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Original Research Article

Perinatal outcome in relation to mode of delivery in meconium stained amniotic fluid

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ABSTRACT

Background: Meconium stained amniotic fluid is the movement of meconium in the uterus by the fetus during the ANC period or through labor. It has been speculated during the intrapartum and postpartum period as a factor affecting fetal wellbeing and considered as the hallmark symptom of imminent asphyxia. Aim and objectives of current study were to correlate the presence of meconium-stained amniotic fluid with the mode of delivery and perinatal outcome.
Methods: A total of 100 women were taken in the study in which meconium stained amniotic fluid and its relation with mode of delivery and neonatal outcome were observed for 2 years.
Results: A total of hundred cases were studied. Incidence of types of meconium found to be thin (25%), moderate (34%) and thick (41%). 76% of patients with thin meconium were delivered vaginally without any assistance with instruments, while 64.7% and 68.3% of cases with moderate to thick meconium respectively were delivered by LSCS. In the group of patients with APGAR score more than 7 at five minutes, there is more percentage of patients with thin MSL while in the group of patients with APGAR score less than 7, there is more percentage of patients with thick meconium. No cases of meconium aspiration syndrome were found
Conclusions: The types of meconium affect the mode of delivery and fetal outcome. There is no association between having a low birth weight and passage of meconium during labor. The severity of the type of meconium associated with APGAR might be due to severe hypoxia and severe form of nervous system depression leading to cardiovascular and respiratory depression and activation of the parasympathetic nervous system causing anal sphincter relaxation and passage of meconium.

Keywords: Meconium, Perinatal outcome, Mode of delivery, APGAR

INTRODUCTION

Meconium stained amniotic fluid (MSAF) has been speculated during the intrapartum and postpartum period as a factor affecting fetal wellbeing. Meconium refers to the first stool passed by the fetus.[1] It is usually observed within the first 48 hours of birth which consists of gastrointestinal contents of the fetus[2]. It is green in color is because of the presence of bile pigments. Meconium consists of water (80%), bile salts, bile acids, and bile pigments and also gastrointestinal digestive enzymes (amylases, lipases, and proteases), intestinal epithelial cells as well as materials which are constantly swallowed from the amniotic fluid (e.g. fetal lanugo hair, vernix caseosa, inflammatory mediators and desquamated epithelial cells). The effects of bile salts and bile acids on the blood vessels in the umbilical cord may lead to the vasospasm of the blood vessels, resulting in an acute decrease in fetal oxygenation.[3] It causes the release of inflammatory mediators which can cause damage of pulmonary parenchymal tissue or damage the pulmonary vasculature resulting in vascular leakage and damage to

the type 2 pneumocytes and decrease surfactant production causing perinatal morbidity and mortality.[4]

Meconium aspiration syndrome (MAS) is characterized as a respiratory failure in infants born with meconium-stained amniotic fluid (MSAF), whose symptoms cannot be described otherwise. MAS can present with varying degrees of severity from mild respiratory distress to life-threatening respiratory failure. Coordination of care between the obstetric and neonatal team is important to reduce the incidence of MAS and to identify and provide urgent therapy in those who develop MAS to reduce morbidity and mortality.

The best approach for managing MAS is prevention by: intrapartum fetal heart (FHR) monitoring and preventing post-term (>41 week's gestation) delivery.[5] Up to 10% of cases of meconium staining develop MAS and nearly all infants with MAS have complete recovery of pulmonary function. Sometimes Initial hypoxic events may cause the infant to have long-term neurological problems, including seizures, general learning disability, and cerebral palsy.[6] In the current study, we aim to correlate the occurrence of meconium-stained amniotic fluid in association with the mode of delivery and perinatal outcome.

Aim and objectives

Aim of current study was to correlate the presence of meconium-stained amniotic fluid with the mode of delivery and perinatal outcome. Objectives of present study were; to correlate the presence of meconium in amniotic fluid with perinatal outcome, to correlate with the presence of meconium-stained amniotic fluid and mode of delivery- vaginal or cesarean section or instrumental delivery, to study the complications in newborns such as APGAR score, NICU admission, detection of MAS will be done and to compare complications in newborns with respect to different grades of meconium-stained liquor.

METHODS

This prospective observational study of 100 cases was done between October 2018 to October 2020 at obstetrics and gynaecology department of Bharati hospital and research centre at Bharati Vidyapeeth University, Pune, India. It includes all pregnant women between 37 - 42 weeks of gestation with singleton pregnancy with cephalic presentation with no fetal congenital abnormality with meconium-stained liquor in labor. All cases with Premature Rupture of Membranes, IUGR, severe oligohydramnios, antepartum hemorrhage. Maternal heart diseases, thyroid disorders, or any other high-risk factors were excluded. The data collection was done by taking proper history, examination of the patient, partograph study, examination of the newborn.

