Volume : 1 | Issue : 2 | February 2012 ISSN : 2250 - 1991

Research Paper Medical Science

A Study Of Risk Factors Associated With In Utero Passage Of Meconium And Subsequent Development Of Meconium Aspiration Syndrome And Outcome Of Babies Born With Meconium Stained Amniotic Fluid

* Dr Pareshkumar A. Thakkar ** Dr Sheila Aiyer

* Assistant Professor of Pediatrics, Medical College & SSG Hospital, Vadodara.

** Additional Professor of Pediatrics, Medical College & SSG Hospital, Vadodara

ABSTRACT

Objective To identifying risk factors associated with in-utero passage of meconium and with subsequent development of MAS and to study the outcome of such babies. Methods It was a prospective study conducted during the period of March to December 2003. All deliveries of live babies associated with meconium stained liquor were included. Results Total 399 babies were associated with MSAF. Highest incidence of MSAF was observed at 39 wks. Chance of meconium passage was significantly higher after 38 wk of gestation p<0.0001. Most commonly associated maternal morbidity and obstetric risk factor were toxaemia and FHR abnormality respectively. Rate of LSCS and instrumental delivery were significantly higher in MSAF group. 49.4% of patients with FHR abnormality had MSAF compared to only 6.8% in patients without FHR abnormality p<0.0001. Incidence of severe birth asphyxia was significantly higher in patients with MSAF. Mortality in MSAF was 7.8%. Risk factors associated with development of MAS: Incidence of MAS was 12.28%. Here 28% of nonvigorous babies and 6.2% of vigorous babies developed MAS P<0.0001. All babies who developed MAS had thick MSAF.

Conclusion maturity and presence of FHR abnormalities are important risk factors for in-utero passage of meconium, while thick consistency of meconium and nonvigourous baby are important risk factor for development of MAS. MSAF is associated with significant morbidity and mortality in neonates.

Keywords : meconium passage, meconium aspiration, risk factors, outcome

Introduction

Acute or chronic hypoxia can result in the passage of meconium in utero. In this setting gasping by the fetus or newly born infant can then cause aspiration of amniotic fluid contaminated by meconium. Aspiration of meconium can obstruct airways, interfere with gas exchange and cause respiratory distress. Meconium stained liquor is fairly common and is associated with significant morbidity as well as mortality, which may be because of respiratory distress due to meconium aspiration, which may lead to respiratory failure, co-existent perinatal asphyxia and its complications, higher incidence of sepsis, other complications of MAS like, Air leaks and PPHN. Apart from fetal distress, other possible risk factors which can be associated with in-utero passage of meconuim are, post-term pregnancy, Oligohydroamnios, IUGR, Chronic placental insufficiency. Meconium passage is uncommon in premature deliveries. This can be because of neural and hormonal factors. As the maturity advances, levels of motilin increases and maturation and myelination of GIT plexus occur, these factors play important role in meconium passage.

Aims and Objectives

To study factors associated with passage of meconium in-utero and factor associated with subsequent development of meconium aspiration syndrome and to study the outcome of babies born with meconium stained amniotic fluid and meconium aspiration syndrome.

Materials and Methods

It was a Prospective observational Study conducted from 1st March 2003 to 31st December 2003 carried out at department of paediatrics, medical college and SSG Hospital, Vadodara, Gujarat. Babies delivered with evidence of Meconium Stained Liquor were included in the study. Still born babies were excluded from study. All the maternal and neonatal details were noted. Fetal Heart rate abnormalities were noted by Obstetrician and were defined as per their standard references. Gestational age was assessed by date of last menstrual period, physical examination by using Maherban Singh's scoring and early ultrasonography dating whenever available and the best estimate of gestational age was put. We followed NRP 2000 guidelines and as per these guidelines, whenever there is evidence of MSAF suction of mouth and nose was performed at delivery of head with Delee suction catheter. Need for suctioning the trachea for meconium was determined by whether or not the baby was vigorous at birth. All babies with MSAF, after initial steps were closely monitored in nursery. Decision of whether baby requires nursery care or not, was taken after initial observation, period extending not more than 2 -4 hours. After initial observation babies who were found stable were handed over & roomed in with mother. Unstable babies were kept in neonatal ICU and were managed as per standard NICU protocols. We had used working definitions given by NNPD Network for Meconium Aspiration Syndrome, respiratory distress, birth asphyxia. Immediate outcome was studied with special reference to complications of MSAF like MAS, air leaks, PPHN etc. or any other significant associated morbidity like septicemia, any complication of perinatal asphyxia like, HIE, acute renal failure, shock etc. All the babies were studied for their immediate outcome till they got discharge / expired.

