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Intrapartum amnioinfusion as a preventive measure for meconium aspiration syndrome; a randomized controlled study

Dr Humma Habib*, Dr Syed Naseer*, Dr Maraj-ud-din, Dr Shakura Bhat****

* Department of Gynecology and Obstetrics, SKIMS Medical College Srinagar, J&K, India.
** Department of Gynecology and Obstetrics, Lalla Ded Hospital GMC Srinagar. J&K India.

ABSTRACT:

Background

The present study has been done to evaluate the role of amnioinfusion in patient with moderate to thick meconium under conditions of limited intrapartum foetal surveillance.

Methods

We performed a prospective randomised controlled study during July 2006 to December 2007 in which 200 pregnant women in labour at 37 or more weeks of gestation were stratified according to the presence of moderately or thickly meconium stained liquor and then randomly assigned to amnioinfusion or to standard care. The primary outcome measure was caesarean section rate and meconium below vocal cords of the baby. Secondary outcome measures included 1-minute and 5-minute apgar scores, meconium aspiration syndrome, admission to NICU and perinatal mortality.

Results

Meconium aspiration syndrome occurred in 8% of controls and in no patient from aminoinfusion group.

Conclusions

For women in labour who have thick meconium staining of the amniotic fluid, amnioinfusion reduces the risk of moderate or severe meconium aspiration syndrome and perinatal morbidity. Caesarean section rate for foetal distress, apgar score <5 at one minute and meconium aspiration syndrome were also significantly less frequent in the study group compared to those in the control group.

Key words: aminoinfusion, meconium, Apgar score, meconium aspiration syndrome

I. INTRODUCTION

Meconium staining of amniotic fluid is considered a harbinger of fetal compromise because of its direct correlation with fetal distress and increased likelihood of inhalation of meconium with resultant deleterious effect on the neonatal lungs. Meconium aspiration syndrome remains one of the most common causes of neonatal distress syndrome. Passage of meconium in utero has been noted in 5% to 25% of live births (1).Incidence rates of the condition in developing countries are found to be higher than in the developed world (2). The presence of meconium in the amniotic fluid is associated with increased perinatal morbidity and mortality.

The meconium aspiration syndrome is believed to result from aspiration of meconium during intrauterine gasping or at the first breath. Prophylactic pharyngeal suctioning and tracheal aspiration have not been shown to reduce the risk of the meconium aspiration syndrome (3). Amnioinfusion is a promising new technique with important implications for the care of pregnant women. It involves infusion of a sterile physiological solution into the amniotic cavity and can be done abdominally or transcervically. Transcervical amnioinfusion is a relatively simple procedure of augmenting amniotic fluid volume once the membranes have ruptured. Potential mechanisms include dilution of meconium, thus reducing its mechanical and inflammatory effects, and cushioning of the umbilical cord, thus correcting recurrent umbilical cord compressions that lead to fetal acidemia (a condition predisposing to the meconium aspiration syndrome).

The present study was conducted in our low resource area where facilities of electronic fetal monitoring and advanced intrapartum fetal surveillance are not available, to find whether amnioinfusion can reduce the incidence of meconium aspiration in newborns and decrease the rate of operative deliveries in cases of meconium stained amniotic fluid.

II. MATERIALS AND METHODS

This prospective randomized study was conducted in the Department of Gynecology and Obstetrics, Government Lalla Ded Hospital, Srinagar. Two hundred women were included in the study during the period from July 2006 to December 2007. Of these hundred women were randomly assigned to the study group and hundred women to control group. These were labeled as study group and control group respectively.

The subjects included women in the first stage of labor who were found to have moderate to thick meconium on spontaneous or artificial rupture of membranes and a regular fetal heart rate. Moderate to thick meconium was defined as thick opaque material in the amniotic fluid. Labor was either spontaneous in onset or induced for an indication. Women with fetal malpresentations and malformations, previous uterine scar, severe hypertension, vaginal bleeding, intrauterine growth restriction and those needing immediate delivery like cord prolapse, severe fetal bradycardia, etc., were excluded from the study.

