

Risk factors for meconium stained liquor and outcome of neonate in meconium stained amniotic fluid

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Abstract

Background and Objectives: Meconium stained amniotic fluid has been considered a sign of fetal distress in presentations other than breech and associated with poor fetal outcome but others considered meconium passage by fetus as physiological phenomenon and produces environmental hazards to fetus before birth.

Such magnitude of different opinion was the object behind taking up of this study and aim of it was to find out the maternal risk factors associated and its correlation with the fetal outcome in terms of morbidity and mortality.

Methods: 100 women in labour with meconium stained amniotic fluid studied considering the inclusion criteria in the Department of Obstetrics and Gynecology, Konaseema Institute of Medical Sciences and Research Center, Amalapuram. Cases divided into two - 'thin' and 'thick' meconium stained group. Maternal and Fetal monitoring, uterine contraction assessed and Apgar score, birth weight, resuscitation of baby noted. All babies of both group followed up to first week neonatal life.

Results: In our study, among 100 cases, 45% of the cases had thin meconium and 55% had thick meconium. Increased incidence of meconium staining was seen in crossed dates. The other risk factors were hypertension, anemia, oligohydramnios, IUGR. 56% went in for cesarean section due to intrapartum fetal distress. Perinatal death was seen in 4 cases, one due to birth asphyxia and the other three due to MAS.

Interpretation and Conclusion: Infants with meconium aspiration syndrome are to be managed in NICU for close monitoring and vigorous treatment. Co operation and coordination of the obstetrician and pediatrician is required to prevent the perinatal morbidity and mortality.

Based on this study we conclude that meconium stained amniotic fluid is associated with increased incidence of caesarean section, low APGAR score, meconium aspiration syndrome and increased NICU admission.

Keyword: Meconium, Amniotic fluid, Antepartum, Intrapartum, Neonate

Introduction

Meconium' is the thick, dark green, sticky, tar like substance passed as the baby's first bowel motion after birth. At times this can be passed before the baby is born, discolouring the waters.⁽¹⁾

Meconium staining of AF is a commonly observed phenomenon in day-to-day practice of obstetrics and its significance as a sign of fetal distress is controversial. The passage of meconium in utero has been described by various authors by different mechanisms. Three theories have been suggested for fetal passage of meconium.

- The pathological explanation proposes that fetuses pass meconium in response to fetal hypoxia.
- In utero passage of meconium represents normal gastrointestinal tract maturation, which is under neural control.
- Commonly, meconium passage occurs following relaxation of anal sphincter and increased peristalsis due to vagal stimulation.
- By the end of the sixteenth week of gestation the gastrointestinal functions of the fetus are sufficiently developed to absorb much of water from it, propel the unabsorbed matter as far as the lower colon. During intrauterine life fetus normally does not pass meconium as the peristaltic

movements of fetal intestine remain quiescent. But if fetal hypoxia occurs, intestinal peristalsis increases sufficiently that causes the unabsorbed matter to be excreted per annum. This fetal excreta is called the meconium. But in quite a good number of cases no definite cause could be found, probably these were the cases where physiological expulsion of meconium took place.

Meconium stained amniotic fluid is always a cause for alarm to any obstetrician. Neonates born through MSAF are at risk of respiratory and neurodevelopment morbidity and mortality, and longer hospitalization. Globally, approximately 7-22% of all live births are complicated by meconium stained amniotic fluid. Meconium aspiration syndrome (MAS) occurs in 1-3% of all cases of MSAF and in 10- 30% of neonates, meconium is present below the vocal cords. MAS is a life threatening condition. But, not all babies born through MSAF develop MAS. Knowledge of the risk factors for the development of MAS can be helpful in the selection of mothers whose babies are at high risk and may benefit from close observation intrapartum. Neonates at high risk for developing MAS can also be given added neonatal care.^(2,3,4)

Risk factors that may cause stress on the fetus which lead to MSAF are: placental ageing due to post-

dated pregnancy, IUGR, oligohydramnios, hypertensive disorder of pregnancy, GDM, overt diabetes mellitus & maternal drug abuse. Meconium may be aspirated before or during labour & delivery resulting in neonatal RDS.⁽⁵⁾

