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Perinatal Outcome in Meconium Stained Amniotic Fluid

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Abstract

Introduction: Meconium stained amniotic fluid has been considered a sign of fetal distress in presentation other than breech and associated with poor fetal outcome but others considered meconium passage by fetus is physiological phenomena and produce environmental hazards to fetus before birth. *Methods:* 200 women in labour with meconium stained amniotic fluid considering the inclusion and exclusion criteria at Teaching & General Hospital. Effect of thin and thick meconium on fetus was studied. Fetal monitoring, mode of delivery, Apgar score, birth weight, resuscitation of baby noted.All babies followed-up up to 1st week of neonatal life. *Result:* Major complications were birth asphyxia, meconium aspiration syndrome, early neonatal death seen in 5.5% (11 cases), morbidity in 20.5%, 4.5% in thin and 16% in thick MSAF. Causes of death were meconium aspiration syndrome in 7 cases, sepsis in 2 cases, pneumonia in 1 case and birth asphyxia in 1 case. *Conclusion:* From our study we conclude that MSAF adversely affect fetal outcome mostly by thick meconium.

Keywords: Meconium Stained Amniotic Fluid; Meconium Aspiration Syndrome; Birth Asphyxia.

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Introduction

Meconium passage remains an enigmatic condition to obstetrics. Obstetrical teaching throughout this century has included the concept that meconium passage is a potential warning sign of fetal asphyxia. Meconium stained amniotic fluid has long been implicated as a factor influencing fetal well being during intra-partum and post-partum periods. Obstetric Management is significantly effected by presence of Meconium Stained Amniotic Fluid(MSAF) possibility reflecting low threshold for obstetric intervention.

Whitridge J Williams, in 1903 observed that a characteristic sign of impending asphyxia is the escape of meconium. He attributed meconium passage to relaxation of the sphincter ani muscle induced by faulty airation of the (fetal) blood. Indeed, although 12 to 22% of human labors are complicated by meconium.

Meconium passage in newborn is a developmentally programmed event normally occurring within the first 24 to 48 hours after birth intrauterine meconium passage in near-term or term fetuses has been associated with fetomaternal stress factor like hypoxia and infection independent of fetal maturity.

Meconium is derived from the Greek word "mekonion" meaning poppy juice or opium. Aristotle is credited for noting the relationship between the presence of meconium in amniotic fluid and a sleepy fetal state of utero. Meconium-stained amniotic fluid, as a result of the passage of fetal colonic contents into the amniotic cavity, is noted in approximately 12% of all deliveries.

Meconium aspiration syndrome (MAS) is

noted in 5% of these infants and more than 4% of MAS infants die, accounting for 2% of all perinatal deaths.

There is strong evidence most meconium passage occurs by each of three basic mechanisms:

1. As a physiologic maturational event.
2. As a response to acute hypoxic events occurring late in pregnancy.
3. As a response to chronic intrauterine hypoxia.

There is some evidence that the risk of development of Meconium Aspiration Syndrome and other serious complications is quite different in each of these three basic mechanisms.

Passage of meconium in the mature fetus is facilitated by myelination of nerve fibers and increase in parasympathetic tone and increase in the concentration of motilil [1-3].

Meconium passed as a maturational event is of thin consistency in most cases. Meconium aspiration syndrome and other serious complications occur infrequently in this circumstances [4].

Newborn with acute hypoxic events, near and after the onset of labour are more likely to pass thick meconium and to suffer meconium aspiration, interventions to clear meconium are more likely to be beneficial for these newborn. Aspiration of meconium with the first breaths after birth is more likely, and the newborns are at higher risk for the obstructive and local inflammatory effects of meconium [5].

Newborn who suffers chronic intrauterine hypoxia are more likely to develop pulmonary arterial muscularization and persistent pulmonary hypertension of the newborn and subsequently their response are more depressed at birth. Chronic hypoxia and hypercapnia stimulate both meconium passage and neonatal gasping. In such cases, meconium aspiration can occur long before birth. Complications could be due to either the aspiration of meconium, the conditions causing chronic hypoxia. Efforts to clear meconium from the newborns pharynx and trachea will be ineffective in preventing the effects of meconiumaspirtion in some cases. These infants are more likely to suffer from long term respiratory and neurologic complications [5,6].

Meconium Aspiration Syndrome remains on of the most common causes of neonatal respiratory distress. Meconium is more potent and toxic than previously appreciated vicious cycle of hypoxemia, shunting, acidosis, pulmonary hypertension is frequently associated with Meconium Aspiration Syndrome and becomes difficult to treat successfully.

