

Original Article

FREQUENCY OF COMPLICATIONS IN MECONIUM ASPIRATION SYNDROME IN HOSPITALIZED BABIES

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Objective: To assess the frequency of complications in neonates with the diagnosis of meconium aspiration syndrome (MAS).

Methods: A Neonates presented with respiratory distress along with meconium staining of vocal cords and body on 1st day of life was admitted in Neonatology Ward of Services Hospital. Neonates with dysmorphic features, congenital abnormalities of heart & lungs and those having risk factors for sepsis were excluded from the study. A predesigned proforma was used to record clinical data on presentation. This included necessary information like gestational age, weight, gender, signs of post term baby and mode of delivery. The proforma was updated on daily basis to make note of any complications arising during the course of hospital stay till outcome (discharge, leave against medical advice or death). Arterial blood gases (ABGs) were done daily to look for persistent hypoxia and Echocardiography was performed when ABGs and clinical examination suggested development of persistent pulmonary hypertension of newborn (PPHN). Chest x-ray was done at the time of admission and repeated if clinical findings were suggestive of pneumothorax. Other investigations like blood culture were sent when there was clinical suspicion of sepsis. The data was subsequently computed and analyzed using SPSS (Statistical Package for the Social Sciences) version 10 by the authors.

Results: 175 babies with meconium aspiration were included in the study. Complications like pneumothorax was observed in 28 babies (16%), persistent pulmonary hypertension of newborn (PPHN) in 35 (20%), respiratory failure in 21 (12%) and sepsis in 27 patients (15.4%). 45 patients died (25.7%), 90 were discharged home (51.4%) and 40 were referred to other hospitals (22.8%).

It was observed that commonest risk factor for MAS was post-maturity, found in 40% with poor APGAR score in 35.4%. There was no significant difference in morbidity between males and females.

Conclusions: It was observed that meconium aspiration syndrome (MAS) is a leading cause of neonatal morbidity and it can be prevented by giving appropriate peri-natal care to high risk pregnancies, vigilance and timely intervention in delivery room.

Keywords: Meconium aspiration, Syndrome, Morbidity, Risk factors, Pneumothorax, Pulmonary Hypertension/persistent, Newborn.

Introduction

Meconium aspiration syndrome (MAS) is a medical condition affecting term and post term (>42 weeks of gestation) babies. It occurs when meconium (the first intestinal discharge of new born) is inhaled in lungs before, during or immediately after delivery. The incidence of MAS is 1.7-35% of neonates born through meconium stained amniotic fluid¹ (MSAF). Meconium staining of the amniotic fluid occurs in approximately 13% of live births; this percentage increases with increasing gestational age at delivery.²

Meconium is normally stored in the neonate's intestine until after birth but sometimes during

prolonged and difficult deliveries, infant often expels meconium into amniotic fluid. This also causes an interference with the supply of oxygen through placenta; as a result, neonate often initiates vigorous respiratory movements' in-utero. Under these circumstances, the baby may aspirate amniotic fluid/meconium which is drawn into respiratory tree with considerable respiratory morbidity.

Many perinatal risk factors have been associated with meconium aspiration, including placental insufficiency, maternal hypertension, maternal tobacco use and mode of delivery² (cesarean section). But, perhaps, the most significant factor is post term delivery. At least one third of infants with MAS

MAS is one of the important causes of neonatal respiratory problems eventually leading to increased neonatal morbidity and mortality thus adding to the burden, physical, financial & psychological for doctors, hospitals and parents respectively. Important complications include air leaks (pneumothorax, pneumomediastinum), persistent pulmonary hypertension (PPHN), sepsis and respiratory failure. In this study, the aim is to assess the frequency of complications in early days of life of neonate with MAS and to know the magnitude of this problem, In turn, forming a liaison with Obstetric department to develop better antenatal care for pregnant women with risk factors and proper resuscitation to babies born through MSAF, thus helping to decrease the morbidity.

