

Retrospective Study of Various Maternal Factors Responsible For Meconium Stained Amniotic Fluid and Its Impact on Perinatal Outcome

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Research Article

Abstract: Meconium is derived from the Greek word “meconium-arion”¹, meaning “opium-like”. Many maternal factors contribute to passage of meconium before birth which includes maternal age, prolonged gestation, anaemia, hypertension, ante-partum haemorrhage and others². **Objectives:** To find out the various maternal factors responsible for meconium stained amniotic fluid(MSAF), intrapartum complications and outcome of labor in cases of meconium stained amniotic fluid and its impact on perinatal morbidity and mortality. **Materials and methods:** It is a retrospective study of 2840 cases of consecutive deliveries from January 2013 to June 2013 in Mandya Institute of Medical Sciences,,Mandya to know the incidence of meconium stained amniotic fluid in these cases, to evaluate the antepartum and intrapartum factors responsible for meconium stained amniotic fluid and also to study the labour outcome with regard to perinatal morbidity and mortality as a result of meconium stained amniotic fluid. **Results:** Out of 2840 deliveries, 571 cases of meconium stained amniotic fluid were studied. The incidence of meconium stained amniotic fluid was 20.1%. Incidence of MSAF was more commonly seen in pregnancy with crossed EDD(>40weeks), oligohyramnios, , preeclampsia, PROM, anaemia. 77 cases of Meconium aspiration syndrome(MAS) were admitted to NICU out of which there were 15 perinatal mortality. 13 cases of MAS were associated with thick meconium and 2 cases with moderately thick meconium stained liquor. Severe perinatal asphyxia(8 cases) was most common cause for perinatal mortality followed by hypoxic ishaemic encephalopathy(4), respiratory distress syndrome(2) and septicaemia(1). **Conclusion:** Meconium stained amniotic fluid was associated with perinatal morbidity and mortality. It signifies the need for prevention and treatment of various antepartum and intrapartum complications, which were responsible for intrauterine hypoxia and meconium stained amniotic fluid.

Key words: Meconium, amniotic fluid, oligohydramnios, meconium aspiration syndrome.

Introduction

Meconium happens! 11 to 22% of all babies will pass the substance prior to birth. Meonium aspiration syndrome(MAS) complicates approximately 4-6 percent of these deliveries with a reported mortality as high as 40 percent and additional 4% to 9% will be diagnosed with other respiratory disorders. Meconium stained amniotic fluid is associated with perinatal morbidity and mortality. It signifies the need of prevention and treatment of

various antepartum and intrapartum complications, which are responsible for intrauterine hypoxia, and MSAF.

Materials and Methods

The present study was conducted from January 2013 to June 2013 in the teaching hospital attached to MIMS, Mandya. After analyses of case records there were 2840 consecutive deliveries during this 6 months period. It is a retrospective study of 2840 cases of consecutive deliveries from January 2013 to June 2013 in Mandya Institute of Medical Sciences, Mandya to know the incidence of meconium stained amniotic fluid in these cases, to evaluate the antepartum and intra-partum factors responsible for meconium stained amniotic fluid and also to study the labour outcome with regard to perinatal morbidity and mortality as a result of meconium stained amniotic fluid. Singleton pregnancy of more than 34 weeks of gestation with cephalic presentation, PROM Intra uterine growth restriction, Medical complications like anaemia, RHD, asthma, Obstetrical complications like PIH, eclampsia, antepartum haemorrhage and Spontaneous/induced/augmented labour were included in the study. Pregnancies with < 34 weeks, IUD, Breech presentation, Anomalous baby, multiple gestations were excluded from the study. In this study all cases were monitored clinically the general condition of the mother, uterine contractions, fetal movements, fetal heart sound every 15 minutes from active phase of labour till delivery. All sequential deliveries were attended at the time of birth and categorized into 2 classes

Class I: Non meconium stained amniotic fluid

Class II: meconium stained amniotic fluid.

