Oshada; Jurnal Kesehatan
https://nawalaeducation.com/index.php/O/index
Volume 2 Nomor 3, June 2025
e-ISSN : 3047-017X
DOI : https://doi.org/10.62872/3432ne55

Meconium Aspiration Syndrome (MAS)

Fetria Faisal [1], Irwandi [2]
[1,2] Faculty of Medicine, Universitas Baiturrahmah, Indonesia
e-mail:
[1]fetria_faisal@fk.unbrah.ac.id
[2]irwandi@fk.unbrah.ac.id

Input : 13 June 2025
Revised : 18 June 2025
Accepted : 25 June 2025
Published : 30 June 2025

ABSTRACT

Meconium Aspiration Syndrome (MAS) merupakan salah satu penyebab utama gangguan pernapasan dan morbiditas pada neonatus, terutama di negara berkembang. Sindrom ini terjadi ketika janin menghirup cairan amnion yang terkontaminasi mekonium, yang dapat menyebabkan obstruksi jalan napas, inflamasi paru, dan infeksi. Artikel ini bertujuan untuk mengulas secara komprehensif aspek etiologi, diagnosis, dan penatalaksanaan MAS berdasarkan temuan terkini. Kajian ini dilakukan melalui tinjauan literatur naratif terhadap 42 artikel ilmiah yang dipublikasikan antara tahun 2015 hingga 2024, diperoleh dari database PubMed, Google Scholar, dan ScienceDirect. Artikel yang diseleksi merupakan publikasi yang relevan dengan fokus pada aspek klinis MAS, termasuk penelitian asli, ulasan sistematis, dan panduan praktik klinis. Hasil kajian menunjukkan bahwa pendekatan diagnosis MAS didasarkan pada temuan klinis dan radiologis, sedangkan penatalaksanaannya melibatkan oksigenasi, ventilasi mekanik, hingga pemberian surfaktan. Artikel ini memberikan kontribusi terhadap literatur yang ada dengan menyintesis perkembangan terkini dalam praktik klinis, serta menekankan pentingnya intervensi dini dan protokol penanganan terstandardisasi guna menurunkan angka morbiditas dan mortalitas pada neonatus dengan MAS.

Keywords: *Meconium Aspiration Syndrome (MAS); Neonatal Respiratory Distress; Hypoglycemia; Neonatal Seizures; Case Report*

INTRODUCTION

Meconium Aspiration Syndrome (MAS) is one of the form disturbance breathing acute in neonates caused by aspiration meconium to in channel breath before, during, or after the birth process. In physiological, meconium should issued after born; however, under conditions certain like stress intrauterine or hypoxia fetus, meconium can released to in fluid amniotic fluid and inhaled by the fetus. Content complex meconium, such as bilirubin, enzymes pancreas, as

well as free fatty acids, can cause obstruction channel breath, deactivate surfactant lungs, and triggers reaction worsening inflammation condition respiration neonates.

Globally, MAS occurs in approximately 5–12% of birth with fluid mixed amniotic fluid meconium (meconium-stained amniotic fluid/MSAF), and 2–9% of MSAF case develops become MAS. In developing countries, including Indonesia, the number of MAS incidents tend to more tall Because limitations facility health, delayed diagnosis, and lack of access to the care unit neonatal intensive care unit (NICU). In Indonesia itself, although epidemiological data national Still limited, report from House Sick education show that MAS is reason significant morbidity and mortality in neonates Enough month, especially those born with history labor problematic.

Management of MAS requires approach multidisciplinary, which depends on the degree severity clinical. Handling covering support oxygen, use of Continuous Positive Airway Pressure (CPAP), ventilation mechanics, up to giving surfactant intratracheal antibiotics can given if suspected existence infection secondary. Although progress technology and neonatal care have improve prognosis, severe MAS cases Still risky cause complications term long like bronchopulmonary dysplasia and disorders neurocognitive. Therefore that's important for power medical, especially doctor young, for understand in a way comprehensive about MAS, starting from etiology, pathophysiology, differential diagnosis, to management clinical. Detection early hypoxia fetus, monitoring pregnancy optimally, as well as management proper delivery is key in effort effective prevention and treatment of MAS.

Meconium aspiration syndrome (MAS) is respiratory distress that occurs in newborns with a history of meconium-stained amniotic fluid (MSAF), where respiratory symptoms cannot be explained by other causes, and are usually accompanied by evidence of meconium aspiration such as coarse crackles, rapid breathing, chest indrawings, cyanosis, or the need for supplemental oxygen immediately after birth. MAS is closely associated with intrauterine hypoxia, and can cause airway obstruction, impaired gas exchange, surfactant inactivation, and inflammatory reactions in the lungs (Guglani et al., 2019).

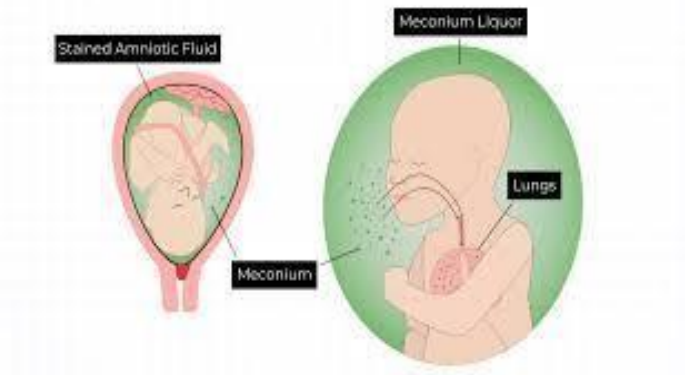


Figure 1. Meconium Aspiration Syndrome

Aspiration meconium can cause obstruction road total breath and partial. Thick and sticky meconium hinder flow air, resulting in atelectasis or hyperinflation local. Besides that, substance chemistry in meconium can damage cell epithelium lungs, deactivate surfactants, and triggers reaction worsening inflammation function lungs (Klinger et al., 2016; Dargaville et al., 2016). In case weight, MAS can also causes Persistent Pulmonary Hypertension of the Newborn (PPHN) (Batra, 2017).

