

**Research Article**

**Effect of intrapartum amnioinfusion on thick meconium stained amniotic fluid**

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**Abstract**

**Objective:** This study was done to evaluate the effectiveness of amnioinfusion (AI) in cases of thick meconium stained liquor:1) In reducing the perinatal morbidity associated with thick meconium.2) Decreasing operative intervention for fetal distress.

**Methods:** The study was carried out in the department of OBG at K.V.G Medical College and Hospital, Sullia over two years from Aug 2011 to July 2013. A total of 150 patients were studied, out of which 100 were given amnioinfusion and 50 were not given amnioinfusion.

**Results:** The rate of Caesarean section for fetal distress was 49% in the amnioinfusion group and 64% in the non infusion group. Although the incidence of caesarean section was high in both the study and control groups, the difference in between the two groups was statistically significant. The fetal outcome was found to be better in the amnioinfusion group. The perinatal outcome was recorded by Apgar score(14 vs 30% at 1 min, 2 vs 6% at 5 min), admission to the neonatal intensive care unit (NICU) (13 vs 30%), need for ventilatory support (0 vs 6%), incidence of meconium aspiration syndrome (10 vs 26%) and perinatal deaths (0 vs 6%). There were no maternal complications with amnioinfusion.

**Conclusion:** The study revealed that amnioinfusion does reduce the perinatal morbidity associated with thick meconium stained amniotic fluid (MSAF). Although the incidence of caesarean section (CS) was high in both the study and control groups, there was a statistically significant reduction in the incidence of operative intervention for fetal distress (FD) in the amnioinfusion group.

**Keywords:** amnioinfusion, meconium stained amniotic fluid, meconium aspiration syndrome

**1. Introduction**

The presence of thick meconium in the amniotic fluid of a vertex presentation is considered to be a sign of fetal distress. Passage of meconium is seen in 7-22% of term live births<sup>1</sup>. Meconium aspiration syndrome (MAS) has been reported in 7-30% of these deliveries. Thick meconium passage in labour is associated with abnormal fetal heart rate patterns (late decelerations, severe variable decelerations and decreased variability), an increased incidence of operative intervention (forceps and caesarean delivery) and a significantly higher incidence of neonatal morbidity and mortality due to meconium aspiration syndrome (MAS). The case fatality rate of meconium aspiration is reported to range from 2-40%<sup>2</sup>. This highlights the need for various modalities to treat and prevent meconium aspiration. Current methods include combined obstetric and paediatric approach as described by Carson<sup>3</sup>. This includes suctioning of the nasopharynx, mouth and hypopharynx as soon as the head is born. Immediately after delivery is completed, the oropharynx is suctioned and vocal cords are inspected by direct laryngoscopy by a paediatrician.

The trachea is directly suctioned if meconium is present at the cords. Clinical application of transcervical amnioinfusion was first described by Miyazaki and co-workers<sup>4</sup> as an intrapartum procedure for the relief of variable decelerations. Intrapartum amnioinfusion was later proposed by Wenstrom and Parsons<sup>5</sup> as a way of diluting the meconium to decrease the incidence of meconium aspiration syndrome. Since then, other prospective randomised trials<sup>6,7,8,9</sup> have also demonstrated a significant reduction in meconium below the cords, meconium aspiration syndrome, perinatal death and operative interference in patients receiving amnioinfusion (AI) in meconium stained amniotic fluid (MSAF) as compared to the non infusion group.

**1.1 Aims and Objectives**

To evaluate the effectiveness of amnioinfusion in cases of thick meconium stained liquor,

1. In reducing the perinatal morbidity associated with thick meconium.
2. Decreasing operative interference for fetal distress.

**2. Materials and methods**

The present study was carried out in the department of OBG at K.V.G. Medical College and Hospital, Sullia over a period of two years from August 2011 to July 2013. A total of 150 term patients with thick meconium stained liquor in active labour were studied, of which 100 were included in the study group and were given amnioinfusion and 50 in the control group and were not given amnioinfusion.

**2.1 Inclusion criteria:**

All women in active labour with

- Thick meconium stained liquor
- Term gestation
- Singleton pregnancy
- Vertex presentation

## 2.2 Exclusion criteria:

- Multifetal gestation
- Malpresentation
- Fetal malformations

## 2.3 Procedure:

Careful history, thorough physical examination and baseline investigations were collected and recorded in a pre designed proforma by taking the important variables for the objective of the study. A total of 150 patients were randomly assigned to either the study or control group. A written informed consent was taken from all the patients.

A partogram was plotted to know the progress of labour. In the amnioinfusion group, under aseptic precautions an infant feeding tube no. 6 was introduced transcervically into the uterine cavity just above the fetal presentation. The tube was connected to the drip set. Initially, 500 ml of normal saline was infused at room temperature through the tube over 30 minutes and then a further 500 ml at the rate of 3 ml/ min. Both the groups were then monitored. The fetal heart rate was monitored every 15 minutes by intermittent auscultation in the first stage and every 5 minutes in the second stage. Uterine contractions were assessed by palpation every 30 minutes. Cervical effacement and dilatation, and the fetal station were noted every 4 hours. In cases where contractions were weak, augmentation with oxytocin was done. All the above findings were recorded in the partogram. At any stage of labour if fetal distress was detected on auscultation, cardiotocography was done.

