

Nursing care for babies with meconium aspiration syndrome (mas) at panembahan senopati hospital, bantul

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Abstract

Neonates who inhale amniotic fluid containing meconium may develop meconium aspiration syndrome (MAS), a respiratory distress disorder that can result in inflammation, airway obstruction, and impaired lung function. MAS frequently results in inadequate airway clearing, which leads to nursing issues. Ineffective airway clearing is a common nursing concern associated with MAS. Objective: To be able to administer nursing care for patients with Meconium Aspiration Syndrome with a nursing diagnosis of Ineffective Airway Clearance in the NICU of Panembahan Senopati Bantul Hospital. Method: This is a cross-sectional observational case study of a male newborn with MAS who was treated in the NICU at Panembahan Senopati Bantul Hospital. Results: The evaluation revealed that the patient suffered tachypnea, chest retraction, rhonchi breath sounds, and mucous vomiting. Laboratory and physical tests confirmed the MAS diagnosis. Nursing interventions included airway management, breathing pattern monitoring, additional breath sounds, sputum, and suction. The three 24-hour evaluations revealed that the issue of inefficient airway clearance had not been completely addressed, as evidenced by the patient's continued tachypnea and chest retraction. Conclusion: In order to prevent complications, nursing care for newborns with MAS must include early detection, rapid and coordinated intervention, and continuous evaluation. Breathing patterns, sputum, and oxygen saturation must all be closely monitored to support the recovery of the infant's respiratory function.

Keywords: Meconium aspiration syndrome, ineffective airway clearance, NICU, newborn, nursing

1. Introduction

Meconium aspiration syndrome (MAS) is a condition in which a newborn inhales a mixture of meconium and amniotic fluid into the lungs, causing difficulty breathing. Meconium is the baby's first stool, a thick, sticky, green color that should be passed in the first few days of life. If meconium is passed before delivery and mixes with the amniotic fluid, the amniotic fluid becomes contaminated, turning from clear and slippery to a cloudy green. This fluid is toxic if inhaled by the fetus as the baby's head emerges from the mother's womb (Rini et al. 2021).

The incidence of MAS in Indonesia varies. The prevalence of MAS in some studies has reached 28.7%. The neonatal mortality rate associated with MAS can reach 1.8%. Several factors, such as thick meconium and meconium in early labor, can increase the risk of MAS (Tantu et al. 2023).

MAS presents with respiratory distress of varying severity associated with tachypnea, cyanosis, nasal flaring, respiratory retractions, and a hyperexpansive thorax. Newborns with MAS can enter a dangerous cycle in which hypoxemia leads to acidosis, and both contribute to worsening pulmonary hypertension. Pulmonary hypertension causes a right-to-left shunt at the level of the foramen ovale and ductus arteriosus, leading to cyanosis and hypoxemia. Meconium inhaled into the airways can cause obstruction, inflammation, and impaired lung function, resulting in difficulty breathing and expelling secretions (Sankaran et al. 2024). Based on this, one of the nursing problems that arises in patients with MAS is ineffective airway clearance. Ineffective airway clearance is the inability to clear secretions or airway obstructions to maintain a patent airway (Ekowati et al. 2022).

Based on the available data and information, MAS patients require more intensive attention and care. Therefore, nurses are required to have a deeper understanding of this disease in order to provide optimal services. Based on this background, researchers are interested in conducting a case study by applying nursing care to patients with a diagnosis of MAS in order to meet patient needs holistically. The purpose

of this study is to be able to provide and apply nursing care to patients with Meconium Aspiration Syndrome with a nursing diagnosis of Ineffective Airway Clearance in the NICU room of Panembahan Senopati Bantul Regional Hospital.

2. Method

This research is an observational case study with a cross-sectional design. The subject of the study was a patient diagnosed with Meconium Aspiration Syndrome (MAS) and received nursing care in accordance with applicable standard practice guidelines. Case collection was carried out in the Neonatal Intensive Care Unit (NICU) of Panembahan Senopati Bantul Regional General Hospital on February 17-19, 2025. In the data collection process, researchers used several techniques, namely interviews, observations, and documentation studies to obtain comprehensive information regarding the patient's condition and the nursing interventions provided.