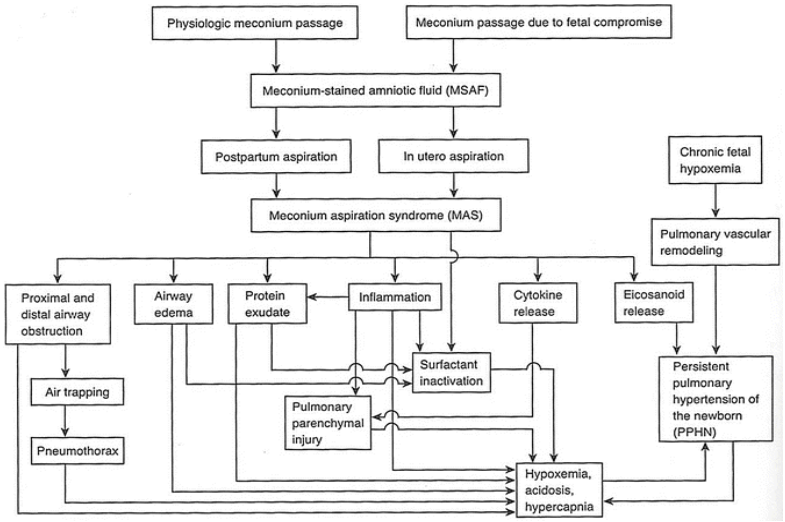


Figure 2. Pathophysiology & Pathogenesis *of Meconium Aspiration Syndrome*

MAS generally occurs in full-term or postterm infants, and is rarely found in premature infants. Exposure to meconium in the amniotic fluid (*Meconium-Stained Amniotic Fluid* /MSAF) is then inhaled into the fetal lungs and causes airway obstruction, inflammation, and impaired gas exchange. In Indonesia, several local studies have stated that *fetal distress* is the dominant cause of intrauterine meconium passage. *Fetal distress* is usually triggered by hypoxia, which causes vagal stimulation, resulting in increased intestinal motility and relaxation of the anal sphincter in the fetus. Fetal hypoxia is often associated with impaired placental perfusion, umbilical cord compression, or excessive uterine contractions (*uterine hyperstimulation*) (Pratama & Winarsih 2019; Mardianingsih et al., 2020).

The older the gestational age (≥ 42 weeks), the higher the likelihood of meconium passage. Meconium is found in amniotic fluid in up to 30–40% of postterm pregnancies. The incidence of MAS increases due to the risk of chronic hypoxia and decreased amniotic fluid volume, which facilitates aspiration. Furthermore, premature rupture of membranes (PROM), hypertension in pregnancy, and prolonged labor have also been identified as factors that can increase the risk of MAS (Pratama & Winarsih 2019; Mardianingsih et al., 2020).

Infants with a birth weight of ≥ 4,000 grams (macrosomia) are more likely to experience prolonged or obstructed labor (dystocia), which increases the risk of fetal hypoxia and *fetal distress,* leading to meconium passage and aspiration. Male fetuses are at higher risk of MAS because the development of male lung function is generally slightly slower than that of female babies, particularly in surfactant production. This makes male babies more susceptible to respiratory disorders, including MAS (Pratama & Winarsih 2019). Some diagnoses are, Anamnesis in MAS cases focuses on the history pregnancy and childbirth. Generally, MAS occurs in infants term or post-term (>40 weeks) with amniotic fluid findings mixed visible meconium (Meconium-Stained Amniotic Fluid/MSAF) cloudy greenish or chocolate. History of fetal distress such as decline pulse heart fetus, decrease movement fetus, or use aids when labor become indicator important. Factor necessary risks noticed covering complications pregnancy like hypertension, gestational diabetes, and infection intrauterine. Baby boy and baby with heavy born ≥ 4,000 grams (macrosmia) also has risk more tall experiencing MAS (Hapsari, 2017). In a way Clinically, MAS is characterized by the appearance of symptoms of respiratory distress. in the first few hours life. Vital signs that are generally found is tachypnea (>60 times/ minute), saturation oxygen <90%, and variability pulse heart depends degrees hypoxia. Inspection show cyanosis, pallor, retraction intercostal, suprasternal, or subcostal, nasal flaring, and grunting when exhalation. Palpation and percussion can show distensi thorax consequence hyperinflation or mediastinal deviation if there is pneumothorax. Auscultation lungs show voice breath decreased in the area of atelectasis, rhonchi rough consequence aspirations meconium, and sometimes accompanied by wheezing or asymmetry voice breath (Hapsari, 2017).

Other signs include hypotonia, lethargy, and reflexes sucking or declining moro consequence hypoxia weight. Color greenish on nails, skin, rope center, or vernix caseous is also common found. Hepatomegaly can appear when happen fail heart right secondary. Inspection radiology thorax is modality main in support the diagnosis of MAS. The findings typical covers infiltrat bilateral rough (patchy infiltrates), overinflation lungs, atelectasis, and possibility pneumothorax or pneumomediastinum (Hapsari, 2017).

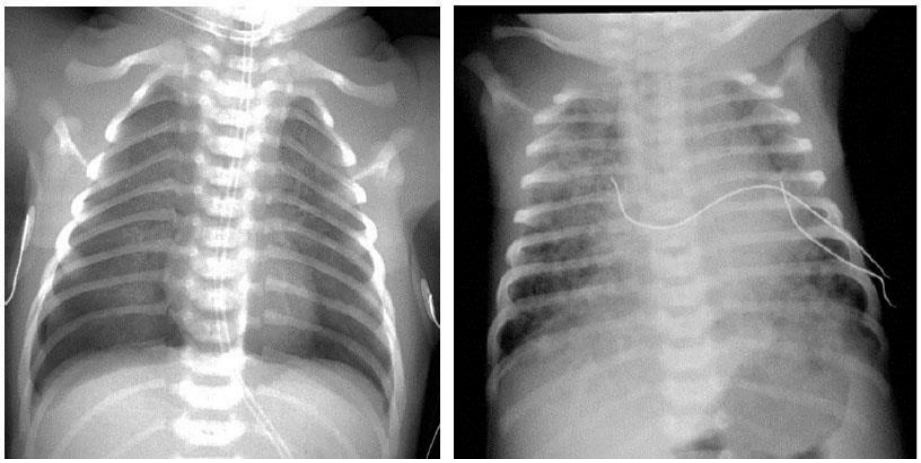


Figure 3. (a) Shows hyperinflation of the lung with an anteromedial pneumothorax on the right. (b) Shows *rope-like perihilar*