The women were divided randomly among two groups

alternately – study group where amnioinfusion was given and control group where amnioinfusion was not given. Written informed consent was taken in all cases. Women assigned to amnioinfusion underwent the procedure immediately after randomization. In the dorsal position a per vaginal examination was performed to rule out cord prolapse and confirm cervical dilatation and fetal presentation. A sterile nasogastric suction catheter no 8 was introduced transcervically to a depth of 30 cm between head and amniotic sac, and a bolus of 500 ml of sterile saline at room temperature was infused under the force of gravity over a period of 30 minutes. Cervical dilatation was noted before and after bolus infusion and if decision was taken to continue with monitoring of labor, infusion was continued at the rate of 2ml/minute to a maximum of 1500 ml. Vaginal effluent was judged by inspection of pads every 30 minutes The use of oxytocin was permitted if there was a delay in the progress of labor or inadequate uterine contractions provided that the fetal heart-rate monitoring did not indicate that urgent delivery was necessary. Amnioinfusion was stopped just before delivery. The total volume of saline infused, the time taken for amnioinfusion, and the length of three stages of labor were noted. The control group did not receive any amnioinfusion. All women were monitored by fetal heart sound auscultation every 15 minutes and uterine activity was assessed every half an hour by palpation. Operative deliveries (vacuum extraction, caesarean section) were done for failure to progress or for fetal indications. After delivery all patients received prophylactic antibiotics.

A pediatrician who was blinded to the study was present in all deliveries. Infants underwent Delee suctioning on delivery of the head and before delivery of the shoulders. After delivery they were intubated by the pediatrician for vocal cord visualization and if meconium was present tracheal intubation and suctioning was done. Neonatal outcome was assessed by the pediatrician. Mothers and babies were followed for one week postpartum. Data on neonatal outcome were obtained from records in the pediatric department where staff was not aware of the allocation.

The primary outcome measure was caesarean section rate and meconium below vocal cords of the baby. Secondary outcome measures included maternal complications, 1-minute and 5-minute apgar scores, need for positive pressure ventilation, meconium aspiration syndrome, admission to NICU, antibiotics given to baby, and perinatal mortality. Patient demographics, labor and delivery characteristics and amnioinfusion details were also analyzed. Results were analyzed using Epi-into version 6.0.statistical significance was testing by chi-square test where appropriate. A 'P' value of 0.05 was considered as statistically significant.

Table1.Baseline Demographic and Obstetrical Characteristics of the Women.

Characteristic	Study group	Control group
Maternal age(yr.)	24.76±0.467	25.22±0.490
Maternal BMI	30.2±5.6	30.2±5.8
Gestational age(wk.)	39.12±0.182	39.5±0.183
Nulliparous (%)	60	64
Cervical dilatation (%)	4.3±0.151	4.3±0.159
Induced labor (%)	*18*	22
Delivery interval(min)	215.72±12.062	197.82±11.384
Oxytocin (%)	58	54
ARM (%)	48	54.6
Initial FHR(bpm)	138.72±0.945	137.36±0.909

III RESULTS

A total of 200 women were studied, 100 in each group. During the study period There 22921 deliveries took place in our hospital of which 2310 patients were discovered to have meconium stained amniotic fluid. The incidence of meconium in our hospital was found to be 10.32%.The study groups were balanced with respect to sociodemographic and anthropometric variables, as well as baseline obstetrical characteristics (Table 1)

Table 2 shows the outcome of the trial.

