Original research article

Study of Babies Born with Meconium Stained Amniotic Fluid in Post-Term Pregnancy

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Abstract

Background: Meconium stained amniotic fluid has been considered a sign of fetal distress and associated with poor fetal outcome but others considered meconium passage by fetus is physiological phenomena and produce environmental hazards to fetus before birth. Such magnitude of different opinion was the object behind taking up of this study and aim was to find out incidence of meconium aspiration syndrome and effect of meconium in terms of morbidity and mortality.

Methods: Two hundred babies born with meconium stained amniotic fluid considering the inclusion and exclusion criteria, in theDepartment of Paediatrics, Mahavir Vatsalya Aspatal Patna Paediatrics. Study duration of two years. Fetal monitoring, mode of delivery, Apgar score, birth weight, resuscitation of baby are noted.

Conclusion: Immediate airway management, need for suction and intubation should be guided by state of newborn rather than presence of meconium. Timely diagnosis and management of meconium stained amniotic fluid may improve fetal outcome.

Keywords: Meconium Stained Amniotic Fluid, Birth Asphyxia, Pneumonia.

Introduction

Meconium is derived from the Greek word "mekonion" meaning poppy juice or opium. Aristotle is credited for noting the relationship between the presence of meconium in amniotic fluid and a sleepy fetal state of utero, Meconium passage remains an enigmatic condition. Teaching throughout thiscentury has included the concept that meconium passage is a potential warning sign offetal asphyxia. Meconium stained amniotic fluid has long been implicated as a factorinfluencing fetal well being during intra-partum and post-partum periods. Whitridge J Williams, in 1903 observed that a characteristic sign of impending asphyxia is the escape of meconium. He attributed meconium passage to relaxation ofthe sphincter ani muscle induced by faulty airation of the (fetal) blood. Indeed, although 12 to 22% of human labors are complicated by meconium. Recent studies indicate Meconium-staining of amniotic fluid occurs in 5-24.6% of live births.[1] The risk increases with rise in gestational age. It is rarely seen before 37 weeks and occurs in more than 30% of the pregnancy which continue past42 weeks of gestation. Meconium aspiration syndrome (MAS) is noted in 7-22% of these infants,[3] 5-33% develop respiratory symptoms and radiographic changes of meconium aspiration

syndrome. Upto 30-50% required mechanical ventilation, 20% develop pulmonary air leaks, 56% perinatal asphyxia and gastrointestinal pathology in30.5%. Approximately 5% of survivors require oxygenation at age 1 month. Withsevere parenchymal disease and pulmonary hypertension mortality approaches 20%. Intrapartum suctioning to remove meconium from oropharynx and trachea hasnot been associated with decrease in prevalence rate and severity of MAS. Passage of meconium in the mature fetus is facilitated by myelination of nervefibers and increase in parasympathetic tone and increase in the concentration of motilil. Meconium passed as a maturational event is of thin consistency in most cases. Meconium aspiration syndrome and other serious complications occur infrequently inthis circumstances. Newborn with acute hypoxic events, near and after the onset of labour are more likely to pass thick meconium and to suffer meconium aspiration, interventionsto clear meconium are more likely to be beneficial for these newborn. Aspiration of meconium with the first breaths after birth is more likely, and the newborns are at higher risk for the obstructive and local inflammatory effects of meconium. Newborn who suffers chronic intrauterine hypoxia are more likely to developpulmonary arterial muscularization and persistent pulmonary hypertension of the newborn and subsequently their response are more depressed at birth. Chronichypoxia and hypercapnia stimulate both meconium passage and neonatal gasping. Complications could be due to either the aspiration of meconium, the conditions causing chronic hypoxia. Efforts to clear meconium from the newborns pharynx and trachea will be ineffective in preventing the effects of meconium aspiration in some cases. Meconium Aspiration Syndrome remains one of the most common causes ofneonatal respiratory distress. Meconium is more potent and toxic than previously appreciated vicious cycle of hypoxemia, shunting, acidosis, pulmonary hypertension is frequently associated with Meconium Aspiration Syndrome and becomes difficult to treat successfully. Murphy and associates (1984) presented evidence that development of newborn pulmonary hypertension with this syndrome depended upon a chronic recurring antenatal insult. This in turn would cause abnormal muscularization of the interacinar arteries beginning well before birth and thus would be unaffected by maneuvers at delivery.

Objectives

To study the perinatal morbidity and mortality of babies born through meconium stained amniotic fluid.

Review of Literature

As meconium stained liquor was thought to be an imminent sign of fetal distress. Many workers have done work on the problem. The first gastrointestinal excretion by the fetus Meconium, was named by Aristotle who derived it from Greekword like ‘opium’ he believed that it was this substance that kept the baby sleeping inthe mother’s womb. Lucas et al. (1989) suggested that levels of ‘Motilin’ an intestinal hormone 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 fetaldistress 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 mayplay a part in the abnormal gut motility leading to passage of meconium seen in prenatal asphyxia.

