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Original Research Article

Meconium Stained Liquor and Pregnancy Outcome

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Abstract

Background: Meconium staining of amniotic fluid is associated with an increased risk of adverse perinatal outcome due to birth asphyxia, fetal distress, intra-partum fetal death, low Apgar score, meconium aspiration syndrome and neonatal death and hypoxic ischemic encephalopathy with its sequelae. In this study we wanted to evaluate the maternal characteristics and risk factors for MSAF along with the fetal outcome and mode of delivery in patients with meconium-stained liquor during labour.

Materials and Methods: This study was conducted among patients in labour who were admitted in AIMS, BG Narara over a period of two years from 2016 to 2018, after obtaining ethical committee clearance from the institutional ethics committee, and informed consent from the study participants. Data was entered in MS Excel software and analysed.

Results: In our study total of 183 babies were born with meconium-stained liquor out of which 51.3% were thin meconium and 48.63% were thick meconium. Among babies with thick meconium 60.09% and 70% babies had suspicious and abnormal CTG patterns respectively. 89.65% of thin meconium babies had vaginal delivery but 69% of thick meconium babies had caesarean section. 11(34.37%) babies in thin meconium group and 21(65.62%) babies in thick meconium group weighed less than 2.5 kgs at birth. 87% babies were asymptomatic and needed only routine care while 24 babies went to NICU out of which 11 needed ventilator, 9 has MAS and 4 had birth asphyxia.

Conclusions: Meconium-stained liquor alone is not associated with an adverse neonatal outcome. 87% of babies remained asymptomatic in spite of MSL and required only routine care. Increasing Grade of MSL is associated with increased adverse outcome. Association of MSL with abnormal CTG is associated with poor outcome, increased caesarean section rate, increased neonatal complications.

Keywords: Meconium, Amniotic Fluid, Adverse Perinatal Outcome, Birth Asphyxia, Fetal Distress, Intra-Partum Fetal Death, Apgar Score, Meconium Aspiration Syndrome, Neonatal Death, Hypoxic Ischemic Encephalopathy.

Introduction

All practicing obstetricians and midwives would be familiar with the thick "*Green pea soup"*, meconium. [1] Meconium stained amniotic fluid is a non-welcome event during labour and both obstetricians

and neonatologists are bothered about the perinatal outcomes in laboring women presenting with meconium stained amniotic fluid. There have been references from 1676 about the association between perinatal death and meconium.2 In 10% of all pregnancies the fetus passes meconium. [2]

The various theories proposed for the passage of meconium are, Physiological gut maturity, pathological because of hypoxia, cord compression, intra uterine infections etc.2 Though passage of meconium could be physiological, it may become an environmental hazard in the presence of fetal academia. The latter supervenes acutely and thus it is highly unpredictable and not preventable. [3]

A term fetus may have passed meconium by nature of its maturity, but if this is innocent, the meconium should have been diluted by adequate liquor [1]. If the fetus is pre term then this meconium is abnormal and suspect infection or hypoxia [1]. If the meconium is thick then it implies that the liquor volume is reduced and suspect uteroplacental insufficiency and possible fetal compromise. [1]

Initially the liquor was clear and later becomes meconium stained, it suggests that the fetus may be compromised which could be due to infection or intrapartum hypoxia. [1]

The incidence increases with increase of Gestational age of fetus and is rare before 32 weeks unless with some intrauterine infections increasing to more than 30% in post term pregnancy. Pre term babies may have MSAF as a result of fetal enteritis due to listeria, ureaplasma urealyticum, and rotavirral infections. [2]

The incidence of Meconium stained amniotic fluid is 30% at 40 weeks and 50% at 42 weeks. Obstetric cholestasis is associated with increased frequency of meconium passage2. Meconium has been associated with additional adverse events like increase pre-term labour, altered coagulation profile in fetus and neonatal seizures. [4]

Meconium Staining of Amniotic fluid is scary as it can cause an increased risk of adverse perinatal outcome due to birth asphyxia, fetal distress, intra-partum fetal death, low Apgar score, Meconium Aspiration Syndrome and neonatal death and hypoxic ischemic encephalopathy with its sequelae. As it increases the risk of chorioamnionitis and operative delivery, maternal morbidity due to surgical intervention and sepsis may be increased. [5]

Fenton and Steer associated fetal heart rate patterns with meconium and outcome and concluded that passage of meconium was not significant with FHR of >110. The introduction of FBS brought more clarity to the situation [2].

