16.66%)	25 (16.66%)
	Placenta Previa	1 (0.66%)	2 (1.33%)
	Abruption placenta	2 (1.33%)	0.(0.0%)

In present study (53.33%) and A. Geidam study (47.5%) majority of the patient in study group were primigravida.

In present study anemia (25.33%) and post-maturity (41 week and above) (25.33%) were most common antenatal complications in study group.

In control group anemia (16.66%) and pregnancy induced hypertension (16.66%) were most common antenatal complications.

Association of above various antenatal complications were significant in meconium stained liquor.

Table 14: Association of maternal antenatal complications in meconium stained liquor.

Antenatal complications	Bhinde SS, Baxi SR study ²⁵ (n = 174)	Present study (n = 150)
Anemia	30 (17.24%)	37 (24.66%)
PIH	24 (13.8%)	24 (16.00%)
PROM	13 (7.47%)	8 (5.33%)
Antepartum haemorrhage	5 (2.87%)	3 (2%)
Postmaturity (41 weeks and above)	-	34 (22.66%)
Oligohydramnios	-	3 (2%)

Table 15: Incidence of low 1 min Apgar score.

	Apgar score	Study group	Control group
Kenyatta hospital study ²⁶ (n = 58)	0-3 (Very poor)	7 (12%)	0 (0%)
	4-6 (Moderately poor)	27 (47%)	18 (31%)
	7-10 (Good)	24 (41%)	40 (69%)
Present study (n = 150)	0-3 (Very poor)	27 (18%)	03 (2%)
	4-6 (Moderately poor)	90 (60%)	46 (30.66%)
	7-10 (Good)	33 (22%)	101 (67.33%)

Table 16: Incidence of low 5 min Apgar score (0-6).

	Study group	Control group
Kenyatta hospital study ²⁶ (n = 58)	14 (24.1%)	2 (3.4%)
Geidam A. study ²⁴ (n = 120)	17 (14.16%)	5 (4.16%)
Roy KK study ²⁷ (n = 217)	15.2%	-
Present study (n = 150)	37 (24.66%)	03 (2%)

In present study most common complication associated with meconium stained liquor was Anemia (24.66%) and post maturity (22.66%) followed by PIH (16.00%).

Results of present study was comparable with the report of Bhinde SS, Baxi SR study.²⁵

Table 17: Incidence of NICU admission in first 24 hours of birth.

	Study group	Control group
Kenyatta hospital study ²⁶ (n = 58)	21 (36%)	10 (17%)
Roy KK study ²⁷ (CTG Monitoring) (n = 217)	15.2%	-
Present study (n = 150)	41 (27.33%)	6 (4%)

Association of low 1 min Apgar score in study group was high and significant, when compared to control group. Clinical diagnosis of foetal distress was found to be associated with low 1 min Apgar score in present study

and comparable with the report of Kenyatta hospital study.⁸

Clinical diagnosis of foetal distress was found to be significantly associated with low 5 minutes Apgar score in present study and was comparable with the reports of Kenyatta hospital study, A. Geidam study, Roy KK study.

Incidence of NICU admission in Kenyatta hospital study, Roy KK study and present study was higher in study group when compared to control group.

Clinical diagnosis of foetal distress was found to be significantly associated with high NICU admission in present study and was comparable with Kenyatta hospital study.²⁶

Table 18: NICU admission in relation to detection of fetal distress to delivery interval.

	Detection of fetal distress to delivery interval	NICU admission
Roy KK study ²⁷ (CTG monitoring) (n = 217)	≤ 30 mins (n = 121)	26 (21.4%)
	> 30 mins (n = 96)	7 (7.2%)
Present study (inter-mittent auscultation of FHR) (n = 150)	≤ 30 mins (n = 60)	16 (26.66%)
	> 30 mins (n = 90)	25 (27.77%)

In Roy KK study in which CTG monitoring was used, the rate of NICU admission was less than present study and Kenyatta hospital study (intermittent auscultation FHR).²⁷

In present study there was no significant difference in immediate NICU admission whether the D-D (Detection of fetal distress to delivery interval) time interval was ≤ 30 minutes or > 30 minutes.

In contrary to this in K.K. Roy study NICU admission in ≤ 30 minutes group was significantly higher.²⁷

But total NICU admission in Roy KK study (with CTG monitoring) the rate of NICU admission was 33 (15.2%) and in present study (intermittent auscultation fetal heart rate) 41 (27.33%) i.e. the rate of NICU admission was less in Roy KK study compared to present study.

CONCLUSION

Association of antenatal complications was high in study group compared to control group. Most common indication for induction of labour in study group was post-date pregnancy and control group was PIH.

Incidence of meconium stained liquor in study group was high. In study group incidence of NICU admission in first 48 hours and mortality was higher in thick meconium compared to thin meconium.

Clinical foetal distress (study group) was found to be significantly associated with low 1 min and 5 min. Apgar Score. Incidence of NICU admission and mortality rate was high in first 48 hours in study group when compared to control group.

Most common indication for NICU admission in study group was MAS (Meconium aspiration syndrome). Most common cause of perinatal death in study group was MAS with HIE stag III with severe PNA.

There was no significant difference in immediate NICU admission whether D-D (i.e. detection fetal detection to delivery interval) time interval < 30 minutes or > 30 minutes. But rate of mortality was high when D-D (i.e. detection fetal detection to delivery interval) was > 30 minutes.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: Not required

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Cite this article as: Jadhav CA, Tirankar VR, Gavandi PS. Study of early perinatal outcome in lower segment caesarean section in severe foetal distress at tertiary care centre. *Int J Reprod Contracept Obstet Gynecol* 2020;9:1259-67.