

Outcome of Early Neonatal Morbidity in Meconium Aspiration Syndrome

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ABSTRACT

Aim: To determine the frequency of pneumothorax and sepsis in patients with meconium aspiration syndrome, along with also determined how many of these MAS patients require mechanical ventilation and their in-hospital outcome.

Duration: November 2012 to May 2013.

Results: Commonest risk factor was post maturity, found in 36% of patients with meconium aspiration syndrome and 64% of patients were born at term. Complications like Pneumothorax was observed in 25 babies (25%) and sepsis in 36 patients (36%). 40 patients with MAS (40%) required mechanical ventilation. Regarding in-hospital outcome, 35 patients with MAS (35%) died and 65 patients (65%) were discharged.

Conclusion: It was observed that MAS is a leading cause of neonatal morbidity and mortality but it can be prevented by giving appropriate peri-natal care to high risk pregnancies and by use of broad spectrum antibiotics and assisted mechanical ventilation in pts who developed complications with MAS.

Keywords: Meconium aspiration syndrome, Morbidity, Mortality, Mechanical ventilation Risk factors

INTRODUCTION

Meconium aspiration syndrome (MAS) is defined as respiratory distress in newborn infants born through meconium stained amniotic fluid (MSAF) whose symptoms cannot be otherwise explained.¹ Meconium itself is composed of epithelial cells, fetal hair, mucus and bile² and is normally stored in the intestine until after birth but sometimes during prolonged and difficult deliveries, infant often expel meconium into amniotic fluid. This also causes an interference with the supply of oxygen through placenta, as a result it often initiates vigorous respiratory movements in-utero. Under these circumstances infant may aspirate amniotic fluid/meconium which is drawn into respiratory tree with considerable respiratory morbidity.

MAS can present with varying degrees of severity from mild respiratory distress to life-threatening respiratory failure. Coordination of care between the obstetric and neonatal team is important to reduce the incidence of MAS, and identify and provide emergent therapy in those who develop MAS to reduce morbidity and mortality³.

Approximately 13% of all live births are complicated by meconium stained amniotic fluid (MSAF).⁴ Incidence of MAS is 21.1% of neonates born through MSAF. A higher risk of MAS was noted at advanced gestation, with 34% of cases born beyond 40 weeks.⁵ Infants with MAS typically have

tachypnea and cyanosis. Reduced pulmonary compliance and use of accessory muscles of respiration are evidenced by intercostals and subxiphoids retractions with grunting and nasal flaring⁶.

MAS usually improves within 72 hours but if severe it is one of the leading cause of neonatal morbidity (pneumothorax and secondary bacterial infection leading to sepsis) and having mortality around 32%.⁷ There is evidence that pneumothorax develops in 24% of infants with MAS⁸ and secondary bacterial infection leading to sepsis in 13.3%.⁹ 30% of which require mechanical ventilation⁷ and newer neonatal therapies, such as inhaled nitric oxide, high frequency ventilation, surfactant administration and ECMO are often brought into play¹⁰, so antibiotic prophylaxis should be prescribed. Pneumothorax and secondary bacterial infection leading to sepsis following MAS are common causes of neonatal morbidity and mortality. Diagnosis of these complications in MAS is necessary for better management thus improving the antenatal and perinatal care. Previous studies identified several risk factors of MAS that is, fetal compromise indicated by abnormalities of fetal heart rate tracings and/or poor Apgar score¹¹ and/or low cord pH¹². Cesarean delivery¹¹ ethnicity (black Americans, Africans, Pacific Islanders); advanced gestation¹³. However, studies based on the global population did not specifically address the determination of risk factors of severe MAS among infants born through MSAF.

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In this review we aimed to determine the outcome in terms of early neonatal morbidity nowadays because local literature is not available in past 5-7 years regarding this issue.

MATERIAL & METHODS

A total of 100 neonates presented with respiratory distress along with meconium staining of vocal cords and body on 1st day of life from Department of Pediatrics, PGMI/Lahore General Hospital, Lahore were included in the study while Neonates presented with respiratory distress who have Dysmorphic features on clinical examination, Congenital heart diseases diagnosed clinically and on Echocardiography, Congenital lung diseases diagnosed clinically and on chest x-ray. And Risk factors for sepsis e.g., PV leaking >18hrs chorioamnionitis, maternal fever >38.8°F were excluded from the study. Informed consent from parents was taken and risks and benefits of study were explained. On receiving the neonate in nursery, vital signs were recorded and examination was done to look for colour (blue/pink) of the neonate, air entry in chest and added sounds in chest like crepitations. This was done to assess the clinical status of neonate on admission and then to monitor the patient regularly for seven days for complications (pneumothorax and sepsis) Neonates were examined daily and investigated for assessment after their admission in nursery by a postgraduate resident for any complication. Chest x-ray was done at the time of admission and repeated if clinical findings were suggestive of pneumothorax and sepsis. Other investigations like CBC (Including Hb, TLC, BN ratio, and CRP) and blood culture was performed when there was suspicion of bacterial infection. Investigations like ABGs was taken by standardized sampling techniques and checked on sophisticated equipment in same laboratory so that results might not altered. Likewise chest x-ray was done free of cost in our hospital. Depending upon the results of ABGs, mechanical ventilation should be given. Information regarding data of the patients, development of complications and in-hospital outcome (mechanical ventilation, discharge and death) with MAS within hospital stay was entered in a proforma.