Further studies have been emphasizing the finding that there is no association between meconium and fetal hypoxia which has been strengthened with the use of fetal pulse oxymetry and fetal haemoglobin analysis [2].

Inspite of a lack of clear evidence between meconium and fetal acidosis at birth, we cannot conclude that presence of meconium with normal FHR pattern poses no threat to the neonate [2]. Meconium stained amniotic fluid is a clinical diagnosis with no practical confirmatory test [6,7]. It is also difficult to define the degree of meconium staining as thick and thin and many a times it becomes more of a subjective assessment.

MSAF is associated with higher rate of caesarean delivery, increased need for neonatal resuscitation and meconium aspiration syndrome 3 In upto 5 % of MSAF cases MAS can occur. In upto 0.05% cases MAS can cause or contribute to perinatal death. In 33% of MAS long term respiratory problems ensue [2].

Meconium aspiration is defined as presence of meconium below the vocal

cords and occurs in about 35% of cases with MSAF. This can result in a disease ranging from transient mild respiratory problem to severe distress. Neonatal death can occur in about 40% of cases. Oropharyngeal suction or intubation before the first breath may not prevent this condition. MAS is more common in thick meconeum rather than thin meconium. MAS can cause chemical pneumonitis, atelectasis, HMD, infections, distal lung collapse [2].

Ramin and associates (1996) studied 8000 MSAF and found the risk factors for MAS to be, academia at birth, forceps delivery, LSCS, Intrapartum heart rate abnormalities, depressed APGAR at birth and need for ventilation at birth [8].

MSAF is associated with maternal conditions like HDP, Oligohydramnios, Diabetes with pregnancy, chronic medical disorders especially of renal, cardiac and respiratory system. It is associated with anomalies in the babies, intra uterine infections, prolonged pregnancy, IUGR and may be shown by abnormalities in CTG, Biophysical profile and other fetal monitoring methods [5,9].

Pre disposing factor identification, diagnostic techniques that could make us suspect the possibility of meconium, associated fetal factors may help in early diagnosis and may improve adverse perinatal outcomes.

Ghidini & Spong 2001 concluded that in many cases chronic hypoxia has been demonstrated in babies with MAS which were evident by the levels of erythropoietin and nucleated RBC count the the neonatal blood [4].

ACOG 2007 also states that no routine suctioning would prevent MAS in cases of MSAF. If the infant is depressed, intubation and infraglottic suctioning is recommended and thus it may not be a preventable event [3].

In more recent studies the overall frequency of meconium stained amniotic fluid has ranged from 5 to 24.6% (median 14%) of all deliveries [9].

Perinatal mortality increased from 2 per 1000 birth with clear amniotic fluid to 10 per 1000 with meconium-stained amniotic fluid. Severe foetal acidemia, meconium aspiration syndrome, delivery by caesarean section (7-14 %) was also increased. It is concluded that meconium in amniotic fluid associated with an obstetric hazard significantly increased risk of adverse neonatal outcome [10].

Katz and Bowes (1992), emphasized the prognostic uncertainity of meconium [11].

Nathan and Co-workers concluded that meconium is a low risk factor and may cause perinatal mortality to the tune of 1 per 1000 births [12].

Though many methods are available to diagnose fetal distress during labour, like CTG, Auscultation, STAN, Scalp blood sampling, the simplest and the easiest method may be finding of meconium in the amniotic fluid. It may be substantiated by CTG changes. The meconium staining of the amniotic fluid can be classified as Grade I, II, III by visual examination after spontaneous or artificial rupture of membranes. Grade I meconium-stained liquor is translucent, light-yellow green in colour, grade II MSL is opalescent with deep green and light yellow in colour. Grade III is opaque and deep green in color.

ACOG 2007 states that no routine suctioning would prevent MAS in cases of MSAF. If the infant is depressed, intubation and infraglottic suctioning is recommended.

Aims and Objectives

To determine the maternal characteristics and risk factors for MSAF

To determine the fetal outcome and mode of delivery in patients with meconium stained liquor during labour.

