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Intrapartum Amnio-Infusion for Meconium Stained Amniotic Fluid

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OBJECTIVE - To evaluate the safety and efficacy of transcervical intrapartum amnioinfusion for meconium stained amniotic fluid (MSAF) and to see its effect on perinatal morbidity and mortality. **METHODS** – Amnioinfusion with normal saline was done with size 8 nasogastric suction catheter through the transcervical route. A total of 250 women having meconium stained amniotic fluid during labor were enroled for the study – 100 received amnioinfusion and 150 who did not and were taken as a control group. **RESULTS** - A significant difference in the various parameters was found between the two groups. Incidence of LSCS was 59% in the amnionfusion group and 74% in the control group (P 0.013). APGAR score of <5 at 5 minutes was seen in 1% of the women in the amnioinfusion group and in 6.6% in the control group (P=0.04). NICU admission was 5% v/s 21.37%, meconium aspiration syndrome (MAS) 1% v s 17.31%, hypoxic ischemic encephalopathy 1% v/s 6.6% and neonatal death 1% v/s 8% in the amnioinfusion group and control group respectively.**CONCLUSION** - Intrapartum amnioinfusion is technically feasible in a developing country situation with limited intrapartum facilities. In this study, amnioinfusion for MSAF was associated with striking improvement in perinatal outcome.

Key words : amnioinfusion, labor, meconium

Introduction

Passage of meconium in utero has been noted in 7% to 22% of live births[1]. Meconium aspiration syndrome (MAS) has been reported in 6.6% to 30% of cases of meconium stained amniotic fluid (MSAF) and 1% to 3% of live born infants[2]. The presence of meconium in the amniotic fluid is associated with increased perinatal mortality and morbidity[3]. Many investigators do not believe that the presence of meconium predicts a poor fetal outcome unless it is accompanied by other signs of fetal distress. However, once meconium has passed, regardless of the stimuli, any episode of fetal or neonatal gasping can result in aspiration of meconium into the trachea and lungs before or during labor.

Miyazaki and Nevarez[4] showed that saline amnioinfusion during labor is useful in correcting oligohydramnios and relieving variable decelerations due to cord compression. There is convincing evidence that amnioinfusion for potential or suspected umbilical cord compression reduces the occurrence of fetal heart rate decelerations and also the frequency of cesarean section.

Amnioinfusion has also been used in women with MSAF, and systematic review of randomised trials has shown an overall reduction in the incidence of cesarean section, meconium below the vocal cords and MAS[5]. As thick meconium staining of the amniotic fluid is unlikely without reduction in the volume of amniotic fluid, it is not clear whether the benefits recorded in these studies were due to dilution of the meconium or correction of oligohydramnios with elimination of fetal heart rate decelerations as discussed above.

It is said that intrapartum dilution of meconium by transcervical amnioinfusion may reduce the risk of meconium aspiration if it occurs during labor. It may also improve the neonatal outcome.

The purpose of this study was to evaluate the safety and efficacy of transcervical amnioinfusion during labor complicated by MSAF, in a setting with limited peripartum surviellence and to evaluate clinically meaningful perinatal outcomes.

Material and Methods

In this prospective case control study conducted from Feb 2001 to Jan 2002, women in labor at > 37 weeks of gestation, with singleton fetus in cephalic presentation and moderate or heavy meconium staining of the amniotic fluid, were included. Consent was taken. Women were excluded if there was an indication for immediate delivery or if there was presence of chorioamnionitis, vaginal bleeding, serious fetal congenital abnormalities, previous cesarean section or maternal cardiac or pulmonary disease. A total of 250 women were included in the study; 100 were given amnioinfusion and other 150 were managed without amnioinfusion and were taken as controls.

In the amnioinfusion group, a size 8 nasogastric suction catheter (outer diameter 2.5mm) was inserted transcervically into the uterine cavity. If the cervix was

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not dilated, the catheter was inserted under vision using a vaginal speculum. Normal saline at room temperature was infused through the catheter, 500 ml over 30 minutes, then 500 ml at 30 drops (2ml) per minute. This simplified method was chosen to give similar rates and volumes to those used at the well equipped centre, atleast over the first few hours, in an environment where automatic infusion pumps were not available and the level of surviellence was limited by the number of nursing staff in a very busy labor ward and by lack of sophisticated equipment. The control group received no uterine catheter placement and infusion.

All patients had continuous clinical monitoring of FHS by auscultation. The combined obstetric and pediatric approach of suctioning the throat of the neonate to prevent meconium aspiration was used in all deliveries. Neonatal outcome was assessed by pediatricians who were blinded to control and study group. Chi square test and Fisher's exact test were used for statistical analysis. Significance was set at $P < 0.05$.

Results

The baseline variables were similar between two groups as shown in Table I.