Methods

This observational (descriptive case series) study was carried out in the Neonatal Unit of Services Hospital, Lahore over a six months period, from December 2009 to May 2010. 175 neonates, based on non-probability purposive sampling, presenting with respiratory distress along with meconium staining of vocal cords and body on 1st day of life were included in the study. All deliveries were attended by specialist pediatrician and babies were resuscitated according to standardized protocols used for these neonates. Neonates who were admitted were shifted to Nursery within 30 minutes of delivery. Neonates presented with respiratory distress who had dysmorphic features on clinical examination, congenital heart diseases (VSD, PDA, TOF) diagnosed clinically and on Echocardiography, congenital lung diseases (congenital pneumonias, diaphragmatic hernias) diagnosed clinically and on chest x-ray and risk factors for sepsis e.g, PV leaking >18 hours, chorioamnionitis, maternal fever >38.8°F assessed on history were excluded from the study. Informed consent from parents was taken and risks and benefits of study were explained. Apart from presenting complaints, necessary information like age & weight of neonate at presentation, gestational age along with signs of post maturity (dry wrinkled skin, overgrown nails, prominent creases in palm and soles) and mode of delivery was noted. On admission clinical status of neonate was assessed and after this they were examined daily and investigated (ABG's, Echocardiography, Blood culture & chest x-rays) for assessment of complications (pneumothorax, PPHN, sepsis)

based on clinical suspicion for seven days

Investigations like ABG's and blood culture were taken by standardized sampling techniques and checked on sophisticated equipment in same laboratory to minimize alteration in results. Likewise chest x-ray and echocardiography were done and reported by same radiologist specialized in pediatric imaging and pediatric cardiologist respectively. These investigations were done free of cost in the hospital. Information regarding data of patient and development of complications were entered in a preformed proforma that was updated on daily basis until outcome (discharge, death of left against medical advice, referral). Statistical analysis was carried out using the SPSS 10 programme. Descriptive statistics were applied in the form of frequencies and percentages for qualitative variables and mean & standard deviation for quantitative variables. As study was descriptive case series so no test of significance was applied.

Results

In this study, 175 patients with meconium aspiration syndrome were observed for first 7 days of their life. As far as gender was concerned, 118 babies were male (67.5%) and 57 were female (32.5%). Out of 175 patients, 90 babies survived and discharged home (51.4%), 45 (25.7%) were expired, while 40 were referred to other hospitals (22.8%) **Fig-I**. About 60% of patients were born at term while 40% were post mature. Most of the patients were delivered by cesarean section 91 (52%), 79 babies were delivered by spontaneous vaginal delivery (45%) and 5 by forceps delivery (3%). Commonest risk factor for meconium stained amniotic fluid and meconium aspiration was post maturity (40%) with other risk factors including poor Apgar score (35.4%), maternal hypertension (19%), maternal diabetes mellitus (4%) and in about 0.6% no obvious risk factor was found.

Complications **Table-I** due to MAS were pneumothorax in 28 babies (16%), PPHN in 35 babies (20%). 27 babies developed sepsis proved on blood culture (15.4%). Another complication observed was respiratory failure, in 21 babies (12%). 64 babies developed no complication (36.6%). Major Cause of death was pneumothorax followed by PPHN and sepsis as shown in the **Table-II**. Sepsis was associated with different microorganisms which were isolated on blood culture in these babies are shown in **Fig-II**.

Apart from pneumothorax, serial chest x-rays also showed air trapping and hyper expansion in 52 babies

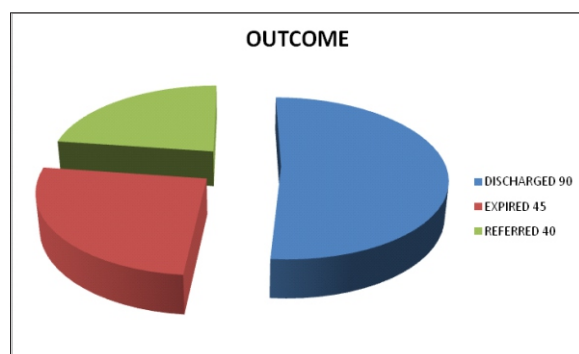


Fig-1: Outcome of MAS.

Table-1: Frequency of complications in MAS.

Complications	No. of Patients (Frequency n=175)	Percentage
PPHN	35	20%
Pneumothorax	28	16%
Sepsis	27	15.4%
Respiratory Failure	21	12%
No complications	64	36.6%

Table-2: Causes of death in newborns with MAS.

