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(CASE REPORT)

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Pneumothorax in a preterm neonate after cesarean-section deliver in a regional hospital setting: A Case report

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Abstract

Neonatal pneumothorax is a rare but critical condition, particularly in preterm infants, with significant morbidity and mortality risks. This case report describes a female neonate delivered at 32+4 weeks of gestation, weighing 1,120 grams, who presented with severe respiratory distress shortly after birth. Chest radiography revealed a right-sided pneumothorax, and the patient was managed with CPAP, intravenous antibiotics, and supportive care. Despite initial stabilization, the patient's condition worsened, prompting referral to a higher-grade hospital.

This report underscores the importance of early recognition and intervention for neonatal pneumothorax. Clinical signs such as tachypnea, chest retractions, and cyanosis require immediate investigation and treatment. Diagnosis is typically confirmed via chest X-ray, and treatment ranges from non-invasive methods like CPAP to invasive interventions such as needle aspiration or chest tube placement. In this case, non-invasive management with CPAP was initially effective but required escalation due to the patient's clinical deterioration.

The findings highlight the need for healthcare providers to remain vigilant for pneumothorax in at-risk neonates, particularly those requiring respiratory support. Timely intervention tailored to the patient's stability can significantly improve outcomes and reduce the need for invasive procedures. This case emphasizes the importance of prompt diagnosis, appropriate management strategies, and continuous monitoring in managing neonatal pneumothorax.

Keywords: Neonatal pneumothorax; Preterm infant; CPAP; Respiratory distress; Early intervention

1. Introduction

Pneumothorax poses a significant challenge in neonatal care, especially in premature infants, requiring immediate intervention to reduce related illness and death[1]. A pneumothorax is an unusual accumulation of air in the pleural space between the lung and the chest wall[2]. Pneumothorax is more commonly seen in neonates (1 – 2%) compared to older children (1.2 – 28 per 100,000)[3]. The incidence can rise to as high as 30% in patients with underlying lung conditions or those needing mechanical ventilation[3]. Spontaneous neonatal pneumothorax occurs twice as often in male neonates compared to female neonates[4]. This condition can also arise as a complication and is associated with high morbidity and mortality due to hypoxemia, hypercapnia, or impaired venous return [5]. An early preterm infant born at 32+4 weeks of gestation was admitted to the Neonatal Intensive Care Unit (NICU) due to suspected respiratory distress. A babygram revealed a right-sided pneumothorax, and she was placed on mechanical Continuous Positive Airway Pressure (CPAP) due to worsening respiratory distress. She was referred to a higher-grade hospital due to unstable vital signs and an abnormal breathing pattern at nine hours old. In term neonates, the treatment of pneumothorax involves the use of higher oxygen concentrations or nitrogen washout for rapid resolution, as well as thoracentesis or chest tube

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insertion[6,7]. The discussion highlights the importance of early recognition and intervention, stressing the need to be aware of clinical indicators and risk factors.

Objective

This case report provide information regarding the risk factors, symptoms, treatment, and outcomes of a newborn presenting with neonatal pneumothorax which is known as a rare case.

2. Case Report

A female newborn, delivered via cesarean section at 32+4 weeks of gestation with a birth weight of 1,120 grams, was born to a 24-year-old first-time mother who had gestational edema-proteinuria-hypertension (GEPH). The infant's Apgar scores were 6, 7, and 8 at 1, 5, and 10 minutes, respectively. Due to severe respiratory distress occurring 15 minutes post-birth, she was admitted to the neonatal intensive care unit (NICU). The mother had a history of uncontrolled hypertension and infrequent prenatal care, with vital signs showing blood pressure at 160/110 mmHg, pulse rate at 62/min, respiration rate at 20/min, and body temperature at 36.7 °C. The newborn exhibited tachypnea, grimacing, and deep intercostal retractions, prompting hospitalization in the perinatal room after the cesarean section. Respiratory distress was noted after one hour, and a chest X-ray revealed a right-side pneumothorax. Laboratory results showed Hb 17.4 g/dL, WBC 14.02 x 10^3/uL, Hematocrit 58.5%, Platelet count 205,000/uL, and random blood glucose 91 mg/dL. Therefore, a diagnosis of neonatal pneumothorax was established. The patient was managed with an IV line administering D10% at 3 cc/hour, and intravenous antibiotics including ampicillin 600 mg every 12 hours and gentamicin 6 mg every 24 hours. The CPAP setting was FiO2 30%, PEP 6, and Flow 7. Unfortunately, the newborn's conditions worsened, and our pediatric specialists decided to refer the patient due to the worsening pneumothorax.