Class II was subdivided into-

Group 1: Thin lightly stained green colour without particulate matter

Group 2: Moderately thick green to brown non viscous without particulate matter

Group 3: Thick dark green viscous with or without particulate matter³

Class I & II were compared with variables like -

- 1) Maternal age
- 2) Parity
- 3) Duration of pregnancy
- 4) Antenatal complications - APH, PIH, heart diseases, asthma, hepatitis, Eclampsia, severe anemia
- 5) Intrapartum complication
 - Fetal distress alone (bradycardia or tachycardia)
 - Fetal distress with prolonged labour
 - Fetal distress with failed progress of labour
 - Fetal distress with cord problems - tight loop, true knots, cord entanglement. (Noted after delivery or at the time of caesarean section)
 - Fetal distress due to cord presentation
 - Prolonged rupture of membranes > 18hrs
- 6) Outcome of labour
 - Spontaneous vaginal delivery
 - Oxytocin/Tab. Misoprostol/dinoprostone induced vaginal delivery
 - Forceps delivery
 - Vacuum delivery
 - Caesarean section

7) Effects on perinatal morbidity (admission to NICU) and mortality (birth asphyxia, RDS, hypoxic ischaemic encephalopathy).

Meconium Aspiration Syndrome

The criteria for diagnosing meconium aspiration syndrome are:

Presence of meconium below the vocal cords, Clinical respiratory distress in the first 24 hours of life (tachypnea, retractions, grunting or abnormal signs of physical examination consistent with pulmonary disease, Abnormal chest x-ray consistent with aspiration pneumonia, need for supplemental oxygen on ventilator support and low suspicion for infection⁴

Meconium staining of membranes, cord, baby, length of the cord, cord around the neck.

The following points regarding fetal outcome were noted

- a) live born or still born
- b) Gestational age
- c) Weight of the baby
- d) Time of delivery
- e) Apgar score after 1min & 5min
- f) Meconium aspiration if present
- g) Any complications

Resuscitation methods for the baby

All meconium stained infants were subjected to suctioning of the oro pharynx immediately after delivery. Stomach wash was given. Suction of the trachea under direct vision was done in infants with low apgar score, apnea, respiratory distress or birth asphyxia

All infants were observed for the development of respiratory distress for a period of 24 hours.

All infants with meconium aspiration were treated with a combination of cefotaxime and amikacin with oxygen & other supportive measures.

Observations and Analysis

Out of 2840 deliveries 571 cases of meconium stained amniotic fluid were studied from January to June 2013.

Out of these 571 cases, 77 cases developed Meconium aspiration syndrome.

Table I: Incidence of meconium stained amniotic fluid

Total no. of cases	Class I Non Meconium	Class II Meconium
2840	2269	571

Table II: Type Of Meconium Stained Amniotic Fluid And Its Incidence

Class II(meconium stained liquor)	No. of cases	Percentage(%)
Group 1 (thin meconium)	253	44.3
Group 2(moderately thick meconium)	100	17.5
Group 3 (thick meconium)	218	38.1

Out of 571 cases of MSAF, 253 cases were thin meconium stained, 100 cases were moderately thick meconium stained & 218 cases were thick meconium stained.

Table III: Relationship of Meconium Stained Amniotic Fluid with Booked and Unbooked Cases

	Total	Class I	Class II
Booked	2689	2224	465
Unbooked	151	45	106

The incidence of meconium stained amniotic fluid was found to be more in unbooked cases (70.1%).

Table IV: Incidence of Meconium Stained Amniotic Fluid According to Maternal Age

	Total	Class I	Class II
<20yrs	65	25	40
20-25yrs	2076	1711	365
26-30yrs	684	528	156
>30yrs	15	5	10

Meconium staining of amniotic fluid was more common in young mothers, 365 cases were between 20-25yrs. 156 were patients were between 26-30 years of age.

Table V: Incidence of Meconium Stained Amniotic Fluid With Respect to Gravida

	Total	Class I	Class II
Primi	1951	1621	330
Gravida 2	704	528	176
Gravida 3	170	110	60
Gravida 4	15	10	5

The Incidence of Meconium stained amniotic fluid was found to be more in Primi gravida.

