STUDY OF VARIOUS FACTORS FOR MECONIUM STAINED AMNIOTIC FLUID (MSAF) AND COMPARISON OF FETAL OUTCOMES IN MECONIUM STAINED AMNIOTIC FLUID AND CLEAR AMNIOTIC FLUID CONTRIBUTORS

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ABSTRACT

AIMS AND OBJECTIVES: To identify various factors for meconium stained amniotic fluid (MSAF) and comparison of pregnancy outcome in meconium stained vs. clear amniotic fluid. **MATERIAL AND METHODS:** The study was conducted at the Department of Obstetrics and Gynaecology of a teaching tertiary care hospital. Out of 850 deliveries, 100 cases of MSAF were studied for 17 months. Detection of MSAF during delivery and follow-up of mother and baby during hospital stay was done. **RESULTS:** Overall incidence of meconium staining of AF during labor was in the present study 11.6%. The incidence of meconium staining was much greater in postdated pregnancy and oxytocin-induced labor. Birth asphyxia was more common when the AF was meconium stained and severity was directly proportional to the degree of thickness of MSAF. Abnormal heart rate was much more frequent in the study group and when thick meconium was associated with bradycardia fetal outcome was worst. **CONCLUSION:** Prevention of fetal distress and maternal hypertension can reduce MSAF to ultimately minimize cesarean /instrumental delivery and adverse fetal outcome. This study confirmed that our clinical impression—“meconium staining of amniotic fluid adversely influence the fetal outcome”

KEYWORDS

Meconium Stained Amniotic Fluid (MSAF), Pregnancy Outcome, Clear Amniotic Fluid (CAF)

INTRODUCTION

Meconium, the gastrointestinal excreta of the fetus was named by Aristotle. The word meconium is derived from the Greek word 'Meconium Arion' which means like opium or poppy-like substances induced sleeping condition of the fetus in the mother's womb.

Meconium Staining of Amniotic Fluid (MSAF) is a relatively common problem occurring in 8-15 percent of all deliveries. MSAF is considered a harbinger of fetal compromise because of its direct correlation with fetal distress and increased likelihood of aspiration of meconium with resultant deleterious effects on the neonatal lung.

The major goal of obstetric care is to prevent maternal and fetal morbidity and mortality. To reduce fetal morbidity and mortality early identification of markers of fetal distress is important. Loss of or reduced fetal movements, changes in fetal heart rate pattern, presence of meconium in AF, presence of fetal molding, and drop in fetal scalp blood pH are the classical signs or indicators of fetal hypoxia. Since all fetuses with meconium passage in labor do not have an adverse outcome, it is important to distinguish those who are destined to develop fetal distress promptly and intervene accordingly to prevent MAS and sequelae.

As found by some authors, a large proportion of women with MSAF have risk factors simultaneously like pre-eclampsia, diabetes, post maturity. This research is, therefore, an attempt to determine if AF meconium staining has any association with high-risk factors, is predisposed to fetal labor distress, and to accurately assess the fetal status and outcome of all MSAF cases with the help of data obtained in the present sequence.

Hence the present study has been undertaken to note the frequency of meconium staining of AF in obstetrical practice, to whether all meconium stained cases result in asphyxiated birth, to whether the amount of meconium discharge into the AF has any relation with fetal outcome.

MATERIALS AND METHODS

The study was undertaken at a teaching tertiary care hospital in the department of Obstetrics and Gynaecology. The study period was done from October 2012 to September 2014. Cases were randomly selected during the study period from mothers in labor with MSAF who were admitted to the said department for confinement.

Inclusion criteria

- Term labor (>37 completed weeks)
- Cephalic presentation.
- Live singleton pregnancy
- Pregnancy without any congenital malformation

Exclusion criteria

- Pre-term labor (<37 completed weeks)
- Antepartum hemorrhage
- Breech presentation
- Transverse lie
- Multiple pregnancies
- Pregnancy with congenital malformations
- Intrauterine death

Mothers in labor were studied when meconium was found at the time of rupture of membrane or when clear AF turned meconium-stained during labor.

