

Original Research Article

Study of fetal and neonatal outcome in meconium stained amniotic fluid in low risk parturient

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Abstract: The purpose of the study was to know the fetal heart rate pattern, timing and mode of delivery in meconium stained amniotic fluid and to study the fetal and early neonatal outcome in meconium stained amniotic fluid. In this hospital based observational study, after applying exclusion and inclusion criteria; women were divided into two groups, study and control group. Study group consist of women with thin and thick meconium respectively and control group with clear liquor. 88% cases of thick meconium liquor had suspicious CTG findings all of them required caesarean section and rest delivered vaginally. 75% cases of thick meconium had APGAR scores <7/10 at one minute which improved at five minute after resuscitative measures. Birth asphyxia, meconium below vocal cords, meconium aspiration syndrome was seen in 16.67% cases with thick meconium and there were 5.5% cases of neonatal mortality in thick meconium cases. Both mode of delivery and fetal outcome were affected by the presence of thick meconium stained liquor as compared to clear and thin meconium. Thick MSAF in presence of low APGAR score is directly responsible for high neonatal morbidity and mortality.

Keywords: CTG, Meconium stained aspiration syndrome, APGAR score

INTRODUCTION

Meconium is the name given to substances which have accumulated in the fetal bowel during intrauterine life. The components of meconium include water (72-80%), desquamated cells from the intestine and skin, gastro-intestinal mucus, lanugo hair, material from vernix caseosa, amniotic fluid, intestinal secretions, blood group specific glycoproteins, and bile & drug metabolites [1]. Meconium is a green viscous fluid that first appears in fetal ileum from 10 weeks gestation [2]. Meconium stained amniotic fluid rarely occurs before 34 weeks gestation [3]. After 34 weeks incidence of meconium passage increases with gestational age and reaches approximately 30% at 40 week and 50% at 42 week.

Although 69% of new-borns pass meconium by 12 hours of age, many infants pass meconium prior to birth as well [4]. Presence of meconium stained amniotic fluid is seen in 12-16% of deliveries [5].

Although the exact cause is not known, meconium is thought to be passed from the fetal gastro-intestinal tract as a response to hypoxia, mesenteric vasoconstriction induced gut hyper peristalsis, falling umbilical venous saturation, vagal stimulation and normal physiological function of a mature fetus [6, 7]. When meconium is passed, the oxygen saturation in umbilical vein is at or below 30%. It has been proposed that anoxia weakens the action of rectal sphincters, leading to passage of meconium. So if meconium stained liquor is found, then continuous fetal heart rate monitoring Cardiotocography (CTG) is to be done for fetal well-being [8-10]. The passage of meconium in the absence of any changes in the foetal heart rate is clearly not a sign of foetal distress [11, 12]. Generally thick meconium is associated with poor perinatal outcomes.

METHODS

This hospital based observational study was conducted in Department of Obstetrics & Gynaecology,

SMS Medical College, and Jaipur. This study included singleton pregnancies admitted in the labour room with gestational period of >37 weeks with no risk factors with cephalic presentation in active phase of labour with spontaneous or artificial rupture of membranes. Any high risk factor as pre-eclampsia, diabetes or post maturity, known fetal congenital anomalies was excluded.

After applying inclusion and exclusion criteria women were divided into two groups: Study Group and Control Group

Study Group consists of Group-A & B.

Group-A: consist of 36 women in labour with thin meconium stained liquor (light yellow or light green staining of amniotic fluid) [13, 14].

Group-B: consist of 36 women in labour with thick meconium stained liquor (thick green meconium with particulate matter in amniotic fluid/pea soup consistency).

Group-C: consist of 36 women in labour with clear liquor (Control group).

Those with presence of meconium after spontaneous/artificial rupture of membranes were

monitored by CTG for 20 minutes. Fetal heart rate monitoring was done according to NICE (National Institute for Health and Care Excellence) guidelines. General measures like oxygen inhalation, left lateral position, intravenous fluid and decreasing or discontinuing oxytocin. Labour was monitored by using routine partograph.

OUTCOME MEASURES-

Mode of delivery was decided considering obstetric conditions. . Continuous fetal monitoring was done. If CTG showed fetal heart abnormalities, intervention was done. Neonatal details were recorded - sex, birth weight, APGAR score of the baby at 1 and 5 minutes.