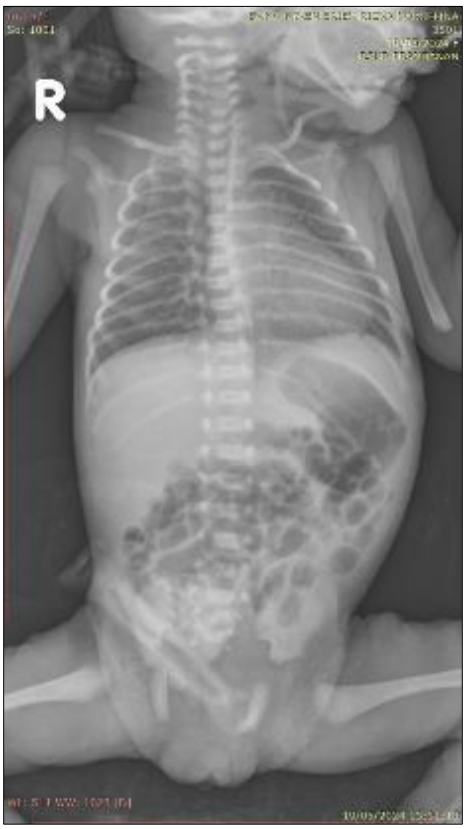

Figure 1 A Babygram which suspected of pneumothorax dextra

3. Discussion

Pneumothorax in neonates, especially those born prematurely, poses a significant challenge due to its high morbidity and mortality rates[8]. Furthermore, pneumothorax leads to a 5.27-fold increase in mortality (95% CI = 1.96–14.17) and a 4.28-fold increase in the incidence of bronchopulmonary dysplasia (BPD) in survivors[9,3]. The incidence of pneumothorax in neonates varies, with higher rates observed in those receiving mechanical ventilation or CPAP support[7]. As a result, neonatologists are particularly concerned with diagnosing and treating pneumothorax[5].

This case involves a preterm female neonate with Spontaneous Pneumothorax, which can occur due to various mechanisms, including traumatic disruption of tissue barriers, infection, or spontaneous alveolar rupture[10]. Spontaneous neonatal pneumothorax presents shortly after birth in 1% to 2% of all infants[11]. Clinical signs and symptoms such as worsening tachypnea, chest retractions, nasal flaring, grunting, and cyanosis are critical indicators that necessitate immediate investigation[2]. These symptoms usually improve with bed rest, oxygen therapy, or a simple thoracic tube, although recurrence rates range between 50% and 100%[12].

High transpulmonary pressures may cause lung rupture, particularly if there is bronchial obstruction due to the aspiration of blood, meconium, or mucus[2]. A transpulmonary pressure of 60 cmH2O can rupture an adult lung, whereas a pressure of 45 cmH2O can rupture a neonatal rabbit lung[13]. Pneumothorax most commonly occurs within the first three days of life, likely due to the high transpulmonary pressures associated with the onset of breathing[14].

Risk factors for neonatal pneumothorax include respiratory distress syndrome (RDS), meconium aspiration syndrome, pneumonia, and transient tachypnea of the newborn[2]. In our case, the newborm developed spontaneous pneumothorax with underlying lung pathology, specifically bronchopneumonia in both the right and left lungs.

To diagnose pneumothorax, a thorough examination of the thorax is essential. Typically, the chest appears expanded, and respiratory motion is diminished. Breath sounds are reduced, though this can be difficult to discern since sound from a normal lung can easily be transmitted to the affected side in a small neonatal thorax[11] .

This case also emphasizes the crucial role of chest radiography in the timely diagnosis of pneumothorax, which allowed for the immediate initiation of appropriate treatment. Traditionally, thoracentesis for pneumothorax is performed in the second intercostal space at the midclavicular line or the fourth to fifth intercostal space at the midaxillary line, with the needle pointed toward the opposite shoulder[15]. A repeat chest radiograph is typically obtained after the procedure. However, this procedure is not without risks and complications.

In our case, we used CPAP instead of chest tube placement or a venous catheter connected to an underwater seal (UWSD) because the patient was hemodynamically stable and only required mechanical ventilation[16]. This method offers a less invasive option that can effectively manage air leaks and support respiratory function. Meanwhile, UWSD proved to be a quick and efficient bedside procedure, resulting in significant improvement in the patient's respiratory status and avoiding the need for a more invasive chest tube insertion[5]. The success of this approach is consistent with findings from recent trials, which suggest that needle aspiration can reduce hospital stay and decrease surgery-related complications[2]. Systematic reviews have shown no significant differences between needle aspiration and chest tube placement in terms of safety and immediate success rates[17]. However, needle aspiration is associated with less pain and a shorter hospital stay compared to chest tube thoracotomy.

The high mortality associated with untreated or delayed treatment of pneumothorax, particularly in preterm infants, underscores the importance of early diagnosis and intervention.

4. Conclusion

Although neonatal pneumothorax is relatively rare, it is crucial for all birth attendants to be aware of the condition. Prompt emergency treatment, such as chest tube insertion, is essential to reduce the severity of pneumothorax. Continuous monitoring is necessary until the infant fully recovers.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of ethical approval

This case report was conducted in accordance with the ethical standards of Prambanan Regional Public Hospital in 2024 and the Helsinki Declaration of 1964, as amended. Informed consent was obtained from the patient's parents for the publication of this report and associated images. The patient's identity and personal information have been anonymized to ensure confidentiality.

Statement of informed consent

Written informed consent was obtained from the patient's parents for the publication of this case report and any accompanying images. Every effort has been made to ensure anonymity, and no identifying information has been included in this report.

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