If there were late decelerations, persistent bradycardia or persistent tachycardia, the delivery was expedited by operative intervention. At delivery, as soon as the head was born, a thorough suction of the mouth and nasopharynx was done with a suction catheter to remove any meconium. Baby's cord was clamped and the baby was handed over to the paediatrician. The birth weight, sex of the baby, the 1 and 5 minute Apgar score were noted. Laryngoscopic examination of the vocal cords was done to know if there was any meconium below the vocal cords. Meconium if present was aspirated from the trachea. Stomach wash was given to all the babies. Any evidence of respiratory distress (tachypnoea, chest retraction, grunting, and nasal flaring) was noted.

If the Apgar scores were low or the baby had respiratory distress, the baby was admitted to the neonatal intensive care unit. Chest X-ray was done if respiratory distress persisted for 24 hours or more. Meconium aspiration syndrome if present was noted. The outcome of labour i.e. the type of delivery was noted. The neonatal outcome was noted using the following variables- Apgar scores, presence of respiratory distress, X-ray evidence of meconium aspiration syndrome, need for ventilatory support and perinatal deaths. Mother was followed up in the post partum period for evidence of uterine infection. Other procedure related complications like hypertonic uterine contractions, cord prolapse, amniotic fluid embolism, placental abruption, maternal cardiopulmonary compromise, altered plasma electrolyte concentration or maternal mortality were noted.

## 2.4 Statistical methods:

Chi square test was used for statistical analysis. SPSS for windows Version-16 (2007) was employed for statistical analysis.

## 3. Results

Total numbers of cases studied were 150 out of which 100 were in the study group and were given amnioinfusion, 50 were in the control group and were not given amnioinfusion. The two groups were comparable with respect to age, parity, period of gestation and labor characteristics as seen in table 1.

**Table 1- Baseline data**

Characteristics	Study (n=100)	Control (n=50)
Average age (years)	22.98	23.08
Parity		
Primigravida	n=67, 67%	n=32, 64%
Multigravida	n=33, 33%	n=16, 32%
Average period of gestation (weeks)	39.5	39.5
Onset of labor		
Spontaneous	88%	86%
Induced	12%	14%
Average cervical dilatation when thick meconium was detected (cm)	4.21	4.2
Average time interval between amnioinfusion and delivery (hours)	1.63	1.88

**Table 2- Comparison of outcome in study and control group**

Outcome	Study group (n=100)		Control group (n=50)	
	Number	Percent	Number	Percent
Mode of delivery				
Vaginal delivery*	40	40	12	24
Outlet forceps delivery	10	10	6	12
Vacuum delivery	1	1	0	0
Caesarean section*	49	49	32	64
Apgar score				
At 1 min <7	14	14	15	30
At 5 min <7	2	2	3	6
NICU admission*	13	13	15	30
Respiratory distress*	13	13	15	30
Meconium below the vocal cords*	10	10	13	26
Babies needing ventilation	0	0	3	6
Meconium aspiration syndrome*	10	10	13	26
Neonatal deaths	0	0	3	6

\*- statistically significant

Table 2 shows the outcome of the study. In the study group, 40 of the 100 patients (40%) had a spontaneous vaginal delivery whereas 12 of the 50 patients (24%) delivered vaginally in the control group. This difference was statistically significant (p value- 0.001). 11 cases (11%) in the study group

and 6 in the control group required instrumental delivery. Of the 11 cases, one vacuum delivery was prophylactically used for severe pre eclampsia, the remaining 10 were forceps used for fetal distress (FD). In the control groups all 6 were forceps and were indicated for fetal distress. Among the cases in the study group, 49 cases had caesarean section (CS) for fetal distress (49%) and among the control 32 (64%) had a caesarean delivery for fetal distress (p value-0.033). The difference was significant.

Apgar score at 1 minute was less than 7 in 14 (14%) babies in the study group and 15 (30%) babies in the control group (p value-0.083). Similarly Apgar score at 5 minute was less than 7 in 2 (2%) babies of the study and 3 (6%) babies of the control group (p value 0.302). The difference was not significant. Among the neonates fewer babies in the study group had respiratory distress 13 (13%) as compared to 15 (30%) babies in the control group. This difference was statistically significant (p value-0.007). More babies in the control group 13 (26%) had meconium below the vocal cords than in the amnioinfusion group 10 (10%). This was statistically significant (p value<0.05). 15 babies (30%) in the control group and 13 (13%) in the study group were admitted for observation in view of thick meconium stained liquor (p value- 0.007).