The presence of MSAF is believed to be one of the oldest and surest sign of fetal distress in utero due to fetal hypoxia. Foetal distress is defined as alterations in the foetal heart rate (FHR) more commonly bradycardia and the passage of meconium in response to the underlying foetal hypoxia. Variations in FHR, passage of the meconium in the amniotic fluid, pathological or abnormal CTG and decreased foetal scalp blood pH are strong indicators of fetal distress. MSAF is associated with higher rate of caesarean delivery, increased need for neonatal resuscitation and meconium aspiration syndrome. The incidence of meconium aspiration syndrome increases in case of non-reassuring FHR and clinical condition of the newborn at birth. The meconium aspiration syndrome can cause or contribute to neonatal death and in addition upto one-third of all cases in which aspiration occurs, develop long term respiratory compromise. The meconium stained amniotic fluid is a clinical diagnosis with no practical confirmatory test. However, various methods have been tried to detect the presence of meconium in liquor and to prevent meconium aspiration syndrome. These methods include Amnioscopy during early labour and oropharyngeal suction and endotracheal intubation after birth. The perinatal morbidity and mortality associated with meconium aspiration syndrome can be brought down if the high risks are identified in the antenatal period and careful decisions are made about the timing and mode of delivery and vigilant monitoring of the labour. This study was carried out to determine foetal outcome and mode of delivery in pregnant women with meconium stained liquor.⁽⁶⁾

This study is an effort to ascertain whether meconium staining of AF has any correlation with high risk factors, predisposing to fetal distress in labour and to assess exactly the fetal condition and outcome in all cases of MSAF with the help of data obtained in the present series.

Materials and Methods

Source of Data: The study was done at Konaseema Institute of Medical Sciences & Research Centre, Amalapuram, in the department of Obstetrics and Gynecology. The study includes, 100 cases admitted in hospital after 37 weeks of pregnancy in labor who exhibit meconium stained liquor after spontaneous or artificial rupture of membranes. Data was collected from antenatal history and clinical examination.

The inclusion criteria include Term labour (>37 completed weeks), Cephalic presentation, Live singleton pregnancy and exclusion criteria include Antepartum haemorrhage, Malpresentations, Pregnancy with congenital malformations, Intrauterine death.

Mothers in labour were studied when meconium was found at the time of rupture of membrane or when clear AF turned meconium stained during the course of labour. A total number of 100 cases were studied in each group as prospective study. Following selection of cases a detailed history regarding age, gravida and parity, past obstetrical history, menstrual history, socioeconomic status, history of present pregnancy, history of medical and surgical disorders were noted from the patients antenatal records. When AF was thin stained with greenish yellow in colour, it was graded as thin stained (thin meconium stained). When AF was dark green or tarry black or muddy in colour and of thick consistency it was considered as thick stained (thick meconium stained). Clinical fetal monitoring i.e. fetal heart rate was also noted at the time of collecting the MSAF. All the babies delivered were kept in observation for 24hours. Babies which were normal and did not develop any complications within 24hrs after birth were placed with the mother. Babies who developed any sign of complications within 24hrs were kept in NICU. Babies who placed with the mother if developed any complication also were transferred to NICU. Babies were followed-up up to 7thday and their clinical condition was assessed and any abnormalities were recorded. Death and its cause during hospital stay within first week of neonatal life were also recorded.

Results

During this period 100 cases of meconium stained amniotic fluid cases were included in the study which fulfilled the inclusion criteria. 45 of the 100 cases had thin meconium and 55 cases had thick meconium stained amniotic fluid noted at the time of spontaneous/ artificial rupture of membranes. Incidence of meconium stained amniotic fluid has been shown in different age groups. Increased incidence of MSAF is noted in gestation > 40 weeks. Large group of cases belong to gestational age 40-42 weeks with a mean gestational age of 41 weeks. Maternal Antepartum and intrapartum risk factors in cases of meconium stained amniotic fluid included Oligohydramnios, Hypertension, Anaemia, IUGR, Prolonged labour. More than one risk factor was seen in 10 cases. Cases with crossed dates had increased incidence of meconium stained amniotic fluid. In the present study, there was a significant association with the consistency of meconium and the mode of delivery. Incidence of Cesarean Section was highest in thick group 35% compared to 21% in thin group due to increased non reactive CTG associated with meconium staining. Total neonatal morbidity in meconium stained cases was 33%. Neonatal morbidity was highest in thick meconium stained groups that is about 22%. Out of 100 cases of meconium stained liquor, 3 cases had neonatal death and 1 case of thick MSG had still birth. The cause of still birth was meconium aspiration syndrome.