Materials and Methods

After obtaining ethical clearance this study was conducted for a period of 2 years (2016-2018) at AIMS, BG Narara. The study was done on patients admitted in labour who fulfilled the inclusion and exclusion criteria. All the patients in the study underwent a similar form of labour management. A detailed history and routine clinical examination were carried out in all of them and an admission CTG was done followed by partographic management of the labour once they were into established active labour. Patients who had spontaneous rupture of membranes or who underwent artificial rupture and who had different grades of meconium were enrolled in the study. The fetal heart rate was monitored by intermittent auscultation after an initial CTG tracing. The fetal heart rate tracing were classified as normal, suspicious, abnormal according the NICE (National Institute of Clinical Exellence) guidelines. The meconium staining of the amniotic fluid was classified as thick or thin. The route of delivery and timing of decision to deliver were decided based on the maternal parameters and fetal heart rate tracings. Decision for Cesarean was taken on other obstetric parameters also, otherwise the patients were allowed to deliver vaginally under careful monitoring. The route of delivery, birth weight of the baby, MAS, need for ventilation, NICU admission, APGAR at birth were noted. Babies were followed till discharge, or any other adverse outcomes and the results were tabulated and studied. Fetal outcome with meconium was also studied in relation to intrapartum FHR patterns.

Inclusion Criteria

All women in labour beyond the gestational age of 37 weeks with cephalic presentation, singleton pregnancy in patients with meconium stained liquor (Thick and thin Grade 1 and 2 were taken as thin grade 3 was taken as thick) after spontaneous or artificial rupture of membranes during labour.

Exclusion Criteria

Gestational age <37 weeks,
Previous cesarean section
Multiple pregnancy
Malpresentations

Observations

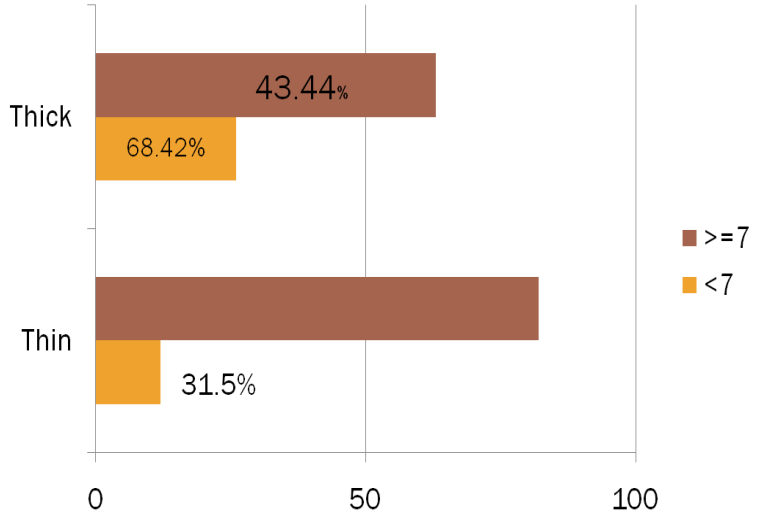

Figure 1: Fetal outcome according to grades of meconium stained liquor and Apgar score

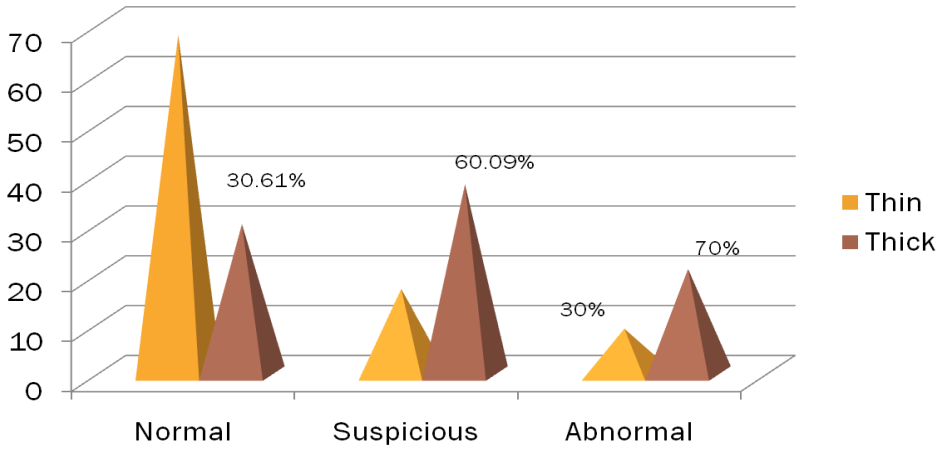

Figure 2: Fetal heart rate patterns in CTG with grades of meconium stained liquor