Baby was evaluated for presence or absence of meconium aspiration, confirmed by presence of meconium below the vocal cords on laryngoscopic examination and endotracheal suction. The baby was admitted to NICU, if necessary and monitored for respiratory distress, development of MAS, birth asphyxia or other complications and managed accordingly.

RESULTS

Table 1: Distribution of Cases According to CTG Findings

CTG Findings	Study Group				Control Group (Group-C)	
	(Group-A) {Thin Meconium}		(Group-B) {Thick Meconium}		No.	%
	No.	%	No.	%		
Normal	35	97.00	22	61.12	36	100.00
Suspicious	1	3.00	14	38.88	0	0.00
Pathological	0	0.00	0	0.00	0	0.00
Total	36	100.00	36	100.00	36	100.00

Group-A & B: Fisher Test, p = 0.003227 Sig,

The above table shows that, 38.8% cases of thick meconium, 3% cases of thin meconium had suspicious CTG findings while with clear liquor all had

normal CTG. p-value between Group-A and B is <0.005 which is significant showing significant fetal heart abnormalities in thick meconium.

Table 2: Mean Time Interval between Meconium Detection and Time of Delivery

	N	Mean (hrs)	Standard Deviation
Thin (Group-A)	36	1.0398	0.67214
Thick (Group-B)	36	0.9259	0.47174
Control (Group-C)	36	2.3333	1.58919

ANNOVA Test Applied: F = 20.62, D.F. = 2.105 , p < 0.05 Sig, Difference between Different Groups

Group-A & C : p < 0.05 Sig

Group-B & C : p < 0.05 Sig

Group-A & B : p > 0.05 NS

P-value between thin and control group, as well as for thick and control group is < 0.05 which is significant, which showed expedition of delivery is

done to avoid neonatal complications in MSAF. Whereas p-value between thin MSAF and thick MSAF is >.05 which is non-significant.

Table 3: Distribution of Cases According to Mode of Delivery

Mode of Delivery	Study Group				Control Group (Group-C)	
	(Group-A) {Thin Meconium}		(Group-B) {Thick Meconium}		No.	%
	No.	%	No.	%		
Vaginal	31	86.11	18	50.00	33	91.67
Assisted (Forceps)	4	11.11	4	11.11	0	0.00
LSCS	1	2.78	14	38.89	3	8.33
Total	36	100.00	36	100.00	36	100.00

For calculation of p-value assisted and LSCS groups are merged

Group-A & C : Fisher exact test p = 0.2391 NS

Group-B & C : $\chi^2 = 15.13$ d.f. = 1 p < 0.05 Sig

Group-A & B : $\chi^2 = 9$ d.f. = 1 p < 0.002 Sig

P-value between thin and control group is 0.2391 which is non-significant and between thick and control group is p < 0.05 which is significant, showing more operative deliveries in Group-B.

P-value between thin and thick MSAF group is 0.002 which is significant showing more operative deliveries in thick MSAF group.

Table 4: Distribution of Cases According to APGAR at 1 Minute

APGAR at 1 Minute	Study Group				Control Group (Group-C)	
	(Group-A) {Thin Meconium}		(Group-B) {Thick Meconium}		No.	%
	No.	%	No.	%		
<4	0	0.00	1	2.80	0	0.00
4 – 6	14	38.88	26	72.20	2	5.55
≥ 7	22	61.12	9	25.00	34	94.44
Total	36	100.00	36	100.00	36	100.00

Merged <4 and 4-6 for comparison

$\chi^2 = 37.28$ d.f. = 2 p < 0.05 Sig

Group-A & C : $\chi^2 = 11.57$ d.f. = 1 p < 0.05 Sig

Group-B & C : $\chi^2 = 36.09$ d.f. = 1 p < 0.05 Sig

Group-A & B : $\chi^2 = 9.574$ d.f. = 1 p < 0.05 Sig

Apgar score at 1 minute showed significant difference in the entire three groups.