Miller et al. 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. Khatua SP et al. in 1981 a study of 26377 consecutive live born infants revealed 104 cases of aspiration syndrome showing incidence of 3.9 per 1000 live births and constituted 57.1% of respiratory distress in newborn 4.1% of newborn wereborn with high meconium stained amniotic fluid. Meconium aspiration syndrome developed in 8%, 1.9% and 14% cases born, thick, thin and normal amniotic fluid respectively. Higher incidence and mortality were associated with primipara, poor antenatal care, abnormal and difficult delivery and birth through thick meconium. Ingermarsson(1986) studied the usefulness of a short electronic fetal heartrate recording at admission of patients in labour (admission test) was investigated in low-risk patients in two prospective studies. Pravin Goud et al. in 1989 according to this study incidence of MSAF was 95.9%, 30.9% of them were thickly meconium stained, 78.4% of these patients followed had thick meconium stained liquor had associated maternal factors such as hypertension in 25.52%, anemia 29.4%, APH 1.96%, prolonged labour 21.56%, 54%of the babies required neonatal intensive care and 17.6% did not survive. Narang reported that incidence of MAS (MAS) as 10.5% those accounting for almost 20% of perinatal death. The persistence of the MAS despite suctioning atbirth may be related to intrauterine aspiration. Vinzileos AM et al. (1995) compared continuous intrapartum electronic fetalheart rate monitoring with intermittent auscultation for detecting fetal acidemia at birth. Data from a previously published randomized trial of electronic fetal heart monitoring versus intermittent auscultation were analyzed to identify any differencesbetween the two methods in detecting fetal acidemic at birth. Meconium, an odourless, thick, blackish green material, is first demonstrable in the fetal intestine during the third month of gestation. It is the accumulation of debris that consists of desqumatted cells from the alimentary tract and skin, lanugo hairs, fatty material from the vernix caseosa, amniotic fluid and various intestinal secretions.

Material and methods

Two hundred babies born with meconium stained amniotic fluid considering the inclusion and exclusion criteria, in theDepartment of Paediatrics, Mahavir Vatsalya Aspatal Patna Bihar. Study duration of two years. Fetal monitoring, mode of delivery, Apgar score, birth weight, resuscitation of baby are noted. During the study period 200 newborn babies born with the history of MSAF were randomly selected. For uniformity of results babies with major congenital anamolies, visceral/multiorgan dysfunction, born of breech or other abnormal presentation were excluded from the study.

Study conducted in obstetric department and NICU at our hospital. Proformawas used to collect data.

Inclusion criteria

Inborn babies with meconium stained amniotic fluid, Outborn babies with meconium staining of skin and umbilical cord, Babies showing features of meconium in the upper respiratory tract onexamination.

Exclusion criteria

Babies with congenital anamolies, Babies with visceral/multiorgan dysfunction, Babies born of breech or other abnormal presentation.

Well babies, who had no other risk factors were roomed in with mother andfollowed up till discharge. Gestational age determined using modified Ballard's score. Babies with respiratory distress were admitted in NICU. In addition sick newborns with risk factors like HIE, LBW were also admitted.

Meconium aspiration

Presence of meconium in trachea with suctioning, Meconium aspiration syndrome, Presence of meconium stained infant, Abnormal chest X-ray with aspiration with patchy infiltrates, atelectasis andoverinflation, Clinical features of respiratory distress within 24 hours of life. Post maturity: Completed 42 weeks of gestation, Antenatal visits: Those who have had more than or equal to 3 antenatal visits areconsidered registered cases.

Results

The presence of MSAF during labour in cephalic presentation is a potentiallyominous sign of fetal well being. Studies show the incidence of MSAF ranging from7-24.6%, studies done by Narli N and colleagues (8-20%), Mohammed and colleagues (7-22%) and Wiswell TE and colleagues (13%). The maximum incidenceof MS (5-24.6%) has been noted in study done by Sankhyan and colleagues.

Table 1:

Studies	**Incidence**
Sankhyan and colleagues	5-24.6%
Narli N and colleagues	8-20%
Mohammed and colleagues	7-22%
Wiswell TE and colleagues	6.3%

study 200 babies born through MSAF was randomly selected.

Maternal factors that could have led to meconium staining were also studied.In the present study PROM (9.2%) and PIH (6%) were some of the maternal factors that could have led to meconium staining. This study was compared to Sankhyan et al.study where the incidence of PROM was 12.67% and incidence of PIH was 10.7% Cecil et al. reported PROM incidence as 5.85%. In this study 1.2% were found to beHepatitis B positive.

