



Original Research Article

A Prospective Study on Role of Intrapartum Factors in Fetal Distress and Neonatal Outcome

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Abstract

In this prospective study done in Kamla Nehru Hospital IGMC Shimla 100 women with one or more signs of fetal distress like abnormal fetal movement perception by mother, fetal heart rate abnormality and meconium staining of amniotic fluid were recruited. Effects of intrapartum factors like Total duration of labour, Rupture of membranes, Time interval between duration of signs of fetal distress and delivery and Mode of delivery studied in terms of neonatal outcome with Apgar score at one and five minutes. All these above intrapartum factors have been found to affect the neonatal outcome as healthy, mildly asphyxiated and asphyxiated.

Introduction

Fetal distress is a state of jeopardy that if undetected leads to significant neonatal morbidity or fetal death. Newer methods have greatly improved one's ability to identify distressed fetus. But, at most places in our country we still have to depend on clinical signs and symptoms like maternal perception of fetal movement, fetal heart rate or rhythm and meconium staining of amniotic fluid for detection of fetal distress. Every fetus has a potential risk of intrapartum hypoxia or birth injury and an optimum outcome can be concluded only at the end of labour or occasionally much later. Dr. Virginia Apgar, devised the Apgar scores which is a quick method of assessing the state of newborn infant (Apgar V. 1953)¹. The one minute Apgar score predicts the immediate neonatal outcome. It determines the immediate need for resuscitation of the neonate. Apgar score at 5 minutes predicts the long term neurological

outcome. The 5 minutes Apgar score is a useful index of effective resuscitation effort. Risk to the fetus bears a direct relationship to the time interval between the first notation of fetal distress and delivery (Minz)². Prolongation of labour is by far the most common single cause of asphyxia of newborn (Russ et.al)³. There is a relatively rapid increase in the rate of asphyxia when second stage has exceeded more than one hour (Lund)⁴. Several investigators reported a significant increase in perinatal loss in prolonged rupture of membranes. These studies prompted a policy of delivery whenever possible within 24 hours (Russel et.al)⁵, Lanier et.al⁶, Shubek et. al⁷, Johnson⁸). Neonatal death was directly proportional to the time interval between detection of sign of fetal distress and delivery (Johnson D.J.)⁹. Early delivery is vitally important unless conditions are favourable for vaginal delivery, otherwise cesarean section or instrumental delivery is necessitated.

Material and Methods

A prospective randomized study was conducted in the department of obstetrics and gynaecology at Kamla Nehru Hospital of IGMC Shimla between July 2002-June 2003. Total no. of delivery during this period was 3912. Out of these 100 patients with full term pregnancy in labour with one or more clinical signs and symptoms of fetal distress were enrolled for the studies.

Selection of Cases

Patients with full term (37-42 weeks) normal pregnancy with cephalic presentation in labour; who had shown some alterations in fetal heart rate or rhythm, decrease or loss of fetal movements and meconium staining of amniotic liquor on spontaneous or artificial rupture of membrane were selected for the study. Pregnancy with antenatal complications like pregnancy induced hypertension, twin pregnancy, diabetes mellitus, severe anaemia, Rh incompatibility, antepartum haemorrhage and post maturity were excluded from the study. In all cases following observations were made and recorded in the case proforma:-

In each case a detailed obstetric and menstrual history was taken. Patients were asked about duration of labour pain, history of any bleeding or leakage per vaginum and color of liquor and any decrease or cessation of fetal movements. A detailed general, physical, systemic and obstetrical examination was done and findings were noted. Labour was monitored partographically. Fetal heart sound was auscultated in all patients at regular intervals to know any abnormality in rate (tachycardia >160bpm and bradycardia <110bpm), rhythm, fluctuation of FHR (tachycardia-bradycardia) in relation to uterine contractions. Patients with any of the clinical signs of fetal distress whenever possible was monitored with a cardiotocograph or clinically by auscultation at 15 minutes interval and management was decided accordingly. Hb%, blood grouping and Rh typing and urine for albumin and sugar were done in each patient. Continuous monitoring of fetal heart rate was

