Paediatrica Indonesiana

p-ISSN 0030-9311; e-ISSN 2338-476X; Vol.65, No.4(2025). p.346-9 ; DOI: https://doi.org/10.14238/pi65.4.2025.346-9

Case Report

Chest drainage for neonatal spontaneous pneumothorax: a rare case report in a rural area

Elisabeth E. Patty[1], Sugi Deny Pranoto Soegianto[1,2]

Spontaneous pneumothorax can occur in a term neonate male through a wide variety of mechanisms, including traumatic disruption of the barriers between tissues and air, generation by infectious sources, or spontaneously through alveolar disruption. The maternal risk factor was anhydramnion with a bad obstetric history. Predisposing factors were male sex, neonate born by cesarean section, and the presence of respiratory distress syndrome. Conservative treatment was adopted for neonatal pneumothorax with mild symptoms, good general condition, and small pneumothorax. This included proper sedation, oxygen inhalation, and anti-infection therapy. If there is a presence of respiratory distress, abnormal blood gas levels, and cardiovascular instability, definitive management was evident, including expectant therapy, thoracentesis, or chest drainage. Early recognition and prompt treatment of pneumothorax were key to good outcomes in this case. **[Paediatr Indones. 2025;65:346-9; DOI: https://doi.org/10.14238/pi65.4.2025.346-9].**

Keywords: *neonatal; pneumothorax; chest drainage; case report; rural area*

Pneumothorax is an abnormal air accumulation between the visceral and parietal pleura, a common air leak syndrome in the neonatal period. It can increase intrathoracic pressure, resulting in a partial or complete collapse of the lung on the affected side. The clinical manifestation of pneumothorax depends on the degree of collapse of the lung, which can impair pulmonary gas exchange and hemodynamic stability and become life-threatening conditions.[1]

Pneumothorax occurs more frequently in newborns than in any other age group, with an incidence rate of 1% to 2% in the general population and 6% to 7% in very low birth weight (VLBW) infants with a birth weight of less than 1,500 grams.[1] It is more common in males than females (roughly three to six times higher). The incidence of spontaneous pneumothorax in males ranges from 7.4 per 100,000 population per year in the United States and 37 per 100,000 population per year in the United Kingdom. The incidence in females ranges from 1.2 per 100,000 population per year in the United States and 15.4 per 100,000 population per year in the United Kingdom.[2] In Indonesia, there is no significant data on the prevalence of neonatal spontaneous pneumothorax. A study in Sumatera Selatan showed that in four years, there were 37 cases of 1859 patients in Dr. Mohammad Hoesin Central Hospital.[3] It is supposed to be a rare case in East Nusa Tenggara. Pneumothorax is more common in ventilated neonates. Mortality rates have varied from 20% to 38%. Predisposing factors

From Siloam Hospital[1] and Faculty of Medicine and Veterinary Medicine[2], Universitas Nusa Cendana, Kota Kupang, Nusa Tenggara Timur, Indonesia.

Corresponding author: Elisabeth E. Patty. Siloam Hospital. Jl. R. W. Monginsidi, Fatululi, Kec. Oebobo, Kota Kupang, Nusa Tenggara Timur, Indonesia. Email: elizabeth.erna@ymail.com.

Submitted January 10, 2023. Accepted July 18, 2025.

identified are male sex, low birth weight neonates, prematurity, neonate born by cesarean section, the presence of respiratory distress syndrome, and meconium aspiration requiring resuscitation after birth.[4]

The case

A full-term male neonate was delivered by a multigravida mother with a bad obstetric history at 37 weeks of gestation through emergency cesarean section due to anhydramnion. A history of leaking amniotic fluid was denied. The baby was born with an APGAR score of 7/9 and 2750 grams of birth weight. After the routine care, the baby is still difficult to breathe, has retraction, and tachypnea up to 87 breaths per minute, and is admitted to NICU for CPAP with 7cmH_2O of PEEP and 21% of oxygen fraction. The blood test shows good results, without leukocytosis or thrombocytopenia. An urgent chest X-ray was done, which revealed a right-sided pneumothorax but without displacing mediastinal structures (**Figure 1**). Suddenly, the baby turns to gasp with bradycardia of 90-100 beats per minute.

The baby was diagnosed with pneumothorax at 3rd hour of life. A chest tube was inserted in the right 4th intercostal space (ICS) anterior axillary line as soon as the clinical indication was evident such as the presence of respiratory distress. A chest X-ray was repeated afterward to verify the position was correct and show the resolving pneumothorax (**Figure 2**). There were no complications such as bleeding and infection. Cardiorespiratory and neurologic status have been monitored before, during, and after the procedure.

