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Original Research Article

Risk Factor for Meconium Stained Liquor and Outcome of Neonate in Meconium Stained Amniotic Fluid

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Abstract:

Background: Meconium-stained amniotic fluid is a condition that varies in prevalence and significance. This study explores its occurrence and the associated risks, considering maternal factors and neonatal outcomes.

Methodology: This prospective study analyzed 120 cases of pregnant women beyond 37 weeks in labor with meconium-stained amniotic fluid. Data collection included maternal demographics, obstetric history, and medical conditions. Statistical analysis was performed using the Chi-square test.

Results: Of the 120 cases, 55 had thin meconium staining, and 65 had thick staining. Primigravida mothers had a higher incidence of meconium-stained amniotic fluid (61%). Risk factors such as oligohydramnios, hypertension, anemia, intrauterine growth restriction, and prolonged labor were associated with meconium staining. Neonatal morbidity was observed in 33% of cases, with higher rates in the thick meconium group. Apgar scores were lower in the thick meconium group, and the main causes of neonatal morbidity were asphyxia and meconium aspiration syndrome.

Recommendations: Healthcare professionals should remain vigilant for maternal risk factors and promptly address foetal distress during labor. Enhanced coordination between obstetricians and pediatricians is crucial in ensuring the well-being of both mother and newborn.

Conclusion: Meconium-stained amniotic fluid is more common in certain maternal conditions, leading to a higher rate of cesarean sections. Prompt delivery and vigilant labor monitoring can reduce neonatal complications. Identifying individuals at risk for foetal distress is crucial to preventing meconium aspiration syndrome and its complications. Coordination between obstetricians and pediatricians is essential for better neonatal outcomes.

Keywords; Meconium-stained amniotic fluid, Foetal distress, Neonatal morbidity, Cesarean section rates

Introduction

Meconium, a dark green, sticky substance, can sometimes be discharged before or after a baby's birth, altering the amniotic fluid's color. Its significance regarding foetal distress is debated. Various theories attempt to explain foetal meconium passage. Firstly, the pathological explanation suggests that foetal hypoxia, or low oxygen levels, triggers meconium passage. Secondly, the normal gastrointestinal maturation theory posits that meconium passage signifies the normal development of the foetal digestive system, controlled by neural factors. Thirdly, vagal activation proposes that meconium is passed due to increased peristalsis and relaxation of the anal sphincter resulting from vagal nerve stimulation. Typically, fetuses do not pass meconium during pregnancy, as their digestive movements are usually inactive. However, foetal hypoxia can lead to increased peristalsis and meconium excretion, while in some cases, meconium discharge occurs without a clear cause [1, 2].

Obstetricians are concerned about meconium staining of amniotic fluid due to its risks for infants, including respiratory and neurological issues, longer hospital stays, and higher mortality rates. Globally, 7-22% of live births involve meconium-stained amniotic fluid, with 1-3% developing meconium aspiration syndrome (MAS), a potentially fatal condition. However, not all babies born through MSAF develop MAS [3, 4].

Several risk factors, such as placental aging, intrauterine growth restriction (IUGR), oligohydramnios, hypertensive pregnancy

disorders, gestational diabetes mellitus (GDM), overt diabetes, and maternal drug use, can lead to MSAF. Babies can aspirate meconium before or during labour, potentially causing Neonatal Respiratory Distress Syndrome (RDS) [5].

Meconium staining of amniotic fluid is considered one of the earliest and most reliable signs of foetal distress due to hypoxia. Indicators of foetal distress include changes in the foetal heart rate (FHR), particularly bradycardia, and meconium passage in response to foetal hypoxia. Strong markers of foetal distress include lower foetal scalp blood pH, abnormal Cardiotocography (CTG), heart rate variability abnormalities, and meconium in the amniotic fluid. MSAF is associated with a higher likelihood of cesarean deliveries, increased need for newborn resuscitation, and a greater risk of meconium aspiration syndrome. Various methods have been attempted to identify MSAF, including amnioscopy during early labour, oropharyngeal suction, and endotracheal intubation after delivery, but there is no definitive test to confirm it. Reducing perinatal morbidity and mortality associated with MAS requires identifying high-risk cases during prenatal care, carefully considering the timing and method of delivery, and vigilant labour monitoring [6].

