ORIGINAL ARTICLE

Meconium Staining of Amniotic Fluid- A Poor Indicator of Fetal Compromise

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Abstract

The presence of meconium at the onset of labour and its obstetric outcome was studied over a 3 month period. Out of the 1267 deliveries that occurred during this period, 100 (7.89%) had meconium staining of liquor. These were compared to the remaining 1167 patients with clear liquor. Monitoring included cardiotocography, scalp pH estimation when required and optimal care at delivery.The fetal heart rate abnormalities were more common in meconium stained patients. Thick meconium staining was associated with higher cesarean section rate, low Apgar score at one minute and more admissions to the neonatal intensive care unit.All women with meconium staining of liquor should be cardiotocographically monitored in labour and managed by optimal timely intervention in order to avoid severe asphyxia and meconium aspiration

Key Words

Meconium, Amniotic Fluid, Fetal Compromise

Introduction

The classical concept of passage of meconium by the fetus in response to hypoxia and its association with poor fetal outcome is controversial. However, conventionally, the passage of meconium by the fetus has been taken as an indication for urgent delivery. Although its exact cause is not known, factors ranging from mesenteric vasoconstriction induced gut hyperperistalsis, falling umbilical venous saturation, vagal stimulation and a normal physiological function of a mature fetus have all been proposed to have an aetiological role in this condition (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 (3-5) Although Abramovici et al failed to demonstrate a correlation between the appearance of meconium during labour and fetal outcome , Low and Paul et al suggested a significant increase in fetal asphyxia with meconium staining of amniotic fluid (3-5) With facilities like continuous fetal heart rate monitoring and scalp pH estimations, the degree of fetal compromise can be evaluated. In the present prospective studY, fetal heart rate abnormalities, mode of delivery and short term fetal outcome have been evaluated in relation to different degrees of meconium staining and to a control population, with the aim to evaluate the accuracy of meconium staining of amniotic fluid as a marker of fetal compromise.

Material and Methods

The present prospective study was carried out over a 3 month period on 100 consecutive cases admitted to the labour ward of a tertiary care centre of North India, with singleton term pregnancies, cephalic presentation and various degrees of meconium staining of amniotic fluid during labour. One thousand one hundred and sixty seven other patients with clear amniotic fluid during labour and who were matched for age, parity, period of gestation and blood pressure, were regarded as controls. Women with previous cesarean sections and breech presentations were not included in the study.

All the patients in the study were subjected to a standardized form of management. All patients underwent a full trial of vaginal delivery and cesarean section was carried out only if vaginal delivery was unsuccessful or if fetal distress developed. All women with meconium in the liquor were monitored by continuous

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cardiotocography (CTG). The fetal heart rate (FHR) tracings were classified as normal, suspicious or abnormal according to the guidelines of National Institute of Clinical Excellence (NICE). If the FHR tracing was suspicious or abnormal, fetal scalp blood sampling (FBS) was carried out for estimation of blood pH. A fetal blood pH of 7.2 or less was regarded as evidence of fetal distress. The indications of instrumental vaginal and abdominal deliveries were noted. The Apgar scores of the neonates at 1 and 5 minutes, their birth weights and the number of cases admitted to the neonatal intensive care unit (NICU) were noted.The meconium staining of amniotic fluid was classified as light, moderate and thick, on visual examination. Opaque and deep green liquor was regarded as thickly meconium stained (TMS), translucent and light yellow green colour was considered lightly meconium stained (LMS) while opalescent liquor with colour in between deep green and light yellow green was classified as moderately meconium stained (MMS).The data was recorded and analysed statistically by Chi square test.

Results

During the study period, a total of 1267 deliveries were conducted. Of these, 100 (7.89%) had meconium staining of liquor . Thirty nine percent had LMS liquor, 43% had MMS while 18% had TMS. All the 100 patients with meconium in amniotic fluid were electronically monitored during labour.

Table 1 depicts the fetal heart rate patterns associated with various degrees of meconium stained amniotic fluid. As is evident from it, the incidence of abnormal tracings in the LMS, MMS and control groups were comparable, while it was insignificantly higher (16.66%) in the TMS group. The suspicious FHR patterns were comparable in all the meconium stained groups, and the corresponding value for the control group was significantly lower ($p<0.01$).

Table 2 depicts the Apgar scores at 1 and 5 minutes vis a vis the degree of meconium staining of amniotic fluid. Fifty percent of the babies with TMS had an Apgar score of less than 7 at one minute. This recovered with resuscitation and only 0.18% had an Apgar score below this value at 5 minutes. Presence of light and moderate meconium in liquor did not appear to affect the Apgar scores adversely at 1 and 5 minutes after birth.