done by a cardiotocograph and interpretation was made of baseline heart rate, period of acceleration, period of deceleration (early, variable and late), oscillation along the baseline for beat to beat variability and amplitude of oscillation. Duration of first stage and second stage of labour were recorded in cases of normal vaginal delivery (NVD), low forceps delivery and in ventouse application. The time interval between the signs of fetal distress and delivery was recorded. If delivery was not eminent and clinical monitoring showed ominous signs of fetal distress patients were taken up for cesarean section. Placenta and umbilical cord were examined for any abnormality. Neonates were examined for Apgar score, birth weight, gestational age, any congenital malformation, meconium staining of cord, nails and cornea or any evidence of meconium aspiration syndrome. According to Apgar scores at one and five minutes neonates were classified into 3 categories-

1. Apgar score 7-10: healthy, no birth asphyxia.
2. Apgar score 4-6: mild asphyxia.
3. Apgar score 0-3: severe asphyxia and still birth.

Asphyxiated babies were admitted to neonatal intensive care unit after primary resuscitative measures and followed up as long as the neonate was in hospital.

Statistics: Observations were recorded and analyzed using Paired Student's t-test.

Observation

The cases were categorized on the basis of Apgar score at one and five minutes as follows after delivery:

1. Group I: Babies with no asphyxia; Apgar score 7-10.
2. Group II: Babies with mild to moderate asphyxia; Apgar score 4-6.
3. Group III: Babies with severe asphyxia and still birth; Apgar score 0-3.

Table no. I: Duration of rupture of membrane and neonatal outcome

Duration of Rupture	Total=100	At one minute			At five minute		
		Group I	Group II	Group III	Group I	Group II	Group III
Upto 1 hrs.	8	4(50%)	4(50%)	0	8(100%)	0	0
1 hrs. to 5 hrs.	50	17(34%)	30(60%)	3(6%)	44(88%)	6(12%)	0
5 hrs. to 10 hrs.	24	5(20.83%)	15(62.5%)	4(16.67%)	22(91.67%)	2(8.33%)	0
10 hrs. to 15 hrs.	9	2(22.22%)	3(33.33%)	4(44.44%)	3(33.33%)	5(55.55%)	1(11.11%)
>15 hrs.	9	2(22.22%)	5(55.56%)	2(22.22%)	6(66.67%)	2(22.22%)	1(11.11%)

Paired student's t-test:

Group I : t= -2.14, p= 0.099
 Group II : t= 1.83, p=0.141
 Group III: t= 2.99, p=0.040 (SIGNIFICANT)

Out of 9 patients of DROM (duration of rupture of membrane) >15 hours, 77.78% (7 patients) at 1 minute and 33.33% (3patients) at 5 minutes had moderate to severely asphyxiated babies. In patients with DROM upto 1 hour, 50% (4 patients) at 1 minute had asphyxiated babies in contrast to nil at 5 minutes. The table 1 is showing statistically significant result (p=0.040) in group III.

Table no. II: Total duration of labour with neonatal outcome.

Duration of labor	Total=100	At one minute			At five minute		
		Group I	Group II	Group III	Group I	Group II	Group III
upto 5 hrs.	16	4(25%)	10(62.5%)	2(12.5%)	16(100%)	0	0
5 hrs to 10 hrs.	37	17(45.94%)	17(45.94%)	3(8.10%)	33(89.18%)	4(10.81%)	0
10 hrs. to 15 hrs.	31	6(19.35%)	21(67.74%)	4(12.90%)	25(80.65%)	5(16.12%)	1(3.22%)
>15 hrs..	16	3(18.75%)	9(56.25%)	4(25%)	9(56.25%)	6(37.5%)	1(6.25%)

Paired student's t-test:

Group I : t= -4.72, p=0.018 (SIGNIFICANT)
 Group II : t= 3.77, p=0.033 (SIGNIFICANT)
 Group III : t= 11.0, p=0.002 (SIGNIFICANT)

In >15 hours group; 81.25% (13 patients) at 1 minute and 43.75% (7 patients) at 5 minutes had moderate to severely asphyxiated babies. It was observed that as the duration of labour went on prolonging, the no. of severely asphyxiated babies were progressively increased and p value was significant in all the three groups.