Women with both circumstances such as spontaneous rupture of membranes (SRM) or (ARM) artificial membrane rupture monitored in this study. The parameters observed are fetal heart rate (FHR) irregularities, APGAR score of less than 7 at 1 minute and 5 minutes, and also other complications seen in newborns such as meconium aspiration syndrome in association with grading of meconium-stained liquor. Subjects were followed up during the delivery and after delivery, detailed records of the clinical status of the subject and fetal outcome will be maintained. Perinatal outcome was compared with respect to normal vaginal delivery (NVD), cesarean section (CS) groups, and instrumental deliveries.

Observation of the NICU stay of the newborns in MSAF was done. Grading system of meconium stained liquor was done by visual inspection of the appearance and consistency of meconium after sudden (SRM) or artificial membrane rupture (ARM). The grading is described as grade I (thin), grade II (moderate), grade III (thick). The collected data were coded and entered into a Microsoft Excel sheet. The data were analyzed using SPSS (statistical package for social sciences) version 20.0 software. The results were presented in tabular and graphical format. For qualitative data, various rates, ratios, and percentages (%) were calculated. For quantitative data mean, SD, median, etc were calculated. For qualitative data tests like Chi-square test and for quantitative data test like t-test/ANOVA was used for comparison of variables. A two-tailed test with p value <0.05 was considered significant.

Variables used in the study

Variables used in the study were; gestational age, stage of labor, grading of meconium, mode of delivery, fetal outcome/ APGAR score/ NICU admission/complications, and any complications after delivery.

RESULTS

The data collected in this study in 100 patients is presented in the following tables/graphs. In this study, there were 25% cases of thin meconium, 34% cases of moderate meconium and 41% cases of thick meconium. There were 39% cases belonging to maternal age group of 21-25 years followed by 32% cases belonging to maternal age group 26-30 years followed by 17% cases belonging to maternal age group 31-35 years.

Table 1: Types of meconium.

Type of meconium	N	%
Thin	25	25.0
Moderate	34	34.0
Thick	41	41.0
Total	100	100.0

Gestational age distribution was seen as highest percentage of cases were seen in 38-39 weeks (49%)

followed by 37-38 weeks (32%) followed by 39-40 weeks (19%).

Table 2: Age groups.

Age group (years)	N	%
≤20	9	9.0
21-25	39	39.0
26-30	32	32.0
31-35	17	17.0
>35	3	3.0
Total	100	100.0

Table 3: Gestational age.

Gestational age (weeks)	N	%
37-38	32	32.0
38-39	49	49.0
39-40	19	19.0
Total	100	100.0

Table 4: Type of rupture membrane.

Rupture of membrane	N	%
ARM	51	51.0
SRM	49	49.0
Total	100	100.0

Table 5: Obstetric history.

Obstetric history	N	%
Primi	55	55.0
Multi	45	45.0
Total	100	100.0

Table 6: Relation to gravid.

Obstetric history	Group			Total
	Thin MSL	Mod MSL	Thick MSL	
Multi	10	17	18	45
	40	50.0	43.9	45
Primi	15	17	23	55
	60	50.0	56.1	55
Total	25	34	41	100
	100	100	100	100
P value 0.735				

In 51 % cases artificial rupture of membrane was done while in rest 49% cases there was spontaneous rupture of membrane. The study included 55% cases who were primigravida and rest were multigravida. When the data of severity of meconium staining of liquor and parity is analysed, it was found that there was no parity wise distribution of meconium staining. There were almost comparable numbers of primigravida and multigravida cases in thin, moderate and thick meconium groups. There was statistically no significant difference in severity of meconium staining and gravid status. The study included 32% cases which were delivered vaginally without instrumentation (ventouse/forceps), 13% cases delivered by assisted vaginal delivery and 55% underwent LSCS. It has been observed that more number of cases with thin meconium delivered vaginally (N=19; 76%). In case of moderate and thick meconium more number of cases underwent LSCS (N=22; 64.7% and N=28; 68.3% respectively). This association is also statistically significant with p<0.01.

Table 7: APGAR at 1 minute.

APGAR >7 at 1 minute	Group			Total
	Thin MSL	Mod MSL	Thick MSL	
No	21	25	27	73
	84	73.5	65.9	73
Yes	4	9	14	27
	16	26.5	34.1	27
Total	25	34	41	100
	100	100	100	100
P value 0.272				

Table 8: APGAR at 1 min <7.

APGAR <7 at 1 minute	Group			Total
	Thin MSL	Mod MSL	Thick MSL	
No	21	25	27	73
	28.76	34.24	36.98	100
Yes	4	9	14	27
	14.81	33.33	51.85	100
Total	25	34	41	100

Table 9: NICU admission.

NICU admission	Group			Total
	Thin MSL	Mod MSL	Thick MSL	
No	24	26	24	74
	96.0	76.5	58.5	74.0
Yes	1	8	17	26
	4.0	23.5	41.5	26.0
Total	25	34	41	100
	100.0	100.0	100.0	100.0
P value<0.01				

APGAR score at 1 minute and 5 minute with severity of meconium staining of amniotic fluid was also analysed. There were 27% cases with APGAR score more than 7 at 1 minute and rest were having it less than 7.