Results

During the study period, there were 399 out of total 3429 live births were associated with meconium stained liquor, being 11.63 %. Out of these 399 babies, 227 (57 %) had thick MSAF and 172 (43%) had thin MSAF.

For analysis and to derive statistical significance groups have been made as MSAF Group and non MSAF Group. MSAF is very rare is preterm delivery so to make groups comparable only full term babies are taken in to account in non MSAF group.

Analysis for possible Risk Factors associated within utero meconium passage

In the MSAF group 223 were males and 176 were females, male to female ratio being 1.26:1.

Gestational age In our study maximum babies were having maturity of 37 and 38 weeks. Average maturity was found to be 37.7 wks. Out of all babies with MSAF only 4 babies (1%) were preterm. Incidence was found highest at 39 weeks of gestation 24% (69/287). (Table I)

Table I - Incidence of MSAF of different gestation

	Babies with MSAF (% is of total with MSAF)	Total no. of babies	Percentage %
< 37 wks	4 (1 %)	277	1.44
37 wks	117 (29.3 %)	1166	10.0
38 wks	177 (44.4 %)	1442	12.3
39 wks	69 (17.3 %)	287	24
40 wks	24 (6 %)	208	11.5
≥ 41 wks	8 (2%)	49	16.3
Total	399 (100%)	3429	

Table II shows babies with more than 38 weeks of gestation are at significant risk of MSAF, $X^2 = 30.2$, P value < 0.0001, (RR 0.56, CI 0.45 0.68) (Table III). So chance of passing meconium is higher after 38 wks gestation.

Table II

	With MSAF	Without MSAF	Total
≤ 38 wks	298 (10.32%)	2587 (89.68 %)	2885
> 38 wks	101 (18.56%)	443 (81.44 %)	544
Total	399	3030	3429

Maternal Morbidity

Out of total 399 subjects, Pregnancy induced HT, Pre-eclampsia / Eclampsia was associated in 66 (16.5 %), severe anemia was found in 18 (4.5%), Heart disease in 6 (1.5%) and asthma in 3 (0.8%). So most common morbidity was preeclamptic toxaemia.

Intrapartum / Obstetric Factors Associated:

Out of total 399 subjects, Fetal Heart Rate abnormality was found to be the most important intrapartum risk factor, was seen in 213 (53.4%) patients. Other factors found were prolonged labour in 20 (5%), cephalopelvic disproportion in 12 (3%), Cord accidents in 12 (3%), oligohydroamnios in 10 (2.5%), placenta previa in 2 (0.5%), premature rupture of membrane in 11 (2.8%) patients and foul smelling liquor in 4 (1%).

FHR Abnormalities and MSAF

213 out of 399 (53 %) had evidence of FHR abnormalities. 49.4 % of patients with FHR abnormality passed meconium while only 6.8 % of patients without FHR abnormality passed meconium this difference was found statistically very significant, $X^2 = 610.25$, P value < 0.0001. (RR 6.75, CI 5.76-7.89). (Table III). Risk of meconium passage is 6.7 times higher if FHR abnormalities are present.

Table III

	FHR abnormalities present	FHR abnormalities absent
MSAF group	213 (49.4 %)	186 (6.8 %)
Non MSAF group	218 (50.6 %)	2535 (93.2 %)

Association with Birth Asphyxia:

Severe birth asphyxia (1 min. APGAR ≤ 3) was present in 65/399 (16.3%) compared to 2% (57/2753) in non MSAF group. This difference was statistically significant $X^2 = 189.4$ p value < 0.001. (RR 7.87, CI 5.6-11.05). So there is significant association between meconium passage and severe birth asphyxia.

