

Effect of Amnioinfusion for Meconium Stained Amniotic Fluid on Perinatal Outcome

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Introduction

Fetal distress is a widely used but poorly defined term.¹ Its use commonly indicates anxiety about fetal condition which is usually assessed by measuring the fetal heart rate and checking for the presence of meconium in the amniotic fluid, and it is often assumed that an abnormal fetal heart rate, especially in the presence of meconium stained liquor, indicates hypoxia and acidosis. The purpose of this case control study was to evaluate the possible effects of amnioinfusion with respect to effect of amnioinfusion in improving fetal outcome.

Clinical obstetrics throughout this century has practiced the concept that meconium passage is a potential warning of fetal distress. Aspiration of meconium by the fetus remains a relatively common cause of perinatal mortality and morbidity because it is difficult to prevent. The fetus passes meconium into the amniotic fluid in 10% of all pregnancies, in 5% of these (i.e., 1:200 of all pregnancies) the meconium is aspirated into the lungs of the fetus or neonate. This can result in severe respiratory difficulty, the meconium aspiration syndrome.²

Amnioinfusion is defined as a procedure in which a physiologic solution (such as normal saline or ringer lactate) is infused into the uterine cavity to replace the amniotic fluid. There is evidence that amnioinfusion is associated with improvements in perinatal outcome when used for meconium stained liquor in labour, particularly in hospitals where facilities for perinatal surveillance are limited.³

Patients and Methods

This study was conducted in Department of Obstetrics and Gynaecology, Jinnah postgraduate Medical Centre, Karachi from 1st January 1998 to 31st December 2000. A total of 400 patients were selected and were equally divided in study and control group. Only patients of gestation more than 37 weeks, presenting in active labour with vertex presentation and presence of meconium on vaginal examination were included and patients with multiple gestation, mal-presentation, previous scar,

maternal fever and pre natal diagnosed fetal malformation were excluded from the study.

Patients were admitted through emergency or antenatal clinic and informed consent was taken and then was allocated to either group. Relevant personal details, history, examination, investigations and labour findings were then recorded. Meconium was clinically defined as being thick, tenacious, and opaque and contained significant particulate matter and then these patients were admitted in labour ward.

Amnioinfusion was started by inserting a nasogastric tube transcervically into the uterine cavity just above the fetal presentation. Initially, 500 ml of normal saline or ringer lactate (at room temperature) was infused through the tube over 30 minutes, and then a further 500 ml at a rate of 3ml/min.

The amnioinfusion group and the control group were then managed in the labour ward by the team on duty according to the routine protocol of labour room. The uterine tone and the frequency of the contractions were assessed by palpation and were recorded at baseline and after every one hour. The fetal heart rate was checked ever 15 minutes by intermittent auscultation.

At the time of delivery, the doctor on duty in accordance with the hospital policy conducted delivery. Any decision regarding the mode of delivery was made purely according to the obstetrical indications. The Apgar score of the baby was recorded at 1 minute and 5 minutes.

Results

Four hundred patients were evaluated in this study, 200 were allocated in each group. The different aspects of the study were statistically analyzed and the results were obtained for both the groups. Majority of the patients in our study were not booked for antenatal care. In amnioinfusion group 59% were non-booked, whereas in control group, 64% were non-booked. The mean age was 25.7 ± 4.99 in amnioinfusion group and 26.09 ± 4.37 years in control group. Most patients were in active phase of labour at the time of admission

Table 1. Colour of amniotic fluid.

Degree of meconium staining	Amnioinfusion (n=200)	Control (n=200)
Grade I	58 (29%)	64 (2%)
Grade II	112 (56%)	104 (52%)
Grade III	30 (15%)	31 (16%)

p < 0.72, chi square = 0.66

In majority of the patients meconium was found to be of moderate intensity i.e., 56% in amnioinfusion group and 52% in controls. Lesser number was found to have grade I meconium and least were with grade III meconium

Table 2. Apgar score at 5 minutes.