Table 5: Distribution of Cases According to APGAR at 5 Minutes

APGAR at 5 Minutes	Study Group				Control Group (Group-C)	
	(Group-A) {Thin Meconium}		(Group-B) {Thick Meconium}		No.	%
	No.	%	No.	%		
<4	0	0.00	1	2.80	0	0.00
4 – 6	2	5.55	4	11.10	2	5.55
≥ 7	34	94.45	31	86.10	34	94.45
Total	36	100.00	36	100.00	36	100.00

Merged <4 and 4-6 for comparison

Group-A & C : $\chi^2 = 0$ d.f. = 1 p = 1 NS

Group-B & C : $\chi^2 = 2.25$ d.f. = 1 p = 0.1337 NS

Group-A & B : $\chi^2 = 2.25$ d.f. = 1 p = 0.1337 NS

On the contrary apgar score at 5 minutes did not showed any significant difference.

Table 6: Distribution of Cases According to Neonatal Morbidity

Neonatal Morbidity	Study Group				Control Group (Group-C)	
	(Group-A) {Thin Meconium}		(Group-B) {Thick Meconium}			
	No.	%	No.	%	No.	%
Birth Asphyxia (Mild / Moderate / Severe)	1 (Mild)	2.70	6 1 (Severe) 1 (Moderate) 4 (Mild)	16.60	1 (Mild)	2.70
Hypoxic Ischaemic Encephalopathy	0	0.00	1	2.70	0	0.00
Meconium Aspiration Syndrome	0	0.00	6	16.60	0	0.00
Meconium Aspiration Below Vocal Cords	0	0.00	6	16.60	0	0.00
Endotracheal Intubation	0	0.00	4	11.10	0	0.00
Septicemia	0	0.00	1	2.70	0	0.00
NICU Admission	1	2.70	6	16.60	1	2.70
Perinatal Death	0	0.00	2	5.50	0	0.00

For birth asphyxia and NICU admission p-value, Fischer test

Group-A & C : No difference

Group-B & C : <0.05 Sig

Group-A & B : <0.05 Sig

Meconium aspiration syndrome was seen in 6cases (16.6%) of thick meconium while none in thin meconium and control group. There were 2 perinatal deaths in thick meconium while none in thin and control group

DISCUSSION

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. The detection of meconium stained liquor (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. MSAF alone is not an indication for caesarean section; however MSAF needs strict supervision during labour for better perinatal outcome. Presence of meconium in absence of fetal heart abnormalities is not suggestive of fetal compromise and does not require any intervention.

Our study showed suspicious CTG findings in thick meconium cases (38.88%) while CTG was normal in control and 3% thin meconium cases had suspicious findings. (p=0.003227).A similar significant result was also reported in studies of Soni *et al.*; [15] and Gupta SN *et al.*; [14]. There were more operative delivery in

thick meconium cases when compared to thin meconium and control group.(p-value between A and C-.2391,B and C-<0.05, A and B<0.002.A similar significant result was also reported in studies of Patil KP *et al.*; [16] and Rokade *et al.*:[17]. Our study showed significant difference for apgar scores at 1 minute in study and control group showing babies with thick meconium were at highest risk (p<0.05).on the contrary apgar score at 5 minute did not show any significant difference.(p>0.05). A similar significant result was also reported in studies of Gupta SN *et al.*; [14] and Jeena S *et al.*; [18].

Birth asphyxia was present in 6(16.6%) in thick meconium, 1(2.7. %) each in thin meconium and clear liquor (p<0.05). Meconium below vocal cords and meconium aspiration syndrome was present in 6(16.6%) of thick meconium and none in thin meconium and control group. There were 2 (5.5%) neonatal mortality in thick meconium and none in thin meconium and control group. A similar significant result was also reported in studies of Duhan N *et al.*; [19] and Mundhra R *et al.*; [20].

CONCLUSION

Both mode of delivery and fetal outcome were affected by the presence of thick meconium stained

liquor as compared to clear and thin MSL. So presence of thick meconium should be monitored closely and additional monitoring facilities such as CTG if available could guide the obstetrician to decide the mode of delivery and any other necessary intervention on time. Thick MSAF in presence of low APGAR score is directly responsible for high neonatal morbidity and mortality.