Murphy and associates [4] (1984) presented evidence that development of newborn pulmonary hypertension with this syndrome depended upon a chronic recurring antenatal insult. This in turn would cause abnormal muscularization of the interacinar arteries beginning well before birth and thus would be unaffected by maneuvers at delivery.

Type of meconium passage and time of passage are significant factors affecting fetal outcome.

Katz and Bower [7] (1992) concluded from their review that etiology of meconium aspiration syndrome is primary chronic fetal asphyxia rather than simply damage from meconium. They postulated that chronic antepartum asphyxia causes pathophysiologic changes leading to pulmonary vascular damage, pulmonary hypertension and persistent fetal circulation. Affected newborns are unable to clear aspirated meconium.

Many maternal factors contribute to passage of meconium before birth which include maternal age, prolonged gestation, type of labour, anemia, hypertension and toxemia of pregnancy [2,8].

Type of meconium passage and time of passage are significant factors affecting fetal outcome.

Methodology

A prospective study of 200 cases of meconium stained amniotic fluid was studied and during study, cases were selected with pregnant women at term gestation with cephalic presentation with meconium stained amniotic fluid, keeping in mind the inclusion and exclusion criteria.

Methods of Collection of Data

A careful history is taken from all cases particularly about age, parity, gravidity and duration of labour.

Previous obstetric history

Previous obstetric complications

A detailed clinical examination and appropriate investigations.

Inclusion Criteria

All pregnant women in labour with cephalic presentation with singleton pregnancy with meconium stained liquor irrespective of age, parity and stage of labour.

Artificial rupture of membranes or spontaneous

rupture of membranes.

Pregnancy induced hypertension.

Previous normal deliveries and previous LSCS.

Exclusion Criteria

- Malpresentation.
- Multiple pregnancies.
- Preterm and post-term pregnancy.
- Maternal medical diseases.
- Fetal malformation.
- Intrauterine fetal demise.
- Obstetric complications: Eclampsia, antepartum hemorrhage.

Clinical Examination

a. *History Taking*

- Age of the patient.
- Parity.
- History of previous pregnancies.
- Nature of delivery.
- Past history and personal history.
- Post natal or post operative events.

b. General Examination

General condition, temperature, pulse rate, blood pressure were recorded, jaundice, anemia and edema and built of the patient is noted .

c. Systemic Examination

The cardiovascular system is examined for the presence of murmurs Lungs were carefully auscultated to rule out clinical abnormalities.

Obstetric Examination

a. *Abdominal Examination*

The height of the uterus, presentation, girth of abdomen, the position and lie of fetus are noted down. The fetal heart is auscultated carefully with Doppler. Uterine action is also noted down.

Pelvic Examination

The position of cervix, dilatation, the presence or absence of membranes, the level of the presenting part, type of pelvis are noted down. If membranes are absent the type of liquor, whether it is thin meconium or thick meconium is noted down. If uterine action is good and cervical dilatation 4 centimeter, membranes were ruptured artificially and the colour of liquor is noted down. Amniotic fluid greenish yellow – thin; dark green/ tarry black – thick were grouped.

Investigations

- Complete hemogram.
- Urine – Albumin, sugar and microscopy.
- Blood grouping and Rh-typing.
- HIV,HBSAG- after taking informed consent.
- RFT, LFT if required.
- USG if required.
- CTG.

Management During Labour

The patient who were having meconium stained amniotic fluid with or without heart rate variation were given, left lateral position, IV fluids, and oxygen inhalation .

The rate of cervical dilatation, duration of labour were noted. If there are any associated complications like PIH, PROM, anemia, the specific treatment is given.

The mode of delivery was dependent upon the fetal and maternal condition. Depending on conditions, the delivery was either spontaneous or with assisted with forceps,Vaccum, operative interventions- lower segment caesarian section were done.

Newborn

The Apgar score at one minute and five minutes are noted down. The lungs were examined for aspiration syndrome and signs were noted down. The presence or absence of respiratory grunt, tachypnoea was also noted. The weight of the baby was also noted. If the baby is active just thorough oropharyngeal suction done,stomach wash was given and were placed with mother. Apgar score >7 were considered as good.

If the baby did not cry spontaneously at birth, resuscitative measures like oxygen inhalation, or endotracheal intubation, ambubagging and aspiration of stomach contents were carried out.