Causes of Death	No. of Patients n=45)	Percentage
Pneumothorax	20	11.4%
PPHN	15	8.6%
Sepsis	10	5.7%

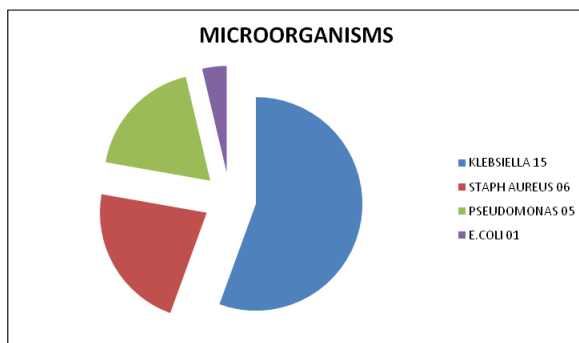


Fig-2: Blood culture pattern.

Discussion

Meconium aspiration syndrome (MAS), as we know it, is a problem found all over the world, irrespective of race and ethnicity. MAS is a major issue regarding respiratory morbidity in neonatal intensive care units (NICU) everywhere in the world but has been efficiently dealt, with proper antenatal obstetrical care and better facilities available for post-natal management of newborns

having this condition like extracorporeal membrane oxygenation (ECMO). In Pakistan, it has been a leading cause of admissions in NICU, found to be the 5th in list in a study done by Prakash et al⁴ in Karachi after infections, asphyxia, jaundice and prematurity. The disease is characterized by small airway obstruction which produces early onset of respiratory distress in a meconium stained infant with tachypnea, chest retraction, grunting, cyanosis,⁵ poor lung compliance and hypoxemia clinically and patchy opacification and hyperinflation radiologically.⁶ However, in developing countries like Pakistan, where health facilities are still not enough and limited only to developed cities, there is substantial morbidity and mortality caused by this condition.

In this study, the objective was to assess the pattern of complications, which arise in first 7 days of life in newborns admitted with MAS. Most common complication observed was persistent pulmonary hypertension of newborn (PPHN), in 20% of babies with MAS. Many babies who developed PPHN also had poor APGAR scores at delivery. This showed that hypoxia is an important contributor in the development of PPHN. It was also shown by Bhatt RY et al⁷ in India. They observed that 15.5% of babies with MAS developed PPHN.⁷

Pneumothorax was found to be the 2nd most arisen complication, seen in 16% of babies, which is close to another study done by Razzaq⁸ in Multan, where it was 13.3%. However in a study done by Green bough et al⁹, it was shown to be 15-33% in infants with MAS. Our study differs from this international study, perhaps due to less use of mechanical ventilation, as this is an important risk factor for development of pneumothorax, and our unit does not have enough ventilatory support for these babies. The third major complication was sepsis (secondary bacterial infection), in 15.4% of babies. These babies had no ante-natal risk factors for sepsis like PV leaking, chorioamnionitis etc. Although meconium aspiration is also associated with secondary bacterial pneumonias due to microorganisms like *Listeria monocytogenes* and *Escherichia Coli*, these babies developed infection 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. 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*

aureus. This was contrary to the usual pathogens associated with MAS. Only one baby had growth of *Escherichia Coli*.

Another complication which was observed was respiratory failure in 12% of babies. Mortality was found to be 25.7% in this study; it is very high as compared to 5% mortality shown by Velaphi et al¹⁰ in their study, and 20% by Razzaq³ in Multan. In one study, it was found that 9.7% of babies with MAS develop respiratory failure and required assisted ventilation¹¹. Again it might be due to insufficient facilities for managing these babies, and also due to a large burden of neonates which our nursery is receiving apart from MAS in a very small set up. A large number of patients were referred to other hospitals (22.8%) because proper NICU care was not available. 51.4% babies survived and discharged home. Among these, 36.6% babies developed no complications. Major cause of death was pneumothorax (11.4%) followed by PPHN (8.6%). 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 post maturity, in 40% as in other studies which show an increase incidence of MAS after 40 weeks of gestation¹⁰. It is important to note that avoidance of post mature pregnancy is a preventable factor in MAS. In one prospective study, a decrease in incidence of MAS from 5.8% to 1.5% over an 8 year period was attributed to a reduction in births at more than 41 weeks of gestation.¹² Another factor was poor Apgar score, in 35.4% 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 also related to complications like PPHN and pneumothorax as discussed above.