REFERENCES

1. Cloherty JP, Eichenwald EC, Hansen AR, Stark AR. Manual of Neonatal Care. Seventh Edition, Lippincott Williams & Wilkins, Chapter-35, Meconium Aspiration, 2012: 429-434.
2. Smith CA, Nelson NM. The Physiology of the Newborn Infant, 4th ed. Springfield, IL: Charles C Thomas; 1976: 69-72.
3. Steer PJ, Eligbe F, Lissaure TJ, Bread RW. Interrelationship among abnormal Cardiotocography in labour, Meconium staining of amniotic fluid, Arterial cord blood pH and Apgar score. *Obstet Gynaecol*, 1989; 74 : 715-21
4. Wood CL. Meconium stained amniotic fluid. *J Nurse Midwifery*. 1994, Mar-Apr; 39(2 Suppl) : 106S-109S
5. Maymon E, Chaim W, Furman B, Ghezzi F, Vardi IS, Mazor M. Meconium stained amniotic fluid in very low risk pregnancies at term gestation. *European Journal of Obstetrics & Gynecology and Reproductive Biology*. 1998 Oct 1; 80(2):169-73.
6. Walker J. Fetal distress. *Am J Obstet Gynecol*, 1959; 77: 94-98.
7. Fenton AN, Steer CM. Fetal distress. *Am J Obstet Gynecol*, 1962; 83: 354-59.
8. Xu H, Mas-Calvet M, Wei SQ, Luo ZC, Fraser WD. Abnormal fetal heart rate tracing patterns in patients with thick meconium staining of the amniotic fluid: association with perinatal outcomes. *American journal of obstetrics and gynecology*. 2009 Mar 31; 200(3):283-e1.
9. Gee H. Routine intrapartum care: an overview. In: Luesley DM, Baker PN. *Obstetrics and gynecology: an evidence based text for MRCOG*, 2nd edition. Hodder Arnold, 2010: 287-95.
10. NICE. Intra-partum care. Clinical Guideline 190. London: National Institute for Health and Clinical Excellence, 2014.
11. Paz Y, Solt I, Zimmer EZ. Variables associated with meconium aspiration syndrome in labors with thick meconium. *European Journal of Obstetrics & Gynecology and Reproductive Biology*. 2001 Jan 31; 94(1):27-30.
12. Bhutta ZA, Jalil S. Meconium aspiration syndrome: the role of resuscitation and tracheal suction in prevention. *Asia-Oceania Journal of Obstetrics and Gynaecology*. 1992 Mar 1; 18(1):13-7.
13. Naveen S, Kumar SV, Ritu S, Kushia P. Predictors of meconium stained amniotic fluid: a possible strategy to reduce neonatal morbidity and mortality. *J Obstet Gynecol India*. 2006 Nov; 56(6):514-7.
14. Kumar S, Gupta SN, Mahato IP, Giri R, Yadav A, Thakur A, Thapa K. Maternal and fetal outcome in term labour with meconium stained amniotic fluid. *Health Renaissance*. 2012 Dec 4; 10(3):198-202.
15. Soni A, Vaishnav J, Vaishnav G, Kumar RN, Gohil J. Neonatal outcome in cases of meconium stained amniotic fluid. *Int J Res Med*, 2014; 3(2) : 45-48
16. Patil KP, Swamy MK, Samatha K. A one year cross sectional study of management practices of meconium stained amniotic fluid and perinatal outcome. *J Obstet Gynecol India*, March/April 2006; 56(2) : 128-130
17. Rokade J, Mule V, Solanke G. To study the perinatal outcome in meconium stained amniotic fluid. *International Journal of Scientific and Research Publications*, 2016 July; 6(7): 41-43.
18. Jeena S. Perinatal Outcomes Associated With Meconium Stained Non Vigorous Babies In A Tertiary Centre Of Uttarakhand (India). *Journal of Biomedical and Pharmaceutical Research*. 2014 Feb 28; 3(1).
19. Duhan N, Paul A, Duhan U. Meconium Staining of Amniotic Fluid-A Poor Indicator of Fetal Compromise.
20. Mundhra R, Agarwal M. Fetal Outcome in Meconium Stained Deliveries. *Journal of Clinical and Diagnostic Research*, 2013 Dec; 7(12): 2874-2876