Table 1: Frequency and type of meconium staining of AF of total deliveries (N=100)

Amniotic fluid	No. of cases	Percentage
Thin meconium stained AF (Grade-I)	45	45
Thick meconium stained AF (Grade-II)	55	55
Total	100	100

Out of the 100 cases delivered, 45% were with thin meconium stained amniotic fluid and 55% cases were with thick meconium stained amniotic fluid.

Table 2: Incidence of Gravity in 100 cases of meconium stained deliveries

Gravity	Thin Meconium		Thick Meconium		Total	
	No of cases	%	No of cases	%	No of cases	%
Primigravida	23	23	38	38	61	61
Multigravida	22	22	17	17	39	39
Total	45	45	55	55	100	100

Chi square test – 3.36, P value > 0.05. Incidence of meconium stained liquor was more common in Primigravida compared to Multigravida. There was no significant association with gravity and the consistency of meconium.

Table 3: Antenatal and intrapartum risk factors associated with meconium staining

Risk factors	No of cases	Percentage
Hypertension	6	6
Anemia	4	4
I U G R	1	1
Oligohydramnios	8	8
Prolonged labour	10	10
More than one risk factor	10	10
No risk factor	61	61

Chi square test – 14.18, P value < 0.05

Maternal Antepartum and intrapartum risk factors in cases of meconium stained amniotic fluid included Oligohydramnios, Hypertension, Anaemia, IUGR, Prolonged labour. More than one risk factor was seen in 10 cases. Cases with crossed dates had increased incidence of meconium stained amniotic fluid. Since calculated value is greater than table value = 11.07, the risks such as Oligohydramnios, Prolonged labour and Hypertension prevailed more compared to other things and had statistically significant association with meconium stained amniotic fluid.

Table 4: Shows the mode of delivery

Meconium consistency	Total no of cases	Normal deliveries		Vaccum extraction/Forceps		Caesarean section	
		No. of cases	%	No. of cases	%	No. of cases	%
Thin	45	19	19	5	5	21	21
Thick	55	14	14	6	6	35	35
Total	100	33	33	11	11	56	56

Chi square test – 25.88, P value < 0.05 – significant

In the present study, there was a significant association with the consistency of meconium and the mode of delivery. This table shows that mode of delivery varies according to grading of meconium staining.

Incidence of Cesarean Section was highest in thick group 35% compared to 21% in thin group due to increased non reactive CTG associated with meconium staining.

Table 5: Correlation of 1 minute and 5 minute APGAR score in different groups of meconium stained cases

Group of cases	APGAR score at one minute				APGAR score at five minutes			
	1-3	4-6	7-10	Total	1-3	4-6	7-10	Total
Thin meconium stained	3	19	23	45	0	11	11	45
Thick meconium stained	3	44	8	55	1	19	19	55
Total	6	63	31	100	1	30	69	100

Chi square test – 12.06, P < 0.05

This table shows among the 76 stained cases, 3 cases of Thick MSG babies and 3 of thin MSG babies were grossly asphyxiated having APGAR score at 1 minute 1-3 and at five minute score was high in between 4 – 6.

The present study shows that meconium staining is significantly associated with low APGAR score at both one minute and five minutes. Low APGAR scores were observed in thick meconium than in thin meconium.

Table 6: Different causes of neonatal morbidity in meconium stained liquor

Causes	N1=45		N2=55		Total	
	Thin group		Thick group		No. of cases	%
	No. of cases	%	No. of cases	%		
Asphyxia	7	7	14	14	21	21
MAS	4	4	8	8	12	12
Pneumonia	0	0	0	0	0	0
HIE	0	0	0	0	0	0
Total	11	11	22	22	33	33

Chi square test - 44.89, $P < 0.05$

The present study shows that, meconium stained liquor significantly increased the neonatal morbidity. Total neonatal morbidity in meconium stained cases was 33%. Neonatal morbidity was highest in thick meconium stained groups that is about 22%.