Table no. III: Time interval between duration of signs of fetal distress and neonatal outcome.

Duration	Total=100	At one minute			At five minute		
		Group I	Group II	Group III	Group I	Group II	Group III
Upto 30 min.	19	3(15.79%)	13(68.42%)	3(15.79%)	16(84.21%)	3(15.79%)	0
31 min.to 60 min.	16	4(25%)	11(68.75%)	1(6.25%)	15(93.75%)	0	1(6.25%)
61 min. min. to 120 min.	39	15(38.46%)	22(56.41%)	2(5.13%)	34(87.18%)	5(12.82%)	0
>120min.	26	8(30.77%)	11(42.30%)	7(26.92%)	18(69.23%)	7(26.92%)	1(3.85%)

Paired student's t-test:

Group I : t= -6.57, p= 0.007 (SIGNIFICANT)
 Group II : t= 3.95, p=0.029 (SIGNIFICANT)
 Group III : t= 2.20, p=0.115

In 60-120 minutes interval; 61.54% (24 patients) at 1 minute and 12.82% (5 patients) at 5 minutes had babies with Apgar <7. In >120 minutes interval 69.23% (18 patients) at 1 minute and 30.77% (8 patients) at 5 minutes had moderate to severely asphyxiated babies. It was noted that as the interval between duration of fetal distress had increased >60 minutes had incidence of asphyxia (64.61% at 1 minute vs. 7.69% at 5 minutes). It was statistically significant in group I (p=0.007) and in group II (p=0.029).

Table IV: Mode of delivery and neonatal outcome

Mode of Delivery	Total=100	At one minute			At five minute		
		Group I	Group II	Group III	Group I	Group II	Group III
NVD	15	1(6.67%)	12(80%)	2(13.33%)	11(73.33%)	3(20%)	1(6.67%)
Outlet forceps	8	1(12.5%)	5(62.5%)	2(25%)	8(100%)	0	0
Ventouse extraction	14	2(14.28%)	10(71.43%)	2(14.29%)	12(85.71%)	2(14.29%)	0
LSCS.	63	26(41.27%)	30(47.61%)	7(11.11%)	52(82.54%)	10(15.87%)	1(1.59%)

Paired student's t-test:

Group I : t= -3.08, p=0.05 (SIGNIFICANT)
 Group II : t= 3.20, p=0.049 (SIGNIFICANT)
 Group III: t= 2.48, p=0.089

Out of 100 patients with one or more signs of fetal distress; 15% delivered normally, 8% with outlet forceps, 14% with ventouse extraction and 63% with LSCS. Out of 15 patients delivered normally; 93.33% (14 patients) at 1 minute and 26.67% (4 patients) at 5 minutes had asphyxiated babies. 8 patients delivered by outlet forceps; only 12.5% (7 patients) at 1 minute had asphyxiated babies in contrast to no asphyxia at 5 minutes. 14 patients

delivered by ventouse extraction, 85.72% (12 patients) at 1 minute and 14.29% (2 patients) at 5 minutes had babies with Apgar <7. Out of 63 patients delivered by LSCS; 58.88% (37 patients) at 1 minute and 17.46% (11 patients) at 5 minutes had asphyxiated babies. It was noted that the patients delivered by LSCS had better neonatal outcome as compared to normal vaginal delivery. It was statistically significant in group I ($p=0.05$) and in group II ($p=0.49$).

