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Original Research Article

Study of risk factors and perinatal outcome in meconium stained deliveries from a district of Uttar Pradesh, India

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ABSTRACT

Background: The objective is to identify the risk factors of Meconium stained deliveries and evaluate the perinatal outcomes in Meconium Stained deliveries.

Methods: This prospective observational study included those pregnant women who had completed 37 weeks of gestation, with singleton pregnancies with cephalic presentations and with no known fetal congenital anomalies. Among these, we selected 110 cases with Meconium stained amniotic fluid and they were compared with 110 randomly selected controls.

Results: Regular antenatal visits were seen in 22.73 % of the cases while 77.27% cases had no previous visit. Majority of cases were primigravida and gestational ages of >40 weeks was seen in 55.45 % cases. 19.09% cases had meconium staining among pregnancies complicated with pregnancy induced hypertension, as compared to those among controls (5.45%). Fetal heart rate abnormalities were seen in 29.09% cases, and statistically significant fetal bradycardia was seen in cases. Caesarean section rates were nearly double in cases (54.55%). Poor perinatal outcome was found in cases as seen in results by low Apgar score (<7) at 1 minute and 5-minute, higher incidence of birth asphyxia, Meconium Aspiration Syndrome and increased NICU admission as compared to that among controls.

Conclusions: Meconium stained amniotic fluid is more commonly associated with higher gestational age >40 weeks, pregnancy induced hypertension and fetal bradycardia, increased cesarean section rates, low APGAR score and higher incidence of birth asphyxia and NICU admissions. Meconium aspiration syndrome was associated with early neonatal death.

Keywords: Birth asphyxia, Meconium aspiration syndrome, Meconium stained amniotic fluid

INTRODUCTION

In utero, passage of meconium is relatively common occurring to 7-22% of all term deliveries.¹ Meconium passage is rare before 34 weeks of gestation and incidence increases steadily beyond 37 weeks of gestation.² The exact etiology of in utero passage of meconium remains unclear.^{3,4} Various risk factors like advanced gestational age at delivery, increased duration

of rupture of membranes (ROM), prolonged second stage of labor, and intra-amniotic infection, placental insufficiency, maternal hypertension, pre-eclampsia, oligohydroamnios or maternal drug abuse (tobacco or cocaine) are associated with meconium staining of amniotic fluid.⁵⁻¹¹ Abnormal fetal heart rate in MSAF deliveries leads to increased perinatal morbidity thus requiring the need for continuous fetal heart rate monitoring/fetal blood sampling.^{12,13}

Presence of meconium below the vocal cords is known as Meconium aspiration and it is seen in 20-30 % of all infants with meconium-stained amniotic fluid (MSAF).¹⁴ As compared to neonates born through clear amniotic fluid, neonates with MSAF are 100 times more likely to develop respiratory distress.¹⁵ Respiratory distress in a neonate born through MSAF with radiographic changes of aspiration pneumonitis may be defined as Meconium aspiration syndrome.¹⁶ About 5% of the babies born through meconium stained amniotic fluid develop meconium aspiration syndrome and the mortality rate of these babies vary from 4-7%.¹⁷

In deliveries complicated with MSAF, there is an increased risk of caesarean section, chorioamnionitis and puerperal sepsis along with higher morbidity and mortality in mother while the unfavorable outcomes in neonate include increased risks of birth asphyxia and fetal distress, low Apgar scores, increased incidence of neonatal intensive care unit (NICU) admission, meconium aspiration syndrome and early neonatal death.^{18,19}

Meconium stained amniotic fluid is really alarming for both obstetrician and pediatrician and thus taking the risks into consideration, this study was done to identify the associated risk factors of meconium stained deliveries and compare the perinatal outcome in deliveries complicated by meconium staining versus clear liquor.

METHODS

This prospective observational study was carried out in the Department of Obstetrics and Gynaecology and Department of Pediatrics, Hind Institute of Medical Science, Safedabad, Barabanki, Uttar Pradesh, India, over a period of 12 months, from March 2017 to February 2018.

Inclusion criteria

Included all pregnant women who had completed more than 37 weeks of gestation, with singleton pregnancies with cephalic presentations and with no known fetal congenital anomalies.

Exclusion criteria

Included pregnancies which had completed less than 37 weeks of gestation; with presentations other than cephalic presentations and with known fetal congenital abnormalities.