The aim of this study is to evaluate foetal outcomes, modes of delivery, and the relationship between high-risk indicators for foetal distress during labour and meconium staining in amniotic fluid.

Methodology

Study Design: This study was prospective in nature.

Study Setting: This study was conducted by reviewing medical records of a pregnant women who were admitted to the hospital while in labour after being at least 37 weeks pregnant in the Obstetrics and Gynecology department of M.G.M. Medical College in year 2022-2023.

Participants: This study was conducted by examining the medical records of pregnant women who had meconium staining in their amniotic fluid, which occurred either naturally or due to their water being artificially broken.

Inclusion and Exclusion Criteria: The study's inclusion criteria require participants to meet several key conditions: term labour (more than 37 weeks), cephalic presentation (baby's head-first position), and a single live fetus. Exclusion criteria encompass antepartum hemorrhage, malpresentations, pregnancies with congenital malformations, and intrauterine foetal death.

Study Size: After fulfilling the inclusion criteria, 120 women in labour with meconium stained amniotic fluid were studied.

Data Collection and Analysis: Following the selection of the cases, we gathered comprehensive data from the antenatal records of the patients, encompassing information on age, parity and gravidity, previous obstetrical history, menstruation history, socioeconomic situation, current pregnancy history, and any medical or surgical illnesses.

Bias: To minimize bias, the goal of the research was not disclosed to the participants or healthcare providers during data collection. Additionally, data analysts were blinded to the identity of the participants.

Statistical Analysis: The Chi-square test was used with a P-value less than 0.05, indicating statistical significance.

Ethical Considerations: The study was carried out in accordance with ethical guidelines, which included getting each participant's informed consent. The ethics committee examined and approved the study protocol.

Results

Table 1: Key Findings from the Study on Meconium-Stained Amniotic Fluid and Neonatal Outcomes

Parameter	Number of Cases	Percentage (%)
Total Patients Enrolled	120	100
Meconium Staining		
- Thin Meconium Staining	55	45.8
- Thick Meconium Staining	65	54.8
Incidence of Meconium Staining		
- Primigravida Mothers	61	50.8
- Multigravida Mothers	39	32.5
Antenatal and Intrapartum Risk Factors		
- Oligohydramnios	8	6.7
- Hypertension	6	5.0
- Anemia	4	3.3
- Intrauterine Growth Restriction (IUGR)	1	0.8
- Prolonged Labour	10	8.3

- Multiple Risk Factors	10	8.3
Neonatal Morbidity		
- Total Neonatal Morbidity	40	33.3
- Neonatal Morbidity in Thick Meconium Group	22	18.3
Apgar Scores at One Minute		
- 1-3	6	5.0
- 4-6	63	52.5
- 7-10	31	25.8
Apgar Scores at Five Minutes		
- 1-3	1	0.8
- 4-6	30	25.0
- 7-10	69	57.5

The study involved 120 individuals in labour who were past 37 weeks of pregnancy and had meconium-stained amniotic fluid, either naturally or due to artificial membrane rupture. Information about their age, pregnancy history, menstrual history, socioeconomic status, and medical conditions was gathered from prenatal records. Foetal heart rate was monitored, and the degree of meconium staining was categorized. Babies were observed for 24 hours, and those without issues stayed with their mothers, while those with complications or meconium aspiration syndrome were placed in the Neonatal Intensive Care Unit. Follow-up for seven days recorded any problems or newborn deaths. Out of the 120 cases, 55 had thin meconium staining, and 65 had thick staining. The study found that meconium staining was more common in first-time mothers and was associated with factors like prolonged labour, low amniotic fluid, anemia, hypertension, and foetal growth issues. Cesarean section rates were higher in cases with thick meconium staining due to non-reactive foetal heart rate patterns. Neonatal morbidity was observed in 33% of meconium-stained cases, with the highest risk in the thick meconium group. Meconium staining was also linked to lower Apgar scores at one and five minutes, particularly in cases with thicker meconium. Asphyxia and meconium aspiration syndrome were the most common causes of newborn morbidity.