Intravenous antibiotics, ampicillin and gentamicin, were started to be given. Chest drainage

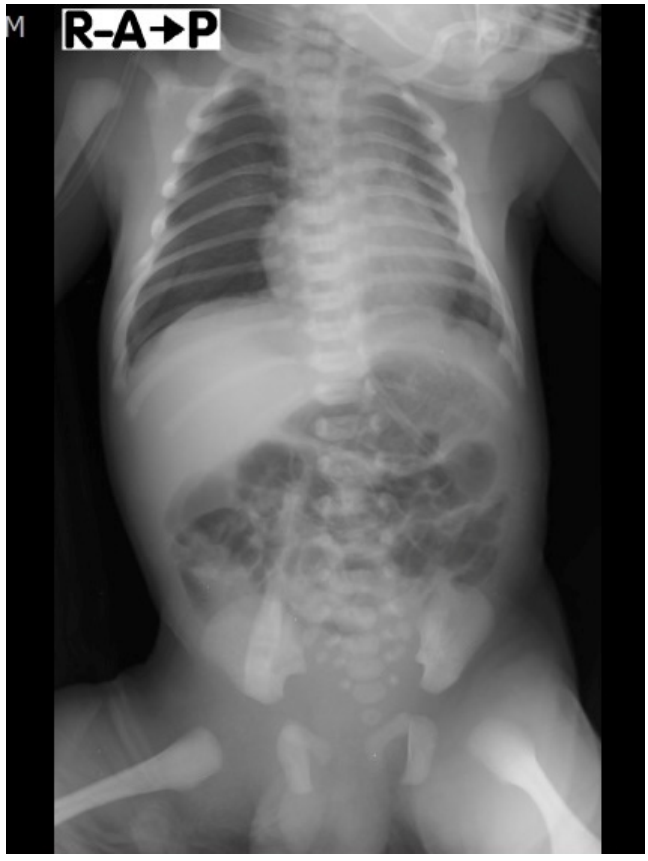

Figure 1. Right-sided pneumothorax without mediastinal shift

was maintained until 16 hours of life and then removed after the clinical condition improved and there were no air bubbles in the water-sealed bottle. There was no worsening of breath. FiO_2 requirement and Silverman score significantly decreased. Respiratory distress began to subside significantly. Feeding was gradually increased without complications, and the baby was kept on full feed. As the respiratory distress settled and FiO_2 requirement decreased, the baby was weaned to breathe on room air on the 2nd day of life. The baby was successfully discharged on 6th day after the onset of pneumothorax, with stable vitals signs and normal respiratory pattern.

Discussion

Premature newborns are more often to have pneumothorax than term newborns. It may develop in term newborns without pulmonary pathology or positive pressure ventilation, and this is most probably due to high transpulmonary pressure generated with the onset of breathing.[5] At first inspiratory breath, the newborn creates a transpulmonary pressure greater than 100 cm of the water column and opens the lungs that were closed in utero. This pressure normalizes after a few breaths and the lungs begin to function. Accumulation of air between the visceral and parietal pleura can happen if the transpulmonary pressure remains elevated for a long time and may result in the rupture of alveoli. The air created in the intrapleural space leads to a pathological condition called neonatal pneumothorax.[6]

This case described a term neonate male with spontaneous pneumothorax; this can occur through a wide variety of mechanisms including traumatic disruption of the barriers between tissues and air, generation by infectious sources, or spontaneously through alveolar disruption.[5] The maternal risk factor of this case was anhydramnion with a bad obstetric history. According to a meta-analysis journal of *The American Journal of Obstetrics & Gynecology* in 2020, there was an impact of oligohydramnios on pregnancy outcomes, which can increase the risk of developing respiratory distress syndrome.[7] Predisposing factors, in this case, were sex, neonate born by cesarean section, and the presence of respiratory distress syndrome.[1,4]

Respiratory distress syndrome is the most common cause of pneumothorax. The baby's lungs lack the slippery substance called surfactant that helps the alveolar to stay open (inflated), so the tiny air sacs are not able to expand easily. If the baby needs a mechanical ventilator, extra pressure on the baby's lungs from the machine can sometimes burst the air

Figure 2. Chest X-ray evaluation after chest drainage showed a resolved pneumothorax

sacs. Another cause of pneumothorax in newborns is meconium aspiration syndrome. Meconium passage normally occurs within the first 24 to 48 hours after birth. Hypoxic conditions and acidosis intrauterine before or during birth can stimulate meconium passage, and the baby may inhale the meconium. This may obstruct the airways and cause breathing problems. Pneumonia (infection of the lung) or underdeveloped lung tissue can also cause pneumothorax. A healthy infant can develop an air leak when they take the first few breaths after birth, less commonly. This occurs because of the pressure needed to expand the lungs for the first time. There may be genetic factors that contribute to this problem.[8]

Neonates with pneumothorax, if asymptomatic, were observed conservatively. For neonates with mild symptoms, good general condition, and small pneumothorax, conservative treatment was adopted, including proper sedation, oxygen inhalation, and anti-infection therapy. The chest tube insertion was performed by the pediatricians as soon as the clinical indication presence such as respiratory distress, abnormal blood gas levels, and cardiovascular instability. Definitive management was evident, including expectant therapy, thoracentesis, or chest drainage.[9,10] In this case, early recognition and prompt treatment of pneumothorax were key to good outcomes.

Conflict of interests

None declared.

Acknowledgements

We would like to thank anyone who contributed to and supported this case.

Funding acknowledgements

The authors received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

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