After spontaneous or artificial rupture of membranes, patients with meconium stained amniotic fluid (MSAF) were taken as cases while patients with clear liquor were taken as control group. 110 cases with MSAF were thus selected and they were compared with 110 randomly selected controls. A detailed antenatal history along with clinical examination and investigations were done. The

patients were watched for progress of labour and foetal heart rate monitoring was done by doing intermittent auscultations. Patients with maternal co-morbidities (severe anemia, PIH, pre-labour rupture of membranes etc.) were closely monitored. Fetal heart rate monitoring by cardiotocography was done for 20 minutes in MSAF cases and taking into consideration regarding all obstetric conditions, mode of delivery was then decided. Evaluation of perinatal outcome was based on apparently healthy baby, APGAR score (<7) at 1 min and 5 min, meconium aspiration syndrome (MAS), birth asphyxia, neonatal sepsis, respiratory distress, seizures, HIE, neonatal intensive care unit (NICU) admissions, duration of NICU stay and early neonatal death (death within seven days of birth), etc. All the information was noted in systematic way in a pre-designed Performa regarding cases and controls.

Chi-square test was used for statistical analysis of results.

RESULTS

In present study, 77.27 % were unbooked deliveries and only 22.73% were booked deliveries (at least 3 visits, with first visit in first trimester) among 110 cases with meconium stained amniotic fluid (MSAF). Among the cases, 60% women were of 20-30 years age-group and 51.82% pregnant females were primigravida, while 48.18% were multigravida (Table 1).

Table1: Prevalence of MSAF in relation to booking status, maternal age and parity.

Maternal parameters		Cases (%)	Control (%)
Booked		25 (22.73)	44 (40)
Unbooked		85 (77.27)	66 (60)
Maternal age	<20 years	15 (13.64)	10 (9.09)
	20-30 years	66 (60)	73 (66.36)
	>30 years	29 (26.36)	27 (24.55)
Parity	Primi	57 (51.82)	46 (41.82)
	G2-G4	35 (31.82)	53 (48.18)
	G5 and above	18 (16.36)	11 (10)

In present study, 55.45% cases had gestational age more than 40 weeks as compared to 14.55% controls that showed similar gestational ages which signify that increasing gestational age increases meconium staining of amniotic fluid (Table-2). Among the cases, severe anemia (hemoglobin <7 gram%) was seen in around 12.73% cases, pregnancy induced hypertension (PIH) was seen in 19.09% cases, pre-labour rupture of membranes was seen in 11.82% cases, fetal bradycardia in 22.73% cases and fetal tachycardia in 6.36% cases.

As compared to those among controls (5.45%), pregnancies complicated with PIH had higher rates of meconium staining (19.09%) among the cases and was found to be statistically significant (p-value<0.05). Fetal heart rate abnormalities was seen in 29.09% cases and statistically significant fetal bradycardia was seen among

cases as compared to that in controls (p-value<0.05) (Table-3).

Table 2: Prevalence of MSAF in relation to gestational age.

Parameters	Cases (%)	Control (%)
37-38 weeks	11 (10)	20 (18.18)
>38-39 weeks	16 (14.55)	39 (35.45)
>39-40 weeks	22 (20)	35 (31.82)
>40-41 weeks	24 (21.82)	9 (8.19)
>41-42 weeks	30 (27.27)	6 (5.45)
>42 weeks	7 (6.36)	1 (0.91)

Table 3: Relation of ante partum and intrapartum risk factors with meconium stained amniotic fluid.

Parameters	Cases* (%)	Control* (%)	p-value
Anemia (hemoglobin <7 gram %)	14 (12.73)	6 (5.45)	0.07
Pregnancy induced hypertension	21 (19.09)	6 (5.45)	0.0038
Prelabour rupture of membrane	13 (11.82)	11 (10)	0.68
Fetal bradycardia	25 (22.73)	4 (3.64)	0.000096
Fetal tachycardia	7 (6.36)	4 (3.64)	0.36

* statistically significant (p<0.05)

Spontaneous vaginal delivery rate was 37.27% and 70.91% among cases and control group respectively. The rate of caesarean section in control and MSAF cases were found to be 25.45% and 54.55% respectively and found to be statistically significant when compared between these two groups (p-value<0.05). Instrumental deliveries were done in 8.18% of cases with MSAF as compared to 3.64% among controls (Table 4).

Table 4: Mode of delivery among cases and control group.

Mode of delivery	Cases* (%)	Control* (%)	p-value
Spontaneous vaginal delivery	41 (37.27)	78 (70.91)	0.00069
Instrumental delivery	9 (8.18)	4 (3.64)	0.16
Caesarean section	60 (54.55)	28 (25.45)	0.00064

* statistically significant (p<0.05)

74.55% babies were asymptomatic at birth among the cases as compared to 91.82% babies among controls. Babies with MSAF had low Apgar scores at birth and 25.45% cases needed neonatal intensive care unit admissions (p-value<0.05). Meconium aspiration syndrome was seen in 4 cases (3.64%) and all the 4 babies who were born to these cases had early neonatal deaths, though the difference was not statistically

significant as compared to controls. Babies born to MSAF cases had statistically higher incidence of birth asphyxia and NICU admissions as compared to those who were born to control group (p-value<0.05) (Table 5).