Discussion

Duration of rupture of membrane (DROM): In the present study (Table I) as the DROM increased there was increased incidence of moderate to severely asphyxiated babies ($p=0.04$). When DROM was up to 1 hour 50% (4 patients) had moderately asphyxiated babies but none at 5 minutes. But when DROM was >15 hours 77.78% (7 patients) at 1 minute and 33.33% (3 patients) at 5 minutes had moderate to severely asphyxiated babies. Several studies (Russel et.al⁵, Lanier et.al⁶, Shubek et.al⁷ and Johnson et.al⁸) reported a significant increase in perinatal loss associated with prolonged rupture of membranes. These studies prompted a policy of delivery, whenever possible within 24 hours otherwise delay between membrane rupture and delivery may lead to increased risk of sepsis and neonatal morbidity.

Duration of Labour: In the present study (Table II); as the duration of labour had prolonged, the no. of asphyxiated babies progressively increased significantly ($p=0.002$). In patients who had duration of labour up to 5 hours; 75% (12 patients) at 1 minute and none at 5 minutes had moderate to severe asphyxia. This is in contrast with the patients who had total duration of labour >15 hours; 81.25% (13 patients) at 1 minute and 43.75% (7 patients) at 5 minutes had moderate to severe asphyxia. Russel et.al³ concluded that the prolongation of labour is by far the most outstanding single cause of asphyxia of the newborn. Meis et.al¹⁰ also observed that more incidence of meconium passage when duration of labour prolonged >10 hours.

Duration of Fetal Distress: The time interval between the detection of signs of fetal distress and delivery of baby has proved to be a very important determinant of neonatal outcome. In the present study (Table III) out of 100 patients 65% (65 patients) who delivered after >1 hour of detection of signs of fetal distress; out of 8 asphyxiated babies, 7 neonatal death and 1 fresh still birth had occurred. In the present study the perinatal mortality rate is 12.30% which is similar to perinatal mortality rate of 10.8% by Fenton and Sreer¹¹.

Mode of Delivery: Choice of methods of delivery depended on various factors like; associated risk factors, nature of distress, stage of labour and response to preliminary treatment given. Early delivery is vitally important unless conditions are favourable for vaginal delivery, otherwise cesarean section or instrumental delivery is necessitated. In the present study (Table IV), LSCS was done mostly (37 patients) in meconium stained amniotic liquor (MSAL)+ fetal heart rate abnormality (FHRA) group and when the duration of fetal distress was >120 minutes. Higher incidence of forceps application was linked with FHRA (4 patients), ventouse application with FHRA+MSAL group (9 patients) and normal delivery was seen in FHRA+MSAL group (7 patients). Out of 63% (63 patients) delivered by LSCS 41.27% (26 patients) at 1 minute and 82.54% (52 patients) at 5 minutes had healthy babies whereas in normal vaginal delivery group 16.67% (1 patient) at 1 minute and 73.33% (11 patients) at 5 minutes had healthy babies. Neonatal outcome at 1 minute Apgar was better among LSCS group compared to other mode of delivery which is consistent with the findings of Minz² in which perinatal salvage of infants delivered by LSCS due to fetal distress is twice that of similar group delivered vaginally. In the ventouse group 85.71% (12 patients) at 1 minute and 14.29% (2 patients) at 5 minutes had moderate to severely asphyxiated babies. In the outlet forceps group 100% of patients (8 patients) had healthy babies at 5 minutes whereas 87.5%

was asphyxiated at 1 minute. The neonatal outcome in outlet for cephalic delivery was better in comparison to ventouse delivery due to time factor in conducting the delivery. In the normal delivery group 93.33% (14 patients) had asphyxiated babies at 1 minute but at 5 minutes 26.67% (4 patients) were asphyxiated which was highest among all other methods in relation to incidence of asphyxiated babies. The neonatal outcome in normal vaginal delivery group was poor as compared to instrumental and abdominal delivery.

Conclusion

As the duration of rupture of membrane prolonged, the incidence of asphyxiated babies were progressively increased ($p=0.040$). The duration of labour was found to have a significant effect on the neonatal outcome. The longer the duration of labour more the babies born asphyxiated ($p=0.002$). The longer the duration of fetal distress worse the neonatal outcome ($p=0.029$). Early intervention and immediate delivery by LSCS, ventouse or outlet forceps had better neonatal outcome as compared to normal vaginal delivery ($p=0.049$).

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