Blood gas analysis important for evaluate degrees disturbance respiratory and metabolic. The general results show hypoxemia (low PaO_2), hypercapnia (high $PaCO_2$) and acidosis respiratory or metabolic, especially in cases weight (American Academy of Pediatrics, 2016). Pulse oximetry used for monitor saturation oxygen in a way continuous and as screening beginning for Persistent Pulmonary Hypertension of the Newborn (PPHN), one of the complications serious MAS. In the condition this, pre- and postductal saturation Can show significant difference. If PPHN is suspected, Doppler echocardiography is performed for evaluate pressure arteries pulmonary and differences flow blood side right and left heart. Examination laboratory like blood complete blood count and C-Reactive Protein (CRP) were performed for get rid of infection neonates as a differential diagnosis or complications. Leukocytosis or leukopenia can indicates the presence of an inflammatory process or infections accompanying MAS.

Table 1

Differential Diagnosis Differences

Criteria	MAS	TTN	Congenital Pneumonia	RDS
Anamnesis	- Born at term/postterm - History of meconium stained amniotic fluid (MSAF) - Sign fetal distress	- Born cesarean section without contractions - No there is MSAF - Onset soon after birth	- History of maternal infection (fever, amniotic fluid) broken long) - No there is MSAF	- Born prematurely - No there is MSAF - Onset immediately after birth

Etiology	Meconium aspiration causing obstruction, inflammation, and disturbance surfactant	Fluid absorption late lung	Infection intrauterine (bacteria/virus)	Surfactant deficiency due to lung immaturity
Physical examination	- Tachypnea, retractions, grunting - Cyanosis - Nail/ greenish skin	- Mild tachypnea to moderate - No cyanosis heavy	- Tachypnea - Can accompanied by fever and weakness - Possible hepatosplenomegaly	- Distress heavy breathing: retraction, grunting, nasal flaring - No there is meconium
Supporting investigation	- X-ray: infiltrat rough, overinflation, atelectasis - AGD: hypoxemia, acidosis	- X-ray: interlobar fluid lines, mild hyperinflation - AGD: normal or light	- X-ray: infiltrat diffuse - Laboratory: leukocytosis/leukopenia, CRP Up	- X-ray: ground-glass appearance, diffuse atelectasis - AGD: hypoxemia, acidosis

METODOLOGI

This research adopts a descriptive case report design, aimed at presenting a comprehensive clinical overview of a neonate diagnosed with Meconium Aspiration Syndrome (MAS) at RSUD M. Natsir Solok. The case report method allows for an in-depth analysis of clinical presentation, diagnostic procedures, treatment interventions, and patient outcomes, supported by relevant literature to enhance clinical understanding. The subject of this study is a post-term male neonate who developed signs of respiratory distress shortly after birth. The clinical case was managed in the neonatal care unit of RSUD M. Natsir Solok as part of a pediatric clinical rotation and educational training for senior medical students.

Data were collected retrospectively through medical record review. The collected information included antenatal and delivery history, condition of the amniotic fluid, neonatal vital signs, physical examination findings, as well as laboratory and radiological data. Clinical features such as respiratory distress, blood glucose levels, and daily monitoring records were also analyzed. Several diagnostic tools were utilized to confirm MAS and exclude differential diagnoses, including:

1. Chest X-ray to evaluate for bilateral patchy infiltrates, lung overinflation, atelectasis, or possible complications such as pneumothorax.
2. Blood gas analysis to assess levels of hypoxemia, hypercapnia, and acid-base balance.

3. Pulse oximetry with pre- and post-ductal saturation measurement to detect Persistent Pulmonary Hypertension of the Newborn (PPHN).
4. Doppler echocardiography, if PPHN was suspected, to assess pulmonary artery pressure and intracardiac shunting.
5. Laboratory tests including complete blood count and C-reactive protein (CRP) to evaluate for possible neonatal infection or inflammatory responses.

The patient received oxygen therapy via CPAP, intravenous fluids (Dextrose 10%), empirical antibiotic therapy (ampicillin-sulbactam and gentamicin), and anticonvulsant treatment (phenobarbital) for neonatal seizures. Daily monitoring included respiratory status, oxygen saturation, feeding tolerance, neurological examination, and general condition. This case report was prepared with strict attention to patient confidentiality. All identifying information was removed to protect patient privacy. The case documentation was conducted as part of an educational assignment during a pediatric clinical rotation and adhered to ethical standards in medical education and reporting.

RESULTS AND DISCUSSION

Patient is a baby post-term male born on May 21, 2025 at 23.56 WIB via labor spontaneous vaginal at home giving birth, handled by a midwife. When born, baby No direct cry strong and new cry after done stimulation and suction mucus from nose and mouth. Baby's Apgar score moment born is 7 in minutes first and 8 in the minute fifth. Amniotic fluid looks cloudy, thick, colored green, but No smells, indicates possibility exposure meconium intrauterine. Approximately 12 hours after born, baby referred to to M. Natsir Regional Hospital Solok by midwife with complaint main difficulty breathing. Signs of respiratory distress were observed covers breathing lobe nose, retraction chest wall, cyanosis of the extremities, and a weak cry. Besides that, there is a single episode of seizures that lasts for ±1 minute, without seizures repeated. Baby has breastfeeding as much as three times after born and show one vomit greenish in amount around One spoon eat. No found symptom fever, jaundice, or signs infection systemic other.