Following the selection of cases a detailed history regarding age, gravida, and parity, past obstetrical history, menstrual history, socioeconomic status, and history of present pregnancy, history of medical and surgical disorders were noted from the patients' antenatal records. Detection of MSAF during delivery and follow-up of mother and baby during hospital stay was done. A total number of 100 cases were studied in each group as a prospective study.

RESULTS

Total numbers of deliveries during the study period were 850 of which 100 cases had meconium staining of AF, which constituted 11.76% of total deliveries. Out of 850 deliveries, 100 cases of MSAF were studied for 17 months. The incidence of meconium staining of AF in this study is limited to 100 cases. 4.35% (n=37) of deliveries had thin meconium staining and 7.41% (n=63) had thick meconium staining.

In the study group, the maximum numbers of cases (50%) were in the age group of 21 – 25 years and the mean age group was 22.53 years. In the control group also the maximum number of cases (48%), were in the same age group and the mean age was 22.54 years. Cases were selected with age-matched in the control group with meconium stained group. So the percentage of cases in the different age groups was almost the same in control and meconium stained cases.

Postdated cases are more (62%) in meconium stained group compared to the control group (8%), signifying that meconium passage is a common occurrence in postdated pregnancy. Mean gestational age in meconium stained group was also higher (39.82 weeks) compared to the control group (38.8 weeks)

Mode of delivery varies according to the grading of meconium staining in the study group. The incidence of CS was highest in the thick group (71.4%) compared to 54% in the thin group. Incidence of CS was 2½ times more in the thick group in comparison to the control group where incidence was only 28%. Vacuum extraction is also more in the meconium stained group than the control group. Normal vaginal

delivery was 65% in the control group whereas in meconium stained group it was 28%.

We found that male babies were more than female babies in study group. Male babies were also more in study group than control group.

The numbers of babies were the same who were more than 3 kgs by birth weight both in meconium stained group and control group. Mean birth weight in meconium stained group was more than that of the control group.

Table 1: Shows risk factors associated with meconium stained group and control group with clear AF.

Risk factors	Meconium stained group (N=100)		Control group(N=100)	
	No. of cases	Percentage	No. of cases	Percentage
Post dated	27	27	8	8
Prolonged labour	14	14	5	5

Table 2: Correlation of intrapartum fetal heart rate and condition of baby at birth in MSG and control group

Fetal Heart Rate	Meconium stained Cases (N=100)								Control cases (N=100)							
	No. of Case	%	Still birth		Grossly asphy-xiated		Moderately asphy-xiated		No. of Cases	%	Still birth		Grossly asphy- xiated		Moderately asphy- xiated	
			No.	%	No.	%	No.	%			No.	%	No.	%	No.	%
< 120 bpm	29	29	4	4	0	-	5	5	14	14	1	1	0	-	2	2
> 160 bpm	3	3	0	-	0	-	0	-	2	2	0	-	0	-	0	-
120-160 bpm	68	68	0	-	2	2	12	12	84	84	0	-	3	3	6	6
Total	100	100	4	4	2	2	17	17	100	100	1	1	3	3	8	8

Table 2 shows 19 (19%) babies in meconium stained group suffered from birth asphyxia (Moderate + Gross asphyxia) compared to 11 (11%) in the control group, i.e. meconium stained group suffered from nearly two times more than the control group. Bradycardia was associated with much more frequency in the study group than the control group. Among the study group with bradycardia 5 suffered from birth asphyxia compared to the control group where 2 babies suffered from it. There was no case in both groups of tachycardia with birth asphyxia. Stillbirth was 4 times more in the study group than the control group.

Study found that 75.7% of cases had spontaneous labor in the thin meconium group, whereas in the thick meconium group it was 81%. 86% of cases had spontaneous labor in the control group whereas in the meconium group it was 79%.

Correlation of NST with meconium staining and control group showed 64.9% non-reactive NST in the thin meconium group, 81% in the thick meconium group where as in the control group non-reactive NST was only in 25%.

Table 3: Shows the different causes of Neonatal morbidity in study group and control group.