Number of days in NICU were noted between 1-3, 4-6 and more than 7 days and interventions like intubation, requirement for ventilation was noted.

Results

Out of total 200 deliveries with meconium stained amniotic fluid 130 cases i.e., 65% were booked cases and 70 cases i.e., 35% were unbooked cases. The higher incidence in booked cases is increased awareness for regular ANC. Increased number MSAF in booked cases were seen mostly in referred cases in labour from PHC and CHC and some patients missed the last trimester ANC in which PIH and anemia incidence was more.

Table 1: Relationship of MSAF with Booked and Unbooked

	No. of Deliveries	Percentage
Booked	130	65.00
Unbooked	70	35.00
Total	**200**	**100.00**

Table 2: Incidence of MSAF according to Maternal Age

Age	No. of cases	Percentage
< 20 years	15	7.50
20 – 25 years	143	71.50
26 – 30 years	39	19.50
More than 30 years	3	0.15
Total	200	100.00

Table 3: Birth weight and meconium stained amniotic fluid

Birth weight	Thin	Percent	Thick	Percent
≤2.5 Kg	9	12.00	18	14.40
2.5 to 3.5 Kg	62	82.67	102	81.60
≥ 3.5 Kg	4	5.33	5	4.00
Total	**75**	**100.00**	**125**	**100.00**

Maximum incidence of meconium stained amniotic fluid was seen in the age group of 20-25 years i.e., 71.5% followed by 26-30 years (19.5%). The incidence was lower in mothers less than 20 years or more than 30 years.

Babies weighing <2.5 Kg, in that 24 babies were then meconium i.e., 32.8%, 18 babies i.e., 14.4% were thick meconium. 164 babies weighing between 2.5 to 3.5 Kg in that thin meconium were 62 babies i.e., 82.67%, 102 babies i.e., 81.6% were thick meconium. 9 babies were weighing 3.5 Kgs or more in that 4 babies i.e., 5.33% were thin meconium and 5 babies i.e., 4.00% were thick meconium babies.

Out of 125 babies with thick Meconium stained amniotic fluid, 62 babies had NICU admissions i.e., 49.61%, where it was 25.3% in thin Meconium stained amniotic fluid. NICU admission and number of newborn needed resuscitation were more with thick meconium stained.

Table 4: NICU admissions

MSAF	NICU admissions	Total	Percentage
Thin	19	75	25.33
Thick	62	125	49.61

Table 5: Incidence of NICU admission and staying in days with Meconium Stained Amniotic Fluid

NICU stay (days)	Total No. of fetuses				Total	
	Thin (n=19)		Thick (n=38)			
	No.	%	No.	%	No.	%
1 – 3 days	10	52.63	32	51.61	22	73.68
4 – 6 days	7	36.84	20	32.26	23	47.37
More than 7 days	2	10.53	10	16.13	12	21.05
	19	100.00	62	100.00	57	100

Incidence of NICU admissions for more than 7 days were more than 2-fold in thick meconium i.e., 16.13% as compared with thin meconium, which was 10.53%. Number of NICU days between 1-3 days was more in thin meconium i.e., 52.63% compared to thick meconium 51.61% indicating more number of days in NICU for thick meconium babies.

41 babies developed morbid condition like aspiration syndrome in 11 cases, pneumonitis in 4 cases, sepsis in 5 cases, birth asphyxia in 21 cases. Comparative to thin meconium morbidity was more in thick meconium.

Table 6: Incidence of perinatal morbidity

Perinatal morbidity	Thin (n=75)		Thick (n=125)		Total (n=200)	
	No.	%	No.	%	No.	%
MAS	--	--	11	34.38	11	5.5
Pneumonitis	1	11.11	3	9.38	4	2.0
Sepsis	2	22.22	3	9.38	5	2.5
Birth asphyxia	6	66.67	15	46.88	21	10.5
Total	9	100.00	32	100.00	41	20.5

Table 7: Incidence of perinatal mortality

Perinatal morbidity	Thin (n=75)		Thick (n=125)		Total (n=200)	
	No.	%	No.	%	No.	%
MAS	--	--	11	34.38	11	5.5
Pneumonitis	1	11.11	3	9.38	4	2.0
Sepsis	2	22.22	3	9.38	5	2.5
Birth asphyxia	6	66.67	15	46.88	21	10.5
Total	9	100.00	32	100.00	41	20.5

Table 8: Perinatal Outcome in meconium stained amniotic fluid

Perinatal outcome	Thin meconium	Thick meconium
Morbidity	9	32
Perinatal deaths	1	10

Out of 200 cases, perinatal mortality seen only in thick Meconium stained amniotic fluid i.e., 11(5.5%). There was one perinatal death in thin meconium stained amniotic fluid.