Table 2: Factors contributing to meconium staining

Problems	Number of patients	Percentage
Fetal distress	35	17.5
Prolonged second stage	6	3
Post term	7	3.5

Careful monitoring in labour may go a long way in preventing meconium staining. Fetal distress as indicated by Fetal Heart Rate (FHR) on auscultation or abnormal Non-Stress Test (NST) was present in 35 (17.5%) of patients in our study ascompared with study of Sankhyan et al. who have reported 27% incidence.

Table 3: Registration of pregnancy

Registration	Present study	Sankhyan study
Booked	113 (56.5%)	71.7%
Unbooked	87 (43.5%)	28.2%

Out of 200 cases, 113 (56.5%) mothers were registered and the rest87 (43.5%) were not registered as compared with Sankhyan study where 114 (71.7%)cases out of 159 who had taken antenatal care.

MSAF alone is not an indicator for LSCS unless there is associated Fetal Distress (FD). In this study LSCS and Normal Vaginal Delivery (NVD) were almostequal assisted instrumental deliveries which include vacuum and forceps application.The number of LSCS born babies were 96 (48%), NVD 95 (47.5%) and instrumental9 (4.5%). This was compared with similar studies by Sankhyan et al. where incidencewas 49% (78%) in LSCS, 39% (62) in vaginal delivery and 10% (16) by forceps. Another study by Narli N et al. reported 155 (55.8%) in LSCS and 123 (44.2%) by NVD. The incidence of delivery by cesarean increased with meconium from 7% to 14% in studies by Nathan et al. and Ziadeh et al. Comparing the gender in this study, 120 (60%) males born through MSAF andremaining 80 (40%) females to Narli N et al. where 51.7% were males and remainingfemales (48.2%). Lam BCC et al. The need for admission to NICU was much more in asphyxiated babies, making about 37.5%. Out of these babies with asphyxia 18 had seizures and 12 werein HIE stage III of Sarnat and Sarnat staging of HIE, 11% diagnosed as MAS according to the definition in the present study, 5% for respiratory distress and the remaining 7.5% for observation, 10% for sepsis, 5% for pneumothorax and 5% for physiological jaundice and 2.5% for PPHN. Asphyxia has been known to predispose to MAS. Severe degree of fetal hypoxia secondary to asphyxia leads to neuromuscular depression, predisposing babyto higher chances of aspirating meconium.
Meconium staining is known to occur in babies who are post mature and lesslikely to occur in preterm babies.

Discussion

The passage of meconium by the fetus in utero has been considered as a sign of fetal distress from hypoxia. Others suggest, that this may represent normal physiological maturation of the fetal gastro intestinal tract. MSAF is a common finding among term births and it occurred in 8-15% of pregnancies in this study. The importance of meconium as an obstetric risk factor is difficult to interpret when so many pregnancies demonstrate this finding, yet so few have adverse perinatal outcomes.

Risk Factors

Some conditions associated with MSAF are intrauterine growth retardation, oligohydramnios, post-datism, maternal age, parity, hypertensive disease, prolongedrupture of membrane. In our study, the variables like prolonged rupture of membraneand PIH were useful markers for MSAF. Other maternal complications were not associated with adverse risks. Finally in our study post-term pregnancies were not significantly associated with MSAF.

Mode of Delivery

However it did provoke considerable obstetric anxiety regarding status of fetalhealth leading to the finding of interventions in labour with MSAF by cesarean section and instrumental deliveries.MAS, Meconium aspiration syndrome occurred in 11% of the babies born through MSAF. The presence of meconium found below the vocal cords increases the incidence. These infants were more likely to be apneic at birth suggesting the occurrence of intrauterine hypoxia. Meconium acts as an irritant and cause chemicalpneumonitis and acts as a good culture medium for bacteria and promote lung infection. It destroys the surfactant causing alveolar instability, collapse and atelectasis. In small bronchioles, air trapping cause emphysema, air leaks, pneumothorax, meconium damage of fetus therefore starts in utero because aspirationmay occur in utero and continues after birth. MSAF is looked upon with lot of concern and a pediatrician attends the delivery complicated by MSAF. Inspite of this, babies are admitted with MAS to special care nurseries and in our study 40% were admitted. Out of 200, 5.5% was themortality rate. MAS is the most common cause of neonatal morbidity and mortality among term infants. perinatal death was 5.5% in the study group. In the seriesof other authors perinatal mortality ranged from 3% to 7.7%. They had similar observation as compared to present study. In our study, 100% of the perinatal mortality was in thick meconium group.

Conclusion

Primiparity, prolonged labour, PIH, PROM were the common maternal problemspresent in mothers who had meconium staining. Fetal distress was present in 5.5% of patients with MSAF. There was not much difference in the mode of delivery in this group of MSAF andwhen compared to those born out of clear liquor. Immediate airway management, need for suction and intubation should be guided by state of newborn rather than presence of meconium. Timely diagnosis andmanagement of meconium stained amniotic fluid may improve fetal outcome.

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