Table 3 depicts the admission rate to neonatal intensive care unit (NICU) in babies below and above 2500 gms. The admissions to NICU in the TMS group (22.22%) were significantly higher ($p<0.01$) than in all the other meconium groups, irrespective of the birth weight. The admissions to NICU in the LMS and MMS categories were comparable to the control group in both the categories of the birth weights analysed.

The cesarean section rate for women in TMS group was 33.33% which is significantly higher ($p<0.01$) than 17.13% in the clear liquor group. The rates of abdominal deliveries in the LMS and MMS groups (20.51% and 25.58% respectively) were not significantly different from the clear liquor group (17.8%). The rates of instrumental vaginal delivery for fetal distress were comparable in the

Table 1. FHR Patterns in Different Degrees of Meconium Stained Liquor

Liquor description	Clear (n=1167)	LMS (n=39)	MMS (n=43)	TMS (n=18)
CTG pattern n (%)				
Normal	875 (74.97%)	25 (64.1%)	28 (65.11%)	10 (55.55%)
Suspicious	163 (13.96%)	10 (25.64%)	10 (23.25%)	5 (27.77%)
Abnormal	129 (11.05%)	4 (10.25%)	5 (11.62%)	3 (16.66%)

Table 2. APGAR Scores at 1 and 5 Minutes and Degree of Meconium Staining

Liquor description	Clear (n=1167)	LMS (n=39)	MMS (n=43)	TMS (n=18)
Apgar score				
% <7 at 1 min	63 (5.3%)	2 (5.12%)	5 (11.62%)	9 (50%)
% <7 at 5 min	13 (1.1%)	0	0	1 (0.18%)

Table 3. Admission to NICU

Liquor description	Clear (n=1167)	LMS (n=39)	MMS (n=43)	TMS (n=18)
Admission to NICU (%)				
Birth weight >2500 gms	34 (2.9%)	1 (2.56%)	1 (2.32%)	2 (11.11%)
Birth weight <2500 gms	54 (4.62%)	1 (2.56%)	2 (4.65%)	2 (11.11%)

Table 4. Mode of Delivery and Meconium Staining of Liquor

Liquor description	Clear (n=1167)	LMS (n=39)	MMS (n=43)	TMS (n=18)
Mode of delivery (%)				
Instrumental vaginal delivery				
Total	208 (17.8%)	8 (20.51%)	11 (25.58%)	5 (27.7%)
For fetal distress	50 (4.28%)	1 (2.56%)	2 (4.65%)	20 (11.11%)
LSCS				
Total	200 (17.13%)	7 (17.94%)	8 (18.60%)	6 (33.33%)
For fetal distress	43 (3.68%)	1 (2.56%)	2 (4.65%)	2 (11.1%)

clear liquor, LMS and MMS groups while it was insignificantly higher in the TMS group.

Discussion

The only fresh stillbirth in the study was from the TMS category and had a birth weight of 1900 gms.

The National Institute of Clinical Excellence, UK has categorized the fetal heart rate tracings as normal, suspicious and abnormal (6). A significantly increased incidence of abnormal and suspicious FHR tracings in meconium stained groups is evident from the present study in comparison to the clear liquor group. However, the incidence of abnormal CTG tracings was higher in the TMS group. Similarly, a low 1 minute Apgar score and admissions to neonatal intensive care were higher in the TMS group. The perinatal outcome and the instrumental vaginal delivery rates were similar in the LMS, MMS and clear liquor groups, thus suggesting that passage of thick meconium may represent fetal compromise in utero and that passage of light and moderate meconium does not suggest an increased risk of intrauterine fetal compromise over and above that in cases with clear liquor. A similar association of thick meconium with fetal asphyxia was suggested by Low *et al*.(3) Miller reported that the presence of meconium in the absence of abnormalities of the fetal heart rate was not suggestive of fetal compromise and does not require any intervention (7). The results of the present study indicate that the management of patients with meconium staining of the amniotic fluid should include cardiotocographic monitoring, fetal scalp blood sampling in indicated cases and optimal care after delivery in order to prevent severe asphyxia and meconium aspiration.

The exact reason of passage of meconium in liquor is poorly understood. It could reflect a state of compensated fetal distress as is suggested by the few babies who are actually acidotic during labour (5). 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 (8). Such repetitive bouts can be avoided by careful fetal monitoring, active management of labour and optimal care after birth. This would help avoid unnecessary cesarean sections in all cases of meconium stained liquor in the absence of a definite indication.

Conclusion

Thick meconium staining is associated with higher cesarean section rate, low APGAR score at one minute and more admissions to the neonatal intensive care unit.All women with meconium staining of liquor should be cardiotocographically monitored in labour and managed by optimal timely intervention in order to avoid severe asphyxia and meconium aspiration

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