

Meconium Stained Liquor and Its Fetal Outcome - Retrospective Study

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Abstract AIMS & OBJECTIVES: To determine the fetal outcome and mode of delivery in patients with meconium stained liquor during labour.MATERIALS & METHODS: This retrospective study was conducted from January 2012 to December 2012 on patients admitted to Labour ward,PSGIMSR. Out of 2124 deliveries,250 patients who met the inclusion criteria were enrolled in our study.The data was collected in a predesigned proforma.RESULTS: The results of fetal outcome and mode of delivery were analysed statistically using SPSS version 19. The Chi Square test was applied between Grades of Meconium and APGAR Score.p value < 0.05 which was statistically significant. Also, the study between Grades of Meconium and CTG pattern proved to be significant with p value < 0.05.CONCLUSION: Meconium Stained Liquor alone is not associated with an adverse neonatal outcome,86% of babies remained asymptomatic .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: APGAR Score, CTG, Meconium Stained Liquor, Meconium Aspiration Syndrome

I. Introduction

Meconium staining of the amniotic fluid has long been regarded as a sign of fetal distress. Although the exact cause is not known, meconium is thought to be passed from the fetal gastro-intestinal tract as a response to hypoxia, mesentric vasoconstriction induced gut hyperperistalsis, falling umbilical venous saturation, vagal stimulation and normal physiological function of a mature fetus.[1,2]

Conflicting outcomes have been reported in the labours, complicated by meconium staining of the amniotic fluid, varying with the degree of meconium staining.[3,4,5]

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.[6]

MSAF is associated with higher rate of caesarean delivery, increased need for neonatal resuscitation and meconium aspiration syndrome.[7]

The risk factors for meconium stained amniotic fluid are both maternal and fetal. The maternal factors are hypertension, Gestational Diabetes mellitus, maternal chronic respiratory or cardiovascular diseases, post term pregnancy, preeclampsia, eclampsia. The fetal factors include oligohydramnios, intrauterine growth restriction, poor biophysical profile.[8]

Aspiration of meconium by the fetus remains relatively common cause of perinatal morbidity and mortality because it is difficult to prevent.[9]

The fetus passes meconium into the amniotic fluid in 10% of all pregnancies, in 5% of these (1:200 of all pregnancies) the meconium is aspirated into the lungs of the fetus or the neonate[9].This can result in severe respiratory distress, meconium aspiration syndrome[9]. Thick meconium by itself is not associated with adverse foetal outcome. However, the incidence of meconium aspiration syndrome increases in case of non-reassuring FHR and clinical condition of the newborn at birth.[10,11]

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.[12]

The meconium stained amniotic fluid is a clinical diagnosis with no practical confirmatory test.[13]

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.

II. Aims And Objectives

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

III. Inclusion And Exclusion Criteria

The inclusion criteria are gestational age >37 weeks, cephalic presentation, singleton pregnancy in patients with meconium stained liquor (grade I, II, III) after spontaneous or artificial rupture of membranes during labour. The exclusion criteria are gestational age <37 weeks, previous cesarean section, multiple pregnancy, non cephalic presentations, like breech transverse lie and compound presentation.

IV. Materials & Methods

After obtaining ethical clearance this retrospective study was conducted from January 2012 to December 2012. The study was done on patients admitted to labour ward, in the department of Obstetrics and Gynecology at PSG IMS&R. Pregnant women with singleton pregnancy, cephalic presentation with more than 37 weeks of gestational age were studied. Out of 2124 deliveries, 250 patients had meconium stained liquor. All the patients in the study undergone a standardised form of labour management. The patients who fulfilled the inclusion criteria were enrolled in the study. Patients detailed history, gestational age, per abdominal examination, per speculum and per vaginal examination, admission tests including intrapartum CTG were recorded in a pre designed proforma. The patients were carefully monitored for the progress of the labour by plotting the parameters on a partogram. The fetal heart rate was strictly monitored by continuous electronic fetal monitoring. The fetal heart rate tracing were classified as normal, suspicious, abnormal according the NICE (National Institute of Clinical Excellence) guidelines.[14]. The meconium staining of the amniotic fluid was 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. Delivery is expedited when fetal heart rate abnormalities were detected by safest mode of delivery either by instrumental vaginal delivery or caesarean section. All patients underwent full trial of labour and caesarian section was done only if trial of labour was unsuccessful or if there were obstetric indications including fetal distress. The APGAR score of neonates at 5 minutes, birth weight, NICU admission, the neonates who had meconium aspiration syndrome and birth asphyxia were recorded.