3. Results and Discussion

3.1. Assessment

This study was conducted on February 17, 2025 in the NICU Room of Panembahan Senopati Bantul Regional General Hospital, and the results showed that By.Ny D, aged 1 day, was male, Muslim, Javanese, and Indonesian citizen.

The assessment was conducted on the patient's mother. Based on the interview conducted with the patient's mother, it was stated that the patient was taken to the hospital to be born and the baby was admitted to the NICU due to problems during delivery, namely baby asphyxia. Based on the results of observations conducted on the patient, the patient's data were obtained with weak consciousness, crying less strongly, inactive movements, abnormal breathing sounds such as rhonchi were heard so that the patient was unable to cough effectively. The baby's condition was tachypnea, chest retraction was seen, a 5cc clear residual OGT was installed, mucus vomited 2x, CRT <3 seconds, the sucking reflex was not yet trained and the mother had not breastfed. The results of the X-ray dated February 17, 2025 at 07.56 hours supported the impression of MAS (meconium aspiration syndrome). The patient was installed with NCPAP FiO₂ 21% PEEP 7, and a D10% infusion of 80 cc / kgbw / day was installed.

Based on the physical examination of vital signs shows that the pulse: 135 x / minute can still be considered normal, temperature: 36.5 °C indicates that the body temperature is normal, Respiratory frequency: 61x / minute exceeds the normal limit, oxygen saturation: 95% within normal limits. Body weight: 3,300 gr shows within normal limits, Body length: 49cm within normal limits, Head circumference: 33 cm is generally considered normal, Down Score 3 indicates that the baby is experiencing mild respiratory distress, Apgar Score: 4/6 babies with Apgar scores of 4-6 may need to be monitored more closely and given respiratory assistance such as oxygen or airway suction. Abnormal Apgar scores (≤ 7) in patients with Meconium Aspiration Syndrome (MAS) can cause complications such as difficulty breathing, cyanosis, and even permanent brain damage. This is because inhaled meconium can block the airways, irritate the lungs, and cause surfactant dysfunction (Luo et al. 2023).

Based on the examination of the level of development/primitive reflexes, it shows that in fine motor skills the baby can move his head right and left, grasp his hands, and put his hands to his mouth (Anindita et al. 2022) In infants with MAS who do not experience severe complications, primitive reflexes such as grasping and head movements are generally still visible. However, in cases of severe asphyxia, these reflexes may decrease or disappear, and the infant may appear limp and less active after birth. Developmental findings: the infant cries when uncomfortable, looks intently at faces, and can smile.

A Humpty Dumpty Score of 16 indicates a high risk of falls. Newborns transferred to the NICU are at higher risk of falls due to their medical conditions, care environment, and mobility limitations. Medical conditions such as MAS, low birth weight, and respiratory distress can make babies more

susceptible to injuries from falls. The NICU environment, which is crowded with medical equipment and babies requiring intensive care, can also increase the risk of falls.

Based on the results of laboratory examinations including hematology examinations on February 17, 2025 at 08.32, the hemoglobin level was 19.3g/dl (13.2-17.3 d/dl), rods 16% (2-5%),

segments 71% (17-60%). Very high hemoglobin levels in babies with Meconium aspiration syndrome (MAS) can occur because this condition causes increased production of erythropoietin by the kidneys to compensate for the lack of oxygen in the blood. MAS occurs when the baby inhales amniotic fluid mixed with meconium into the lungs, which can interfere with oxygen exchange and cause hypoxia, so the body reacts by increasing the production of red blood cells.

According to (Rini et al. 2021) This increase in red blood cells can also pose a risk of complications such as increased blood viscosity, which can worsen the baby's condition and require special treatment. Therefore, monitoring hemoglobin levels and managing hypoxia in babies with MAS is crucial to prevent further tissue damage and systemic complications.

3.2. Nursing Diagnosis

The nursing diagnoses that emerged were ineffective airway clearance related to the infection process, ineffective breathing pattern related to respiratory muscle fatigue, ineffective thermoregulation related to increased oxygen needs, ineffective breastfeeding related to lack of exposure to information about breastfeeding methods, risk of nutritional deficit related to increased metabolic needs, risk of falling as evidenced by ≤ 2 years. The main diagnosis taken in this case was ineffective airway clearance related to the infection process. The diagnosis taken was in accordance with the nursing diagnosis guideline according to the Indonesian Child Health Insurance (IDHS) based on the definition, characteristic limitations, and etiology (Tim Pokja SDKI DPP PPNI 2017).

