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Study of Neonatal Outcome in Neonates Born with Meconium Stained Amniotic Fluid at A Tertiary Hospital

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ABSTRACT
Meconium staining of liquor amnii is a commonly observed phenomenon in day-to-day practice of obstetrics and its significance as a sign of fetal distress is controversial. This study is an effort to ascertain whether meconium staining of liquor parse with no other high risk factors, predisposes to fetal distress in labor. Present study hospital based, prospective, observational study, conducted in women in labour with meconium staining of amniotic fluid singleton pregnancy with cephalic presentation. After delivery fetal well-being was assessed. Among the 200 cases of meconium staining of amniotic fluid, thin meconium constituted to 35% of the cases and thick meconium in 65% of cases. 64% of the cases had an abnormal CTG in the thin meconium group. 80% of the thick meconium group had abnormal cardio- tocography, of which 52.3% had late decelerations. 51% of the cases admitted to our hospital were delivered vaginally whereas, 42% were taken for caesarean section. 64.3% of the cases among thin meconium group underwent caesarean section, whereas, in thick meconium group, this constitutes about 77.1%. 4% of the cases in the thin meconium group had an Apgar score of <6 at 5 minutes. In the thick group 14% had an Apgar score of <6 at 5 minutes. Meconium aspiration syndrome was observed in one of the 70 cases in the thin meconium group, where as it has been observed in 12% of the cases in the thick meconium group. 1% of the total deliveries complicated with meconium aspiration syndrome. Meconium stained amniotic fluid was found in 13.2% of all deliveries. Meconium aspiration syndrome was more common in cases with thick meconium stained liquor group. Neonatal mortality rate was more in thick meconium group.

INTRODUCTION

The major goal of neonatal care is to prevent fetal morbidity and mortality, to reduce the fetal morbidity and mortality early identification of markers of fetal distress is important. The classical signs or markers of fetal hypoxia are loss of, or decreased fetal movements, variations in fetal heart rate pattern, presence of meconium in amniotic fluid, presence of fetal molding and decrease in fetal scalp blood pH[1,2]. Meconium staining of liquor amnii is a commonly observed phenomenon in day-to-day practice of obstetrics and its significance as a sign of fetal distress is controversial. At the other end of spectrum, meconium passage is a normal physiological event in a term fetus and is not a sign of fetal distress in the absence of fetal heart rate abnormalities[1,2]. But can become an environmental hazard when fetal acidemia supervenes[3]. Whatever the cause of meconium passage, any asphyxial event in a fetus with meconium stained fluid might result in gasping in utero, aspiration of meconium and its complications.

Since all fetuses with meconium passage in labor do not have adverse outcome, it is important to distinguish those who are destined to develop fetal distress promptly and intervene accordingly to prevent meconium aspiration syndrome. As found by some authors, a large proportion of women with meconium stained amniotic fluid have risk factors simultaneously like pre-eclampsia, diabetes (or) post maturity[4,5,6]. This study is an effort to ascertain whether meconium staining of liquor parse with no other high risk factors, predisposes to fetal distress in labor.

MATERIALS AND METHODS

Present study hospital based, prospective, observational study, conducted in department of paediatrics, SNR District Hospital, Kolar, India. Study period was from January 2022-December 2023. Study approval was obtained from institutional ethical committee.

Inclusion Criteria:

- Women in labour with meconium staining of amniotic fluid singleton pregnancy with cephalic presentation., willing to participate in present study.

Exclusion Criteria:

- Women in labour with clear liquor
- Pregnancies with Malpresentations, Congenital anomalies, Multiple pregnancies.

All cases were divided into two groups based on the consistency of meconium in amniotic fluid.

Group I: All women in labour with thin meconium stained amniotic fluid.

Group II: All women in labour with Particulate meconium at spontaneous or artificial rupture of membranes.

Patients were carefully examined for any antepartum or intrapartum risk factors and were clinically monitored during labour. Depending upon type of meconium, fetal heart rate variations, stage of labour, time and mode of delivery was decided. After delivery the condition of cord and placenta was noted. Fetal well-being was assessed by Apgar score at one minute and five minutes and resuscitation was given if required. Babies were carefully followed up in perinatal period to note any morbid condition.

Data entered in Microsoft excel and analyzed using SPSS software version 21. Categorical variables were presented by numbers and percentages

RESULTS AND DISCUSSIONS

Total number of deliveries during the study period were 1511. of which 200 cases had meconium staining of amniotic fluid, which constituted to 13.2% of total deliveries. 4.6% of deliveries had thin meconium staining and 8.6% had thick meconium staining. Among the cases of meconium staining of amniotic fluid, thin meconium constituted to 35% of the cases and thick meconium in 65% of cases.

Both the groups were comparable in distribution with parity. 70% of the thin meconium group were booked, whereas only 55% of the thick meconium group were booked. 86% of the cases had spontaneous labor in the thin meconium group, where as in thick meconium group it was 95%.

