



Fetal and neonatal outcome of babies in meconium stained amniotic fluid and meconium aspiration syndrome

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OBJECTIVE(S) : To study the incidence of meconium aspiration syndrome (MAS) in meconium stained amniotic fluid (MSAF) and also the morbidity and mortality in newborn babies with MAS.

METHOD(S) : Two hundred and fifty pregnant women were enrolled, 179 having babies with MSAF and 71 having babies with MAS.

RESULTS : MAS developed in 28.4% cases. Need for assisted delivery was 46.37% in MSAF group and 36.62% in MAS group. Apgar score of <5 at 5 minutes was seen in 2.23% in MSAF group and 14.08% in MAS group. NICU admission was 64.23% in MSAF group as compared to 100% in MAS group. Neonatal morbidity was 25.15% in MSAF group as compared to 97.2% in MAS group. Mortality was 9.2% in MSAF group as compared to 25.3% in MAS group.

CONCLUSION(S) : Presence of meconium in amniotic fluid is a poor predictor of fetal outcome. There is increased chance of operative delivery in presence of meconium, specially if associated with abnormal fetal heart sounds.

Key words : meconium, meconium aspiration syndrome, meconium stained liquor

Introduction

Meconium stained amniotic fluid (MSAF) is present in 1-18% of all deliveries¹. Meconium aspiration syndrome (MAS) occurs in 1-3% of all cases of MSAF and in 10-30 % of neonates meconium is present below the vocal cords². MAS is defined as meconium identified below the laryngeal cords with respiratory distress requiring oxygen or ventilation and with no evidence of sepsis³. Infants born through MSAF are 100 times more likely to develop respiratory distress compared to their counterparts born through clear amniotic fluid⁴. It is the particulate meconium (moderate or thick) which is associated with MAS and poor perinatal outcome. More than 90% develop MAS in patients with thick meconium, probably meconium of greater viscosity is more likely to pass below the cords¹.

Paper received on 29/08/2004 ; accepted on 07/07/2007

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The present study was undertaken to find the incidence of MAS in cases with MSAF and to study the morbidity and mortality in newborn babies with MAS.

Methods

This study was carried out over a period of 9 months from July 1999 to March 2000. All women having full term (>37 weeks) and postterm singleton pregnancy with vertex presentation in labor with meconium stained liquor (MSL) or those in whom MSL was detected during cesarean section were enrolled as MSAF. For all the cases enrolled, detailed obstetric and medical history was taken and general, systemic and local examinations carried out. Vaginal examination was done to determine the status of the cervix, station of the head, and color and characteristics of meconium. MSL cases were managed as per our hospital practice viz., O₂ inhalation, left lateral position, discontinuation of oxytocics, cesarean section if in 1st stage of labor and forceps delivery if in 2nd stage. The investigations done were estimation of hemoglobin, blood group and blood sugar, and urine examination. All cases were followed during labor, delivery and postpartum period, and complications if any were recorded.

For the neonate apgar score at 1 minute and 5 minutes and findings at endotracheal intubation were noted and complete anthropometry was recorded. Babies were examined for congenital malformations and neonatal complications, and were managed accordingly. All MAS and MSAF cases were followed up on day 7, and at 1 and 3 months to study anthropometric measurements, respiratory infections, and other morbidity and mortality.

Results

During the study period there were 9840 deliveries including 1085 (11.03) cesarean deliveries, while MSAF developed in 250 (250/9840; 2.54%) and MAS in 71 of these 250 (28.4%). 43.02% of MSAF cases needed cesarean delivery compared to 29.58% of MAS cases. Table 1 gives demographic characteristics.

Table 1. Demographic characteristics.

Characters	Meconium stained amniotic fluid n=179		Meconium aspiration syndrome n=71	
	No.	%	No.	%
Mean age (years)	24.62	-	28.34	-
Primiparity	89	49.72	29	40.85
Gestational age				
37-40 weeks	121	67.6	46	64.79
>40 weeks	58	32.4	25	35.21
Meconium detected				
In latent phase	60	3.35	17	23.94
On delivery	57	31.8	24	33.80.

The mean age of women in MSAF group was 24.62 years and in MAS group 28.34 years. 49.72% women were primiparous in MSAF group and 40.85% in MAS group.

Table 2 shows association between risk factors. MAS was commonly associated with postdated pregnancy, premature rupture of membranes (PROM) and preeclampsia.