V. Results & Observations

Table 1: Distribution Of Meconium Stained Liquor Deliveries

Total number of deliveries	Meconium Stained Liquor deliveries n =250(11.77%)		
2124	Grade 1 MSL	Grade 2 MSL	Grade 3 MSL
	86 (34.5%)	102 (40.8%)	62 (24.8%)

Table 2 – Potential Risk Factors For Meconium Stained Liquor:

Antepartum Risk Factors	Intrapartum Risk Factors
Post dated pregnancy =82	Prolonged PROM =9
Pregnancy Induced Hypertension =12	IUGR =8
Rh Isoimmunisation =12	Prolonged Labour =3
Oligohydramnios =9	Circumvallate placenta =1
Gestational Diabetes Mellitus =8	Ileal Atresia =1
Heart Disease =5	Premature Atrial contraction of fetus =1
Higher Maternal Age >35 yrs =5	
Chronic Respiratory Disease =4	
Cholestasis in Pregnancy =3	
Teen age pregnancy =3	

Table 3 : Foetal Outcome According To Grades Of Meconium Stained Liquor & Apgar Score

Grades of MSL	<7	≥7	Total
1	12 (13.95%)	74 (86.04%)	86
2	15 (14.70%)	87 (85.29%)	102
3	20 (32.25%)	42 (67.74%)	62
Total	47 (18.8%)	203 (82.2%)	250

The Statistical Package for Social Science (SPSS 19) was used to analyse the above data and Chi Square Test

was applied between the Grades of meconium and APGAR Score at 95% confidence interval with p value< 0.05 which is considered to be statistically significant.

Table 4 – Foetal Heart Rate Patterns On CTG With Grades Of Meconium Stained Liquor

Grade of MSL	Normal (n=110)	Suspicious(n=90)	Abnormal(n=50)	Total(n=250)
1	49 (56.97%)	28 (32.55%)	9 (10.46%)	86
2	45 (44.11%)	38 (37.25%)	19 (18.62%)	102
3	16 (25.80%)	24 (28.70%)	22 (35.48%)	62

The SPSS 19 was used to analyse the above data and Chi Square was applied between the Grades of Meconium and fetal heart rate patterns on CTG at 95% confidence interval with p value< 0.05 which is considered to be statistically significant.

Table 5- Birth Weight & Grade Of Meconium Stained Liquor

Grade of MSL	<2.5 Kgs	≥2.5 Kgs
1	10 (34.48%)	76 (34.38%)
2	13 (44.82%)	89 (40.27%)
3	6 (20.68%)	56 (22.62%)
Total	29 (11.6%)	221 (88.4%)

Table 6- Neonatal Outcome According To Grades Of Meconium Stained Liquor

Grade of Meconium stained liquor	n=250		n=35		
	Asymptomatic Routine care at birth	NICU Admission	Ventilator	MAS	Birth asphyxia
1	79	7 (8.1%)	1	1	1
2	95	7 (6.86%)	4	3	1
3	41	21 (33.87%)	12	10	3
Total	215 (86%)	35 (14%)	17 (48.57%)	14 (40%)	5 (14.28%)

Table 7 – Mode of Delivery & Grades Of Meconium Stained Liquor

Grades of MSL	Normal delivery	Instrumental delivery	LSCS	Total
1	46 (53.48%)	17 (19.76%)	23 (26.74%)	86
2	36 (35.29%)	26 (25.49%)	40 (31.21%)	102
3	4 (6.45%)	15 (24.19%)	43 (69.35%)	62
Total	86 (34.4%)	58 (23.2%)	106 (42.4%)	250

VI. Discussion

Fetal condition during labour is usually assessed by fetal heart rate and checking the presence of meconium in the amniotic fluid.[14,15].

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.[16].

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[17].

Generally thick meconium is associated with poor perinatal outcomes.[18,19]

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[20].

Acute or chronic fetal hypoxia can result in the passage of meconium in utero[21].