The data was analyzed by using SPSS-10 computer system. Descriptive statistics were applied in the form of frequencies and percentages for qualitative variables like gender & morbidity (pneumothorax, sepsis) & mechanical ventilation & in hospital outcome (discharge or death) while mean and standard deviation for quantitative variables like age of neonate and gestational age at presentation.

As study is descriptive so no test of significance is applicable.

RESULTS

In this study, 100 patients with meconium aspiration syndrome were observed for first 7 days of their life. Commonest risk factor was postmaturity (36%) with other risk factors including poor APGAR score (45%). As far as gender was concerned, 71 babies were male (71%) and 29 were female (29%). About 64% of patients were born at term while 36% were post mature. Complications due to MAS, observed for, were Pneumothorax in 25 babies (25%), 36 babies developed sepsis proved on blood culture (36%), 39 babies developed no complication (39%). Serially these babies were investigated by chest x-ray, which showed air trapping and hyperexpansion in 27 babies (27%), Pneumothorax in 25(25%) and diffuse infiltration in 8(8%) with atelectasis in 9(9%). No changes were observed in 34(34%). Assisted mechanical ventilation required in 40(40%) babies while 60(60%) required no ventilation. Out of 100 patients 35(35%) were expired. 65 babies survived and discharged home (65%). Causes of death were: Pneumothorax 13(13%), Sepsis 22(22%).

DISCUSSION

In our study, the most common complication was sepsis (secondary bacterial infection), in 36% of babies. Although meconium aspiration is also associated with secondary bacterial pneumonias due to microorganisms, these babies also developed infections due to other factors. A probable reason for development of bacterial infection was improper handling of these babies in nursery. These babies received multiple pricks for blood sampling and also regular examination of these babies by doctors and staff nurses without washing hands. Another important reason may be their close proximity to other babies in nursery who actually had sepsis. This was also shown by the blood culture results of these babies which showed growth of microorganisms like Klebsiella and Staphylococcus aureus. This was contrary to the usual pathogens associated with MAS. Only two babies had growth of Escherichia Coli.

Pneumothorax was found to be the 2nd most arisen complication, seen in 25% of babies, which is close to another study done by Greenbough et al,¹⁴ it was shown to be 15-33% in infants with MAS. In our study, patients with MAS(40%) were required assisted mechanical ventilation which is closely related to an international study done by Goldsmith JP¹⁵.

Regarding the in-hospital outcome of MAS patients, in our study, the major cause of death was sepsis (22%) followed by pneumothorax (13%). In this study, total mortality was 35% which is comparable to local study (32%) done by Anwar Z et al¹⁶ but very high as compared to an international study (4.6%) done by Liu WF and Harrington T¹⁷. This is because of overcrowding, overworked, inadequate staffing and improper perinatal services. Pneumothorax is an acute fetal condition, if untreated, and it requires urgent management by needle and chest tube insertion. Increase mortality was due to unavailability of specialist care from pediatric surgery.

This study also highlighted some other important variables like risk factors for MAS. The most common was postmaturity, in 36% as in other studies which show an increase incidence of MAS after 40 weeks of gestation. It is important to note that avoidance of post mature pregnancy is a preventable factor in MAS.

Another factor was poor APGAR score, in 45% patients. It has been recognized that this reduction in APGAR might be due to intrapartum suctioning of baby, when head is delivered, by obstetrician who suppresses spontaneous breathing. This intrapartum suctioning is no longer recommended now. This poor

APGAR score is related to complication like pneumothorax. As far as good outcome is concerned, combined obstetric and pediatric care can lead to prevention and, if it occurs, reduced severity of meconium aspiration syndrome with low complication rate could be possible with the use of broad spectrum antibiotics and assisted mechanical ventilation and this will lead to decrease mortality.

CONCLUSION

Meconium aspiration syndrome is a leading cause of neonatal morbidity and mortality but it can be prevented by giving appropriate peri-natal care to high risk pregnancies and by use of broad spectrum

antibiotics and assisted mechanical ventilation in patients who developed complications with MAS.

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