



**EFFECT OF MECONIUM
ASPIRATION IN NEW BORN**

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Child Mortality in World and Africa, In Present time.

- ◆ Global child mortality has dropped by 53% - from 12.7 million in 1990 to 5.9 million in 2015.
- ◆ Sub-Saharan Africa still has the highest child Mortality rates in the world.
- ◆ South Africa has reduced its child mortality rate from 60 deaths per 1000 live births in 1990 to 41 in 2015. Though the MDG target is 20.



Meconium Aspiration in Babies - Born in HIV positive mothers.

- Study done in Stanger Provincial Hospital, Durban, South Africa
- Time Period- 2011 to 2013.
- 500 New born having Meconium Aspiration were closely studied in NICU and Neonatal ward.
- Most of NICU admitted babies mothers were HIV positive.



Meconium Aspiration in HIV positive mother's Baby.

- ◆ Our Study is to find if HIV positive mothers babies are more prone to Meconium Aspiration?
- ◆ As in our NICU and Neonatal ward patient's mothers, 80% of them are HIV positive
- ◆ They were already on ARV or newly on ARV.
- ◆ Some of the mothers were diagnosed in the 3rd trimester of pregnancy.



Meconium Aspiration in HIV positive mother's Baby.

- ◆ Total Neonatal ward and NICU admission in Stanger Hospital was around 2000 in two years time, out of them approximately ¼th, around 500 were diagnosed as MAS.
- ◆ 80% of all admission of New born baby's mother were HIV positive.



Meconium Aspiration

- ◆ Meconium Aspiration means-
- ◆ When a newborn inhales a mixture of the miconium and amniotic fluid, either in the uterus or just after birth.





Meconium Aspiration

What is Meconium

Meconium is the medical term for the newborn infant's first stool.

Meconium is composed of amniotic fluid, mucus, lanugos' (the fine hair that covers the baby's body), bile, and cells that have been shed from the skin and the intestinal tract.

Consistency of Meconium - is thick, greenish black, and sticky.

Amniotic Fluid



- ◆ What is Amniotic Fluid-
- ◆ This fluid is a clear, slightly yellowish liquid that surrounds the unborn baby (fetus) during pregnancy -- it is contained in the amniotic sac inside the uterus.
- ◆ The fetus floats in the amniotic fluid. During pregnancy the amniotic fluid increases in volume as the fetus grows. Amniotic fluid volume is greatest at approximately 34 weeks of gestation, when it averages 800 ml. Approximately 600 ml of amniotic fluid surrounds the baby at full term (40 weeks gestation).

Incidence of Meconium Aspiration

- ◆ Meconium stained baby found in 10-15% of all births.

@The possibility of inhaling meconium occurs in and around 10% of all births.

- ◆ Its generally happens after 34 to 42 weeks of gestation.

- ◆ 30% of them needs ventilation.



◆ Epidemiology



- ◆ In the industrialized world, meconium in the amniotic fluid can be detected in 8-25% of all births after 34 weeks' gestation. Of those newborns with meconium-stained amniotic fluid, approximately 10% develop meconium aspiration syndrome.

◆ Epidemiology

- ◆ In developing countries with less availability of prenatal care and where home births are common, incidence of meconium aspiration syndrome is thought to be higher and is associated with a greater mortality rate.



Factors that promote the passage of meconium in utero include the following:

Placental insufficiency

Maternal hypertension

Preeclampsia

Oligohydramnios

Maternal drug abuse, especially of tobacco and cocaine

Maternal infection/chorioamnionitis

Fetal gasping secondary to hypoxia

Inadequate removal of meconium from the airway prior to the first breath

Use of positive pressure ventilation (PPV) prior to clearing the airway of meconium



Causes of Miconium Aspiration

- ✦ It typically occurs when the fetus is stressed during labor,
- ✦ During a stressful labor, an infant may suffer a lack of oxygen. This can cause increased movement of the infant's intestines and relaxation of the anal sphincter, causing meconium to pass into the amniotic fluid surrounding the unborn baby .That is the **FIRST** stool of the Baby before birth.
- ✦ The amniotic fluid and meconium mix to form a green-stained fluid of various thickness .
- ✦ If the infant breathes while still in the uterus or while still covered by this fluid after birth, the mixture of meconium and amniotic fluid can be inhaled into the lungs ,and that is
- ✦ **MICONIUM ASPIRATION.**



Path physiology of Meconium Aspiration.

