

## Original Article

## EARLY NEONATAL MORBIDITY IN MECONIUM ASPIRATION SYNDROME

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**Objective:** To assess the frequency of early morbidity in neonates with meconium aspiration syndrome.

**Material and Methods:** Neonates presented with respiratory distress along with meconium staining of vocal cords and body on 1st day of life were admitted in Neonatology Ward of Services Hospital. Neonates with dysmorphic features, congenital abnormalities of heart & lungs and 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 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 analyzed using SPSS (Statistical Package for the Social Sciences) version 20.0.

**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%. About 60% patients were born at term while 40% were post mature. There was no significant difference in morbidity between males and females.

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

**Key words:** Meconium aspiration, syndrome, morbidity, risk factors, pneumothorax, pulmonary hypertension newborn

### Introduction

Meconium aspiration syndrome (MAS) is a medical condition affecting term and post term 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 fluid<sup>1</sup> (MSAF). Meconium staining of the amniotic fluid occurs in approximately 13% of live births; this percentage increases with increasing gestational age at delivery.<sup>2</sup> 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 delivery<sup>2</sup> (cesarean section). But, perhaps, the most significant factor is post term delivery. At least one third of infants with MAS require intubations and mechanical ventilation.<sup>3</sup>

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 of

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 infant 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.

### Materials & Methods

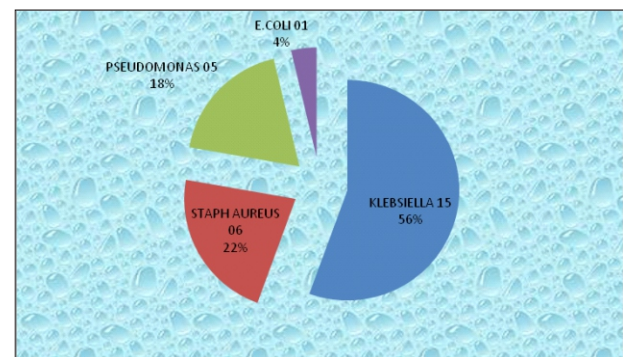
This observational (descriptive case series) study was carried out in the Neonatal Unit of Services Hospital, Lahore over a six months period, from December 2009 to May 2010. 175 neonates, based on non-probability purposive sampling, presenting with respiratory distress along with meconium staining of vocal cords and body on 1st day of life were included in the study. 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 and gestational age & 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.

Neonates were examined daily and investigated (ABG's, Echocardiography, Blood culture & chest x-rays) for assessment of complications based on clinical suspicion. 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

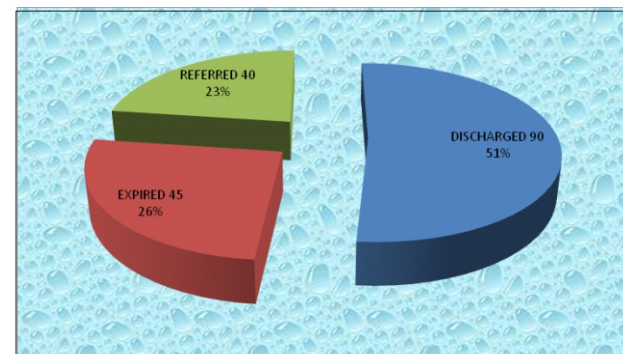
respectively. These investigations were done free of cost in the hospital. Information regarding data of patient and development of complications were entered in a preformed proforma that was updated on daily basis until outcome (discharge, death of left against medical advice, referral). Statistical analysis was carried out using the SPSS 10 programme. Qualitative variable were express in the form of frequencies and percentages were applied while for standard deviations 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-1**). 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



**Fig-1:** Blood culture pattern.



**Fig-2:** Outcome of mas.

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-1**) 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 which was 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-2**) Sepsis was associated with different microorganisms which were isolated on blood culture in these babies are shown in **Fig-2**) Apart from pneumothorax, serial chest x-rays also showed air trapping and hyper expansion in 52 babies (29.7%), diffuse infiltration in 17 (9.7%) with atelectasis in 8%. No changes were observed in 64 babies (36.6%).

**Table-1:** Frequency of complications in MAS

Causes of death	No of Patients	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	Percentage
Pneumothorax	20	11.4%
PPHN	15	8.6%
SEPSIS	10	5.7%

## 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 ECMO. In Pakistan, it has been a leading cause of admissions in NICU, found to be the 5<sup>th</sup> in list in a study done by Prakash et al<sup>4</sup> in Karachi after infections, asphyxia, jaundice and prematurity. The disease is spiratory failure and required assisted ventilation<sup>11</sup>. 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 gestation<sup>10</sup>. 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.<sup>12</sup> 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.

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 and decrease mortality.

## Conclusion

It is unlikely that the incidence of meconium passage will decrease substantially. If MAS and its various complications are to decrease, 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, implementation of performing intrapartum amnioinfusion along with management of pregnancy at 41 weeks' gestation to avert 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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## References

1. Gupta V, Bhatia BD, Mishra OP. Meconium stained amniotic fluid: Antenatal, intra-partum and neonatal. *Indian Pediatr* 1996; 33:293.
2. Walsh MC, Faranoff JM. Meconium stained fluid: approach to the mother and baby. *Clin Perinatol*. 2007; 34(4):653-65.
3. Bhutani VK, Chima R, Sivieri EM. Innovative neonatal ventilation and meconium aspiration syndrome. *Indian J Pediatr*. 2003; 70:421-27.
4. Parkash J, Das N. Pattern of admissions to neonatal unit. *Journal of the College of Physicians and Surgeons Pakistan*. 2005; 15:341-344.
5. Dudell GG, Stoll BJ. Respiratory tract disorders. In: Kliegman RM, Behrman RE, Jenson HB, Stanton BF, editots, *Nelson Textbook of Pediatrics*. 18th ed. Philadelphia: Saunders; 2007. p.742-43.
6. Cleary GM, Wiswell TE. Meconium stained amniotic fluid and the meconium aspiration syndrome: an update. *Pediatr Clin North Am*. 1998; 45:511-529.
7. Bhat RY, Rao A. Meconium stained amniotic fluid and meconium aspiration syndrome: a prospective study. *Ann Trop Pediatr*. 2008; 28(3):199-203.
8. Razzaq A. Early neonatal morbidity and mortality in meconium aspiration syndrome [dissertation]. Multan: Nishtar Medical College; 2007.
9. Greenough A, Pulikot A, Dimitriov G. Prevention and management of meconium aspiration syndrome - assessment of evidence based practice. *Eur J Pediatr* 2005; 164(5): 329-30.
10. Velaphi S, Vidyasagar D. Intra-partum and post delivery management of infants born to mothers with meconium-stained amniotic fluid: evidence-based recommendations. *Clin Perinatol*. 2006; 33(1):29-42.
11. Clark RH. The epidemiology of respiratory failure in neonates born at an estimated gestational age of 34 weeks or more. *J Perinatol* 2005; 25: 251-257.
12. Yoder BA, Kirsch EA, Barth WH, Gordon MC. Changing obstetric practices associated with decreasing incidence of meconium aspiration syndrome. *Obstet Gynecol*. 2002; 99(5pt1):731-9.