History pregnancy show that Mother undergo routine antenatal check-ups good at the integrated health post or in the facilities health secondary. Pregnancy This is pregnancy first (G1P1A0H0) with age gestation reached 41–42 weeks (post-term). No there is history comorbidities during pregnancy like hypertension, diabetes mellitus, infection, or disease chronic others. Childbirth ongoing without amniotic fluid broken early, and not there is signs intrapartum infection. Nutrition Mother during pregnancy assessed Enough well, with consumption 2–3 meals a day and animal protein intake and adequate vegetable nutrition. Mother also regularly taking additional tablets blood and acid folat start age 20 weeks pregnant up to 36 weeks.

From the inspection physique moment enter House sick, baby looks in condition Sick moderate. Birth weight recorded 3,410 grams, body length 48 cm,

circumference head 32 cm, chest circumference 30 cm, and circumference stomach circumference 29 cm. symphysis measured 26 cm, length arm length 20 cm, and leg length 25 cm. All anthropometric parameters shows growth status suitable fetus age pregnancy. Overview general This support early diagnosis *Meconium Aspiration Syndrome* (MAS) with possibility complications in the form of hypoxemia and neonatal seizures.

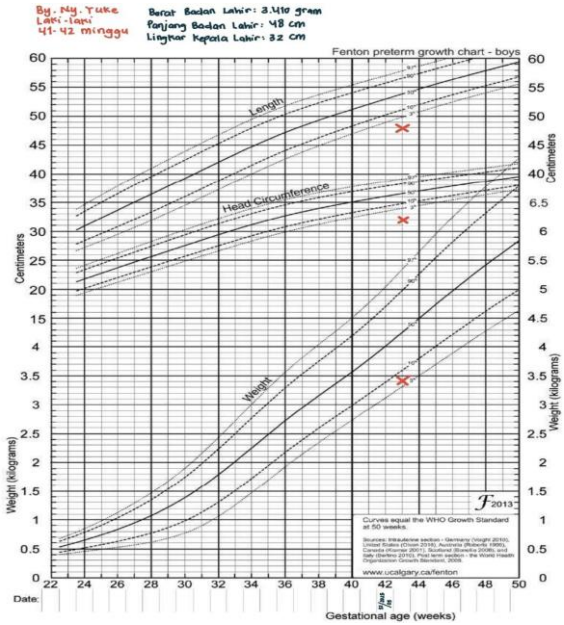


Figure 4. Fenton Male

Vital signs at the moment enter House Sick show temperature body 36.8°C, frequency pulse 132 beats per minute, frequency breaths 67 times per minute, blood pressure blood 57/36 mmHg, and saturation oxygen (SpO_2) 63%. Assessment level difficulty breath use Downes Score yielding a total score of 6, which indicates degrees distress breathing weight. Score This based on findings tachypnea, retractions heavy, decreased air entry, grunting is heard through stethoscope, and cyanosis that is not getting better with oxygen.

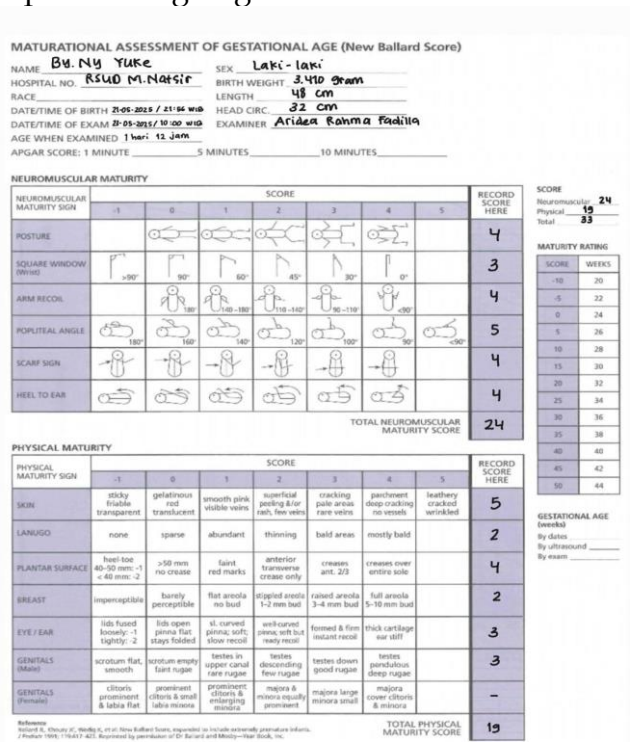
Inspection Physical and General Status

On examination physique systemic, visible that skin baby paleness of the palms hand with cyanosis of the extremities and color greenish in some part surface skin, which indicates existence exposure meconium. Head baby shaped normocephal with anterior fontanel visible concave, showing possibility dehydration light or impaired perfusion status. Baby 's eyes show reflex light positive (+/+), isochoric pupil with size 3 mm, without found conjunctiva anemia and sclera jaundice. No found abnormalities congenital defects of the ears and nose; however, signs breath lobe nose positive seen clear as part from respiratory distress.

Mucosa mouth looks moist and there is cyanosis, strengthening findings hypoxemia. In the system respiration, inspection lungs show existence retraction chest wall in the epigastric and subdiaphragmatic areas with movement fixed thorax symmetrical Good in a way static and dynamic. Auscultation lungs

disclose voice breath vesicular accompanied by rhonchi bilateral rough, dominant in the lungs left, without presence of wheezing. Examination system cardiovascular show that ictus cordis is visible and palpable One lateral finger of line midclavicularis in the gap ribs fifth right. Rhythm heart regular, without murmurs and gallops are heard.

On abdominal examination, no found sign distension. Cord center looks wilted and greenish, without hyperemia. Liver and spleen organs No palpable, whereas sound intestines heard with normal frequency around seven times per minute. Extremities top and bottom palpable cold with time filling capillary (CRT) deficiency from two seconds, showing perfusion peripheral Still adequate. The anus appears normal and has happen elimination meconium, while the genitalia are not show existence abnormalities congenital. Reflex primitive such as sucking, rooting, and grasping monitored active, whereas Moro reflex not yet done at the time inspection ongoing.


