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A Study to Find Relation between Meconium Staining and Fetal Heart Rate Variability

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Abstract

Introduction: The infants with meconium aspiration usually have trachypnea, frequently upto 100 beats / minutes which may last for few days to weeks and sometimes persist even after complete recovery. Cyanosis is obvious in the most severely affected infants. Chest retraction is not a prominent sign, marked over distension of chest as a result of air trapping seen frequently. *Methodology:* The Apgar score at one minute and five minutes are noted down. The lungs were examined for aspiration syndrome and signs were noted down. The presence or absence of respiratory grunt, tachypnoea was also noted. The weight of the baby was also noted. If the baby is active just thorough oropharyngeal suction done, stomach wash was given and were placed with mother. Apgar score >7 were considered as good *Results:* NST pattern was non-reactive in 55.5% especially in thick meconium accounting for 66.4% than compared to thin meconium 37.34% and also accounting for increased incidence in operative interventions. Fetal heart rate- <120bpm there were 12 cases, 120-160bpm there were 183 cases, >160 there were5 cases. *Conclusion:* Low Apgar scores were observed in thick meconium than in thin meconium.

Keywords: Meconium; Apgar Scores; Fetal Heart Rate.

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Introduction

As meconium stained liquor was thought to be an imminent sign of fetal distress. Many workers have done work on the problem.

Meconium, the first gastrointestinal excretion by the fetus was named by Aristotle who derived it from Greek word like 'opium', he believed that it was this substance that kept the baby sleeping in the mother's womb.

Lucas et al [1] (1989) suggested that levels of 'Motilin' an intestinal harmone responsible for bowel peristalsis and defecation are lower in premature infants and higher in infants who have passed meconium, it has been shown that infants with fetal distress had a four-fold elevation of cord plasma motilin than normal. There is also evidence that motilin decreases small intestinal transit time in man. The very high motilin levels seen in infants with fetal distress, is therefore expected to deliver rapidly, the contents of the small intestine into the large intestine. Thus, motilin may play a part in the abnormal gut motility leading to passage of meconium seen in prenatal asphyxia.

Katz and Bowers [2] (1992) concluded from their review that etiology of MAS is primary chronic fetal asphyxia rather than simply damage from meconium. They postulated that chronic antipartum asphyxia causes pathophysiologic changes leading to pulmonary vascular damage, pulmonary hypertension and persistent fetal circulation. Affected newborns are unable to clear aspirated meconium.

Hellman [3] (1958) oncluded that the passage of meconium carries greatest risk for fetal survival and it was most serious when associated with FHR alterations and he

divided it into two groups "Olive green variety" and "dark sea green lumpy variety". Later group was associated with high perinatal mortality. Former group associated with very few complications.

Leonard et al [4] in 1961 reported incidence of meconium stained amniotic fluid 4.3%, umbilical cord abnormalities were found in 26%, toxemia of pregnancy was found in 40%, the histology of meconium aspiration syndrome was unrecognized in 58% of the cases. Thick meconium stained amniotic fluid was the most significant since 42% of the newborns with this type required resuscitation and 4 perinatal deaths. The perinatal mortality was 9.5% in thick meconium stained liquor.

Miller et al [5] in 1975 reported that presence of meconium in the AF without signs of fetal asphyxia (late decelerations and acidosis) is not a sign of fetal distress and need not be an indication for active intervention. The combination of fetal asphyxia and meconium staining of the amniotic fluid however does enhance the potential for meconium aspiration and a poor neonatal outcome.

Vinaya Pendse [6] 1981, the aim of this study was to find out the incidence of meconium stained amniotic fluid and its correlation with various other significant obstetrical condition and fetal outcome. Incidence was 3.4%. Cases were divided into three groups.

The infants with meconium aspiration usually have trachypnea, frequently upto 100 beats / minutes which may last for few days to weeks and sometimes persist even after complete recovery. Cyanosis is obvious in the most severely affected infants. Chest retraction is not a prominent sign, marked over distension of chest as a result of air trapping seen frequently.

In severe cases paleness may be seen caused by vasoconstrictive effect of hypoxia on peripheral vessels.

Methodology

A careful history is taken from all cases particularly about age, parity, gravidity and duration of labour.

Previous obstetric history

Previous obstetric complications

A detailed clinical examination and appropriate investigations.

A prospective study of 200 cases of meconium stained amniotic fluid was studied at Teaching Hospital.

During study cases were selected with pregnant women at term gestation with cephalic presentation with meconium stained amniotic fluid, keeping in mind the inclusion and exclusion criteria

- *Clinical examination*

History Taking

Age of the patient

Parity

History of previous pregnancies

Nature of delivery

Past history and personal history.

Post natal or post operative events.

General Examination

General condition, temperature, pulse rate, blood pressure were recorded, jaundice, anemia and edema and built of the patient is noted .

Systemic Examination

The cardiovascular system is examined for the presence of murmurs Lungs were carefully auscultated to rule out clinical abnormalities.

- *Obstetric Examination*

Abdominal Examination

The height of the uterus, presentation, girth of abdomen, the position and lie of fetus are noted down. The fetal heart is auscultated carefully with Doppler. Uterine action is also noted down.

Pelvic Examination

The position of cervix, dilatation, the presence or absence of membranes, the level of the presenting part, type of pelvis are noted down. If membranes are absent the type of liquor, whether it is thin meconium or thick meconium is noted down. If uterine action is good and cervical dilatation 4 centimeter, membranes were ruptured artificially and the colour of liquor is noted down. Amniotic fluid greenish yellow – thin; dark green/ tarry black – thick were grouped.