Table VI: Relation of Antepartum Complication with Meconium Stained Amniotic Fluid

	Total	Class I	Class II
Crossed EDD	450	296	154
PROM	170	118	52
APH	10	8	2
PIH	302	250	52
Eclampsia	11	9	2
Heart disease	6	4	2
Anaemia	362	322	40
Oligohydramnios	389	327	62
Post term	5	0	5

Most common maternal risk factors were pregnancy with crossed EDD followed by oligohydramnios, PROM, PIH and anaemia.

Group I: The commonest associated factors were crossed EDD, oligohydramnios PIH.

Group II: Commonest associated factors are PIH, PROM and anaemia

Group III: Commonest associated factors were pregnancy with crossed EDD, PIH, PROM & oligohydramnios.

Table VI a: Relation of Material Risk Factors with Meconium Aspiration Syndrome

Maternal risk factors	No. of cases(n=77)
PROM	20
Oligohydramnios	8
Crossed EDD	15
Mild anaemia	10
Moderate anaemia	5
Severe anaemia	2
Severe PE	8
Mild PE	4
Eclampsia	1
IUGR	3

Total no. of PIH + Eclampsia were 10 cases

1 case of MAS had no associated maternal risk factors

Table VII: Relation of Intrapartum Complications with Meconium Stained Amniotic Fluid

	Total
Fetal distress	128
Fetal distress with failed Progress of labour	35
PROM > 18 hrs	12

Table VIII: Relation of Fetal Heart Rate Pattern in Meconium Stained Amniotic Fluid

FHR pattern	Group 1 No.of cases -253)	%	Group 2 (No.of cases- 100)	%	Group 3 (No.of cases- 218)	%
Normal	220	86.9	68	68%	155	71.1
Bradycardia	9	3.5	10	10	15	6.8
Tachycardia	15	5.9	10	10	20	9.1
Bradycardia+ irregular rhythm	9	3.5	12	12	28	12.8

Table VIII A: Incidence of Abnormal Fetal Heart Rate Pattern in Meconium Stained Amniotic Fluid

Abnormal FHR pattern	No.of cases-128	%
Bradycardia	34	26.5
Tachycardia	45	35.1
Bradycardia irregular rhythm	49	38.2

Table VIII B: Incidence of Normal Fetal Heart Rate Pattern in Meconium Stained Amniotic Fluid

Type of Meconium Stained Amniotic Fluid	Normal FHR Pattern-443	%
Group I (253)	220	86.9
Group II (100)	68	68
Group III (218)	155	71

FHR variation was commonest in group III.

Group-I: Out of 253cases 220 had normal fetal heart rate, 9 had bradycardia, 15 had tachycardia and 9 had bradycardia with irregular rhythm.

Group- II: Out of 100 cases 68 had normal fetal heart rate, 10 had bradycardia, 10 had tachycardia and 12 had bradycardia with irregular rhythm.

Group-III: Out of cases 218, 155 had normal fetal heart rate, 15 had bradycardia, 20 had tachycardia, 28 had bradycardia with irregular rhythm.

In all the meconium stained cases, the commonest fetal heart rate variation was bradycardia with irregular rhythm, followed by tachycardia and then bradycardia.

Table IX: Mode of Delivery

Mode of delivery	Group I No.of cases	%	Group II No.of cases	%	Group III No.of cases	%
Normal	143	56.5	64	64	69	31.6
Vaccum delivery	39	15.4	8	8	17	7.7
LSCS	71	28.06	28	28	132	60.5

Group-I: 143 Patients had normal delivery, 39 had vacuum delivery and 71 had LSCS.

Group-II: 64 had normal delivery, 8 had vacuum delivery and 28 had LSCS.

Group-III: 69 had normal delivery, 17 had vaccum delivery and 132 had LSCS.

Caesarean section was highest in group-III, instrumentation was highest in group-I and II

Table IX A: Incidence of Delivery Outcome in Meconium Stained Amniotic Fluid

Mode of delivery	No. of cases	%
Normal	276	48.3
Vacuum	64	11.2
LSCS	231	40.2

On the whole, normal and assisted vaginal delivery formed the highest percentage of cases, incidence of caesarean section was 40.4%.