Meconium aspiration syndrome (MAS) was diagnosed clinically by the findings of thick meconium stained liquor, respiratory distress at birth and presence of meconium below the vocal cords. MAS was present in 10 babies in the study group (10%) and 13 in the control group (26%). The difference was statistically significant (p value<0.05). In the control group, 3 babies needed mechanical ventilation and none of the babies in the study group needed ventilators. In the control group, 3 babies died due to meconium aspiration syndrome. There were no deaths in the study group. Duration of stay in the hospital was significantly more in the babies in the control group than in the amnioinfusion group. There were no cases of postpartum infection in both the groups. No procedure related morbidity or mortality was noted in the study group. There was no neonatal infection noted in the study group.

#### 4. Discussion

This study was done to know the role of amnioinfusion in thick meconium stained liquor in reducing the operative intervention for fetal distress and in reducing the incidence of meconium aspiration syndrome in the baby. In our study, although the incidence of caesarean section was high in both the study and control groups, the difference in between the two groups was statistically significant (p value- 0.033). Our results correlate with the results of study by Patil *et al*<sup>10</sup>(42.57% vs 58.2%).

The incidence of MAS was significantly lower in the study group 10% as compared to the control group (26%), (p value- 0.006) which was comparable to the results reported by Ashfaq *et al* (12% vs 35%)<sup>11</sup>. In the control group, 3 babies died due to MAS (6%) which was similar to the results reported by Ashfaq *et al*<sup>11</sup> and Lathika *et al*<sup>12</sup>. Furthermore, in the group which received amnioinfusion, babies had better Apgar scores, fewer babies had respiratory distress and meconium below the vocal cords, fewer babies needed NICU admission for respiratory distress and babies needing mechanical ventilation were significantly reduced. These findings were supported by the studies done by Lathika *et al*<sup>12</sup> and Rathorea *et al*<sup>13</sup>. Duration of stay in the hospital was significantly more in the babies in the control group than in the amnioinfusion group. Rathorea *et al*<sup>13</sup> found that amnioinfusion was associated with a significant decrease in the incidence of meconium below the vocal cords (p=0.001), respiratory distress, improvement in 1 minute Apgar scores (p<0.05) and fewer admissions to nursery as compared to the controls. On the contrary, Fraser *et al*<sup>14</sup> in his study, found that amnioinfusion did not reduce the risk of MAS or perinatal death. The need of operative intervention was also not affected by amnioinfusion. In spite of intrauterine catheter placement and saline infusion, there were no cases of infectious morbidity in the group receiving amnioinfusion. No other procedure related complications were noted in the control group.

A systematic review done by Hofmeyr *et al*<sup>15</sup> showed that in clinical settings with standard peripartum surveillance, there is no evidence to show that amnioinfusion reduced the risk of MAS or reduced the incidence of caesarean section, but in clinical settings with limited peripartum surveillance where complications of MSAF are common, AI reduces the risk of MAS. However as discussed above, many studies<sup>10,11,12,13</sup> including our study have proved the efficacy of AI in reducing MAS and in decreasing the CS rate. There have been varied recommendations for pregnancies complicated by meconium passage other than AI.

Continuous electronic fetal monitoring during labour when reactive, predicts a favourable outcome. Selective operative delivery has also been proposed. Because of the belief that the pathophysiology of MAS centres around inhalation of meconium at delivery, suctioning of the infant's pharynx at the time of delivery, combined with visualisation of the vocal cords and tracheal suctioning was proposed to minimise deep aspiration. Unfortunately, even the most vigorous suctioning before the first breath does not remove the meconium already aspirated into the lungs before birth and thus does not eliminate the occurrence of MAS. Another approach is chest physiotherapy, the objectives of which are to prevent accumulation of debris, improve mobilisation of airway secretions and improve the efficiency and delivery of oxygenation. Saline lavage could thin out the tenacious meconium and assist in its removal. AI is a simple procedure in which normal saline is infused into the uterine cavity<sup>16</sup>. It acts by replenishing the amniotic fluid volume and diluting the meconium. Aspiration of diluted meconium with the first breath might be less likely to cause MAS than aspiration of thick particulate meconium. It also corrects oligohydramnios and thereby reduces cord compression which causes hypoxia and hypercapnoea and thereby prevents fetal gasping.

#### 5. Conclusion

Thick meconium stained liquor is a cause of concern to both the obstetrician and paediatrician as it results in increased morbidity to the mother as a result of operative interference and increased morbidity and mortality to the baby due to meconium aspiration. This study has demonstrated that amnioinfusion in cases of thick meconium stained liquor improves the neonatal outcome by diluting the meconium in amniotic fluid.

The Apgar scores are improved; there is decreased incidence of fetal distress, meconium below the vocal cords and meconium aspiration syndrome. It also reduces the operative intervention for fetal distress. Further, it does not cause any increase in maternal morbidity. Thus, transcervical amnioinfusion is an effective, simple and safe preventive measure which could be routinely incorporated in the management protocol of labour complicated by thick meconium stained amniotic fluid and may result in better fetal outcome and lower rates of caesarean section.

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