- *Investigations*

a. Complete hemogram.

b. Urine – Albumin, sugar and microscopy.

c. Blood grouping and Rh-typing.

d. HIV,HBSAG- after taking informed consent.

e. RFT, LFT if required.

f. USG if required.

g. CTG.

Newborn: The Apgar score at one minute and five minutes are noted down. . The lungs were examined for aspiration syndrome and signs were noted down. The presence or absence of respiratory grunt,tachypnoea was also noted. The weight of the baby was also noted. If the baby is active just thorough oropharyngeal suction done,stomach wash was given and were placed with mother. Apgar score >7 were considered as good.

If the baby did not cry spontaneously at birth, resuscitative measures like oxygen inhalation, or endotracheal intubation, ambubagging and aspiration of stomach contents were carried out.

Number of days in NICU were noted between 1-3, 4-6 and more than 7 days and interventions like intubation, requirement for ventilation was noted.

Procedure

Prospective study

Sample size – 200

Apgar Scoring Chart

Sign	0	1	2
Heart rate	Absent	Below 100	Above 110
Respiratory effort	Absent	Slow irregular	Good crying
Muscle tone	Flaccid	Some flexion	Active motion
Reflex irritability	No response	Weak cry	Vigorous cry
Colour	Blue, pale	Body pink, extremities blue	Completely pink

Results

Table 1: Relationship of Weeks of Gestation to Meconium Stained Amniotic Fluid

Gestational Age (weeks)	MSAF	
	No.	Percentage
37 – 38 weeks	65	32.50
39 – 40 weeks	119	59.50
41 – 42 weeks	16	8.00
	200	100.00

Table 2: NST pattern in different groups

NST	Thin		Thick		Total	
	No.	%	No.	%	No	%
Reactive	47	62.66	42	33.60	89	44.5
Non-reactive	28	37.34	83	66.40	111	55.5
	75	100.00	125	100.00	200	100.00

Table 3: Apgar Score at 1 Minute

Apgar score	Thin	Percent	Thick	Percent
0 – 3	7	9.33	21	16.80
4 – 6	47	62.67	71	56.80
7 – 10	21	28.00	33	26.40
Total	**75**	**100.00**	**125**	**100.00**

$\chi^2 = 91.008$ $p<0.001$ Highly significant

Table 4: Apgar Score at 5 Minute

Apgar score	Thin	Percent	Thick	Percent
0 – 3	0	0.00	1	0.80
4 – 6	8	10.67	29	23.20
7 – 10	67	89.33	95	76.00

$\chi^2 = 5.41$ $p<0.05$ Significant

Table 5: Non-reactive NST in meconium stained amniotic fluid group

Meconium	Rosario[7]	Present study
Thin	4.00%	37.36%
Thick	54.00%	66.44%

Table 6: Comparison of Apgar at 1 minute

Apgar Score	Miller et al[8]	Present study
0 – 3	14.10%	14.00%
4 – 6	11.30%	59.00%
7 – 10	74.00%	27.00%

Table 7: Comparison of Apgar at 5 minute

Apgar Score	Miller et al	Present study
0 – 3	0.9%	0.50%
4 – 6	10.4%	18.50%
7 – 10	88.7%	81.00%

Meconium stained amniotic fluid is more common in between 39-40 weeks of gestation.Mean gestation age is 39.12weeks in present study.

NST pattern was non-reactive in 55.5% especially in thick meconium accounting for 66.4% than compared to thin meconium 37.34% and also accounting for increased incidence in operative interventions. Fetal heart rate- <120bpm there were 12 cases, 120-160bpm there were 183 cases ,>160 there were5 cases. Significant decceleration -44 Cases and decreased beat to beat variability -68 cases.

The incidence of Apgar score between 7-10 for thin and thick meconium was 28.0% and 26.0% respectively. The incidence of Apgar score in thin and thick meconium between 4-6 is 62.67% and 56.8% respectively and between 0-3 is 9.33% and 16.80% respectively. Low Apgar scores were observed in thick meconium than in thin meconium.

Apgar score at 5 minute is mostly 7-10 in thin meconium i.e., 67 (89.33%) thick meconium 95 (76.00%). Apgar score between 4-6 in thin meconium was seen in 10.61%, in thick it was 23.2%. Apgar score between 0-3, there was no baby in thin meconium whereas in thick meconium 1 case i.e. 0.80%.

Discussion

Mean gestational age was 39.12 weeks in the present study, which was comparable with the study conducted by Miller having mean gestation age of 39.82 weeks. Rosario in his study found mean gestational age of 39.62 weeks and Krebs found mean gestational age of 40.04 weeks indicating gestational age progresses towards post-datism incidence of meconium staining is high.

Overall increased percentage of non-reactive NST has been noted because of delayed referral cases to our institute as ours is a referral unit from many PHC, CHC and taluka hospitals and referred here for LSCS, hence increased in incidence of LSCS. Early detection of fetal distress with NST availability helped in reducing perinatal morbidity.

At 1 minutes Apgar score were good in thin meconium compared to thick meconium.

Lower Apgar score were seen more thick meconium stained liquor, indicating adverse fetal outcome. There was improvement in Apgar score at 5 minutes.

Conclusion

NST pattern of non-reactive were more in case of thick meconium as compared to non-reactive in case of thin meconium

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