- ◆ The inhaled meconium can cause a partial or complete blockage of the airways, causing difficulty breathing and poor gas exchange in the lungs.
- ◆ In addition, the substance is irritating and causes inflammation in the airways and potentially, causes chemical pneumonia.

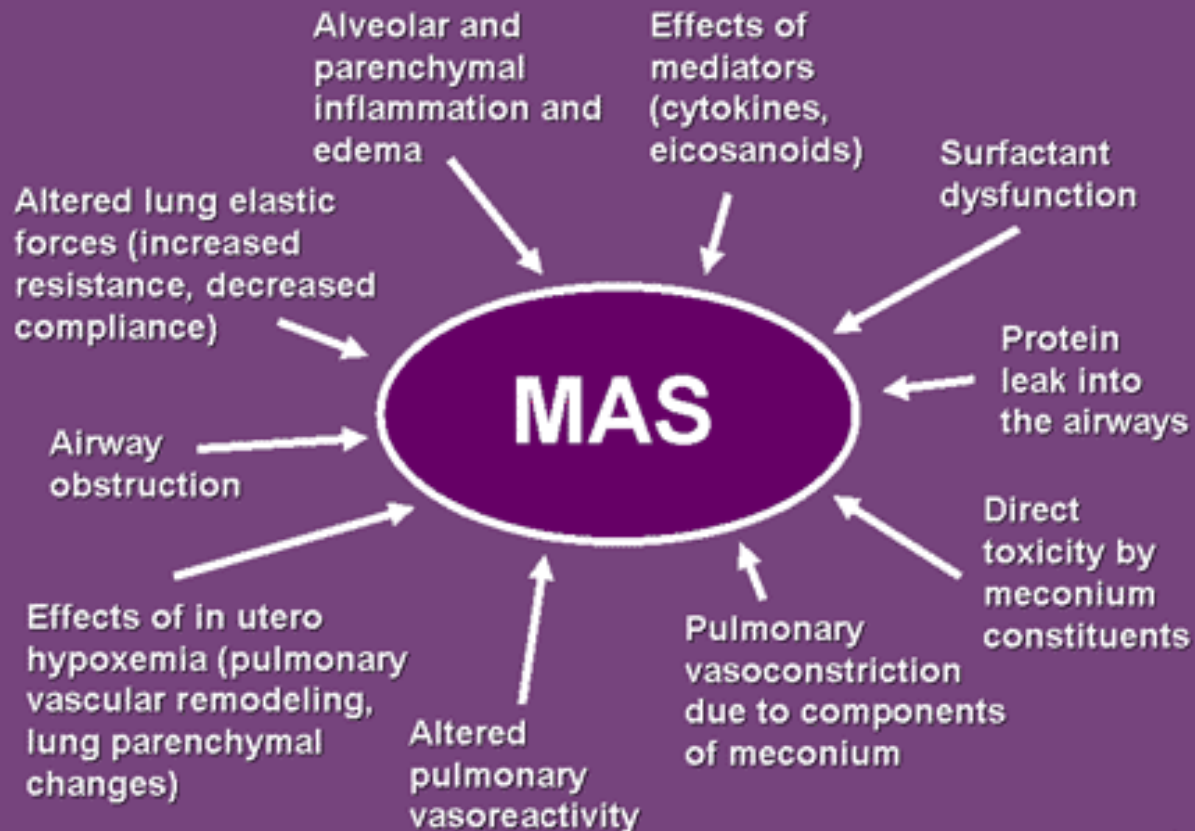


Path physiology of Meconium Aspiration

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MAS Pathophysiology



◆ Effect of Meconium Aspiration-

- ◆ Meconium particles in the amniotic fluid can block small airways and prevent the exchange of oxygen and carbon dioxide after birth. Some babies have immediate respiratory distress and Others develop respiratory distress within a few hours.
- ◆ The plugged airways may cause air to be trapped and leak into the tissues in and around the lungs. Infection can also occur causing pneumonia .