Table X: Relation of Meconium Stained Amniotic Fluid and Apgar score

Apgar score	Group- I	Group- II	Group-III
At 1 min.			
0-3	12	16	18
4-6	181	74	135
7-10	60	10	65
At 5 min.	NIL		
0-3	34	2	15
4-6	219	20	30
7-10		78	173
NICU admission	24	10	42
Death	NIL	2	13

2 Cases were referred to higher centres. Out of 77 NICU admissions 13 cases of Group III and 2 cases of Group II died.

Table XI: Neonatal Mortality in Meconium Aspiration Syndrome

	No. of cases	Percentage
Birth asphyxia	8	53.3%
Respiratory distress syndromewith respiratory failure	2	13.3
Hypoxic ischaemic encephalopathy	4	26.6
Septicaemia	1	6.6

Table XII: Relationship between Perinatal Mortality with Type Of Meconium

	No. of cases-15
Group-III- thick meconium	13
Group II- moderately thick meconium	2
Group I- thin meconium	Nil

Table XIII: Birth Weight and Meconium Aspiration Syndrome

Birth weight(kgs)	N=77 No. of cases
<2.5	4
2.5-3.0	50
3.0-3.5	21
3.5-4.0	2

Discussion

The present study was undertaken to evaluate the significance of various maternal factors responsible for meconium stained amniotic fluid and its impact on perinatal outcome. out of 2840 consecutive deliveries 571 patients of meconium stained liquor were selected and studied. The presence of meconium in amniotic fluid in the antenatal period and during labour is a commonly observed phenomenon. It has been seen in association with pregnancy induced hypertension, anaemia, post term, oligohydramnios, intrauterine growth restriction and other conditions. Various authors have found incidence of meconium staining of amniotic fluid between 9 to 22% in resnick et al, (1955), found it to be 9.9% in their series of 767 cases. douglas johnson(1968) in 1501 cases found the incidence to be 18%. Another large series from pittsburgh analysed 42000 cases were incidence of meconium stained was 10.30% (toshi fujikura et al 1975.)

Table 1: Incidence of Meconium Stained Amniotic Fluid

1	Wisewell, et al ⁵ .	12.20
2	Fujikura and klionsky.	10.30
3	Meis, et al	22.00
4	Rossi, et al	22.00
5	Hageman, et al	14.40
6	Johnson.	18.00
7	Present study	20.1

247 cases of MSAF were studied out of 1540 consecutive deliveries in debdas et al., series, there was 78.75% cases of thin meconium stained liquor and 21.25% cases of thick meconium stained liquor. In pravin goud and usha krishna's series⁶, 44.80% cases were thin meconium stained, 24.20% cases were moderately meconium stained 30.90% cases were thick meconium stained. In the present study 44.3% cases were thin meconium stained 17.5% cases were moderately meconium stained and 38.1% cases are thick meconium stained. According table-V incidence of meconium stained amniotic fluid was found to be more in primi gravida. Meconium and other associated conditions Meconium staining of amniotic fluid was more commonly seen with associated conditions like pregnancy induced hypertension, anaemia, IUGR, oligohydramnios, pregnancy with crossed EDD. The incidence of these factors in the present study has been compared with those of other authors

1)Pregnancy induced hypertension-it was found in 8.20% to 23.58% cases in Miller,et al. in 15.75% cases in Pravin and Usha krishna's series⁶. 11.20% in Fujikura and 54 (PIH + eclampsia) cases (17.2%) in the present study.

2)Anaemia -Incidence of cases in anaemia was 22.12% in praveen goud and usha krishna's series, and 40 cases (11%) in the present study.

3)Premature rupture of membranes-incidence was 3.10% cases in meis, et al.to 6.60% cases in miller,et al⁷. and 9.1% cases in present study

4)IUGR-In the study by debdas, et al.13.70% cases had small for gestational age babies. In present study no of cases were 4.