Taking both moderate as well as severe birth asphyxia into account, 27.6 % (110/399) were associated with birth Asphyxia (1 min APGAR of < 7) in MSAF group compared to 4.4% (121/2753) in non MSAF group. Incidence of MSAF in patients with birth asphyxia was 47.6 % which is only 9.8 % in babies without birth asphyxia. This difference is statistically significant, $X^2 = 275.56$, P value < 0.0001. (RR 6.27, CI 4.95-7.94)

Mode of Delivery

Rate of LSCS delivery was 41% (164/399) in MSAF group compared to 19.7% (543/2753) in non MSAF group. Rate of instrumental delivery was 13.5% (54/399) in MSAF group compared to 6% (170/2753) in non MSAF group. The difference found is statistically significant. X2 = 138.41, p value = 0.001 (RR 2.41, CI 2.01-2.89)

Meconium Aspiration Syndrome:

Out of total 339 babies with MSAF, 49 patients developed MAS making incidence of 12.28%.

Factors Observed with Development of MAS

At birth Vigorous Vs. Non Vigorous

Out of 49 babies with MAS, 18 (36.7 %) babies were vigorous at birth so intratracheal suction was not done, 31 (63.3 %) were non vigorous in which intra tracheal suctioning was performed. 28 % (31/110) of non vigorous babies developed MAS while only 6.2 % (18/289) of vigorous babies developed MAS, the difference was statistically significant X2 35.65, P value < 0.0001.

Consistency of Meconium: Thick Vs. Thin

All the patients who developed MAS had thick MSAF. In our study no patient with thin MSAF developed MAS. The difference is statistically significant $X^2 = 42.33$, P value < 0.0001.

Early Vs. Late Meconium Passage:

Out of total 227 babies with thick MSAF, 49 patients developed MAS out of which 32 (65 %) were associated with Early passage while 17 (35%) were associated with late passage. Incidence of MAS in patients with early meconium passage was 18.8% compared 29.8% in patients with late meconium passage. But the difference was not significant statistically. No patient from thin MSAF group developed MAS, so here only babies with thick MSAF were taken into account. Mortality in patients with early meconium passage was 10% (17/170) compared to 21% (12/57) in patients with late meconium passage. This difference was statistically significant, $X^2 = 462$, P<0.05.

Outcome of Babies with MSAF

Out of total 399 babies, 356 babies were discharged, 12 left against medical advice and 31 patients died, mortality being 7.8 %. Perinatal asphyxia was the most common single most important cause of death found in 19 out of 31 (61.3%), other were MAS in 3, air leaks in 4, septicaemia/meningitis in 5 patients.

Morbidities in Patients with MSAF:

Complications directly related to meconium, MAS was found in 49 (12.28%), air leaks in 7 (2%) and PPHN was found in 5 (1.25%) patients.

Other Morbidities found were Septicemia in 52, pneumonia in 6, meningitis in 5, NEC in 3, Superficial infections in 11, HIE in 25, IVH in 2, Hyperbilirubinemia in 17, anemia in 12, hypoglycaemia in 5, hypocalcemia in 1, hypothermia in 3 patients.

Discussion

Incidence of MSAF found in other studies were ranging from 3.4% to19%1,5,6,7,8,9,11,12. In our study it is found to be 11.63 % which correlates with various other studies mentioned here. Reasons for variation in incidence of MSAF could be because of different inclusion criteria and type of centre, referral centre, centre dealing with more high risk deliveries are likely to have higher incidence. Contribution of post mature babies for MSAF is quite variable in various studies; in our study it is only 1 % out of which 25 % developed MAS. The increased incidence of MAS with post maturity could be explained by the increased likelihood of cord compression as amniotic fluid declines with advancing gestational age coupled with maturation of gut.. In our study 1 % of the babies with MSAF were preterm, which is quite similar to other studies. Occurrence of MSAF in preterm babies is quite uncommon. Frequencies of various maternal morbidities like pre-eclamptic toxaemia, severe anemia, oligohydroamnios etc seen in the present study are in confirmity with other studies6,7,8,9,10. Toxaemia was associated in 16.5% in our study, other studies shows ranging from 3.9 to 26.6%. Anemia and oligohydroamnios were detected in quite significant numbers. In the present study, incidence of PROM was 2.8% which was comparable with other studies 1.5-7.5%. Prolonged labour was quite near to the incidence found by Nayak et al., Cord accidents were in confirmation with the figures detected by other authors. These specific patterns of obstetric risk factors may be because of the late referral of patients, inadequate facilities at periphery and inadequate antenatal care.