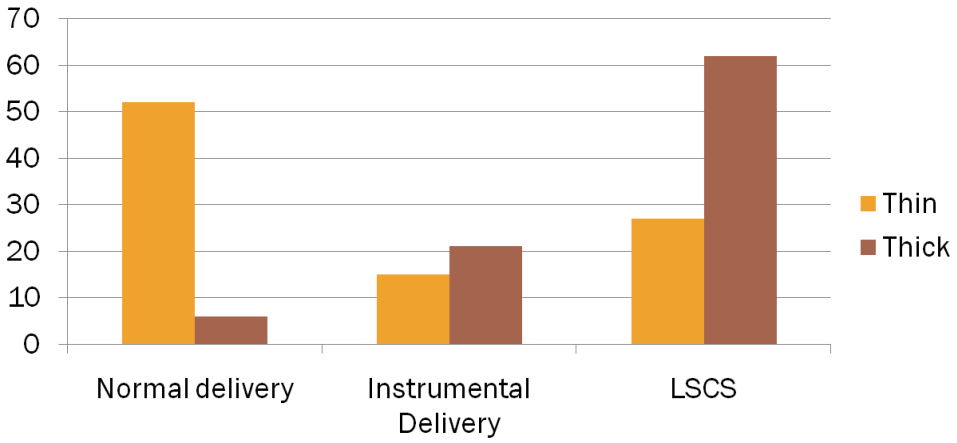

Figure 3: Mode of delivery and grades of meconium stained liquor

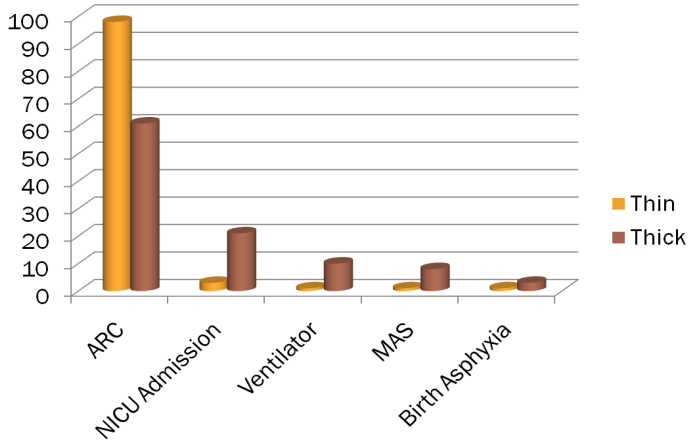

Figure 4: Birth weight and grades of meconium stained liquor

Table 1: Neonatal outcome according to grades of meconium-stained liquor

Grades of MSL	<2.5kgs	>=2.5kgs
Thin	11 (34.37%)	83 (54.96%)
thick	21 (65.62%)	68 (45.03%))
total	32	151

Discussion

Fetal condition during labour is usually assessed by fetal heart rate and checking the presence of meconium in the amniotic fluid [13,14]. The passage of meconium may be a normal physiological event reflecting fetal maturity. It may on the other hand reflect fetal hypoxia or increased vagal activity from cord compression [15]. The detection of MSL during labour often causes apprehension and anxiety for the patient as well as the health provider as it is often considered as indication of fetal distress [16]. Generally thick meconium is associated with poor perinatal outcomes [17,18]. The exact reason of passage of meconium in the liquor is poorly understood. It could reflect the state of compensated fetal distress as it is suggested by few babies who are actually acidotic during labour [19]. Acute or chronic fetal hypoxia can result in the passage of meconium in utero [20]. Also the incidence of meconium passage during labour increases with gestational age 30% at 40 weeks, 50% at 42 weeks [21]. The MSAF and its association are still very important determinants of perinatal morbidity and mortality and a successful management of such pregnancies is only possible after better understanding pathophysiology of meconium passage [22]. Presence of meconium below vocal cord is known as meconium aspiration and occurs in 20-30% of all infants with MSAF with around 12% mortality [23]. MSAF alone is not an indication for caesarian section, however with MSAF needs strict supervision during labour for better perinatal outcome [24]. The low apgar scores may be because of direct vasoconstrictor effect of meconium on umblical vein that results in vasospasm in leading to impaired placental blood flow [25]. Infants with APGAR Score<7 at 5 min are three times more likely to have abnormalities on neurological examination [26].

