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Adverse perinatal outcome and mode of delivery in patients with meconium stained amniotic fluid

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Abstract
Objective: To evaluate the perinatal outcome and mode of delivery in patients with Meconium stained Amniotic Fluid (MSAF).
Material and Methods: This prospective observational study was carried out in Department of Obstetrics and Gynaecology, Government Medical College and Rajindra Hospital, Patiala, over a period of one year from January 2017 to December 2017. Total 4653 patients delivered over this time period. A total of 609 patients who had completed more than 37 weeks of gestation, with singleton pregnancies and cephalic presentations with meconium stained liquor were included in this study.
Results: Among 609 patients, 63.1% of patients were unbooked cases, 36.9% of patients had at least 3 visits to our institute. Nulli parous patients accounted for 66.2% of the cases. 29.2% cases were beyond 42 weeks of pregnancy. 21.8% patients were of pregnancy induced hypertension. 20.2% patients were of oligo hydramnios, 10.2% patients were of Gestational Diabetes mellitus. In grade I MSAF 10.1% patients had abnormal CTG pattern, in Grade II MSAF 20.4% patients had abnormal CTG pattern, in Grade III MSAF 46.7% patients had abnormal CTG pattern. In grade I MSAF 26.4% patients delivered with LSCS, in grade II MSAF 45.7% patients delivered with LSCS, in Grade III MSAF 81.5% patients were delivered with LSCS. In patients with Grade I MSAF 14.1% babies were admitted to Neonatal intensive care unit, in Grade II MSAF 18.1% babies were admitted to Neonatal intensive care unit, in grade III MSAF 42.4% babies were admitted to Neonatal intensive care unit.
Conclusion: Meconium stained amniotic fluid is really worrisome from both, obstetrician's and paediatrician's point of view, as it increases the caesarean rates, causes birth asphyxia, Meconium Aspiration Syndrome [MAS] and increase in neonatal intensive care unit admissions.

Keywords: Meconium stained amniotic fluid, Birth asphyxia, meconium aspiration syndrome, lower segment caesarean section

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 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 underlying foetal hypoxia. Variations in FHR, passage of the meconium in amniotic fluid, pathological or the 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 Pre eclampsia, eclampsia, Gestational Diabetes mellitus, maternal chronic respiratory or cardivascular diseases, post term pregnancy. 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 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 and meconium aspiration syndrome [9].

Thick meconium by itself is not associated with adverse foetal outcome. However, the incidence of meconium aspiration syndrome increase 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 case 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].

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.

Aims and objectives

To determine the perinatal outcome and mode of delivery in patients with meconium stained amniotic fluid during labour.

Inclusion and exclusion criteria

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

Materials and Methods

This prospective observational study was done in department of Obstretrics and Gynaecology, Government Medical College and Rajindra Hospital Patiala from January 2017 to December 2017.

Pregnant women with singleton pregnancy, Cephalic presentation with more than 37 weeks of gestational age were included in the study. Out of 4653 patients, 609 patients had meconium stained amniotic fluid. 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. 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 to National Institute of Clinical Excellence guidelines [14]. The meconium staining of the amniotic fluid was classified as Grade I, I, III. By visual examination after spontaneous or artificial rupture of membranes. Grade I meconium stanied liquor is translucent, light yellow green in colour, grade II MSL is opalescent with deep green and light yellow in colour. Grade III MSL opaque and deep green in colour. Delivery was 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 trail of labour and caesarean 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, NICU admission, the neonates who had meconium aspiration syndrome and birth asphyxia were recorded.

Result

Total 4653 Patients were delivered during the study period. 609 patients had got meconium stained amniotic fluid. The incidence of meconium stained amniotic fluid came out to be 13.1%.

Table 1: Demographic profile of patients

Total patients with Meconium Stained liquor	**609**
Unbooked Cases (%)	384 (63.1%)
Booked Case (%)	225 (36.9%)
Parity	
Nulliparous (%)	403 (66.2%)
Multiparaous (%)	206 (33.8%)
Age Distribution (in years)	Number of patients (%)
<20	76 (12.5%)
21-25	273 (44.8%)
26-30	190 (31.2%)
31-35	64 (10.5%)
>35	6 (0.98%)
Maternal Risk Factors	Number of patients (%)
Post dated	178 (29.2%)
PIH	133 (21.8%)
Rh isoimmunisation	31 (5.09%)
Oligohydramnios	123 (20.2%)
Gestational Diabetes Mallitus	62 (10.2%)
Heart Disease	14 (2.1%)
Cholestasis of pregnancy	23 (3.7%)
Foetal Risk factor	Number of patients (%)
Premature Rupture of Membrane	23 (3.7%)
Intra Uterine Growth Retardation	79 (12.9%)
Prolonged labour	11 (1.8%)
Number of patients depending on Grading of Meconium Stained amniotic fluid	
Grade I	208 (34.1%)
Grade II	249 (40.8%)
Grade III	152 (24.9%)