Symptoms include the following:

- Alar flaring
- Cyanosis
- Tachypnea
- Intercostal retractions
- Barrel chest in the presence of air trapping
- Auscultated rales and rhonchi (in some cases)
- End-expiratory grunting



Signs of Meconium Aspiration

- ✦ dark greenish staining of the amniotic fluid or the obvious presence of meconium in the amniotic fluid .
- ✦ infant's skin stained greenish (occurs if meconium passed a long period before delivery)
- ✦ Umbilicus and nails of the newborn will be greenish rather than white or yellowish.
- ✦ infant appears limp at birth –means lathergic
- ✦ bluish skin color in the infant (cyanosis)
- ✦ rapid breathing (tachypnea)
- ✦ labored breathing (the infant needs to work hard to breathe)
- ✦ absence of breathing (apnea)
- ✦ the infant may show signs of post-maturity (weight loss, peeling skin)
- ✦ Definitely will have low Apgar score.



SIGN AND PHYSICAL EXAMINATION OF THE INFANT

- ◆ Direct visualization of the vocal cords for meconium staining with a laryngoscope in the delivery room is the most accurate evaluation for possible meconium aspiration.
- ◆ The diagnosis may be aided by listening to the infant's chest with a stethoscope (auscultation) and hearing abnormal breath sounds, especially coarse, crackly sounds.



Investigation or Test

- ◆ blood gas analysis showing low blood pH (acidosis, an acidic condition of the blood), decreased pO₂ and increased pCO₂ .
- ◆ a chest X-ray showing patchy or streaky areas on lungs .



X-RAY Findings



chest X-ray showing patchy or streaky areas on lungs



Management of Meconium Aspiration

- ◆ Specific treatment based on the following:
 - ◆ the amount and thickness of the meconium
 - ◆ the length of time the baby was exposed
 - ◆ the degree of respiratory distress
- ◆ **At delivery**, treatment may include:
 - ◆ suctioning of the upper airways (MNO-mouth, nose, and oropharynxes)
 - ◆ suctioning of the lower airways through an endotracheal tube (ET) placed in the windpipe
 - ◆ supplemental oxygen given by face mask or mechanical ventilator



The American Academy of Pediatrics Neonatal Resuscitation Management Guide lines- 1

- ◆ If the baby is not vigorous (defined as depressed respiratory effort, poor muscle tone, and/or heart rate <100 beats/min): Use direct laryngoscopy, intubate, and suction the trachea immediately after delivery. Suction for no longer than 5 seconds. If no meconium is retrieved, do not repeat intubation and suction. If meconium is retrieved and bradycardia is persist, reintubate and continue suction. If the heart rate is low, administer positive pressure ventilation and consider suctioning again later.

Treatment Guidelines- 2

◆ If the baby is vigorous (defined as normal respiratory effort, normal muscle tone, and heart rate >100 beats/min): we should not electively intubate. Clear secretions and meconium from the mouth and nose with a bulb syringe or a large-bore suction catheter is enough.

◆ In both cases, the remainder of the initial resuscitation steps should ensue, including drying, stimulating, repositioning, and administering oxygen as necessary.



Treatment Guidelines- 3 in NICU

- Maintain an optimal thermal environment to minimize oxygen consumption-by keeping in incubator.
- Minimal handling is necessary as these infants are easily agitated. Which can cause right-to-left shunting, leading to hypoxia and acidosis.
- Sedation is often necessary to decrease the agitation.



NICU- 2

- Continue respiratory care. Oxygen therapy via hood or positive pressure is crucial in maintaining adequate arterial oxygenation. Mechanical ventilation is required by approximately 30% of infants with meconium aspiration syndrome.⁸ Make concerted efforts to minimize the mean airway pressure and to use as short an inspiratory time as possible. Oxygen saturations should be maintained at 90-95%.