5)Oligohydramnios-in the study by Devang desai⁸ et al 4% of oligohydramnios were associated with MSAF. In the present study it was 10.1%

Mode of Delivery in Meconium Stained Liquor Cases

In all series normal delivery form the highest percentage of cases. Incidence of caesarean section varies from 2.5% to 17% as per various authors. in praveen and usha krishna's series, it is 7.27%. in the present study 40.4% of meconium stained liquor went for caesarean section. Munrokerr is of the opinion that thick meconium staining revealed at the time of induction by amniotomy, or in early labour is so ominous that he generally regards it as an indication for caesarean section.

Table 2: Fetal Heart Rate Pattern(Meconium Group)

Authors	Bradycardia		Tachycardia		Bradycardia+Irregular Rhythms	
	No of Cases	%	No of Cases	%	No of Cases	%
Fenton and steer	185	53.0	11	3.0	149	43.0
Vinay pendse ⁹	42	55.0	20	26.3	14	18.4
Present study	34	26.5	45	35.1	49	38.2

The commonest fetal heart rate pattern was bradycardia with irregular rhythms. Fetal heart rate monitoring was done by intermittent auscultation and continous CTG monitoring.

Table 3: Meconium and Mortality

SL No	Name of Authors	Perinatal Mortality
1	NARANG(1992)	7.7%
2	DEBDAS, ET AL(1981)	3.00%
3	PRAVIN GOUD AND USHA KRISHNA(1998)	7.7%
4	PRESENT STUDY(2013)	2.6%

Table 4: Type of Meconium and Perinatal Mortality

Authors	Thin	Moderate	Thick
PRAVIN GOUD & USHA KRISHNA(1988)	-	-	17.60%
NARANG, et al (1992)	-	7.50%	20.4%
PRESENT STUDY, (2013)	nil	0.3%	5.5%

In the present study, the highest perinatal mortality was in group III (thick meconium) Narang, et al¹⁰ is of the opinion 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 comparision to those with clear liquor.

According to table no. XIII, 50 cases of MAS were found to be between 2.5-3 Kg and 4 cases of IUGR(<2.5 kgs) were found. In the present study, there were 77 cases of MAS, neonatal mortality was in 15 cases.

Total No of MAS cases : 77

Neonatal mortality 15 cases

Group- I: nil

Group-II: 2 cases

1-severe perinatal asphyxia, 1- RDS

Group-III : 13 cases

7 - Birth asphyxia,

4 - Hypoxic ischemic encephalopathy, 1 – RDS, 1 – Septicemia

Incidence of MAS was 13.4%

According to Table – V incidence of maternal risk factors in primigravida was found to be increased.

According to Table – VIa increased incidence of maternal risk factors was found to be associated with MAS. PROM were 20 cases anemia was 17 cases, oligohydramnios were 8 cases out of 77 cases.

According to Table – VIIIa most common abnormal fetal heart rate pattern was bradycardia with irregular rhythm in 49 cases (38.2%) of meconium stained amniotic fluid.

According to table – VIIIb normal fetal heart rate pattern was common in group I cases 223 (88%).

According to Table- X 46 cases of meconium stained amniotic fluid had APGAR score < 3 at 1 min and 17 cases of apgar score <3 at 5 min.18 cases of Group III had

apgar score of < 3 at 1 min and 5 min, Of these 13 cases died and 5 had improved apgar score at 5 min.16 cases of group II had apgar score of < 3 at 1 min & 5 min and 2 cases died.14 had improved apgar score at 5min.12 cases of Group I had apgar score of < 3 at 1 min and all cases had improved apgar score at 5 min.Thus babies born of meconium stained amniotic fluid with apgar score <3 at 1 and 5 min were found to be associated with increased perinatal deaths. Group- III cases of MAS had the maximum perinatal mortality.

Conclusion

Meconium stained amniotic fluid was associated with perinatal morbidity and mortality. It signifies the need for prevention and treatment of various antepartum and intrapartum complications, which were responsible for intra uterine hypoxia and meconium stained amniotic fluid.In the present study pregnancy with crossed EDD, oligohydramnios, anaemia, pre-eclampsia were the leading cause were high incidence of meconium stained amniotic fluid. Thus preventing these antepartum complications by providing good antenatal care and early detection of antepartum complications and treating them we can reduce the incidence of meconium stained amniotic fluid and perinatal mortality.

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