Outcome	Study group	Control group
Volume of fluid(ml)	*905.18*±34.78 7	188.71±11.7 65
C-section for fetal distress (%)	2	26
Ventouse for AFD	2	6
Birth weight (kg)	2.725±0.044	2.74±0.050
Apgar Score<7 at 1 min (%)	30	56
Apgar Score<7 at 5 min (%)	4	8
Need for PPV (%)	*16*	42
Meconium below vocal cords (%)	6	32
Meconium aspiration syndrome (%)	0	8
NICU admission (%)	6	28
NICU stay>4 days (%)	4	14
Post-partum pyrexia (days/%)	4/4	6/6
Perinatal death (%)	0	2

IV DISCUSSION

The two groups were matched regarding various respects including parity, gestational ages, initial temperature, initial fetal heart rate, and most importantly the prevalence of IUGR and of post-dated pregnancies which are considered as predisposing factors for both passage of meconium and MAS. Women in the amnioinfusion group underwent amnioinfusion within 20 minutes after randomization, and the intervention continued until approximately 1 hour before delivery. The total volume of normal saline required for amnioinfusion ranged from 500 to 1400 ml. The incidence of meconium aspiration in our control group was 8% which is higher than the 2% incidence in the study group, despite aggressive tracheal suctioning, reported by Davis et al (1985).(3)The incidence of total operative deliveries was

significantly reduced in the amnioinfusion group;22% versus 54%(p=0.009).making our results in consensus with that of Wenstrom and Parsons,1989(4).There were only two perinatal deaths in the whole study and these belonged to the control group.Das Vinta(2001)(5) has reported a perinatal mortality of 1% in amnioinfusion group and 8.42% in control group(p=0.01).Similar results have been given by Sahu Latika(2003)(6).From the study group 1.6% of babies and from control group 28% were admitted to the neonatal intensive care unit, the reduction in incidence among two groups being statistically significant(0.003;our results are roughly in agreement with those of Das Vinta,2001(5)(5% versus 21.05%), Mahomed 1998(7)(12.8% versus 22.9%) and Sahu Latika.2003(6). In our study we came across none of the maternal complications like uterine hypertonicity, scar dehiscence polyhydramnios, umbilical cord prolapse, pulmonary edema or chorioamnionitis.

V CONCLUSION

This review concludes that, in settings with limited intrapartum perinatal surveillance facilities, amnioinfusion in women with moderate or thick meconium staining of the amniotic fluid could improve some of the perinatal outcomes. The benefits might possibly be due to dilution of meconium, so that toxic effects of meconium, should it occur are diminished. It also corrects oligohydramnios and prevents umbilical cord compression and hence fetal gasping by vagal stimulation. However the procedure will not prevent meconium aspiration that may have already occurred before it is performed. It improved maternal morbidity by decreasing the rate of caesarean sections and instrumental deliveries. However reduction in the quantity of meconium below the vocal cords, a factor thought to be closely related to meconium aspiration syndrome, indirectly showed that amnioinfusion prevented meconium aspiration syndrome. More patients would be needed to definitively study the effects of amnioinfusion on these parameters. Hence, the results of the review are applicable in under-resourced settings where complications of meconium staining of the amniotic fluid are common and facilities for intrapartum surveillance are limited.

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AUTHORS

First Author: Dr Humma Habib, M.D
(Corresponding Author)
Senior Resident
Department of Gynecology and Obstetrics
SKIMS Medical College Srinagar
Email: hummahabib@yahoo.com

Second Author: Dr Syed Naseer, M.D
Consultant
Department of Gynecology and Obstetrics
SKIMS Medical College Srinagar

Third Author: Dr Maraj-ud-din, M.D
Senior Resident
Department of Gynecology and Obstetrics
Lalla Ded Hospital GMC Srinagar. J&K, India

Fourth Author: Dr Shakura Bhat, M.D
Senior Resident
Department of Gynecology and Obstetrics
Lalla Ded Hospital GMC Srinagar. J&K, India

Correspondence Author;Dr Humma Habib, M.D
Senior Resident
Department of Gynecology and Obstetrics
SKIMS Medical College Srinagar
Email: hummahabib@yahoo.com