MATURATIONAL ASSESSMENT OF GESTATIONAL AGE (New Ballard Score)

NAME By. Ny Yuke — SEX Laki-laki
HOSPITAL NO. RSUD M.Natsir — BIRTH WEIGHT 3.410 Gram
RACE — LENGTH 48 cm
DATE/TIME OF BIRTH 21-05-2025 / 21:56 WIB — HEAD CIRC. 32 cm
DATE/TIME OF EXAM 22-05-2025 / 10:00 WIB — EXAMINER Aridea Rahma Fadilla
AGE WHEN EXAMINED 1 hari 12 jam
APGAR SCORE: 1 MINUTE ____ 5 MINUTES ____ 10 MINUTES ____

NEUROMUSCULAR MATURITY

NEUROMUSCULAR MATURITY SIGN	SCORE -1	0	1	2	3	4	5	RECORD SCORE HERE
POSTURE								4
SQUARE WINDOW (WRIST)		>90°	90°	60°	45°	30°	0°	3
ARM RECOIL			180°	140–180°	110–140°	90–110°	<90°	4
POPLITEAL ANGLE	180°	160°	140°	120°	100°	90°	<90°	5
SCARF SIGN								4
HEEL TO EAR								4
							TOTAL NEUROMUSCULAR MATURITY SCORE	24

SCORE: Neuromuscular 24; Physical 19; Total 33

MATURITY RATING

SCORE	WEEKS
-10	20
-5	22
0	24
5	26
10	28
15	30
20	32
25	34
30	36
35	38
40	40
45	42
50	44

GESTATIONAL AGE (weeks): By dates ____ By ultrasound ____ By exam ____

PHYSICAL MATURITY

PHYSICAL MATURITY SIGN	SCORE -1	0	1	2	3	4	5	RECORD SCORE HERE
SKIN	sticky friable transparent	gelatinous red translucent	smooth pink visible veins	superficial peeling &/or rash, few veins	cracking pale areas rare veins	parchment deep cracking no vessels	leathery cracked wrinkled	5
LANUGO	none	sparse	abundant	thinning	bald areas	mostly bald		2
PLANTAR SURFACE	heel-toe 40–50 mm: -1 < 40 mm: -2	>50 mm no crease	faint red marks	anterior transverse crease only	creases ant. 2/3	creases over entire sole		4
BREAST	imperceptible	barely perceptible	flat areola no bud	stippled areola 1–2 mm bud	raised areola 3–4 mm bud	full areola 5–10 mm bud		2
EYE / EAR	lids fused loosely: -1 tightly: -2	lids open pinna flat stays folded	sl. curved pinna; soft; slow recoil	well-curved pinna; soft but ready recoil	formed & firm instant recoil	thick cartilage ear stiff		3
GENITALS (Male)	scrotum flat, smooth	scrotum empty faint rugae	testes in upper canal rare rugae	testes descending few rugae	testes down good rugae	testes pendulous deep rugae		3
GENITALS (Female)	clitoris prominent & labia flat	prominent clitoris & small labia minora	prominent clitoris & enlarging minora	majora & minora equally prominent	majora large minora small	majora cover clitoris & minora		–
							TOTAL PHYSICAL MATURITY SCORE	19

Figure 5. Ballard Score

Inspection Clinical Support and Diagnosis

Inspection hematology routine show level hemoglobin of 15.8 g/dL and hematocrit of 44.45%, still in normal limits for neonates. However, there are erythropenia with amount erythrocytes of 4,250,000/ uL, below mark reference (4,500,000–5,500,000/ uL). Amount leukocytes recorded at 23,300/mm^3, still in normal physiological range neonates (9,000–29,000/mm^3), whereas platelets of 167,000/ uL, still in limit reference. Index erythrocytes (MCV, MCH, and MCHC) are in normal range.

Check up result chemistry clinic show hypoglycemia heavy, with level glucose blood only 23 mg/dL, well below normal limits (40–65 mg/dL). Condition This can explain symptom seizures that occur in patients.

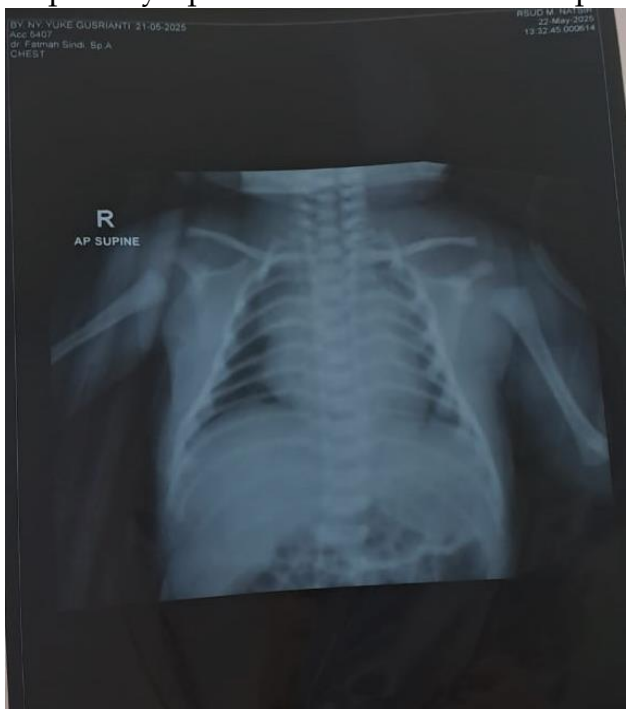


Figure 6. AP Supine Thoracic X-Ray

Inspection radiology thorax (AP supine) on May 22, 2025 shows shape and location normal heart, trachea be on the line middle, and the mediastinum does not widen. No there is bone abnormalities or enlargement of the aorta. However, it was found infiltrat smooth in the field lungs, with pattern bronchovascular No increased. Angle costophrenicus looks taper and diaphragm slippery with position right more tall from left. Radiology conclusion leading to congenital pneumonia, which requires considered as a differential diagnosis of Meconium Aspiration Syndrome (MAS). Inspection support suggested continuation covers blood gas analysis For evaluate degrees acidosis and hypoxemia, C-Reactive Protein (CRP) examination for detection infection systemic, as well as electroencephalogram (EEG) for evaluation more carry on from activity seizures.