Causes	Study group (N=100)						Control group (N=100)	
	n1= 37		n2= 63		Total			
	Thin group		Thick group					
	No. of Cases	%	No. of Cases	%	No. of Cases	%	No. of Cases	%
Birth Asphyxia	5	13.5	14	22.22	19	19	11	11
Meconium Aspiration	5	13.5	7	11.11	12	12	-	-
Physiological Jaundice	1	2.7	2	3.17	3	3	5	5
Septicemia	-	-	-	-	-	-	3	3
Total	11	29.7	23	36.5	34	34	19	19

Table 3 shows Neonatal morbidity was highest in thick meconium group babies, 36.5% whereas in the control group it was less, that was about 19%. Total morbidity was about (34%) 2 times more in meconium stained group than that of in control group (19%)

Frequency of NICU care needed by neonates and staying in days showed that 20 cases of study group required NICU care of which thick meconium group about twice than that of thin meconium group. 14 cases of the control group (14%) required NICU care whereas 20 cases (1.5 times more than the control group) of the study group (20%) required NICU care. ≥ 7 days NICU stay was required by 12 cases of

Hypertensive disorder	8	8	7	7
Induction of labour with oxytocin	21	21	14	14
Oligohydramnios	12	12	3	3
IUGR	6	6	4	4
No risk factors	54	54	74	74

Some others had more than one risk factor hence there is an apparent discrepancy in the total number of cases in both groups. Table 7 shows that the risk factors were greater in meconium stained group. Whereas in study group has no risk factors in 54% in comparison to 74% in the control group.

We found that there were no differences of gravidity in between the meconium stained group and control group. In meconium stained group primigravida was 66% and in the control group, it was 67%. Cases were selected with gravidity matched in the control group with meconium stained group. So the percentage of cases regarding gravidity was almost the same in both groups.

MSG that was about 2.5 times more in comparison to the control group.

Study found that neonatal morbidity in the study Group was more about 34% in comparison to 19% in the control group. In the study Group, stillbirth was 4% which was about 4 times the control group (1%). The thick meconium stained group was more complicated than that of the thin meconium stained group outcome. Early neonatal death was 2% in the study group, it was nil in the control group. Perinatal morbidity was 38% and perinatal mortality was 6% in the study group, those were in the control group 20% and 1% respectively.

DISCUSSION

Of the 850 deliveries conducted in our hospital during this period, 100 cases were included in our study which fulfilled the inclusion criteria. Of the 100 cases, 37 had thin MSAF (MSAF) and 63 had thick MSAF observed at the time of membrane spontaneous or artificial breakup.

In the present study, the incidence was 11.76%. In the present study among the MSAF cases, the highest incidence was thick MSAF. Of the total deliveries of our study period, 4.35% of cases had thin MSAF and 7.41% of cases had thick MSAF. In the present study, cases were selected with age and parity matched in the control group with the MSAF group to rule out any influence of the age and parity in the perinatal outcome in meconium stained cases. So, the percentage of cases in the different age groups was almost the same in control and meconium stained cases

It is evident that from table 3, 27% of mothers in the study group fall into the category of postdated pregnancy, in comparison with the control group where incidence was 8% i.e., postdated pregnancy was more than three times more associated with meconium staining. This signifies that meconium passage is a common occurrence in postdated pregnancy. A similar observation was recorded by Miller, 1975 [1], in his series incidence of postdated pregnancy was 30%. In the present study, it was 27%. The mean gestational age in the study group was greater (39.82 weeks) than the control age (38.8 weeks). Whereas Rosario 1996[2], in his analysis found a mean gestational age of 39.62 weeks in the study group compared to 39.92 weeks in the control group. A similar observation as our study was also observed by Krebs (1980) [3]. In his study mean gestational age was more (40.04 weeks) in MSAF in contrast to the control group (39.73 weeks).

There was an increased incidence of operative delivery in meconium stained group cases in our study. In the present study incidence of CS was highest in the thick meconium group, which was 71.4%, and out of total MSAF cases 65% delivered by the caesarian section whereas in the control group it was 28%. In contrast with the thin group, the

occurrence of the cesarean section in the thick group was almost double. The overall percentage of CS in our study group due to fetal distress indicated by MSAF and abnormal NST.

Regarding sex distribution in our study it was found that male babies are more in MSG than control group.