64% of the cases had an abnormal CTG in the thin meconium group. 80% of the thick meconium group had abnormal cardio- tocography, of which 52.3% had late decelerations.

51% of the cases admitted to our hospital were delivered vaginally whereas, 42% were taken for caesarean section. 64.3% of the cases among thin meconium group underwent caesarean section, whereas, in thick meconium group, this constitutes about 77.1%.

4% of the cases in the thin meconium group had an Apgar score of <6 at 5 minutes. In the thick group 14% had an Apgar score of <6 at 5 minutes.

Meconium aspiration syndrome was observed in one of the 70 cases in the thin meconium group, where as it has been observed in 12% of the cases in the thick meconium group.

1 case in the thin group required ventilatory support, whereas 10 in the thick group were ventilated. 6 cases in the thin group required admission, whereas 24 cases in the thick group required admission without ventilatory support.

Table 1: Frequency and type of Meconium.

Liquor	Number of cases (n = 1511)	Percentage
Clear liquor	1311	86.8
Thin Meconium	70	4.6
Thick Meconium	130	8.6
Total	1511	100

Table 2: General characteristics.

	Thin (n=70)		Thick (n=130)	
	No of cases	Percentage	No of cases	Percentage
Parity				
Primi	38	54.3	66	50.8
Multi	32	45.7	64	49.2
Medical status				
Booked	49	70	72	55.4
Un booked	21	30	58	44.6
Onset of labor				
Induced	10	14.3%	7	5.38%
Spontaneous	60	85.7%	123	94.62%

Table 3: Cardio-tocography

CTG	Thin (n=70)		Thick (n=130)	
	No of cases	Percentage	No of cases	Percentage
Reactive	25	35.7	26	20
Early Decelerations	30	42.8	22	16.9
Late Decelerations	10	14.2	68	52.3
Variable Decelerations	4	5.7	8	6.2
Tachycardia	1	1.4	2	1.5
Bradycardia	0	0	4	3.1

Table 4: Mode of delivery.

Mode of delivery	Thin (n=70)		Thick (n=130)	
	No of cases	Percentage	No of cases	Percentage
Normal vaginal delivery	21	30 %	23	17.7%
Vacuum	1	1.4%	6	4.6%
Forceps	3	4.3%	2	1.5%
LSCS	45	64.3%	99	77.1%

Table 5: Meconium and 5 minute Apgar score.

Apgar score	Thin	Percentage	Thick	Percentage
< 6	3	4.3	17	13.7
> 6	67	95.7	113	86.9

Table 6: Neonatal Morbidity.

Complications	No of cases			
	Thin	Percentage	Thick	Percentage
No complications	60	85.7	86	66.2
Respiratory distress	6	8.57	19	14.6
MAS	1	1.42	15	11.55

Table 7: NICU care

Ventilator support (VS)	NICU stay in days								
	1	2	3	4	5	6	7	>7	
VS +	Thin	0	0	0	0	0	0	0	1
	Thick	1	1	1	0	0	0	3	4
VS -	Thin	0	2	0	2	1	1	0	0
	Thick	3	4	5	3	2	1	2	4

Table 8: LSCS and APGAR score

APGAR Score	Thin	Percentage	Thick	Percentage
<6	1	2.3	12	12.1
>6	44	97.7	87	87.9

Table 9: Meconium Aspiration Syndrome among MSAF cases.

Groups	No of cases	Percentage
MSAF without MAS	184	92
MAS	16	8
Total	200	100

Table 10: MAS and NICU stay.

NICU stay in days	Group I		Group II	
	No of cases	Percentage	No of cases	Percentage
0-3	0	0	1	6.2
4-6	0	0	2	12.5
7-9	1	6.2	9	56.25
>9	0	0	3	18.75

Table 11: Mortality in MSAF cases.

Health status	Thin	Percentage	Thick	Percentage
Healthy	66	94.2	117	90
Still born	3	4.2	10	7.7
Neonatal death	1	1.4	3	2.3

Table 12: Fetal outcome.

Fetal outcome	Thin	Thick	Total	Percentage
Morbidity	7	34	41	20.5
Still born	3	10	13	6.5
Neonatal death	1	3	4	2

Table 13: Perinatal mortality among MSAF cases.

Health status	No of cases	Percentage
Healthy	1494	98.9
Perinatal death	17	1.1
Total	1511	100

Of the LSCS cases 1 case in the thin group had an Apgar score of <6 at 5 minutes, whereas 12 of the thick group had an Apgar score of <6 at 5 minutes.

1% of the total deliveries complicated with meconium aspiration syndrome. 8% of all the parturient with MSAF complicated with MAS. Most of the MAS cases required 7-9 days stay.

Perinatal mortality was 5.6% of cases in the thin meconium group, where as it was 10% in the thick meconium group. 25% of the cases complicated with MAS died during the neonatal period. Neonatal morbidity was 20.5% in our study.