Table I : Baseline Characteristics of women

	Amnioinfusion Group (n=100) (Mean)	Control Group (n=150) (Mean)
Age (in years)	22.8	22.7
Nulliparas (no.)	58	87
Gestational age (weeks)	39	39.2
Pregnancy complications		
Past dates	18	25
Hypertension	15	23
Others	10	17
Spontaneous labour	95	130
At enrolement		
Clinical oligohydramnios	4	5
Cervical dilatation		
< 3 cm	2	4
> 7 cm	6	11
Oxytocin used after enrolement	40	65
Birthweight (kg.)	2.66	2.8

Incidence of meconium during labour in our hospital was 8%. Seventy four percent of patients with MSAF in control group required LSCS as compared to 59% in amnio-infusion group (P=0.013) (Table II).

Table – II : Mode of Delivery

	Vaginal Delivery No.	%	LSCS No.	%
Study group (n=100)	41	41%	59	59%
Control group (n=150)	39	26%	111	74%

Table III shows outcome measures in neonates in both the groups. Incidence of APGAR score < 5 at 5 minutes was 1% in amnioinfusion group as compared to 6.6% in control group (P=0.04). Meconium detected in trachea by laryngoscopy was present in 5% of neonates in the amnioinfusion group as compared to 22.6% in the control group. Difference was highly significant statistically (P=0.00004). Five percent of neonates in amnioinfusion group needed admission in NICU as compared to 21.3% in the control group, the difference was significant (P=0.00009). Antibiotics were given almost equally in both the group (P=0.21).

Table – III : Comparison of outcome measures in Neonates

Outcome measures	Study Group (n=100) No.	%	Control Group (n=150) No.	%	P Value
APGAR at 5 min. <5	1	15	10	6.6%	P = 0.04
Meconium in trachea	5	5%	34	22.6%	P = 0.00004
NICU admission	5	5%	32	21.3%	P = 0.00009
Antibiotic needed	28	28%	52	34.6%	P = 0.21
MAS	1	1%	26	17.3%	P = 0.00003
Hypoxic ischaemic encephalopathy	1	1%	10	6.6%	P = 0.04
Perinatal mortality	1	1%	12	8%	P = 0.01

In the present study MAS was one percent in amnio-infusion group as compared to 17.3% in control group (P=0.000039). Incidence of hypoxic ischaemic encephalopathy in neonate was one percent in amnioinfusion group as compared to 6.6% in control group (P=0.04). Overall perinatal mortality rate was much higher at eight percent in the control group as compared to one percent in the amnioinfusion group (P=0.01).

No complication of amnioinfusion was detected. There was no increase in neonatal or maternal infection and hypertonic uterine contractions were also not observed.

Discussion

This study has shown that amnioinfusion is feasible using simple equipment in a developing country environment without routine electronic fetal monitoring facilities.

In our study, LSCS rate was high (59.0% study v/s 74% control group) but was similar to that reported by Das et al[6] viz 59% in amnioinfusion group v/s 73.15% in control group. Study by Hofmeyr[5] shows LSCS rates as 20% in study group and 31% in control group. Mohamed et al[7], give very low LSCS rates (9.5% in amnio infusion group and 12.3% in control group). Incidence of MAS in our study was very low (1% in amnioinfusion group v/s 17.3% in control group) which was comparable to that reported by Mohamed et al[7] (3.1% in amnioinfusion group v/s 12.8% in control group). Study by Hofmeyer[5] shows lower rate of MAS (2.3% vs 7.2%), and so does the study by Das et al[6] (1% v/s 17.3%).

Perinatal death rate in our study was one percent in the study group and eight percent in the control group. Mohamed et al[7] showed lower PNMR of 12% in study group and 3.6% in control group. Das et al[6] reported PNMR of 1% in control group and 8.4% in study group. Hofmeyer[5] reported no perinatal death.

The results show striking improvement in the perinatal outcome for women receiving amnioinfusion for MSAF. A study by Macri et al[8] shows improvement in pregnancy outcome by amnioinfusion in thick meconium. Sadovasky et al[9], proposed that there was a significant improvement in neonatal outcome by mechanical dilution of meconium during labour, which reduces the intrapartum aspiration of thick meconium.

Amnioinfusion corrects concurrent oligohydramnios because of ruptured fetal membranes, thereby reducing vagal stimuli due to cord compression. This probably decreases further meconium passage as well as removes a stimulus to deep fetal breathing and gasping. Relative sparing of umbilical cord compression by amnioinfusion lessens the frequency of variable deceleration as labour progresses, contributing to an improved acid base status. Owen et al[10] and Nageotte et al[11], suggested that women, both at term or with postdated pregnancies, complicated by reduced amniotic fluid could be potentially benefitted from intrapartum amnioinfusion.

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