The present study shows that the incidence of FHR abnormality was 53% which is little higher than the figures found out by other authors, 49.7% by Nayak et al, 44.6%, 40.66% by Sasikala et al, 38% by Pedse et al. FHR abnormalities were seen in the form of fetal tachycardia, fetal bradycardia, beat to beat variability etc. Table shows rates of LSCS and instrumental deliveries are consistently high in all the studies, varying from 12.6% to 40.6% and 9% to 21.5% respectively.

Rate of LSCS and instrumental delivery found in our study is comparable with other studies, which were 41% and 13.5% respectively.

Incidence of MAS in various studies is ranging between 2.4 to 27 % incidence found in our study 12.28% is comparable.

Incidence of air leaks found in our study 14.3% is comparable with other studies, the range being 1.78 to 15.4 %.

Review of mortality figures in literature reveals extreme variability, ranges between 0-46%. Mortality found in our study was little higher compared to other studies, which was due to higher mortality in patients developing MAS. Gupta et al reported 22.2% and Davis et al reported 12 deaths in 30 patients (40%). Mortality found in our study was 7.8% of all MSAF patients, and was 34.7% of patients who developed MAS. Looking into the details of causes of deaths, perinatal asphyxia was the most common single most important cause of death, contributing 61.3% of all deaths, while MAS related deaths (due to MAS and air leaks) were 14.2%. Septicemia as single most important cause of death was responsible for 16.1% of total deaths. Mortality thus seems to be strongly influenced by associated morbidities like perinatal asphyxia & sepsis.

Conclusions

There is significant association of meconium passage with increasing maturity and presence of FHR abnormalities are important risk factors for inutero passage of meconium, while thick consistency of meconium is an important risk factor and baby being non vigourous at birth is significantly associated with development of meconium aspiration syndrome. MSAF is associated with significant morbidity and mortality in newborn babies.

REFERENCES

Gregory G, Meconium Aspiration in infants a prospective study. J. Paed. 1994; 85 : 848-52. | Methews et al, Relavance of Gestational age distribution of meconium passage in utero. Pediatrics 1979; 64 : 30-31. | Lucas A. et al, Fetal distress, Meconium and Motilin Lancet 1979; 718. | A. K. Gupta et al, Wheezy Baby Syndrome a possible sequele of MAS. Indian J Pediatr 1991; 58 : 525-27. |Narang et al. Management of Meconium stained Amniotic fluid a team approach. Indian pediatr 1993; 30 : 913. | Vineeta Gupta et al, Meconium stained Amniotic fluid : Indian Pediatr 1996 ; 33 : 293 -96. |Bhide S, Shendurnikar N, Aiyer S et al. Neonatal outcome after meconium stained amniotic fluid. J. Obstet Gynecol India 1993; 44 : 933 -35. | Nayak et al. Meconium stained amniotic fluid significance and fetal outcome. J Obstet Gynecol India 1991 ; 480 : 41 -4. | Pendse V et al, Meconium stained liquor it's significance and effect on fetal outcome. J Obstet Gyn India 1983 ; 33 : 66 69. | Sasikala et al, Perinatal outcome in relation to mode of delivery in MSAF. India n J Paed 1995 ; 67 : 63. | Suresh et al. Delivery Room Management of infants through thin meconium stained Amniotic fluid. Indian Pediatr 1994; 31 : 1177-80. | Chaturvedi et al. Delivery Room Management of Meconium stained Amniotic Fluid. Indian Pediatr 2000 ; 37 : 1251 54. | Davis et al, Fetal meconium aspiration syndrome occurring despite airway management considered appropriate. Am J Obstet Gyn 1985; 151 : 731.