The perinatal mortality rate due to meconium and its complications was 11.2 per 1000 deliveries. 1.1% neonates of the total deliveries died due to complications of meconium.

The passage of meconium in utero has been ascribed by various authors to different mechanisms. Three theories have been suggested to fetal passage of meconium

- The pathological explanation proposes that fetuses pass meconium in response to fetal hypoxia. Amjadi[7]
- In utero passage of meconium represents normal gastrointestinal tract maturation, which is under neural control. Padmapriya[8]
- Commonly, meconium passage occurs following relaxation of anal sphincter and increased peristalsis from vagal stimulation. Aina[9]

Fetuses that have passed meconium during labor are in the state of temporary compensated fetal distress with well-oxygenated vital organs and peripheral hypoxia. David[10] At this stage, the fetal blood pH will show no acidemia and Apgar score will be good if delivered within reasonable period of time. A change in the fetal scalp pH would indicate a state of decompensated fetal distress in which intervention becomes necessary. The combination of fetal asphyxia and meconium staining of amniotic fluid enhance the potential for meconium aspiration and a poor neonatal outcome. Chiruvolu[11]

Of the 1511 deliveries conducted in our hospital during this period 200 cases which fulfilled the inclusion criteria were included into our study. 70 of the 200 cases had thin meconium stained amniotic fluid and 130 cases had thick meconium stained amniotic fluid noted at the time of spontaneous or artificial rupture of membranes. In present study, incidence of meconium stained amniotic fluid was 13.2 %. Similar findings were noted by Lakshminrusimha[12] (16.6%), Zhu[13] (17.3%) and Davis[14] (14.1%).

Fetal heart rate abnormalities on electronic monitor trace were significantly more common in thick meconium group (54%) in Dereje[15] study which is comparable with the present study in which 80% of the parturients with thick meconium had fetal heart rate abnormalities. The overall increased percentage of CTG abnormalities has been noted because of delayed referral of the cases to our institution.

In present study, incidence of LSCS for meconium stained amniotic fluid was 41.6% in thin MSL and 72% in thick MSL. While in Davis[14] study, incidence of LSCS for meconium stained amniotic fluid was 4.5 % in thin MSL and 16.9% in thick MSL. In both the studies the percentage of caesarean section was more in the thick group compared to the thin group. The overall percentage of caesarean section was more in our study which may be due to delayed referral of cases.

5 minute Apgar score is >6 in both thin and thick meconium groups in Dereje[15] study (95.6% for thin MSL and 80% for thick MSL) which is comparable to the present study (95.7% for thin MSL and 86.3% for thick MSL). There a varied frequency of MAS complicating from parturients with MSAF. Our results (8%) found to be within the range Zhu[13] (17.3%) and Ranjbar[16] (17.3%).

Neonatal mortality for meconium stained amniotic fluid deliveries in our study was 6.5 % which was higher than Davis[14] study (3.42%). The fetal mortality (8.5%) and morbidity (10.23%) in our study are comparable with Davis[14] study (mortality-3.7% and morbidity-6.85%) and Tantu[17] study (mortality-6% and morbidity-32.6%).

For management of parturients with meconium stained liquor and fetal heart rate variation, Fenton and Steer[4] studied the 'Time Factor' between the

discovery of the signs of fetal distress and delivery, which is very crucial. They feel that delivery must occur within 30 minutes when true fetal distress is present. When the child could be delivered within 15 minutes of discovery of fetal distress, the perinatal mortality was 0.5% and between 15-29 minutes it was 3.65 after 30 minutes it was 11%.

In every case, the patient should be re-examined and reassessed, if fetal distress supervenes. Administration of oxygen to the mother with mask in moderate concentration improves the fetal heart rate variations. The mother is placed in left lateral position and if necessary lateral and Trendlenburg positions could be combined. This prevents, the composition of the inferior venacava by the gravid uterus. When fetal heart rate deceleration is due to cord compression, then the change in the position helps. For treatment of maternal acidosis and hypotension, 500 ml of 50% dextrose every 3 hours is adequate to correct it., ringer lactate can also be used.

Transcervical Amnioinfusion may allow spontaneous vaginal delivery and avoid the necessity of operative intervention. This inexpensive technique appears to pose little risk and warrants consideration in properly selected patients. Amnioinfusion theoretically restores normal amniotic fluid volume and cushions the umbilical cord, which reduces cord compression, allowing for the resumption of normal function as demonstrated by net efflux of aspirated meconium and amniotic fluid in the previously hypoxic or asphyxiated fetus. Mousavi[18]

CONCLUSION

Meconium stained amniotic fluid was found in 13.2% of all deliveries. Meconium aspiration syndrome was more common in cases with thick meconium stained liquor group. Neonatal mortality rate was more in thick meconium group. NICU care was required in 41(20.5%) cases. Neonatal morbidity was more in newborns with thick meconium group (26.5%. Vs 10%).

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