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ORIGINAL ARTICLE

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Role of intrapartum amnioinfusion in meconium stained amniotic fluid

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OBJECTIVE(S): To study the effect of intraamniotic infusion (IAI) of normal saline in meconium stained amniotic fluid.

METHOD(S): Between January 2003 and June 2004, 200 women at term with vertex presentation having moderate to thick meconium stained liquor were alternately allocated to the study group where IAI was given and to control group where IAI was not given. Chi square test was used for statistical analysis.

RESULT(S): Cesarean section rate for fetal distress, apgar score <5 at one minute and meconium aspiration syndrome (MAS) were significantly less frequent in the study group compared to those in the control group ($P < 0.01$, <0.05 and <0.01 respectively), without increasing the febrile morbidity of the mother.

CONCLUSION(S): IAI using simple equipment is safe and beneficial for management of women with moderate to thick meconium stained liquor.

Key words : fetal distress, meconium, meconium stained amniotic fluid, meconium aspiration syndrome, amnioinfusion

Introduction

Fetal distress is a widely used but poorly defined terminology. Fetal condition during labor is usually assessed by fetal heart rate (FHR) and checking the presence of meconium in the amniotic fluid, especially in the set-up where facilities of cardiotocography and fetal scalp blood pH estimation are not available. Aspiration of the meconium into the fetal or neonatal lung is associated with clinical disease ranging from mild respiratory distress to severe respiratory compromise, and causes significant increase in perinatal morbidity and mortality. Various methods such as intrapartum amnioinfusion (IAI) and tracheoesophageal suctioning at birth have been employed to decrease meconium aspiration. Wenstrom and Parsons [1] initially proposed IAI as a way of diluting meconium to decrease the incidence of meconium aspiration syndrome. IAI, the instillation of normal saline into the uterus during labor, reduces meconium concentration and thereby the effect of aspiration. It may also reduce cord compression in cases of oligohydramnios.

The present study was conducted in the context of our low resource area where facilities of modern fetal monitoring are not available, to find whether IAI can reduce the incidence of cesarean section (CS), and perinatal morbidity and mortality in cases of meconium stained amniotic fluid.

Methods

This study was conducted between January 2003 and June 2004. During the period we had 21837 deliveries and 200 women had meconium stained liquor during labor giving an incidence of 9.2%. Women with pregnancy at or beyond 37 weeks with a single fetus in cephalic presentation, and moderate to thick meconium stained amniotic fluid were included in this study. Women with postcesarean pregnancy, chorioamnionitis, fetal congenital anomalies, antepartum hemorrhage, severe medical disorders, and those needing immediate delivery (e.g. cord prolapse, severe fetal bradycardia, etc.), were excluded from the study. Ours being

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a low resource set-up, we don't have the facilities for electronic fetal monitoring. Hence, all the patients were monitored clinically.

The women were allocated alternately to two groups – study group where IAI was given and control group where IAI was not given. Written informed consent was taken in all cases. All women had moderate to thick meconium stained liquor seen after either spontaneous or artificial rupture of membranes. In the study group, a nasogastric tube (FG 8 size) was introduced transcervically into the uterine cavity just above the fetal head and 500 mL of normal saline at room temperature was infused through it within 30 minutes, and another 500 mL was infused at the rate of 2 mL/minute. The control group did not receive any IAI. All women were monitored by fetal heart sound auscultation every 15 minutes and uterine activity was assessed every half an hour by palpation. Augmentation for inadequate uterine contraction was done with syntocinon drip when no fetal bradycardia was recorded or fetal heart rate (FHR) came back to normal after IAI. Emergency CS was done in those cases where there was further deterioration of FHR, persistent bradycardia, or nonprogress of labor. However, cases of CS done for nonprogress of labor were excluded from the study as they did not comply with the primary outcome measure of the study.

The primary outcome measure of the study was CS rate for fetal distress and secondary outcome measure was the condition of the fetus at birth judged by apgar score at 1 and 5 minutes. Any evidence of meconium aspiration syndrome (MAS) like development of respiratory distress within an hour of birth, chest x-ray showing diffuse patchy opacities, atelectasis etc. was recorded. Oropharyngeal suction was done in all newborns at delivery of the head. The neonatologist undertook subsequent resuscitative procedures. Chi square test was used for statistical analysis.