Fujikura (1975) [4] observed that the incidence of meconium staining was significantly more with increased birth weight more than 3 kgs. But in our present study, there was no difference between MSG and the control group in respect of birth weight. In both groups about the same no. of babies are of > 3 kgs birth weight. But in the study group 2.92 Kg, whereas in the control group 2.88 Kgs, the mean birth weight was high.

In the present study following were risk factors-post dated pregnancy, prolonged labor, hypertensive disorder, induction of labor with oxytocin, oligohydramnios, IUGR. In the present study, 14% of stained cases were associated with prolonged labor compared to 5% in the control group. Meis (1978) [5] also recorded almost double the incidence of prolonged labor in the Study Group compared to the control group. In the present study incidence of oxytocin augmented/induced labor was almost 1.5 times more in the study group (22%) compared to control cases (14%). A similar observation was recorded by Desmond (1956) [6]. However, James Walker (1954) [7] concluded that although the incidence of meconium staining of AF was more in his series in oxytocin augmented/induced labor it was the cause for which oxytocin was used e.g. Hypertensive disorder, prolonged labor, etc., were responsible for the increased incidence of meconium staining AF not directly due to oxytocin induction. In the present study pregnancy-induced hypertension was associated with 8% MSG of cases compared to 7% in the control group. A hypertensive disorder associated with MSAF group was found in 8.2 to 23.58% cases by Miller [1], 15.75% cases in Pravin Goud [8] series, 11.2% of Fujikura [4]. Debdas [9] found 13.70% of cases IUGR related to MSAF. In the present study, it was found 6% were related to MSAF.

In present study primigravida were more associated with meconium staining AF in compared to other study.

Unbooked cases are mostly associated with MSAF. In our study it was 62% of study group in comparison to control (50%).

The meconium group's fetal heart rate pattern was largely normal (68 percent). Out of the abnormal pattern (32%), bradycardia was the common abnormal pattern. Bradycardia was 29% whereas Tachycardia was only 3%. Babies complicated by stillbirth and asphyxia in the bradycardia group more (31%) than the babies delivered having normal fetal heart rate pattern (20.5%).

In our study it was showing that the number of cases of induced labor was more in meconium stained group (21%) that was in clear AF 14%. Induction was mostly indicated due to postdated pregnancy. As in MSAF group, post-dated pregnancy was more, so induction of labor was more in compared to the clear AF group.

In our study, non-reactive NST was 75% in the study group whereas in the control group it was 25%. Non-reactive NST was three times greater in the sample group compared to the control group and 81 percent higher in the thick group compared to 64.9 percent in the thin group. The overall increased percentage of NST abnormalities has been noted because of delayed referral of the cases to our rural institution.

In present study neonatal morbidity was 34% in study group, where as it was in control group 19.19%. Morbidity was more in thick group 36.5% than that of in thin group 29.7%.

The present study has shown that NICU care is needed more in MSAF group babies (20%) than that of the control group. It is due to associated meconium aspiration in study group babies. Another study by Pravin Goud (1989) [8] also observed 54% of MSG babies required NICU care. The most prevalent complication was the major complications between deliveries by MSAF birth asphyxia. Again birth asphyxia was more common in the thick meconium group. All 4 stillbirths occurred in the thick meconium group and MAS was also more in the thick group.

In our study mortality and morbidity in MSAF is comparable to other studies as observed by Usha (2004) [10], where morbidity was 32.6% and mortality 6% in comparison with our study it was 34% and 6% respectively. The fetal outcome is statistically associated with MSAF in our study ($p < 0.01$).

CONCLUSION

This research reported that our clinical impression – “meconium staining of amniotic fluid adversely influence the fetal outcome”. Most of the centers in our country lack facilities for electronic fetal heart rate monitoring and fetal scalp blood studies. Under such circumstances, only clinical evaluation of cases with meconium-stained AF is necessary. It is, therefore, necessary to re-examine the importance of clinical methods and apply them to judge fetal hypoxia and prevent its long-term sequelae. Till such time that better strategies for management of meconium-stained neonates are outlined by further studies, the best course would be careful intrapartum fetal heart rate monitoring and other measures to prevent fetal asphyxia. Immediate airway management, need for suction and intubation should be guided by the state of the newborn, rather than the presence of meconium.

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