Discussion

In the present study patients with thin meconium stained amniotic fluid were 45% and patients with thick MSAF were 55%. This was in comparison with the study done by Arun et al⁽⁷⁾ but the study done in Pakistan by Erum Majid Shaikh⁽⁸⁾ had more patients with thin MSAF. Higher incidence of MSAF was seen in Primigravida that is 61%. This study was correlating with the study done by Kamala Ghokroo et al.⁽⁹⁾ James⁽¹⁰⁾ mentions incidence of MSAF increases with gestational age and reaches approximately 30% at 40 weeks and 50% at 42 weeks. Hiremath P B⁽¹¹⁾ and others did a similar study in which the gestational age from 40 – 42 weeks was upto 36% and they had large number of cases (40%) > 42 weeks. In present study large group of cases belong to gestational age 40-42 weeks. In present study following were the associated ante partum and intrapartum risk factors - prolonged labour, hypertensive disorder, Oligohydramnios, IUGR, Anaemia. Cases with crossed dates had increased incidence of MSAF. More than one risk factor was seen in 10 cases. In the study conducted by Hiremath P B,⁽¹¹⁾ 33% of MSAF cases had anemia and 42% of MSAF cases had hypertension. In our present study perinatal death was 4%, among which 3 were due to MAS and 1 was due to asphyxia. In the series of other authors perinatal mortality ranged from 3% to 7.7%. They had similar observation as compared to present study.

Debdas (1981) opined that in the group with thin meconium the babies are not generally depressed at birth and do not have any higher perinatal mortality rate in comparison to those with clear group. Other worker Arun (1991) observed 3.42% neonatal death.

Conclusion

The incidence of meconium stained amniotic fluid greatly varies with maternal antenatal and intrapartum risk factors. Increased incidence was seen in cases with crossed dates. Prolonged labour, oligohydramnios and hypertension prevailed more compared to other factors. As per the mode of delivery concerned, increased incidence of cesarean section was seen and was significantly associated with the consistency of meconium.

Infants with severe meconium aspiration syndrome and birth asphyxia are to be managed in NICU where they can be closely monitored and vigorously treated. Prompt and efficient labour monitoring and delivery can minimize the sequel of meconium aspiration syndrome. If neonatal complications are to be avoided, full cooperation and coordination of the Obstetrician and Pediatrician is required.

Since all foetuses with meconium passage in labour do not have associated maternal risk factor and do not have adverse outcome, it is important to distinguish those who are destined to develop foetal distress promptly and intervene accordingly to prevent meconium aspiration syndrome and sequel.

References

1. Jyotirameshchandran et al: risk factors for meconium aspiration and mas (meconium aspiration syndrome) in neonates born through meconium stained amniotic fluid (msaf) in a tertiary care centre in Malabar: journal of evolution of medical and dental sciences/ volume 2/ issue 48/ december 02, 2013.
2. Manohar r et al: retrospective study of various maternal factors responsible for meconium stained amniotic fluid and its impact on perinatal outcome: international journal of recent trends in science and technology, volume 9, issue 1 2013.
3. Ramyasundaram et al: risk factors for meconium stained amniotic fluid and its implications: int j reprod contraceptobstet gynecol. 2016 aug;5(8):2503-2506.
4. Sumitjeena et al. Perinatal outcomes associated with meconium stained non vigorous babies in a tertiary centre of Uttarakhand (India). journal of biomedical and pharmaceutical research 3(1):2014,81-87.

5. Dr A.K. Mahapatro et al. Obstetrics outcome at term in meconium stained amniotic fluid – a retrospective study: *int j pharm bio sci* 2014 April;5(2):(b) 866–871.
6. Dr. Meenapriyadharshini. V: meconium stained liquor and its fetal outcome - retrospective study: *journal of dental and medical sciences*, volume 6, issue 2 (Mar.-Apr. 2013), pp 27-31.
7. Arun H Nayek, Asha R Dalal. Meconium staining of amniotic fluid – significance and fetal outcome. *Journal of obstetrics and gynaecology* 1991;41:480-483.
8. Erummajidshaikh, Sadafmehmood, Majidahmedshaikh. Neonatal outcome in meconium stained amniotic fluid-one year experience. *JPMA* 60:711;2010.
9. Kamala gokhroo, ushasharma et al, “various maternal factors responsible for meconium stained amniotic fluid”, *j. Obstetrics and gynecology of India*, 51;6:2001.
10. James D.K, Steer C.P, Weiner B. Gonic. High risk pregnancy. 1994 1st ed. 1135-1142.
11. Hiremathpb, Bahubaligane, Meenal C, Nidhibansal, Ragaramya. The management practices and outcome of meconium stained amniotic fluid. *Int j biol med res.* 2012;3(3):2204-2207.