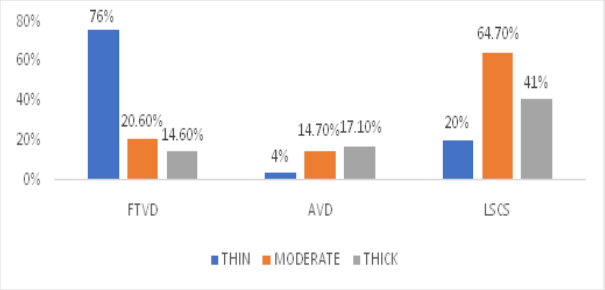

Figure 1: Mode of delivery.

In cases with APGAR score less than 7 at one minute; almost half of the cases (51.85%) were having thick meconium while only 14.81% of such cases had shown thin meconium staining. While cases with APGAR score more than 7 at one minute; severity of meconium that thin, moderate and thick was almost comparable that is around 33% in each group. There were only 5% cases with APGAR score more than 7 at five minutes. In cases with APGAR score less than 7 at five minutes; 60% of the cases were having thick and 40% cases had moderate meconium while none of them had thin meconium staining. While cases with APGAR score more than 7 at one minute; severity of meconium that is thin, moderate and thick was almost comparable and was ranging from 25% to 38% from thin to thick meconium staining. NICU admission was required in 26% cases. Among those who required NICU admission 41.5% cases were having thick meconium. While those not requiring NICU admission the percentage was almost comparable amongst thin, moderate and thick meconium cases. The association of severity of meconium and NICU admission is statistically significant with p value less than 0.01.

DISCUSSION

Both developed and developing countries, found to have growing rates of perinatal morbidity and mortality over years due to the presence of meconium stained amniotic fluid. Developing countries have been associated with much greater risk as well as adverse effects of meconium in liquor on neonates due to multiple reasons.

In this observational study, various parameters were assessed to find out the effects of meconium on mode of delivery and fetal outcome. Hundred women were enrolled in this study randomly according to inclusion criteria. All cases with meconium were observed closely. Out of 100 cases, thin meconium was found in 25% cases, moderate in 34 % cases and thick meconium in 41% cases. Hence, there were maximum cases with thick meconium. The occurrence of thick meconium was seen more in gestational age group of 38 to 39 weeks. While meconium was more commonly seen with primigravida but it was observed that the difference of parity with type of meconium is statistically not significant. A total of 55% cases had caesarean delivery and of which maximum were having thick meconium .Similar results noted in one study conducted by Nath and Carr, et al.[7,8]

There were 27% cases with APGAR score less than 7 at 1 minute and the rest were having it more than 7. In cases with APGAR score less than 7 at one minute; almost half of the cases (51.85%) were having thick meconium while only 14.81% of such cases had shown thin meconium staining. There were only 5% of cases with an APGAR score of less than 7 at five minutes. In cases with APGAR score less than 7 at five minutes; 60% of the cases were having thick and 40% cases had moderate meconium while none of them had thin meconium staining. NICU admission was required in 26% of cases. Among those who required NICU admission 41.5% of cases were having thick meconium. While those not requiring NICU admission the percentage was almost comparable amongst thin, moderate, and thick meconium cases. Our results were consistent with results of study conducted by Mundhra and Agarwal et al.[9] The only limitations of this study was difficulty in grading the meconium.

CONCLUSION

Meconium and mode of delivery: thin meconium is associated with vaginal delivery while moderate to thick meconium is associated with delivery by LSCS mode. The present study has shown 76% of patients with thin meconium were delivered vaginally without any assistance with instruments, while 64.7% and 68.3% of cases with moderate to thick meconium respectively were delivered by LSCS. Though this association is statistically significant ($p<0.01$), other maternal and fetal risk factors such as hypertensive disorders, arrest of descend or dilatation, fetal growth restriction, fetal bradycardia also play their role in the decision making of mode of delivery. Meconium and APGAR score: lower APGAR score (<7) is associated with the severity of meconium staining of liquor. In the group of patients with APGAR score more than 7 at one minute, there is more percentage of patients with thin MSL while in the group of patients with APGAR score less than 7, there is more percentage of patients with thick meconium. Similarly, in the group of patients with APGAR score more than 7 at five minutes, there is more percentage of patients with thin MSL while in the group of patients with APGAR score less than 7, there is more percentage of patients with thick meconium. The severity of the type of meconium associated with APGAR might be due to severe hypoxia and severe form of nervous system depression leading to cardiovascular and respiratory depression and activation of the parasympathetic nervous system causing anal sphincter relaxation and passage of meconium. No case of Meconium aspiration syndrome was found which tells us that proper monitoring of patients in labor has reduced the incidence of MAS.

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