Discussion

Of the 120 cases, 55 showed thin meconium staining, while 65 had substantial staining. While thick meconium staining was linked to risk factors like low amniotic fluid, hypertension, anaemia, poor foetal growth, and delayed labour, thin meconium staining was less common in first-time moms. Because thick meconium patients had aberrant foetal heart rate patterns, the rate of caesarean sections was greater. In 33% of the instances, neonatal health problems were observed; the thick meconium group had the highest incidence of these problems, and these newborns' Apgar scores were worse at one and five minutes, particularly in the presence of thick meconium. The two main causes of infant health issues were asphyxia and meconium aspiration syndrome.

Meconium-stained amniotic fluid was thin in 45% of the patients in our study, whereas thick amniotic fluid was meconium-stained in 55% of the patients. This is consistent with a study conducted in Pakistan by but contrasts from a study where more patients showed thin meconium staining [7,8]. According to a study it was observed that primigravida moms had a greater incidence of meconium-stained amniotic fluid (61%) [9]. According to James, meconium staining rises with gestational age, reaching roughly 30% at 40 weeks and 50% at 42 weeks [10]. These findings are consistent with those of Hiremath [11], as well as other researchers who observed a high number of instances beyond 42 weeks. Many of the instances in our study were between 40 and 42 weeks gestation. A number of prenatal and postpartum risk factors were discovered, such as anaemia, oligohydramniosis, intrauterine growth restriction (IUGR), protracted labour, and hypertensive disorders. Confusing due dates were associated with a greater rate of meconium-stained amniotic fluid in cases. In ten cases, more than one risk factor was found. According to a study [11], 42% of subjects with meconium-stained amniotic fluid had hypertension and 33% had anaemia. Perinatal mortality in our study was 4%; three instances were attributable to meconium aspiration syndrome (MAS), and one case was asphyxia-related. Similar to our findings, other studies have indicated perinatal mortality rates ranging from 3% to 7.7%. In contrast to babies with clear amniotic fluid, those with thin meconium are typically not depressed at delivery and do not have a higher perinatal mortality risk, according to some experts, it was found that 3.42% of newborns died.

Conclusion

Meconium-stained amniotic fluid is not as common as one may think. Mothers who have unknown due dates, extended labour, oligohydramnios, and hypertension are more likely to experience this condition. In these situations, the rate of caesarean sections is higher, particularly when meconium

consistency is taken into account. Neonatal Intensive Care Unit (NICU) intensive care is necessary for careful observation and intensive treatment of infants suffering from severe meconium aspiration syndrome and birth asphyxia. The effects of meconium aspiration syndrome can be reduced with prompt delivery and efficient labour monitoring. In order to avoid neonatal problems, obstetricians and paediatricians must coordinate their efforts. Not every foetus experiencing meconium transit during labour has a negative result or a mother risk factor. Meconium aspiration syndrome and its complications can be avoided by quickly identifying individuals who are at risk for foetal distress and taking appropriate action.

Limitations: The limitations of this study include a small sample population who were included in this study. The findings of this study cannot be generalized for a larger sample population. Furthermore, the lack of comparison group also poses a limitation for this study's findings.

Recommendation: Healthcare professionals should remain vigilant for maternal risk factors and promptly address foetal distress during labor. Enhanced coordination between obstetricians and pediatricians is crucial in ensuring the well-being of both mother and newborn.

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List of abbreviations:

1. MSAF - Meconium-Stained Amniotic Fluid
2. NICU - Neonatal Intensive Care Unit
3. FHR - Foetal Heart Rate
4. CTG - Cardiotocography
5. IUGR - Intrauterine Growth Restriction
6. GDM - Gestational Diabetes Mellitus
7. RDS - Respiratory Distress Syndrome
8. MAS - Meconium Aspiration Syndrome

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