

Study of Meconium Aspiration Syndrome in Neonates

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Abstract

Meconium is the first faeces of a newborn. The incidence of meconium stained liquor is 10-25% of deliveries; out of which 10% develop meconium aspiration syndrome. It is regarded as a sign of foetal compromise. **Aim:** To study the babies born with meconium stained amniotic fluid (MSAF) developing Meconium aspiration syndrome (MAS) and factors associated with it. The study also aimed to find out the complications and outcome of MAS. **Method:** A total 90 babies born with MSAF and admitted to the NICU were studied. Detail maternal history was taken. All babies underwent routine septic screen and a chest x-ray. MAS was designated in a baby as per the defined criteria. **Results:** Out of the total 90 babies born with MSAF, 41 were female and 49 were male. Majority (95.6%) cases with MSAF occurred either in full term or post term babies. MAS was found in 68 of the total 90 babies, of which 48(70.5%) were vigorous and 20 (19.5%) were non vigorous. Abnormal X-ray was found in 39(43.3%) babies. 23.5% babies required ventilator care. Overall mortality rate was 15.5%. **Conclusion:** MSAF affects mostly full term and post term babies. History of antenatal foetal heart rate abnormalities and MSAF together are good predictors of non vigorous babies. The duration for which baby remains in contact with MSAF also affect the ultimate outcome. The management of babies born of MSAF should be a combined approach of obstetrician and paediatrician, right from proper monitoring of maternal risk factors to meticulous newborn resuscitation.

Key Words : meconium aspiration syndrome, meconium stained amniotic fluid

Introduction :

Meconium is the first faeces of a newborn composed of a residue of bile, desquamated skin, hair and intestinal cells; which is greenish thick and viscous formed during the 3rd intrauterine week. ⁽¹⁾ Meconium aspiration is defined as the presence of meconium below the vocal cords. It is found below vocal cords in 11-58 % (mean 35%) of live births with MSAF. ⁽²⁾ Proposed mechanism is as follows: Normally foetal lung contains 20ml/kg of fluid. The water content increases with advancing gestational age. The lungs secrete the liquid which contributes to the amniotic fluid production. Breathing efforts at a rate of 40-70/min do go on in utero & its strength increases with advancing gestational age. In utero, this does not cause aspiration as the net amount of amniotic fluid is still in outward direction. ⁽²⁾ Gasping & deep breathing predispose to aspiration of meconium, which occurs with sustained hypoxia or ischemia. It creates sufficiently negative intrapulmonary pressure to overcome the net movement of fluid out of the lungs. ^(2, 3) Risk factors for MSAF are Maternal Hyper-tension, Diabetes Mellitus, heavy smoking, post term pregnancy, pre eclampsia/eclampsia, intra uterine growth retardation and oligohydroamnios. The incidence of meconium stained liquor is 10-25% of deliveries; out of which 10% develop MAS. It is regarded as a sign of foetal compromise. ⁽¹⁾ MAS is diagnosed if any of the following criteria is present. (1) Meconium staining of liquor or staining of the umbilical cord/skin/nails. (2) Respiratory distress soon after birth /within one hour. (3) Radiological evidence of aspiration, Pneumonitis. (Atelectasis/hyperinflation). ⁽¹⁾ Prolonged gestation, ante partum haemorrhage, placental

dysfunction, age of the mother and diseases like diabetes mellitus, hypertension, anaemia and toxemia predispose to passage of meconium in utero. Acute or chronic hypoxia / infection can result in the passage of meconium in utero leading to obstruction of airways, interference of gas exchange and severe respiratory distress. There are still many controversies regarding this subject such as the relation of MSAF to intrauterine asphyxia, Meconium aspiration: intrauterine/ extra uterine, efficacy of obstetric and paediatric intervention in reducing the mortality and the relation of neonatal outcome with the consistency of MSAF. ^(4, 5)

Aims and objectives

Aim of the study was to find out percentage of babies born with MSAF developing Meconium aspiration syndrome. Study also was conducted to know various risk factors in mother, impact of foetal distress and presence of birth asphyxia. Study was also aimed to find out the neonatal outcome and mortality and predicting factors regarding outcome.

Materials and Methods

A prospective study was conducted at tertiary care hospital NICU. A total of 90 babies born of MSAF and admitted to the NICU were studied. Those not admitted were excluded from the study, the indications for admission being non vigorous MSL, Birth asphyxia, Respiratory distress. A detailed maternal history regarding presence of risk factors was taken such as diabetes, hypertension, foetal distress; Neonatal resuscitation was done following NRP guidelines. ^(6,7) Babies with MSAF if indicated were admitted to NICU. All babies underwent routine septic screen and a chest x-ray. All babies were classified according to their gestational age using the new ballard score. MAS was designated in a baby as per the defined criteria. Further management was done according to standard

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protocols and observations were noted regarding treatment and outcome. All babies were studied as per the criteria. Babies admitted were started with IV antibiotics and septic screen was sent along with blood culture. Further decision for antibiotics was taken on basis of clinical picture and reports.⁽⁷⁾

Observations and Discussion

A total of 90 babies born with h/o of MSAF and admitted to the NICU were studied; of which 41 were female and 49 were male. This is just an observation and doesn't generalise any gender prevalence. According to the New Ballard Scoring the babies were divided into the following gestational categories.⁽⁸⁾ (Table 1) This shows that majority (95.6%) of cases in MSAF occur either in full term or post term babies. Gupta et al study found preterm 7.8% and full term 86.7%. Post terms were observed to be 5.3%.⁽⁹⁾ This correlates with the hypothesis that MSAF occurs only after the GIT matures strong enough for the peristalsis to occur i.e. after 37 weeks of gestational age.