Table 5: Perinatal outcome among MSAF cases and control group.

Parameter	Cases* (%)	Control* (%)	p-value
Asymptomatic at birth	82 (74.55)	101 (91.82)	0.16
Apgar score at 1 min (<7)	24 (21.82)	9 (8.18)	0.009
Apgar score at 5 min (<7)	13 (11.82)	8 (7.27)	0.27
Meconium aspiration syndrome	4 (3.64)	1 (0.91)	0.17
Birth asphyxia	19 (17.27)	7 (6.36)	0.018
Neonatal sepsis	5 (4.55)	3 (2.73)	0.47
NICU admission	28 (25.45)	11 (10)	0.0064
Early neonatal death	4 (3.64)	1 (0.91)	0.17

* Statistically significant (p<0.05)

MSAF=meconium stained amniotic fluid

NICU=Neonatal intensive care unit

No significant difference was observed in terms of birth weight between cases and controls (Table-6).

Table 6: Birth weight of babies born to cases and control group.

Weight in gm	Cases (%)	Control (%)
=< 2499gm	15 (13.64)	19 (17.28)
2500 to 2999 gm	65(59.09)	62 (56.36)
>=3000gm	30 (27.27)	29 (26.36)

DISCUSSION

The passage of meconium in utero may be a normal physiological event representing the normal gastrointestinal maturation and indicating fetal maturity or it may reflect acute or chronic fetal hypoxia or increased vagal activity from cord compression.¹⁹ Meconium passage in utero and its associations is a frequent cause of perinatal morbidity and mortality.

In present study, 77.27 % were unbooked deliveries among 110 cases with meconium stained amniotic fluid (MSAF) which was comparable with the study done by Bhide et al, which showed that a majority of cases with MSAF were unbooked. This study, in accordance with the study done by Sandu SS et al showed that the incidence of MSAF was higher in the age group of 20-30 years but this seemed to be a fortuitous finding.^{20,21} In this study, 55.45% cases had gestational age more than 40 weeks as compared to 14.55% controls that showed similar gestational ages which signify that increasing gestational age increases meconium staining of amniotic

fluid. Present study was comparable to study done by Naveen S et al which showed postdated pregnancy was one of the risk factors for MSAF.²²

The incidence of pregnancy induced hypertension (PIH) associated with meconium stained amniotic fluid (MSAF) was 19.09% in this study which was higher than studies done by Hosna Ara Khatun et al where the incidence was 13.8% and Mundhra R et al where the incidence was 16.97%. In utero passage of meconium in PIH patients is because of fetal hypoxia due to uteroplacental insufficiency.^{23,24}

The rate of caesarean section in MSAF cases were found to be 54.55% in present study as compared to 45.7% in a study done by Unnisa S et al.²⁵ Another study by Saunders et al found caesarean sections were done twice as frequently in MSAF cases.²⁶ In contrast to present study, Wong SF found caesarean section rates to be 13.2% and 8.8% in patients with MSAF and clear amniotic fluid respectively indicating that lower rates of caesarean section might be because of scalp pH sampling in their study.²⁷

Fetal outcome also depends on consistency of meconium. Infants with thin meconium are probably healthy at birth but still needs intensive fetal monitoring. Infants with thick meconium had five to seven times increased risk of perinatal death. In present study, cases were not divided based on consistency of meconium.^{28,29}

In present study, 74.55% babies were asymptomatic at birth, 21.82% had low Apgar scores at birth. As compared to present study, Patil et al found that 19% babies with MSAF had low Apgar scores.

Meconium aspiration syndrome was seen in 3.64% MSAF cases in this study which was comparable to study done by Patil et al which reported meconium aspiration syndrome in 12.8% of babies with MSAF.³⁰ In present study, 25.45% MSAF cases needed neonatal intensive care unit admissions and 3.64% cases reported early neonatal death which was similar to studies done by Rajput U et al which reported neonatal intensive care unit admissions in 24% cases and Gupta V et al which reported 4.9% cases with early neonatal death respectively.^{31,32}

CONCLUSION

It is clearly seen in this study that Meconium stained amniotic fluid is more commonly associated with higher gestational age >40 weeks, pregnancy induced hypertension and fetal bradycardia, increased rate of cesarean delivery, increased need for neonatal resuscitation, low APGAR score and higher incidence of birth asphyxia with hypoxic ischemic encephalopathy and NICU admissions. Meconium aspiration syndrome was associated with early neonatal death.

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