In this study we have not assessed the co-relation and association of various obstetrical aspects (duration of labor, type of delivery, indications of cesarean section, and intra partum causes of poor Apgar score) with the development of complications in the neonates with MAS because these important associations should be studied in a large multicentric research to specify obstetrical risk factors related to development of

complications.

As far as good outcome is concerned, combined obstetric and pediatric care can lead to prevention and reduced severity of meconium aspiration syndrome with low complication rate and decrease mortality.

Conclusion

It is unlikely that the incidence of meconium passage will decrease substantially. It is important that all health care professionals who attend deliveries should have an understanding of the controversies surrounding the management of meconium-stained amniotic fluid and be well versed in the proper obstetric and neonatal interventions. On the basis of above observations, following recommendations and conclusions can be drawn:

- Proper obstetrical care in the form of identification and monitoring of high risk pregnancies with MSAF, management of pregnancy at 41 weeks' gestation to avoid post-term delivery, decreases the risk of MAS.
- Good postnatal care starting from delivery room to neonatal unit can control much of the morbidity as well as co-morbid conditions like birth asphyxia associated with MAS. The complication should be kept in mind while managing these newborns.
- Newborns with MAS require supportive therapy for the cardiopulmonary system including oxygen supplementation and possibly mechanical ventilation. In this case, staff of NICU, especially doctors, should be well trained in handling ventilators.
- Intensive efforts should be taken for those who develop pneumothorax, alongwith liaison with pediatric surgeons in managing these babies.

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Medical News

ANEMIA MAY RAISE RISK OF DEATH FOR STROKE PATIENTS

Older adults who have had a stroke may be at greater risk of death if they have anemia. This is the conclusion of a new study published in the *Journal of the American Heart Association*.

Stroke affects more than 795,000 Americans each year, and it is a leading cause of long-term disability in the United States. Around 87 percent of all strokes are ischemic, whereby the artery that supplies oxygen-rich blood to the brain becomes blocked. When an artery in the brain leaks or ruptures, this is known as hemorrhagic stroke. According to the research team - including senior author Dr. Phyto Myint of the University of Aberdeen in the United Kingdom - many patients who have experienced stroke have anemia. Anemia is a condition characterized by low levels of circulating red blood cells or hemoglobin, which causes a reduction in the amount of oxygen that is transported to the body's organs and tissues. Signs and symptoms of anemia include fatigue, headache, pale skin, dizziness, shortness of breath, coldness in the hands and feet, and chest pain.

While anemia can affect any age group, pregnant women and older adults are at increased risk for the condition.

For their study, Dr. Myint and colleagues set out to investigate how anemia may impact risk of death following stroke. Twofold risk of death for stroke patients with anemia. The researchers analyzed the data of 8,013 adults of an average age of 77, all of whom had been admitted to the hospital with acute stroke between 2003-2015. The team looked at how participants' levels of hemoglobin - a protein in red blood cells that carries

oxygen - and incidence of anemia influenced their risk of death in the year after their stroke. On hospital admission for stroke, the researchers found that around 25 percent of patients had anemia, and this increased their risk of death over the following year. Among patients who had ischemic stroke, the risk of death was increased twofold for those with anemia, compared with ischemic stroke patients who did not have anemia. Hemorrhagic stroke patients who had anemia were at 1.5 times greater risk of death. Furthermore, the researchers found that higher hemoglobin levels among patients were associated with poorer stroke outcomes and increased risk of death, particularly in the first month after stroke. This finding, the team says, suggests that both low and high hemoglobin levels may raise stroke patients' risk of death. The researchers' findings were further confirmed with a systematic review of 20 studies - involving almost 30,000 patients - that looked at the link between anemia and stroke outcomes. Overall, the authors say their research highlights the importance of anemia prevention, diagnosis, and treatment for stroke patients. "One example of an intervention might be treating the underlying causes of anemia, such as iron deficiency, which is common in this age group," says co-author Raphae Barlas, also of the University of Aberdeen.

"As the study has convincingly demonstrated, anemia does worsen the outcome of stroke, so it is very important that we identify at-risk patients and optimize the management."