Table 1: Gestational age and MSAF

Maturity	Present study	Gupta et al ⁽¹⁰⁾
Preterm	4.4%	7.8%
Full term	87.7%	86.7%
Post Term	7.7%	5.3%

Out of the 90 babies in the study, mothers of 45, i.e., 50% had one of the risk factors. 60% had PIH, 28% had oligohydroamnios, 8.8% had hypertension and 2.2% had diabetes mellitus. Of these, 12(26.6%) were depressed at birth and 5 (11.11%) expired. This correlates with the findings of high risk situations with increased likelihood of in utero passage of meconium passage, which if timely intervened can decrease the incidence of morbidity and mortality among the babies. Antenatal foetal distress was considered to be present when documented by obstetrician (clinically by foetal tachycardia or bradycardia or other foetal heart sound abnormalities in the Doppler USG. Out of the 90 babies born with MSAF 20 i.e. 22.22% had antenatal foetal distress, of which 12 developed MAS i.e.60% .Thus ante partum foetal distress is higher in babies developing MAS. Gupta et al studied and found foetal distress in 24.5 %.⁽¹⁰⁾

Out of the total 90 babies studied, in 66 i.e. 73.3% there was thick meconium and the rest 24 i.e. 26.66% had thin meconium. Of the 66 babies born with thick meconium, 26 i.e. 39.3% were non vigorous, 53 i.e. 77.9% developed MAS and 14 expired (21%). This shows that thick meconium is associated with higher incidence of MAS and poorer outcome. Out of 90 babies born of MSAF 31 i.e. 33.33% were non vigorous at birth, hence depressed. Wiswell et al⁽¹¹⁾ study mentions 33% of babies depressed. Of the 31 babies who were depressed, 11 babies had evidence of antenatal foetal distress. The other way round of the 20 babies with evidence of foetal distress 11 were depressed at birth i.e.55%. Routine intubation and suctioning of the vigorous meconium-stained neonate will not prevent MAS.⁽¹¹⁾ This shows that foetal heart rate abnormalities and MSAF is together a reliable

sign of foetal compromise and good predictor of depression at birth in a baby with MSAF. Also monitoring of mothers at high risk can anticipate the foetal distress and intensify our delivery room management. Birth Asphyxia defined as Apgar score ≤ 6 at 1 minute was found in 29 of the total 90 babies in the study. Bhide et al⁽¹²⁾ found birth asphyxia in 44.8% and Narang et al⁽¹³⁾ found in 25.5%. This shows increased incidence of birth asphyxia in babies born through MSAF.⁽¹⁴⁾

Meconium aspiration syndrome (defined earlier in the text) was found in 68 of the total 90 babies, of which 48(70.5%) were vigorous and 20 (19.5%) were non vigorous. This implies that meconium aspiration is an in utero process. Bhide et al⁽¹²⁾ and other study mentions 22.95 and range of 1.6% to 35.8 %.

Nail staining (>4 hours of meconium passage) in MSAF indicates a poorer outcome. Abnormal X-ray was found in 39(43.3%) of the 90 babies of which 22(56.4%) had cleared off by 5th day. The rest either expired or took longer time to clear. 4 babies developed persistent pulmonary hypertension of newborn (PPHN) of the total 90 babies which is 4.4%. PPHN is associated in 1/3rd i.e. 33% of the cases but in the present study, however the incidence was low.⁽¹⁵⁾ Of the 16 babies requiring ventilator care, all had developed MAS and 14 expired. According to the text 50% of the infants born of MSAF and developing MAS require mechanical ventilation. In the present study 23.5% required ventilator care. Of the 90 babies, 27 had been treated for septicaemia (proven/probable), i.e. 30% of which 12 babies had only CRP positive, blood culture being negative.⁽¹⁶⁾ False positives arise from intraventricular haemorrhage, meconium aspiration, NEC, pneumothorax, surgery. Currently antibiotics should be instituted in infants with presumed meconium aspiration pneumonia, pending negative cultures.⁽¹⁶⁾ When cultures are negative after 48-72 hours they should be stopped. A total of 14 babies, of the total 90, died giving an overall mortality rate of 15.5%.

Summary and conclusions

Meconium Stained Amniotic fluid (MSAF) affects mostly full term and post term babies. History of antenatal foetal heart rate abnormalities and MSAF together are good predictors of non vigorous babies. The incidence of MAS and mortality is higher in the babies born with thick meconium. The duration for which baby remains in contact with MSAF also affect the ultimate outcome (As seen by nail staining). There is risk of septicaemia in babies born with MSAF, but antibiotics have no role until septicaemia is proven. Also CRP can be a false predictor of septicaemia in MSAF.⁽¹⁷⁾ Very few of the babies develop PPHN if timely managed. A majority of the babies born of MSAF (70%) can be managed with none or <24 hour oxygen requirement. Although a huge amount of them developing MAS require ventilator care. The mortality of babies born with MSAF and MAS is less meaning that timely intervention and management can prevent mortality. Hence, the management of babies born of MSAF is a combined approach of obstetrician and paediatrician, right from proper monitoring of maternal risk factors to meticulous newborn resuscitation.⁽¹⁸⁾

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