Management in NICU

- Ensure adequate oxygen carrying capacity by maintaining the hemoglobin concentration above 13 g/dL.
- Corticosteroids are not recommended. The evidence supporting the use of steroids and thiophylline in the management of meconium aspiration syndrome is insufficient.¹¹
- ECMO is used if all other therapeutic options have been exhausted. Although effective in treating meconium aspiration syndrome, ECMO is associated with a high incidence of poor neurologic outcomes.



Treatment Guidelines- Cont.

- ◆ Surfactant therapy is now commonly used to replace displaced or inactivated surfactant and as a detergent to remove meconium. Although surfactant use does not appear to affect mortality rates, it may reduce the severity of disease and progression to extracorporeal membrane oxygenation (ECMO).⁹ Studies are ongoing to evaluate the potential role of pulmonary lavage with surfactant.



Treatment Guidelines- Cont.

- For treatment of persistent pulmonary hypertension of the newborn (PPHN), inhaled nitric oxide is the pulmonary vasodilator of choice.
- Pay careful attention to systemic blood volume and blood pressure. Volume expansion, transfusion therapy, and systemic vasopressors are critical in maintaining systemic blood pressure greater than pulmonary blood pressure, thereby decreasing the right-to-left shunt through the patent ductus arteriosus.



Prevention

Obstetricians should monitor fetal status in an attempt to identify fetal stress.

- When meconium is detected, amnioinfusion with warm, sterile saline is theoretically beneficial to dilute the meconium in the amniotic fluid, thereby minimizing the severity of the aspiration. However, current evidence does not support routine amnioinfusion to prevent meconium aspiration syndrome.^{4,5}



Prevention

- Current recommendations no longer advise routine intrapartum suctioning for infants born to mothers with meconium staining of the amniotic fluid. {Ref1}⁶
- When aspiration occurs, intubation and immediate suctioning of the airway can remove much of the aspirated meconium.



Movies

↪ Suction before delivery of full body 1

▶ Suction before delivery of full body 2

▶ Endotracheal Suction



Complication- 1

- ◆ **Expectations (prognosis):** Respiratory distress generally subsides in 2 to 4 days, although rapid breathing may persist for days. Infants with severe aspiration that require mechanical ventilation have a more guarded outcome.
- ◆ Lack of oxygen in the uterus or from complications of meconium aspiration may lead to brain damage. The outcome depends on the degree of brain damage. Meconium aspiration rarely leads to permanent lung damage.



Complication-2



aspiration pneumonia

- ◆ pneumothorax (collapsed lung)
- ◆ persistent fetal circulation
- ◆ residual brain damage due to lack of oxygen
- ◆ persistent respiratory distress (breathing difficulty) lasting for several days
- ◆ persistent pulmonary hypertension of the newborn (PPHN) as a result of chronic in utero stress and thickening of the pulmonary vessels.
- ◆ Surviving PPHN babies having persistence hyperinflation-up to 5-10 years of life.

◆ Mortality / Morbidity

- ◆ The mortality rate for meconium aspiration syndrome resulting from severe parenchymal pulmonary disease and pulmonary hypertension is as high as 20%. Other complications include air block syndromes (eg, pneumothorax, pneumomediastinum, pneumopericardium) and pulmonary interstitial emphysema, which occur in 10-30% of infants with meconium aspiration syndrome

Take Home Massage



- ◆ Take good obstetrical history before resuscitate a baby.
- ◆ Suction and good Suction-MNO repeatedly.
- ◆ Use of Conventional Ventilator.
- ◆ Use of Surfactant sufficiently, effectively and timely.
- ◆ Use of High frequency Oscillation ventilation, HFOV
- ◆ Use of iNO₂ and ECMO

Conclusion of Our Study

- ◆ We did Not find any co-relation between MAS and HIV infection of Baby's Mother.
- ◆ But we definitely finds co-relation between HIV infected mothers child with PCP.
- ◆ That is another Study?
- ◆ In developing country like Sub-Shaharan Africa use of CPAP, Ventilator, HPOV, ECMO and even Surfactant is Not available in time of necessary in the Hospital.
- ◆ Reason Morbidity and Mortality are more in Developing Country..





THANK YOU

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