Meconium in liquor

Thick meconium was present in 166 (66.4%) women and thin meconium in 84 women (33.6 cases). MAS developed in 71 of the 250 (28.4%) cases. Thick meconium was present in 62 cases of MAS group and in 104 cases of MSAF group. Meconium was detected in latent phase in 3.35% in MSAF group and 23.95% in MAS group. It was detected at the time of delivery in 31.8% and 33.8% in MSAF and MAS group respectively.

Table 2. Risk Factors.

Risk factors	Meconium stained amniotic fluid n=179		Meconium aspiration syndrome n=71	
	No.	%	No.	%
Postdatism	58	32.4	25	35.21
Premature rupture of membranes	15	8.4	14	19.72
Preeclampsia	25	13.9	14	19.72
Anemia	9	5.03	6	8.45
Oligohydramnios	7	3.91	3	4.23
Intrauterine growth restriction	4	2.23	1	1.41
Rh negative blood group	8	4.47	4	5.63
Antepartum hemorrhage	2	1.12	1	1.41
Hydramnios	2	1.12	0	0
Heart disease	1	0.56	0	0
Hypothyroidism	1	0.56	0	0
Diabetes	1	0.56	0	0
Jaundice	1	0.56	0	0

Mode of Delivery

Table 3 shows labor characteristics. Forceps was applied in 3.35% cases of MSAF group as compared to 7.04% in MAS group. Incidence of lower segment cesarean section (LSCS) was 43.02% and 29.58% in MSAF and MAS group respectively. Fetal distress was present in 35 (19.55%) in MSAF and 15 (21.13%) in MAS group.

Table 3. Mode of delivery.

Delivery	MSAF (n=179)		MAS (n=71)	
	No.	%	No.	%
Vaginal	96	53.63	45	63.38
Forceps	6	3.35	5	7.04
Cesarean section	77	43.02	21	29.58

Fetal and neonatal outcome

There were 249 live births and one still birth in MSAF cases. 74.4% (186) babies required admission in the neonatal intensive care unit (NICU) due to birth asphyxia, respiratory distress and other problems. Whereas all the babies in MAS group needed admission to NICU only 64.23% in MSAF group (115/179) needed it (Table 4). Total number of perinatal deaths was 23 (9.2%) (Table 5). Neonatal mortality in MAS was 18 (25.35%), all within first 7 days. Twenty newborns

died within 7 days of their life. In majority of cases deaths were due to severe birth asphyxia and septicemia. Table 6 gives the neonatal complications and morbidity which were much higher in MAS group than those in MSAF group.

Table 4. Neonatal characteristics.

Characters	MSAF		MAS	
	No.	%	No.	%
Birth weight <2.5 Kg	55	30.73	22	30.99
Apgar at 1 minute <5	41	22.91	42	59.15
Apgar at 5 minute <5	4	2.23	10	14.08
NICU admission	115	64.23	71	100

Table 5. Causes of perinatal mortality (n=23).

Cause	MSAF n=5	MAS n=18
Birth asphyxia	1	10
Septicemia	2	8
Congestive heart failure	1	-
Cot death	1	-

Table 6. Neonatal complications and morbidity.

Complication	MSAF (N=179)		MAS (N=71)	
	No.	%	No.	%
Birth asphyxia	16	8.94	20	28.17
Jaundice	17	9.5	16	22.54
Septicemia	20	1.12	20	28.17
Convulsion	6	3.35	9	12.68
Cephalhematoma	2	1.12	2	2.82
Rh incompatibility	2	1.12	1	1.41
Congestive heart failure	0	0	1	1.41

Discussion

The presence of meconium is associated with higher incidences of abnormal labor, fetal distress, intervention in delivery and low apgar score ¹. Aspiration of meconium occurs as a result of hypoxia and hypercarbia which act synergistically to stimulate fetal gasping. Meconium is composed of swallowed amniotic fluid, fetal hair, gastrointestinal secretion and sloughed mucosal cells from the gut wall ^{4,5}.