In our study, there were 609 patients with MSAF. Out of which 63.1% patients were unbooked, 36.9% patients were booked patients who visited our hospital for at least 3 visits. In the study 66.2% patients were nulliparous, 33.8% patients were multiparous. In this study 12.5% patients were of <20 years of age, 44.8% patients were 21-25 years of age, 31.2% of patients were 26-30 years of age, 10.5% patients were 31-35 years of age, 0.98% patients were >35 years of age. 29.2% patients were post dated patients. 21.8% patients suffered from pregnancy induced hypertension. 5.09% patients were of Rh iso-immunisation, 20.2% patients were of oligo hydramnios, 10.2% patients were of Gestational Diabetes Mallitus, 2.1% patients were of Heart disease, 3.7% patients were associated with cholestasis of pregnancy.

In our study, 3.7% patients were of premature rupture of membrane, 12.9% patients had got Intra uterine growth retarded babies, and 1.8% patients had prolonged labour.

There were 34.1% patients with grade I meconium stained liquor, 40.8% patients with grade II meconium stained liquor and 24.9% patients with grade III meconium stained liquor [Table 1].

Table 2: CTG Pattern and Grades of Meconium Stained Liquor

	Normal	**Suscipious**	**Abnormal**	**Total**
Grade I	119 (57.2%)	68 (32.6)%	21 (10.1)%	208
Grade II	106 (42.5%)	92 (36.9%)	51 (20.4%)	249
Grade III	39 (25.6%)	42 (27.6%)	71 (46.7%)	152

Mode of Delivery and Grades of Meconuim stained amniotic fluid

	Normal Deliveries	Instrumental Deliveries	LSCS	Total
Grade I	125 (60.1%)	28 (13.4%)	55 (26.4%)	208
Grade II	118 (47.3%)	17 (6.8%)	114 (45.7%)	249
`Grade III	22 (14.4%)	6 (3.9%)	124 (81.5%)	152

In present study, in grade I meconium stained liquor, 57.2% had normal CTG pattern, 32.6% patients had suspicious CTG pattern, 10.1% patients had abnormal CTG pattern. In grade II meconium stained liquor 42.5% patients had normal CTG pattern, 36.9% patients had suspicious CTG pattern, 20.4% patients had abnormal CTG pattern. In grade III meconium stained liquor, 25.6% patients had normal CTG pattern, 27.6% patients had suspicious CTG pattern, 46.7% patients had abnormal CTG pattern.

In the present study, In Grade I meconium stained liquor 60.1% patients delivered normally, 13.4% patients underwent instrumental deliveries. 26.4% patients underwent LSCS. The main indication for LSCS was non progress of labour and other obstetric indication including fetal distress. In Grade II meconium stained liquor, 47.3% patients delivered vaginally, 6.8% patients underwent instrumental deliveries, 45.7% patients underwent LSCS. In Grade III meconium stained liquor, 14.4% patients underwent normal deliveries, 3.9% patients underwent instrumental deliveries, 81.5% patients under went LSCS [Table2]

Table 3: Neonatal Outcomes and Grades of Meconium stained Amniotic fluid.

APGAR (at 5 minutes of birth)	Grade I	Grade II	Grade III
APGAR <7	24 (11.6%)	37 (14.9%)	49 (32.4%)
APGAR >7	184 (88.4%)	212 (85.1%)	103 (67.7%)
Asymptomatic Babies	179 (85.9%)	204 (81.9%)	88 (57.8%)
NICU admissions	29 (14.1%)	45 (18.1%)	64 (42.4%)
Early Neonatal deaths	1 (0.48%)	3 (1.2%)	9 (5.96%)
Septicemia	5(2.4%)	8 (3.21%)	13 (8.5%)
Meconium aspiration Syndrome	4 (1.96%)	9 (3.6%)	17 (11.2%)
Birth Asphyxia	3 (1.4%)	7 (2.8%)	13 (8.5%)

In the present study, in grade I meconium stained liquor patients, 11.6% babies had APGAR <7 at 5 minute and 88.4% babies had APGAR >7 at 5 minute. In grade II meconium stained liquor patients, 14.9% babies had APGAR <7 at 5 minute and 85.1% patients had APGAR>7 at 5 minute. In grade III meconium stained liquor patients, 32.4% babies had APGAR <7 at 5 minute and 67.7% babies had APGAR>7 at 5 minute.

In grade I meconium stained liquor, 85.9% of babies were asymptomatic, 14.1% of babies were admitted to NICU, there was one early neonatal death, 2.4% babies suffered from septecemia, 1.96%babies undergone meconium aspiration syndrome and 1.4% babies had got birth asphyxia.