Presence of meconium in absence of fetal heart rate abnormalities is not suggestive of fetal compromise and does not require any intervention. The increased rate of emergency Caesarean Section, Instrumental Vaginal Delivery for fetal distress, meconium aspiration syndrome and neuro developmental handicaps are possible problems with MSAF . After the initial hypoxic bout initiating the passage of meconium, subsequent repetitive bouts due to prolonged labour or abnormal uterine activity may cause severe asphyxia. Such repetitive bouts can be avoided by careful fetal monitoring, active management of labour and optimal care after birth. This would help avoid unnecessary caesarian sections in all cases of meconium stained liquor in absence of a defenitive indication. The clinical diagnosis of perinatal asphyxia is based on several criteria, the two main ones being evidence of cardiorespiratory and neurological depression (Defined as an APGAR Score remaining <7 at 5 min after birth) and evidence of acute hypoxic compromnise with academia [27].

In our study total of 183 babies were born with meconium stained liquor out of which 51.3% were thin meconium and 48.63% were thick meconium. Nirmala et al, in her study, showed that there were 1267 deliveries among which MSL = 100(7.89%); Grade 1 MSL =39%, grade 2 MSL =43%, grade 3 MSL = 18% [28]. Surekha et al, in her study, there were 3673 deliveries among which MSL deliveries = 120(3.48%);Grade 1 MSL=34.16%, Grade 2 MSL= 29.16%, Grade 3 MSL= 36.66% [29].

In our study 68.42% of babies with thick meconium and 31.5% babies with thin meconium had apgar score less than 7, Nirmala et al in her study, there were only one baby(0.18%) in Grade 3 MSL, no babies in Grade 1 and Grade 2 MSL at 5 minute APGAR Score <7 [28].

In our study, among babies with thick meconium 60.09% and 70% babies

suspicious and abnormal CTG patterns respectively, In meena priyadarshini et al study, the normal CTG patterns were 49(56.97%) in Grade I MSL, 45(44.11%) in Grade 2 MSL and 16(25.80%) in Grade 3 MSL; Suspicious CTG patterns were 28(32.55%) in Grade I MSL, 38(37.25%) in Grade 2MSL, 24(28.70%) in Grade 3 MSL; Abnormal CTG patterns were 9(10.46%)in Grade 1 MSL, 19(18.62%) in Grade 2 MSL, 22(35.48%) in Grade 3 MSL [30].

When mode of delivery was compared with grades of meconium staining, we observed that 89.65%of thin meconium babies had vaginal delivery but 69% of thick meconium babies had cesarean section, In Meena priyadarshini et al study, there were 86(34.4%)vaginal deliveries, 58(23.2%) instrumental vaginal delivery and 106(42.4%) caesarean section.(Table 7).The total number of vaginal deliveries including instrumental vaginal deliveries were 144(56.7%).The caesarean section rate is higher among Grade 2 and 3 MSL compared to Grade 1 MSL in our study. Patil et al in his study, showed the caesarean rate as 42% [31] Espinheira MC et al in his study, showed the caesarean rate as 62.5% [32].

In our study there were 11(34.37%) babies in thin meconium group and 21(65.62%) babies in thick meconium group who weighed less than 2.5 kgs at birth. In contrast to our study, Nirmala et al in her study, observed birth weight <2.5kg in 1(2.6%) with Grade 1 MSL, 2(4.65%) in Grade 2 MSL, 2(11.11%) in Grade 3 MSL [28]. On the other hand, Rekha Kumari et al in her study, observed birth weight <2.5kg in 30(40%) of the neonates who had MSL [33].

In our study 87% babies were asymptomatic and needed only routine care while 24 babies went to NICU among them 11 needed ventilator, 9 has MAS and 4 had birth asphyxia. Rekha Kumari et al in her study, 63(84.0%) were asymptomatic and 1(1.3%) had birth Asphyxia [33]. Khazardoost et al observed 64(21.1%) with meconium aspiration syndrome [34]. Espinheira MC et al in his study, there were 1.4% of NICU admission of which 43.1% needed ventilatory support and 5% had meconium aspiration syndrome [32].

Conclusion

Meconium Stained Liquor alone is not associated with an adverse neonatal outcome, 87% of babies remained asymptomatic inspite of MSL and required only routine care. Increasing Grade of MSL is associated with increased adverse outcome. Association of MSL with abnormal CTG is associated with poor outcome, increased caesarean section rate, increased neonatal complications.

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