Meconium is a nonspecific finding that may be associated with some maternal or fetal problems entirely different from

fetal hypoxia. In the study of Fujikura and Kliensky ⁶ MSAF was associated with chorioamnionitis (37.7%), Rh isoimmunization (22.4%), preeclampsia (11.1%), and fetal cardiovascular malformations (13.9%)⁶. In our study MSAF was associated with postdated pregnancy (32.4%), preeclampsia (13.9%), PROM (8.4%) and Rh isoimmunization (4.47%) while MAS was associated with postdated pregnancy (35.21%), PROM (19.72%), preeclampsia (19.72%), Rh isoimmunization (5.63%) and fetal cardiovascular malformation (1.41%).

In Gregory et al's ⁷ study, 46% of infants born through MSAF had apgar scores <6 at 1 minute and 19% had apgar scores <6 at 5 minutes. In our study apgar score was <5 at 1 minute in 22.91% MSAF cases vs 59.15% in MAS cases (Table 5). Apgar score is reported to be <5 at 5 minutes in 2.23% MSAF cases and 14.8% MAS cases ⁷.

Nathan et al ⁸ found meconium as a low risk obstetric hazard because potential mortality attributed to meconium was 1 death per 1000 live births. The passage of meconium which was generally considered a sign of acute or chronic distress may be only a physiological event, reflecting fetal colonic maturation.

Meconium passage occurs in 8-17% of all deliveries, out of which approximately 54% are complicated by thick and 46% by moderate or thin meconium ^{7,9}. In our study meconium was present in 2.54% of all deliveries. Thick meconium was present in 66.4% and thin or moderate meconium in 33.4%.

In a study by Davis et al ¹⁰, MAS was strongly associated with thick meconium and fetal heart rate abnormality. In our study, MAS developed in 28.4% cases of MSAF and it was associated with thick meconium in 87.32%. Mortality rate was 25.35% and 9.2% in MAS and MSAF cases respectively (Table 4).

Rennie and Robertson ¹¹ observed that meconium staining before labor or during the second stage of labor seems to be of little significance in absence of other signs of fetal distress such as fetal heart rate changes or acidemia. In the present study abnormal fetal heart rate was present in 19.55% in MSAF and 21.13% in MAS cases.

Conclusion

MSAF is a predictor of poor fetal outcome. Fetal heart abnormality if associated with MSAF requires careful intrapartum monitoring. Significant perinatal morbidity and mortality is observed with MSAF particularly when it is associated with abnormal fetal heart rate tracings, birth asphyxia or MAS. There is increased chance of operative

delivery in presence of meconium specially if associated with abnormal fetal heart sounds. The complications and morbidity were far higher in MAS group as compared to MSAF group.

References

1. Eriksen NL, Hostetter M, Parisi VM. Prophylactic amnioinfusion in pregnancies complicated by thick meconium. *Am J Obstet Gynecol* 1994;171:931-5.
2. Cialone PR, Sherer DM, Ryan RM et al. Amnioinfusion during labor complicated by particulate meconium-stained amniotic fluid decreases neonatal morbidity. *Am J Obstet Gynecol* 1994;170:842-8.
3. Spong CY, Oqundipe OA, Ross MG. Prophylactic amnioinfusion for meconium-stained amniotic fluid. *Am J Obstet Gynecol* 1994;171:931-5.
4. Singh M. *Care of the newborn*. 5th edn. New Delhi. Sagar Publications. 1999:271-3.
5. Rudolph AM, Hoffman JIE, Rudolph CD. *Rudolph's Pediatrics*. 20th edn. Appleton and Lange. UK. 1996:1605.
6. Fujikura T, Klionsky B. The significance of meconium staining. *Am J Obstet Gynecol* 1975;121:45-50.
7. Gregory GA, Gooding CA, Phibbs RH et al. Meconium aspiration in infants- a prospective study. *J Pediatr* 1974;85:848-52.
8. Nathan L, Leveno KJ, Carmody TJ et al. Meconium: a 1990s perspective on an old obstetric hazard. *Obstet Gynecol* 1994;83:329-32.
9. Rossi EM, Philipson EH, Williams TG et al. Meconium aspiration syndrome: intrapartum and neonatal attributes. *Am J Obstet Gynecol* 1989;161:1106-10.
10. Davis RO, Philips JB, Harris BA Jr et al. Fatal meconium aspiration syndrome occurring despite airway management considered appropriate. *Am J Obstet Gynecol* 1985;151:731-6.
11. Rennie JM, Robertson NRC. *Textbook of neonatology*. 3rd edn. London. Churchill Livingstone. 1999:537-40.