Apgar score	Amnioinfusion (n=200)	Control (n=200)
Less than 5	6 (3%)	38 (19%)
5 - 7	58 (29%)	100 (50%)
>7	136 (68%)	62 (31%)

p < 0.001, chi square = 62.09

Table 3. Fetal outcome.

Fetal outcome	Amnioinfusion (n=200)	Control (n=200)	P value
Born alive and healthy	182 (91%)	164 (82%)	<0.01
Still birth	0 (0%)	8 (4%)	<0.01
Died within 7 days	12 (6%)	28 (14%)	<0.01

in the amniotic fluid, as shown in Table 1. Lower rate of Caesarean Section was encountered in patients with amnioinfusion, that is 37% versus 59% in controls. There was a significant difference between the apgar scores calculated in both the groups at 1 minute and at 5 minutes as shown in Table 2. There was no perinatal death in the study group whereas there were 8 (4%) in control group, even in the presence of close monitoring and same management protocol for both the groups. Perinatal mortality was also found to be high in control group as shown in Table 3. Resuscitation was carried out in a similar manner for both the groups but a higher admission rate to the nursery was observed in control group neonates as compared to amnioinfusion group (Table 4).

The incidence of meconium aspiration syndrome was 22% in amnioinfusion group and 56% in control group, (Table 5), indicating that incidence of meconium aspiration syndrome can be reduced by amnioinfusion and thus preventing fetal respiratory compromise in the new born, this was also evident from the improvement in apgar scores at 1 and 5 minutes.

Table 4. Incidence of meconium aspiration syndrome.

Amnioinfusion (n=200)	Control (n=200)
24 (12%)	70 (35%)
8.02 - 17.07	28.62 - 41 - 80

Table 5. Admission to nursery.

Meconium aspiration Syndrome present	Amnioinfusion (n=200)	Control (n=200)	p value
Syndrome present	44 (22%)	112 (56%)	<0.001 Chi sq = 48.95
Syndrome absent	156 (78%)	88 (44%)	<0.01 chi sq = 7.09

Discussion

The presence of meconium in the amniotic fluid of the foetus in a vertex presentation has been considered to be a sign of foetal distress. Meconium has been associated with increased perinatal morbidity and death, especially when meconium aspiration syndrome is present.⁴⁻⁶ Meconium aspiration syndrome develops when mechanical obstruction and chemical inflammation occur as a result of aspiration of meconium into the lower respiratory tract of the foetus or the neonate. The syndrome is defined as respiratory distress in a neonate with meconium aspiration, with a mortality rate of 25% and it account for 2% of all perinatal death.⁶

The presence of meconium is associated with a higher incidence of abnormal labour, foetal distress, delivery by Caesarean section, and low apgar scores.⁵

In a study of 238 births with meconium-stained fluid Rossi et al⁷ found meconium below the cords more commonly in the presence of thick meconium. This finding agrees with the theory that the greater the concentration of the meconium in the amniotic fluid, the more meconium was passed trans tracheally.

Meconium aspiration syndrome is fatal in up to 40% of cases and may occur within minutes of birth.⁸⁻¹⁰ Initial attempts at reducing morbidity and mortality associated with meconium aspiration syndrome focused on the "combined approach" of Carson et al.¹¹ Their protocol called for nasopharygeal and oropharyngeal suctioning by the obstetrician before delivery of the thorax, followed by suctioning of the trachea under laryngoscopic visualization by the pediatrician. Their data indicated a significant reduction in the incidence of meconium aspiration syndrome with the use of this protocol and rapidly became the standard of care in obstetrics.

In a subsequent investigation Falciglia⁸ demonstrated that the Dele and tracheal suctioning reduced the severity but not the incidence of meconium aspiration syndrome.