Also the incidence of meconium passage during labour increases with gestational age 30% at 40 weeks, 50% at 42 weeks.[22].

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[23].

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[24].

MSAF alone is not an indication for caesarian section, however with MSAF needs strict supervision during labour for better perinatal outcome[25]. The low apgar scores may be because of direct vasoconstrictor effect of meconium on umbilical vein that results in vasospasm in leading to impaired placental blood flow[26]. Infants with APGAR Score<7 at 5 min are three times more likely to have abnormalities on neurological examination[27].

Presence of meconium in absence of fetal heart rate abnormalities is not suggestive of fetal compromise and does not require any intervention[28]. 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 [29].

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 [30]. 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 definitive 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 compromise with acidemia.[31].

In our study, the total number of deliveries was 2124, among which there were 250(11.77%) patients with meconium stained amniotic fluid. Grade I MSL = 86(34.4%), Grade 2 MSL = 102(40.8%), Grade 3 MSL =62 (24.8%).(Table 1). 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%. [32]. 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%. [33]. Rev Sauda et al, in his study, he observed 11.9% of MSL deliveries. [34]. In our study, out of 250 MSL deliveries, the potential antepartum risk factors for meconium stained liquor were post dated pregnancy(82), PIH(12), Rh isoimmunisation(12), Oligohydramnios(9), GDM(8), Heart disease(5), Higher Maternal Age(5), Chronic Respiratory disease(4), Teen age pregnancy(3), Cholestasis of pregnancy(3).The intrapartum risk factors were prolonged PROM (9), IUGR(8), Prolonged labour(3), Circumvallate Placenta(1), Ileal Atresia(1), Premature atrial contraction of fetus(1).(Table 2). Shankyan et al, in his study, the risk factors for MSL out of 159 deliveries were Postdated pregnancy(47), IUGR(21), PROM(20), Higher Maternal Age (19), PIH(17).

In our study, there were 47(18.8%)babies with APGAR Score <7 among which,12(13.9%) babies were in Grade I MSL, 15(14.70%)babies were in Grade 2 MSL and 20(32.25%)in Grade 3 MSL; p value= <0.05, Statistically Significant.(Table 3). In contrast to our study, 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.[32].

In our 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.(Table 4). Among the 22 babies with abnormal CTG patterns, in Grade 3 MSL, 15 babies needed NICU admission; among those 15 babies, 12 of them needed ventilatory support of which 10 babies developed meconium aspiration syndrome and 3 babies had severe Birth Asphyxia. Nirmala et al, in her study, the normal CTG patterns were 25(64.1%) in Grade I MSL, 28(65.11%) in Grade 2 MSL, 10(55.5%) in Grade 3 MSL; Suspicious CTG patterns were 10(25.64%) in Grade I MSL, 10(23.25%) in Grade 2 MSL, 5(27.77%) in Grade 3 MSL; Abnormal CTG patterns were 4(10.25%) in Grade I MSL, 5(11.62%) in Grade 2 MSL, 3(16.66%) in Grade 3 MSL.[32].

In our study there were 29(11.6%) babies with birth weight <2.5kg among which Grade 1 MSL-10(34.48%). Grade 2 MSL-13(44.82%). Grade 3 MSL-6(20.68%).(Table 5).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.[32]. 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.[36].

In our study, 215(86%) of babies remained asymptomatic and required only routine care at birth. 35(14%) of babies required NICU admission. Of these 35 babies, 17(48.57%) of babies needed ventilatory support and among them, 14(40%) developed meconium aspiration syndrome and 5(14.28%) had severe birth asphyxia. (Table 6). Rekha Kumari et al in her study, 63(84.0%) were asymptomatic and 1(1.3%) had birth Asphyxia.[36]. Khazardoost et al observed 64(21.1%) with meconium aspiration syndrome.[37]. 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.[38].

In our 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 sectionrate 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%. [39]. Espinheira MC et al in his study, showed the caesarean rate as 62.5%. [38].

VII. Conclusion

Meconium Stained Liquor alone is not associated with an adverse neonatal outcome, 86% 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.

Ethical Clearance- Obtained from IHEC PSGIMS&R.

Conflict of Interest- None

Source of funding- Hospital

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