Problems Clinical and Diagnostic

Based on clinical and supporting data, several problem identified main is:

1. Baby has shortness of breath
2. Born vaginally, at birth she cried weakly
3. Epigastric and subdiaphragmatic retractions
4. Cyanosis
5. Hypoglycemia
6. Seizures

Based on findings Based on this, a working diagnosis is determined:

1. Distress breathing with suspicion of Meconium Aspiration Syndrome (MAS)

Secondary diagnosis is:

a. Seizures neonates consequence hypoglycemia

Differential diagnosis includes:

a. Congenital pneumonia, based on findings radiologist

b. Transient Tachypnea of the Newborn (TTN)

Management

Management done in a way intensive with support respiration via non-invasive CPAP (FiO_2 21%, flow 14 L/ min, pressure 6 cmH_2O), treatment in incubator, and correction hypoglycemia with a bolus of 10% Dextrose of 6.2 mL, followed by with 10% Dextrose infusion of 11 cc/hour. Therapy antibiotics empirical given in the form of ampicillin-sulbactam 3x110 mg IV and gentamicin 1x16 mg IV for overcome possibility infection congenital. Seizures handled with phenobarbital 2x8 mg IV.

Prognosis

Based on response good clinical to therapy and repair condition in a number of day First, the prognosis is assessed:

1. Quo ad vitam (regarding live): Bonam
2. Quo ad functionam (regarding function): Bonam
3. Quo ad sanationam (regarding healing): Bonam

Check up result laboratory show hypoglycemia heavy with level glucose blood 33 mg/dL. Count blood complete show leukocytosis light, and levels *C-Reactive Protein (CRP)* A little increased, although No found proof strong existence infection systemic. Examination Photo thorax show bilateral infiltrates are not even, sign hyperinflation lungs, as well as areas of atelectasis — all in accordance with description typical *Meconium Aspiration Syndrome* (MAS). No found sign pneumothorax.

Handling patient covering giving oxygen with CPAP method, fluid intravenous Dextrose 10% for correct hypoglycemia, as well as antibiotics empirical in the form of ampicillin-sulbactam and gentamicin Because existence possibility of congenital pneumonia. In the first 12 hours care, baby experience seizures generalizations handled in a way effective with giving phenobarbital intravenous. Repair clinical start seen on the day third, marked with improvement saturation oxygen, decrease symptom disturbance breathing, and tolerance good breastfeeding. Neurological status stable and not found seizures repeated. On the day fifth, support breathing stopped, and the baby sent home

in condition stable on the day seventh. Findings This support working diagnosis *Meconium Aspiration Syndrome* accompanied by complications Hypoglycemia and neonatal seizures. Rapid diagnosis and management multidisciplinary proven play a role important in give external good clinical in case This.

Discussion

A 0 day 12 hour old baby boy was admitted to the Emergency Department of M. Natsir Solok Regional General Hospital with complaints of shortness of breath with a respiratory rate of 67x/minute, chest wall retraction, nasal flaring, and cyanosis. The neonate was born preterm, postterm gravid 41-41 weeks, birth weight 3,410 grams by vaginal delivery, green and thick amniotic fluid. The baby's skin and nails appeared greenish, the baby vomited greenish once and meconium had come out mixed with amniotic fluid and was greenish. On lung auscultation, coarse rhonchi were heard at the apex of the lungs. The *Downes Score result* obtained a total of 6, which means the baby is experiencing severe shortness of breath. The baby's leukocyte result was 23,300/mm3 which seemed normal. The mother's anamnesis showed no history of fever, vaginal discharge, or UTI, but there was no laboratory examination of leukocytes in the mother.

Based on clinical symptoms, this is consistent with the characteristics of *meconium aspiration syndrome.* Clinical symptoms include significant respiratory distress immediately after birth or within a few hours of life. One of the main symptoms is tachypnea, which is an increased respiratory rate in response to hypoxemia, or increased carbon dioxide levels in the blood. Furthermore, retraction of accessory respiratory muscles, such as epigastric and intercostal retractions, indicates increased respiratory effort due to the airway being obstructed by meconium. Cyanosis, or bluish discoloration of the skin and mucous membranes, occurs due to a lack of oxygen in the blood. In severe cases, despite respiratory assistance, oxygen saturation remains low.

Meconium Aspiration Syndrome (MAS) usually occurs in term or postterm infants, especially when fetal distress occurs during labor. In this case, a gestational age of 41–41 weeks indicates that the baby was born postterm, which is a major risk factor for MAS. This is due to intestinal maturity and high vagal stimulation in postterm infants, which can trigger the passage of meconium into the amniotic fluid. The presence of thick, green amniotic fluid indicates that meconium was passed before or during labor. Vaginal delivery also increases the risk of aspiration, as the baby can breathe in utero or immediately after birth, allowing meconium to enter the respiratory tract. Furthermore, the baby's greenish skin and nails indicate prolonged exposure to meconium in utero, further strengthening the suspicion of intrauterine meconium aspiration. All these findings support the diagnosis of *meconium aspiration syndrome* (MAS) in this baby.

Based on the anamnesis results, the diagnosis of *Transient Tachypnea of the Newborn* (TTN) can be ruled out because TTN generally occurs in babies born by cesarean section without any signs of fetal distress and is usually accompanied by clear amniotic fluid, while in this case the baby was born vaginally, with thick

green amniotic fluid and accompanied by signs of severe respiratory distress immediately after birth. Meanwhile, the diagnosis of congenital pneumonia can also be ruled out because there was no history of maternal infection such as fever, premature rupture of membranes, or chorioamnionitis, and there was no clinical evidence of systemic infection such as fever or leukocytosis.

The X-ray results showed a normal heart shape and position, the aorta and mediastinum were not widened, the trachea was located in the middle, the bronchovascular markings were not increased, fine infiltrates were visible in the lung fields, the costophrenic angles were sharp, there were no visible bone abnormalities, the diaphragm was smooth, and the right diaphragm was higher than the left. Thus, the impression of congenital pneumonia was obtained.