Based on the case of a patient with Meconium Aspiration Syndrome (MAS), the author prioritizes the problem of ineffective airway clearance as a diagnostic priority appropriate to the patient's condition. Ineffective airway clearance is one of the problems requiring oxygenation. This clotting problem describes an unclean airway condition such as blockage, secretions, narrowing of the airway due to bronchial spasms, and others. This can inhibit the supply of oxygen (O₂) entering the respiratory tract. (Brauer 2022).

Based on the data in the case above, it was found that patient By.Mrs. D in the objective case was in accordance with the limitations of the characteristics of ineffective airway clearance in the nursing diagnosis. With the objective data obtained, the baby looked weak, rhonchi breath sounds, meconium in the neonatal airway, breathing patterns changed, the baby was attached to NCPAP FiO₂ 21% PEEP 7.

3.3. Intervention

The intervention given to By.Ny D with a diagnosis of Meconium Aspiration Syndrome (MAS) was airway management, namely: monitoring breathing patterns, monitoring additional breath sounds, monitoring sputum and suctioning. Airway management techniques aim to ensure the patient's airway remains open and patent, thus allowing effective gas exchange between the environment and the lungs. Death is often caused by delayed treatment or the inability of health workers to recognize and treat disorders that occur in the patient's airway (Hasnia et al. 2023).

From the results of the assessment, the focus of the intervention is airway management where the oxygenation needs of babies with meconium aspiration syndrome (MAS) require additional oxygen to help breathing because inhaled meconium blocks the airway and makes it difficult for the lungs to work. Too little oxygen can cause hypoxia with a number of potential negative effects and too much oxygen can cause oxidative stress and injury to the tissues of several organs. (Medicine 2023).

Overall, airway management interventions in infants with MAS should be comprehensive and coordinated, including close monitoring, effective suctioning, appropriate oxygen administration, and

additional therapeutic support as needed, to optimize respiratory function and reduce the risk of serious complications.

3.4. Implementation

The author implemented a diagnosis of ineffective airway clearance in this case to address the problem, including monitoring breathing patterns, monitoring additional breath sounds, monitoring sputum, and suctioning. Breathing pattern monitoring was performed every hour on a shift. The components monitored in the breathing pattern were respiratory rate, respiratory rhythm, respiratory depth, and abnormal breathing patterns such as dyspnea, tachypnea, bradypnea, or irregular breathing patterns (Utama and Triana 2023).

By regularly monitoring the baby's breathing pattern, this intervention aims to improve the effectiveness of the baby's breathing, reduce excessive work of breathing, and prevent serious complications that can lead to respiratory failure. This approach aligns with the principles of nursing care for infants with airway compromise, which emphasize the importance of early detection and prompt treatment to ensure optimal oxygenation and restoration of respiratory function (Adolph 2023). Monitor bunyi napas tambahan juga dilakukan setiap shift, meliputi pemantauan suara napas normal dan suara napas tambahan, seperti ronki, mengi, stridor, bunyi berderak (rales), dan gesekan pleura (Tukang et al. 2023).

Additional breath sound monitoring is also performed every shift, including monitoring of normal breath sounds and additional breath sounds, such as rhonchi, wheezing, stridor, crackles (rales), and pleural friction rub (Abilowo and Lubis 2022). While according to (Rini et al. 2021). Infants who inhale meconium into their lungs are at risk of airway obstruction and secondary infections, which can affect the characteristics of sputum. Therefore, regular sputum monitoring is essential to assess the effectiveness of interventions such as suctioning and other supportive therapies and to detect early signs of complications such as pneumonia or respiratory tract infections.

Suctioning is a procedure to address the problem of ineffective airway clearance due to the accumulation of sputum, blood, or fluid. Suction is performed on patients with excessive secretions, abnormal breath sounds, decreased consciousness, and decreased oxygen saturation. Suctioning is performed by inserting a catheter through the nose or mouth into the pharynx or trachea. Suctioning is performed for 15 to 30 seconds with 100% preoxygenation for 1-2 minutes before and after the procedure (Isabella et al. 2022).