Results

A total of 200 women were studied, 100 in each group. There were 21837 deliveries during the study period and 200 had meconium stained liquor giving an incidence of 9.2%. After exclusion of the cases where CS was done for nonprogress of labor, the number of cases in the study group was 93 and in the control group 95. The two groups were comparable with respect to age, duration of pregnancy, pregnancy complications, and labor characteristics (Table 1).

Table 1. Baseline data.

Characteristics	Study Group (n=93)	Control Group (n=95)
Average age (years)	25.6 (Range 18.3-32.7)	24.7 (Range 17.7 – 33.0)
Average gestational age (weeks)	39.1 (Range 36.5 – 40.3)	38.6 (Range 36.1 – 41.2)
Average birth wegith (kg)	2.75 (Range 2.3 – 3.1)	2.77 (Range 2.3 – 3.3)
Pregnancy complications		
Postterm	9	10
IUGR	3	1
Pregnancy induced hypertension	16	14
Average cervical dilatation (cm)	5.4 (Range 4.5 – 6.5)	5.3 (Range 4 – 7.5)
Average time interval between rupture of membranes and delivery	2.9 (Range 2.5 – 3.6)	3.1 (Range 2.6 – 3.7)

Table 2 shows the outcome of the trial along with statistical analysis of the results. The CS rate due to fetal distress was 41.0% in the control group and 19.3% in the study group. The difference was statistically significant (P<0.01). Apgar score < 5 at 1 minute was 11.5% in the control group compared to 4.2% in the study group (P=0.06). The 5 minute apgar score was also better (P=0.29) in the study group.

Respiratory distess of the neonate was significantly less common in the study group than in the control group (3.2% vs 12%; P=0.0349). Laryngoscopic finding of meconium below the vocal cords in neonates was 35.76% in the control group compared to only 6.3% in the study group. The difference was statistically significant (P < 0.001) indicating thereby that meconium aspiration would have been much higher if IAI was not given. Also respiratory distress and

Table 2. Outcome of the study.

Outcome	Study Group (n=93)		Control Group (n=93)		χ^2	P value
	Number	Percent	Number	Percent		
Cesarean section for fetal distress	18	19.3	39	41.5	10.47	0.0012
Forceps delivery	7	7.5	8	8.3	0.05	NS
Apgar <5						
1 minutes	4	4.2	11	11.5	3.39	0.0656
5 minute	2	2.1	6	6.3	1.10	0.2943
Respiratory distress	3	3.2	12	12.6	4.45	0.0349
Meconium below the vocal cords	6	6.3	34	35.76	24.15	0.00001
Meconium aspiration syndrome	22.1	9	9.47	3.34	0.0676	
Perinatal death	2	2.1	3	3.2	0.001	0.9748
Maternal pyrexia	7	7.5	9	9.4	0.23	0.6315

MAS were higher in the control group. There were two perinatal deaths in the study group (one still birth and one early neonatal death due to congenital anomalies) and three perinatal deaths in the control group (P=0.97).

Interestingly, there was no complication of IAI. Maternal pyrexia rate was not higher in the study group. There was no increase in neonatal infection rate. There was no case of hypertonic uterine contractions.

Discussion

The two groups were matched in all respects includindg the prevalence of IUGR and of postdate pregnancy which are considered as confounding variables for both passage of meconium and MAS. In the study group, rate of CS was significantly less (P<0.01) as is also reported by Das et al [2] and Sahu [3]. Respiratory distress was significantly lower in the study group (P=0.03). Incidence of MAS was 2.1% in the study group and 9.47% in the control group (P=0.06) comparable to that reported by Rathore et al [4]. Meconium below the vocal cords was significantly higher (P<0.001) in the control group similar to the findings of Das et al [2] and Rathore et al [4]. There were two perinatal deaths in the study group and three in the control group, which was similar and comparable to the findings of Rathore et al [4]. In spite of intrauterine catheter introduction and saline infusion, the incidence of puerperal pyrexia was lower in the study group. The decrease is probably due to dilution effect on bacteria that enter the uterus. Rathore et al [2] and Hofmyr [5] also found similar results.

Conclusion

IAI decreases the incidence of CS rate owing to fetal distress. It corrects oligohydramnios resulting from rupture of membranes, thereby reducing vagal stimuli due to cord compression. These probably decrease further meconium passage as well as remove a stimulus for deep fetal breathing and gasping. IAI also has a dilution effect on the meconium. Thus it decreases meconium in the trachea and reduces the incidence of MAS and birth asphyxia. IAI is beneficial using simple equipment in absence of modern electronic fetal monitoring facilities.

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