The discrepancy between the history, physical examination, and laboratory findings that suggest a diagnosis of *Meconium Aspiration Syndrome* (MAS) and the radiograph suggesting congenital pneumonia can be explained scientifically. Radiologically, the appearance of MAS and congenital pneumonia can be very similar, especially in the early stages. Both conditions can show infiltrates in the lung fields, making it difficult to differentiate based on chest radiograph findings alone. Furthermore, in some mild cases of MAS or in small amounts of meconium aspiration, the radiograph may appear minimal or unclear at the initial examination. Infiltrates or typical signs of MAS, such as atelectasis and hyperinflation, may not appear until 12–24 hours after birth. Therefore, the initial radiograph may appear mild and nonspecifically resemble congenital pneumonia. The finding of fine infiltrates on lung X-rays can also be used as a differential diagnosis with congenital pneumonia, because both conditions can show similar radiological images, especially in the early stages, so it needs to be further confirmed with clinical data and other supporting examinations.

The baby also experienced seizures, characterized by sudden movements of the hands and feet lasting approximately 1 minute, with no recurrence. A blood glucose test showed a reading of 23 mg/dL. Neonatal seizures are time-limited, occurring within the first 28 days of life (term infants) or 44 weeks of conception (chronological age + gestational age at birth) in premature infants. Hypoglycemia is one of the most common causes of seizures in neonates, with a prevalence of 3-7.5% and can be associated with further symptoms, including epilepsy. Neonatal hypoglycemia is defined as a blood glucose level of less than 40 mg/dL in the first 24 hours of life. This condition can cause impaired brain function and clinical manifestations in the form of seizures, which usually involve sudden, uncontrolled movements of the limbs.

Recommended tests for this infant include blood gas analysis, *C-Reactive Protein* (CRP) examination, and an electroencephalogram (EEG). Blood gas analysis in infants with MAS aims to assess the severity of respiratory distress, oxygenation status, and acid-base balance to aid in the management of respiratory therapy. *A C-Reactive Protein* (CRP) examination is performed to differentiate between inflammation due to meconium aspiration and lung infections such as pneumonia, while also monitoring the possibility of secondary infections. An electroencephalogram (EEG) in infants with neonatal seizures

serves to detect seizure activity, determine seizure type, and monitor response to therapy and long-term neurological prognosis.

Management of this baby was given NIV CPAP FiO2 21% Flow 14.0 l/min CPAP, incubator care, 10% dextrose bolus 6.2 mL, IVFD Dextrose 10% 11cc/hour, ampicillin sulbactam injection 3 x 350 mg IV, Gentamicin injection 1 x 16 mg IV, Phenobarbital injection 2 x 9 mg. NIV FiO2 21% Flow 14.0 l/min CPAP is used to maintain positive pressure in the airways to prevent alveolar collapse and improve oxygenation without the need for invasive intubation. The initial CPAP pressure ranges from 4-6 cmH2O and can be increased gradually to a maximum of 8 cmH2O if retractions and desaturation are still visible. FiO2 in full-term infants starts at 21% and can be increased gradually as needed with a target saturation of 92%-97%. Incubator care for infants serves to provide a warm, sterile, and controlled environment for infants, especially premature newborns, infants with respiratory disorders such as MAS, or infants with certain medical conditions. Incubators help maintain a stable body temperature (thermoregulation), protect the baby from infection, reduce stress due to changes in temperature and the external environment, and facilitate monitoring and administration of medical therapy such as oxygen or infusion.

Administration of ampicillin sulbactam injection 3 x 110 mg IV and gentamicin injection 1 x 16 mg IV is given if a secondary infection (congenital pneumonia) is suspected. A combination of ampicillin + gentamicin antibiotics can be used or using antibiotics according to culture. Ampicillin is a beta-lactam antibiotic that works by inhibiting bacterial cell wall synthesis. Sulbactam is a beta-lactamase inhibitor that works by binding and inhibiting the beta-lactamase enzyme produced by some bacteria to inactivate beta-lactam antibiotics such as ampicillin. The dose of ampicillin sulbactam in mild to moderate infections is 100-150 mg/kgBW/day, divided into 3-4 doses. If the baby weighs 3.1 kg, ampicillin sulbactam can be given a dose range of 310-465 mg, if divided into three doses it can be given 3x150 mg. Gentamicin is given to complete the antibiotic spectrum against gram-negative bacteria that often cause infections in neonates. Gentamicin is an aminoglycoside antibiotic that inhibits bacterial protein synthesis by binding to the 30S subunit of the ribosome, causing bacterial death. The dose for neonates is 4–5 mg/kg once daily. For a baby weighing 3.1 kg, the recommended dose is 12.4–15.5 mg.

The administration of 10% Dextrose bolus 6.2 mL and IVFD Dextrose 10% 11 cc/hour in infants with seizures due to hypoglycemia has a reason because hypoglycemia is a common cause of neonatal seizures and according to laboratory results in infants indicate hypoglycemia. The initial dose of 10% dextrose 2ml/kg BW IV as a bolus and continued with a maintenance dose of 8mg/kgBW/minute IV. This is in accordance with the recommendations for seizures in neonates due to hypoglycemia. In addition, the administration of phenobarbital injection 2 x 8 mg is also a first-line seizure management with a dose of 20 mg/kgBW for 10-15 minutes IV and a maintenance dose of 3-5 mg/kgBW/day, a single dose or divided every 12 hours IV. Phenobarbital works as a central nervous system depressant by strengthening the action of the

inhibitory neurotransmitter GABA (*gamma-aminobutyric acid*). This effect causes suppression of excessive activity in the brain, stabilizes neuronal membranes, and stops seizures. If the neonate's neurologic examination is normal at the time of discharge, all anticonvulsant medications are discontinued. If abnormal, etiological factors should be considered and an EEG should be performed. If the EEG is abnormal, phenobarbital should be continued. However, if the EEG is normal or the etiology is a transient metabolic disorder, phenobarbital can be discontinued.