3.5. Nursing Evaluation

Nursing evaluation in the case after nursing actions for 3x24 hours the nursing problem of ineffective airway clearance has not been resolved, indicated by the respiratory frequency from quite worsening to slightly improving, the breathing pattern is still worsening. On the first day of assessment after the implementation of the nursing problem of ineffective airway clearance, the results showed that the patient was weak, vomiting clear mucus, respiratory frequency: 58x / minute, tachypnea breathing pattern, chest wall retraction, received D10% infusion therapy and was given ampicillin therapy. Planning to continue the intervention of airway monitoring, oxygen saturation monitoring, sputum monitoring.

Nursing evaluation in the case after nursing actions for 3x24 hours the nursing problem of ineffective airway clearance has not been resolved, indicated by the respiratory frequency from quite worsening to slightly improving, the breathing pattern is still worsening. On the second day of the assessment the patient was given implementation of the results of CPAP FiO2 21% installed, received D10% 80 cc infusion, respiratory frequency: 56x / minute, tachypnea breathing pattern, there is chest wall retraction. Planning to continue the intervention of airway monitoring, oxygen saturation monitoring, sputum monitoring.

Nursing evaluation in the case after nursing actions for 3x24 hours, the nursing problem of ineffective airway clearance has not been resolved, indicated by the respiratory frequency still worsening, the breathing pattern still worsening. On the third day of the assessment, the patient was given implementation of the results of CPAP FiO₂ 21% installed, received D10% 80 cc

infusion therapy, respiratory frequency: 60x / minute, tachypnea breathing pattern, there is chest wall extraction. Airway monitoring planning, oxygen saturation monitoring, sputum monitoring. These results are in accordance with the case study conducted by (Wijaya 2022) which showed that on the third day of evaluation, sputum was no longer found in the trachea, mouth, or nose, but the respiratory rate remained high at around 56 breaths per minute, with ineffective airway clearance requiring further intervention. The study emphasized the importance of proper airway management, including regular nebulization and suctioning, to improve airway clearance and respiratory function in infants.

In addition, administering oxygen therapy with CPAP aims to help keep the alveoli open and improve oxygenation, which is important in cases of MAS because meconium causes obstruction and impaired lung function. However, the persistent poor breathing pattern and continued chest indrawings indicate that the baby is still experiencing respiratory distress, requiring continuous intensive monitoring and treatment (Anindita et al. 2022).

Overall, this evaluation confirms that despite nursing interventions and medical therapy, infants with MAS require close monitoring and ongoing management to address ineffective airway clearance and optimally improve respiratory function.

4. Conclusion

Meconium Aspiration Syndrome (MAS) is a respiratory distress condition in neonates caused by inhalation of meconium-stained amniotic fluid into the lungs, which can cause airway obstruction, inflammation, and impaired lung function. MAS often causes major nursing problems in the form of ineffective airway clearance. Assessment of By.Mrs. D showed signs of respiratory distress such as tachypnea, chest wall retractions, rhonchi breath sounds, and vomiting of mucus, as well as radiological results that support the diagnosis of MAS. Primitive reflex and fine motor examination were still within normal limits, except in cases of severe MAS or asphyxia.

The primary nursing problem identified was ineffective airway clearance, evidenced by the presence of secretions in the airway, changes in breathing pattern, adventitious breath sounds, and the use of a ventilator (NCPAP). Nursing interventions included comprehensive airway management, including monitoring the breathing pattern, adventitious breath sounds, sputum collection, and suctioning. These interventions aimed to maintain a patent airway, optimize oxygenation, and prevent serious complications. A 24-hour nursing evaluation revealed that the patient's ineffective airway clearance had not been fully resolved. Although there was a slight improvement in respiratory rate, the breathing pattern still showed tachypnea and chest retractions. This indicated the need for further intensive monitoring and intervention.

Sugesstion

Based on "Nursing Care in Cases of "Ineffective Airway Clearance" in Infants with Meconium Aspiration Syndrome (MAS) in the Neonatal Intensive Care Unit of Panembahan Senopati Bantul Regional Hospital", it is hoped that hospitals can improve the implementation of nursing implementation which develops annually in accordance with nursing care theories, improve 5 nursing processes including assessment, nursing diagnosis, nursing plans, implementation and evaluation of nursing, especially in nursing care in cases of Meconium Aspiration Syndrome (MAS) quickly and precisely in accordance with theoretical developments.

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