Out of 200 cases, 41 babies i.e., 20.5% developed morbid condition in that perinatal morbidity was 4.5% in thin and 16% in thick Meconium stained amniotic fluid. Perinatal mortality was 5.5%, one perinatal death was seen in thin Meconium stained amniotic fluid.

Meconium aspiration syndrome was leading cause of perinatal mortality in 7 cases, followed by sepsis 2 cases, pneumonitis 1 csae and birth asphyxia 1 case.

Table 9: Cause of Death in Babies born with Meconium Stained Amniotic Fluid

Cause	Total No. of babies	Percentage
Meconium aspiration syndrome	7	3.50
Pneumonitis	1	0.50
Sepsis	2	1.00
Birth asphyxia	1	0.50

Discussion

There is increase in the number of booked cases due to increase awareness of good antenatal care. MASF is independent of booked/unbooked. In the present study though the women were booked the high incidence of MSAF in booked cases were due to referred cases and many patients did not have late third trimester ANC.

In the present study the incidence of thin MSAF is 37.5% and thick 62.5% comparable with the study conducted by Debdas and Arun. The number of cases of thick meconium were 125 and thin 75.

Table 10: Comparative study of relationship of MSAF with Booked &unbooked

	Bhide SS[9]	Present study
Booked	31.60%	65.00%
Unbooked	68.40%	35.00%

Table 11: Incidence of Gradation of MSAF was noted by different authors

Authors	Thin MSAF	Thick MSAF
Debdas[10]	78.75%	21.25%
Arun[11]	51.15%	48.85%
Present study	37.50%	62.50%

The present study correlates with the study conducted by Kamala Ghokroo and Sandhu et al.

The present study correlates with study conducted by Nayak et al (1990). The maximum birth weight is in between 2.5 – 3.45 Kgs.

In the present study, the mean birth weight was 2790 grams, which is comparable with the study conducted by Praveen Goud.

Table 12: Comparison of incidence of MSAF according to maternal age

Authors	Thin MSAF	Thick MSAF
Debdas[10]	78.75%	21.25%
Arun[11]	51.15%	48.85%
Present study	37.50%	62.50%

Table 13: Comparative Incidence of Birth Weight

Birth weight	Nayak et al[14]		Present study	
	Thin	Thick	Thin	Thick
< 2.5 Kg	32.4%	27.48%	12.0%	14.4%
2.5 – 3.5 Kg	62.56%	60.23%	82.67%	81.6%
3.5 Kg	5.02%	12.28%	5.33%	4.00%

Table 14: Comparative study of mean birth weight

Author	Mean birth weight (grams)
Miller[15]	3400
Praveen Goud[16]	2750
Present study	2790

Increased incidence in morbidity in the present study is associated with thick meconium i.e., 16%. MAS was seen in 11 cases of thick meconium. Birth asphyxia was seen in 6 cases of thin and 15 cases of thick meconium. Pneumonitis – 3 cases of thick and 1 case of thin MSAF, sepsis – 2 is thin and 3 thick MSAF.

Many babies required NICU admission for observation of respiratory distress and were observed for 24 hours and discharged from the NICU. Conditions like birth asphyxia was common complication followed by meconium aspiration syndrome, pneumonitis, septicemia required NICU stay for longer duration.

In the present study, mortality was 5.5% leading cause of death being meconium aspiration syndrome of 3.5% followed by sepsis 1%, pneumonitis 0.5% and birth asphyxia.

Table 15: Comparative Incidence of Perinatal Morbidity

Meconium	Nayak et al[11]	Present study
Thin	5.58%	4.50%
Thick	8.18%	16.00%

Table 16: NICU Admission

Meconium	Praveen Goud[14]	Present study
Thin	10.80%	25.30%
Thick	54.90%	30.40%

Table 17: Comparison of perinatal mortality

Authors	Perinatal Mortality
Debdas[10]	3.00%
Goud& Krishna[15]	7.7%
Present study	5.5%

Conclusion

The study confirmed that our clinical impression with meconimum stained amniotic fluid adversely affect fetal outcome.

Thick meconium stained amniotic fluid is associated with increased rate of intervention, neonatal morbidity and mortality compared with thin MSAF.

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