CONCLUSIONS

Case This describe manifestation clinical *Meconium Aspiration Syndrome* (MAS) in post-term neonates accompanied by complications metabolic in the form of hypoglycemia and neonatal seizures. The diagnosis was confirmed based on integration between clinical data including history of amniotic fluid mixed meconium, signs distress breathing like retraction chest wall, tachypnea, and cyanosis — with findings inspection support like hypoglycemia weight and image infiltrat bilateral smooth on radiographs thoracic. Differential diagnosis of congenital pneumonia and TTN (Transient Tachypnea of the Newborn) was considered, however characteristics Clinical and perinatal findings support MAS as the primary diagnosis. Management comprehensive which includes support non- invasive ventilation (CPAP), correction level glucose blood, therapy antimicrobial empirical, as well as management seizures with phenobarbital show response clinically significant, with repair symptom respiratory and neurological in period time not enough from One week. Patient prognosis assessed Good vitally, functionally, and curatively. Findings This confirm importance handling early and approach multidisciplinary in MAS management, especially in cases with comorbidities metabolic evaluation comprehensive to history pregnancy, childbirth, and monitoring respiration and metabolism post-natal in a way strict required For pressing number morbidity and mortality due to MAS, especially in facilities health with limitations source power. Study this also emphasizes urgency improvement capacity intensive neonatal care and training clinical based proof for power health.

REFERENCE

Agrawal R, Anan R, Vadera S, et al. Transient tachypnea of the newborn. Reference article, Radiopaedia.org (Accessed on 04 May 2025) https://doi.org/10.53347/rID-2198 .

Agrawal R, Anan R, Yap J, et al. (2025). Respiratory distress syndrome. Reference article, Radiopaedia. https://doi.org/10.53347/rID-1467

American Academy of Pediatrics. Management of neonates with meconium stained amniotic fluid. Pediatrics. 2016;136(4):e856–62.

Anindita, AY, Hidayah, D., Hafidh, Y., Moelyo, AG, & Dewi, M. (2018). Profile Syndrome Aspiration Meconium in Babies New Born at Dr. Soetrasno Regional Hospital Rembang. *Smart Medical Journal, 1* (2), 42-46. https://doi.org/10.13057/smj.v1i2.28692

Aziz, K., Lee, CHC, Escobedo, MB, Hoover, AV, Kamath-Rayne, BD, Kapadia, VS, Magid, DJ, Niermeyer, S., Schmölzer, GM, Szyld, E., Weiner, GM, Wyckoff, MH, Yamada, NK, & Zaichkin, J. (2021). Part 5: Neonatal Resuscitation 2020 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. *Pediatrics, 147* (Suppl 1), e2020038505E. https://doi.org/10.1542/peds.2020-038505E

Batra, M., Rothstein, G,. & Thibeault D. (2017). Meconium aspiration syndrome and the role of nitric oxide. *Neonatology, 11 1* (3), 1-7.

Dargaville PA, Fielding D, Chang A, et al. (2016). Inflammation and lung injury in meconium aspiration syndrome. *Semin Fetal Neonatal Med, 21* (2), a68 76.

Guglani L, Lakshminrusimha S. Meconium Aspiration Syndrome. In: Martin RJ, Fanaroff AA, Walsh MC, editors. *Fanaroff and Martin's Neonatal-Perinatal Medicine*. 11th ed. Philadelphia: Elsevier; 2019. p. 1183-90.

Handryastuti, S. (2016). Neonatal Seizures, Problems in Diagnosis and Management. Pediatrics, 9 (2), 112-20. https://doi.org/10.14238/sp9.2.2007.112-20

Hapsari, R. (2017). Neonatal Infection Due to Cloudy Amniotic Fluid. *Sari Pediatri, 13* (1), 42–7.

Indonesian Medical Association. (2019). *Consensus Recommendations for the Management of Neonatal Seizures*. Indonesian Pediatrician Association.

Kannan TR, Jones R, & McGee ZA. (2017). Surfactant dysfunction in meconium aspiration syndrome. *Am J Respir Crit Care Med, 195* (5), 672-81.

Klinger, G. & Perlman, J.M. (2017). Meconium aspiration syndrome: clinical aspects and pathophysiology. *Semin Fetal Neonatal Med, 22* (4), 201–10.

Mardianingsih I, Hendarto H. (2020). The relationship between fetal distress and the incidence of meconium aspiration syndrome at Dr. Sardjito General Hospital, Yogyakarta. *Gadjah Mada University Medical Journal, 58* (2), 105–11.

Pratama MA, Winarsih N. (2019). Risk factors and clinical outcomes of meconium aspiration syndrome at Dr. Soetomo Regional Hospital, Surabaya. *Brawijaya Medical Journal, 31* (1), 23-8.

Radswiki, T., Ranchod A, Bickle I, et al. *Meconium aspiration.* Reference article, Radiopaedia.org (Accessed on 04 May 2025) https://doi.org/10.53347/rID-1217.

Rohsiswatmo, R., & Kautsar, A. (2018). The Role of Surfactant Rinse in Neonates Aterm with Syndrome Aspiration Meconium. *Pediatrics, 19 (6)*, 356-63. http://dx.doi.org/10.14238/sp19.6.2018.356-63

Shetty A, Ranchod A, Calciu A, et al. Neonatal pneumonia. Reference article, Radiopaedia.org (Accessed on 04 May 2025) https://doi.org/10.53347/rID 28613.

World Health Organization. (2020). Global Health Observatory (GHO) data: Neonatal mortality. Geneva.Availablefrom : https://www.who.int/data/gho/data/themes/topics/topicdetails/GHO /neonatal HYPERLINK

"http://www.who.int/data/gho/data/themes/topics/topicdetails/GHO/neonatal" \h mortality

Wyckoff, M.H., Aziz, K., Escobedo, M.B., Kapadia, V.S., Kattwinkel, J., Perlman, J.M., Simon, W.M., Weiner, G.M., & Zaichkin, J.G. (2015). Part 13: Neonatal Resuscitation: 2015 American Heart Association Guidelines Update for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. *Circulation, 132* (18 Suppl 2), S543–S560. https://doi.org/10.1161/CIR.0000000000000267