In grade II meconium stained liquor, 81.9% babies were asymptomatic, 18.1% babies were admitted to NICU, and there were 1.2% early neonatal deaths. 3.21% babies suffered from septecemia, 3.6% babies had meconium aspiration syndrome, 2.8% babies had got birth asphyxia.

In grade III meconium stained liquor, 57.8% babies were asymptomatic babies, 42.4% babies were admitted to NICU. There were 9 (5.96%) early neonatal deaths among them. 8.5% babies devolped septecemia, 11.2% babies developed meconium aspiration syndrome. 8.5% babies suffered from birth asphyxia. [Table 3]

Discussion

The passage of fetal meconium in the amniotic cavity causes the meconium stained liquor and is a commonly encountered finding in the obstetric practice with an overall frequency between 12% and 19% (13, 15). The incidence of MSAF in our study came out to be 13.1%. Rev Sauda *et al.* [16] in his study observed incidence rate of 11.9% of MSAF. The meconium stained liquor and its associations are still very important determinants of perinatal morbidity and mortality and a successful management of such pregnancies is possible only after a better understanding of pathophysiology of the meconium passage.

In our study, the average age of patients was 21-24 years. Raj laxmi *et al.* [17] and Vaghela *et al.* [18] also had similar results. Majority of patients were not registered with us. Out of 609 patients, 63.1% of patients were unbooked cases. In study carried out by Bhide *et al*., [19] 71% patients were unbooked cases. Nulliparity itself may lead to an increased risk of obstetric complications [20]. The duration of labour of a nulliparous patient is significantly longer than of a multiparous woman [21, 22]. Cheng et al have demonstrated that prolonged duration of the second stage of labour is associated with a higher risk of occurrence of meconium stained liqour [23, 24]. These observations suggest that the frequency of meconium stained liquor is higher among nulliparous patients than among multiparous patients because of a longer duration of the second stage of labour in nulliparous patients. The results of our study supported the view and were consistent with finding of Green Wood et al and David *et al.,* [25, 26]. In our study 66.2% patients were nulliparous.

In the present study, 29.2% patients were postdated patients. Naveen *et al.,* [27] conducted a study on 1500 deliveries to identify predictors of MSAF and observed that a postdated pregnancy was one of the risk factors for meconium stained liquor. In the present study 21.8% pregnancies were associated with PIH. Study done by Bhide *et al.,* [19] showed 13% association with PIH.

PROM is well known risk factors for meconium stained liquor, in present study 3.77% of patients were associated with PROM. Similar type of observation was observed by Rao *et al.,* [28] in their study where 5% patients were associated with PROM.

In the present study, in Grade I meconium stained liquor 26.4% patients had LSCS, in Grade II meconium stained liquor 45.7% patients had LSCS and Grade III meconium stained liquor 81.5% patients had LSCS so making total LSCS rate 48.1%. Patil *et al.* [29] in his study showed caesarean rate of 42% Espinheira MC *et al*., [30] showed the caesarean rate of 62.5% in his study.

In the present study in grade I meconium stained liquor 179 (85.9%) babies were asymptomatic, in grade II meconium stained liquor 204 (81.9%) babies were asymptomatic and in grade III meconium stained liquor 88 (57.8%) babies were asymptomatic. So total 77.3% babies were asymptomatic and 22.7% babies were admitted to NICU. Study done by Rekha Kumari *et al.,* [31] showed 84.0% babies were asymptomatic.

In the present study, in grade I meconium stained liquor, there were 11.6% babies with APGAR <7 at 5 minutes, in grade II cases there were 14.9% babies with APGAR <7, in grade III

cases there were 32.4% babies with APGAR <7 at 5 minute so total 18.06% babies were with APGAR <7 at 5 minutes. Nirmala *et al.*, [32] in her study showed that there were no babies with APGAR <7 in 5 minutes I and II cases and there were only 1.8% babies with APGAR<7 in grade III meconium stained liquor.

In the present study, in grade I cases 1.96% babies had meconium aspiration syndrome, in grade II cases 3.6% babies had meconium aspiration syndrome, and in grade III cases 11.2% babies had meconium aspiration syndrome. So making total 4.8% babies with meconium aspiration syndrome. Espinheira MC *et al.*, [30] in his study observed 5% babies had meconium aspiration syndrome.

In the present study, in grade I meconium stained liquor, 1.4% babies had birth asphyxia, in grade II cases 2.8% babies had birth asphyxia and in grade III cases 8.5% babies had birth asphyxia so total 3.8% babies suffered from birth asphyxia. Rekha Kumari *et al*., observed 1.3% babies had birth asphyxia [31].

Conclusion

Meconium stained amniotic fluid alone is not associated with an adverse neonatal outcome. 77.3% of babies remained asymptomatic inspite of MSAF and required only routine care. Increasing grade of meconium stained liquor is associated with increased adverse outcome. Association of MSAF with abnormal CTG is associated with poor outcome, increased caesarean section rate, increased neonatal complications.

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