Intrapartum amnioinfusion was initially proposed by Wenstrom and Parsons¹² as a way of diluting meconium to decrease the incidence of meconium aspiration syndrome. These investigators showed a significant reduction in the incidence of meconium below the cords. Since this initial report two other prospective randomized trials^{13,14} and one retrospective review¹⁵ have also demonstrated a significant reduction in the incidence of meconium below the cords in patients receiving amnioinfusion. These studies also record a significant reduction in

the incidence of Caesarean section for fetal distress. 12,14

Amnioinfusion is a beneficial method and very safe but is not without risk. Controlled studies have not been sufficiently large to address the possibility of rare events such as cord prolapse or maternal complications. In a review of 186 academic departments in the United States in which 22,000 amnioinfusions were performed annually, 49 centres reported complications including uterine hypertonia, fetal heart rate abnormality, uterine rupture and maternal cardiac or pulmonary failure.¹⁵ Two maternal deaths associated with amniotic fluid embolus have been reported.¹⁶ Several authors have reported the occurrence of excessive uterine contractions or unusually rapid labour progress associated with amnioinfusion. 16,17

Though uncontrolled studies do not prove a causal relation between amnioinfusion and these events, we have put forward the hypothesis that excessive uterine activity in some cases be related to extra amniotic placement of amnioinfusion catheter with stimulation of prostaglandin release. It is possible at least some of the apparent benefits of amnioinfusion may be due to reduction of Caesarean sections performed because of persistent variable fetal heart rate decelerations, rather than a primary beneficial effect on foetal condition. There is therefore no good evidence available of the effectiveness of amnioinfusion in Caesarean section where it is not usually performed for persistent early or variable foetal heart rate decelerations alone. Furthermore, the results of previous studies need to be interpreted with care because of the small numbers observed, with relatively large proportions of participants excluded for failure to adhere to the allocated treatment. 18,19

Conclusion

This study has demonstrated that amnioinfusion is feasible using simple equipment in a developing country without routine electronic fetal monitoring facilities. After data analysis it clearly shows that intrapartum amnioinfusion for meconium stained amniotic fluid, improves foetal outcome as judged by the apgar score and subsequent perinatal mortality. The level of significance in this trial proves beyond doubt that these findings are less likely to be by chance. There was also a significant decrease in the incidence of Caesarean section and meconium aspiration syndrome.

Whatever the mechanism of action, the process of administering amnioinfusion was

effective and the results should be applicable to other hospitals with similar levels of intra partum surveillance. Therefore, amnioinfusion being simple to use, cost effective, logical and safe preventive measure, could be routinely incorporated in the management protocol of foetal distress due to meconium stained amniotic fluid and may result in better foetal outcome and lower rates of Caesarean section.

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Abstract

Objective:

To see the effect of amnioinfusion on perinatal outcome in cases of meconium staining of liquor.

Methods:

This study was conducted in department of Obstetrics and Gynaecology, unit I, Jinnah Postgraduate Medical Centre, Karachi, from 1st January 1998 to 31st December 2000. Four

hundred patients were included in this study, assigning 200 for amnioinfusion and 200 as control. All patients were matched in both the groups with respect to age, antenatal booking, parity, gestational age, stage of labour, colour of amniotic fluid and fetal birth weight. Both the groups were found to be comparable.

Results:

The rate of Caesarean section was found to be 37% in amnioinfusion group, which collaborates with other international studies. The fetal outcome was better i.e. 91% alive and healthy, after amnioinfusion due to dilution of meconium stained amniotic fluid with physiological solutions. The perinatal outcome was recorded by Apgar score at 5 minutes. The perinatal morbidity and mortality both were significantly lowered and was found to be 6% as compared to 14% in control, which was also noticed by less number of admissions in nursery i.e. 12% and perinatal deaths. The incidence of meconium aspiration syndrome was found to be 56% in control and was reduced to 22% after amnioinfusion in the other arm of the study.

Conclusion:

These results are very encouraging and suggestion can be safely made that in future amnioinfusion will be the ideal method of preventing fetal distress due to meconium stained amniotic fluid (JPMA 54:322;2004).